



# **RADIO TEST REPORT**

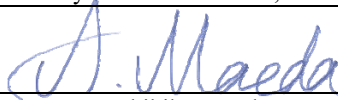
**Test Report No. : 12890237H-B-R2**

**Applicant** : Sony Corporation  
**Type of Equipment** : UHF SYNTHESIZED TRANSMITTER  
**Model No.** : UTX-P40  
**FCC ID** : AK8UTXP40  
**Test regulation** : FCC Part 74: 2018  
**Test Result** : Complied (Refer to SECTION 3.2)

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 above regulation.
4. The test results in this report are traceable to the national or international standards.
5. This test report covers Radio technical requirements. It does not cover administrative issues such as Manual or non-Radio test related Requirements. (if applicable)
6. The all test items in this test report are conducted by UL Japan, Inc. Ise EMC Lab.
7. This test report must not be used by the customer to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.
8. The information provided from the customer for this report is identified in SECTION 1.
9. This report is a revised version of 12890237H-B-R1. 12890237H-B-R1 is replaced with this report.

**Date of test:** July 18 to November 6, 2019

**Representative test engineer:**

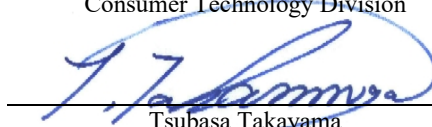


Akihiko Maeda

Engineer

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Tsubasa Takayama

Leader

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This laboratory is accredited by the NVLAP LAB CODE 200572-0, U.S.A. The tests reported herein have been performed in accordance with its terms of accreditation.

\*As for the range of Accreditation in NVLAP, you may refer to the WEB address,  
[http://japan.ul.com/resources/emc\\_accredited/](http://japan.ul.com/resources/emc_accredited/)

☐ 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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Report Cover Page - 13-EM-F0429 Issue # 15.0

## REVISION HISTORY

### Original Test Report No.: 12890237H-B

| Revision        | Test report No. | Date               | Page revised | Contents                                                                                                                     |
|-----------------|-----------------|--------------------|--------------|------------------------------------------------------------------------------------------------------------------------------|
| -<br>(Original) | 12890237H-B     | September 27, 2019 | -            | -                                                                                                                            |
| 1               | 12890237H-B-R1  | November 5, 2019   | P 7          | Addition of Worst margin for Field strength of spurious radiation test.                                                      |
| 1               | 12890237H-B-R1  | November 5, 2019   | P 12, 13     | Addition to explanatory note *1), *2), *3)                                                                                   |
| 1               | 12890237H-B-R1  | November 5, 2019   | P 21, 23     | Correction of high channel frequency on chart in conducted emission data;<br>From 608.875 MHz to 607.875 MHz                 |
| 1               | 12890237H-B-R1  | November 5, 2019   | P 39         | Correction of bandwidth of 941.625 MHz (40 mW) in Occupied Bandwidth data;<br>From 78.7558 kHz to 78.7578 kHz                |
| 1               | 12890237H-B-R1  | November 5, 2019   | P 42         | Correction of frequency of 607.875 MHz (40 mW) in Spurious emissions at antenna terminals data;<br>From 3121 kHz to 3131 kHz |
| 1               | 12890237H-B-R1  | November 5, 2019   | P 60         | Replacement of chart in Necessary bandwidth data                                                                             |
| 2               | 12890237H-B-R2  | November 12, 2019  | P 11         | Addition of 954.625 MHz (Mid2) for RF power output in Clause 4.1 (The details of Operating mode(s))                          |
| 2               | 12890237H-B-R2  | November 12, 2019  | P 13         | Addition of 954.625 MHz(Mid2) of explanatory note *3) in Configuration and peripherals for antenna terminal conducted tests  |
| 2               | 12890237H-B-R2  | November 12, 2019  | P 29         | Addition of data of 954.625 MHz                                                                                              |
| 2               | 12890237H-B-R2  | November 12, 2019  | P70, 71      | Addition of Plot data in APPENDIX 1: Field strength of spurious radiation test                                               |
| 2               | 12890237H-B-R2  | November 12, 2019  | P 74         | Addition of LIMS ID: 141809 and 141830 in APPENDIX 2: Test instruments                                                       |

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## 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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| <b>CONTENTS</b>                                                     | <b>PAGE</b> |
|---------------------------------------------------------------------|-------------|
| <b>SECTION 1: Customer information.....</b>                         | <b>5</b>    |
| <b>SECTION 2: Equipment under test (E.U.T.).....</b>                | <b>5</b>    |
| <b>SECTION 3: Test specification, procedures &amp; results.....</b> | <b>7</b>    |
| <b>SECTION 4: Operation of E.U.T. during testing.....</b>           | <b>10</b>   |
| <b>SECTION 5: Conducted Emission.....</b>                           | <b>14</b>   |
| <b>SECTION 6: Field strength of spurious radiation .....</b>        | <b>15</b>   |
| <b>SECTION 7: Modulation Characteristics .....</b>                  | <b>17</b>   |
| <b>SECTION 8: Antenna terminal tests .....</b>                      | <b>18</b>   |
| <b>SECTION 9: Necessary bandwidth .....</b>                         | <b>19</b>   |
| <b>APPENDIX 1: Data of EMI test.....</b>                            | <b>20</b>   |
| Conducted Emission .....                                            | 20          |
| RF Output Power .....                                               | 28          |
| Modulation Characteristics .....                                    | 30          |
| Occupied Bandwidth.....                                             | 36          |
| Spurious emissions at antenna terminals.....                        | 42          |
| Necessary bandwidth .....                                           | 60          |
| Field strength of spurious radiation.....                           | 64          |
| Frequency stability .....                                           | 72          |
| <b>APPENDIX 2: Test instruments .....</b>                           | <b>74</b>   |
| <b>APPENDIX 3: Photographs of test setup .....</b>                  | <b>76</b>   |
| Conducted Emission .....                                            | 76          |
| Radiated Spurious Emission .....                                    | 77          |
| Worst Case Position .....                                           | 78          |

## **SECTION 1: Customer information**

|                  |   |                                                    |
|------------------|---|----------------------------------------------------|
| Company Name     | : | Sony Global Manufacturing & Operations Corporation |
| Address          | : | 8-4, Shiomi, Kisarazu-shi, Chiba, 292-0834 Japan   |
| Telephone Number | : | +81-438-37-4704                                    |
| Contact Person   | : | Youhei Hisano                                      |

### **\*Remarks**

Sony Global Manufacturing & Operations Corporation (Subsidiary Company Name) is on behalf of the applicant: Sony Corporation.

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                                      | : | UHF SYNTHESIZED TRANSMITTER                                                                |
| Model No.                                              | : | UTX-P40                                                                                    |
| Serial No.                                             | : | Refer to Section 4, Clause 4.2                                                             |
| Rating                                                 | : | DC 3.0 V (Battery), DC 5.0V (USB)                                                          |
| Receipt Date of Sample<br>(Information from test lab.) | : | July 10, 2019                                                                              |
| Country of Mass-production                             | : | Korea                                                                                      |
| Condition of EUT                                       | : | Engineering prototype<br>(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: UTX-P40 (referred to as the EUT in this report) is a UHF SYNTHESIZED TRANSMITTER.

### **General Specification**

|                                    |   |                       |
|------------------------------------|---|-----------------------|
| Clock frequency(ies) in the system | : | DSP: 12MHz (SPXO)     |
| Operating temperature              | : | 0 deg. C to 50 deg. C |

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## **Radio Specification**

### **[Radio microphone part] \*1)**

Radio type : Transmitter  
Modulation type : Frequency modulation  
Emission designator : 116KF3E  
Necessary bandwidth : 116 kHz = 2M + 2D  
where M: Maximum modulation frequency = 18 kHz  
D: Peak deviation = 40 kHz  
Channel spacing : 125 kHz  
Frequency of operation : UTX-P40 (UC14) : 470.125 MHz - 541.875 MHz  
UTX-P40 (UC25) : 536.125 MHz - 607.875 MHz  
UTX-P40 (U90) : 941.625 MHz - 951.875 MHz,  
953.000 MHz - 956.125 MHz,  
956.625 MHz - 959.625 MHz  
Clock frequency(ies) : PLL: 26 MHz (TCXO)  
RF power : High: 40 mW, Low: 5 mW  
Antenna type : 1/4 Lambda Monopole antenna (integral type)  
Antenna gain : 1.5 dBi  
Power Supply (radio part input) : DC 3.0 V, DC 5.3 V  
AF Specification : 40 Hz - 18000 Hz, Maximum input: -24 dBV (MIC level, ATT 0 dB)

### **[NFC part]**

Radio Type : Transceiver  
Modulation type : ASK (amplitude-shift keying)  
Frequency of Operation : 13.56 MHz  
Method of frequency generation : Crystal unit (SPXO)  
Antenna Type : Loop Antenna  
Antenna Gain : -72.44 dBi

\*1) This test report applies to Radio microphone part.

## SECTION 3: Test specification, procedures & results

### 3.1 Test Specification

Test Specification : FCC Part 74: 2018

Title : FCC 47CFR Part74  
EXPERIMENTAL RADIO, AUXILIARY, SPECIAL BROADCAST AND OTHER  
PROGRAM DISTRIBUTIONAL SERVICES

\* Also the EUT complies with FCC Part 15 Subpart B.

### 3.2 Procedures and results

| Item                                    | Test Procedure                                       | Specification                                                    | Worst margin                                                        | Results        | Remarks   |
|-----------------------------------------|------------------------------------------------------|------------------------------------------------------------------|---------------------------------------------------------------------|----------------|-----------|
| Conducted Emission                      | FCC: ANSI C63.10-2013<br>6. Standard test methods    | FCC: Section 15.207                                              | 10.44 dB<br>0.71697 MHz, AV, N                                      | Complied<br>a) | -         |
|                                         | ISED: RSS-Gen 8.8                                    | ISED: RSS-Gen 8.8                                                |                                                                     |                |           |
| RF power output                         | FCC: Section 2.1046                                  | FCC: Section 74.861 (e) (1) / (d) (1)                            | See data.                                                           | Complied<br>b) | Conducted |
|                                         | ISED: RSS-Gen Section 6.12<br>RSS-210 A1 Section 5.1 | ISED: RSS-210 G 3.1                                              |                                                                     |                |           |
| Modulation Characteristics              | FCC: Section 2.1047                                  | FCC: Section 74.861 (e) (3)                                      | See data.                                                           | Complied<br>c) | Conducted |
|                                         | ISED: RSS-210 A1<br>Section 5.3                      | ISED: RSS-210 G 3.5                                              |                                                                     |                |           |
| Occupied Bandwidth                      | FCC: Section 2.1049                                  | FCC: Section 74.861 (e) (5)                                      | See data.                                                           | Complied<br>d) | Conducted |
|                                         | ISED: RSS-Gen Section 6.6                            | ISED: RSS-210 G 3.2                                              |                                                                     |                |           |
| Spurious emissions at antenna terminals | EN 300 422-1 V 1.4.2<br>Clause 8.4                   | FCC: Section 74.861 (e) (6)                                      | See data.                                                           | Complied<br>e) | Conducted |
|                                         |                                                      | ISED: RSS-210 G 3.4                                              |                                                                     |                |           |
| Necessary bandwidth                     | EN 300 422-1 V 1.4.2<br>Clause 8.3                   | FCC: Section 74.861 (e) (7) / (d) (4)                            | See data.                                                           | Complied<br>f) | Conducted |
|                                         |                                                      | ISED: RSS-210 G 3.4                                              |                                                                     |                |           |
| Field strength of spurious radiation    | EN 300 422-1 V 1.4.2<br>Clause 8.4                   | KDB 206256 D1<br>Section III (c), (e) (2)<br>ISED: RSS-210 G 3.4 | 9.9 dB<br>3647.25 MHz,<br>Horizontal/<br>4753.13 MHz,<br>Horizontal | Complied<br>g) | Radiated  |
| Frequency stability                     | FCC: Section 2.1055                                  | FCC: Section 74.861 (e) (4)                                      | See data.                                                           | Complied<br>h) | Conducted |
|                                         | ISED: RSS-Gen Section 6.11                           | ISED: RSS-210 G 3.3                                              |                                                                     |                |           |

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

This EUT does not have receiving part. Therefore Receiver Spurious Emission test was not performed.

- a) Refer to APPENDIX 1 (data of Conducted Emission)
- b) Refer to APPENDIX 1 (data of RF power output)
- c) Refer to APPENDIX 1 (data of Modulation Characteristics)
- d) Refer to APPENDIX 1 (data of Occupied Bandwidth)
- e) Refer to APPENDIX 1 (data of Spurious emissions at antenna terminals)
- f) Refer to APPENDIX 1 (data of Necessary bandwidth)
- g) Refer to APPENDIX 1 (data of Field strength of spurious radiation)
- h) Refer to APPENDIX 1 (data of Frequency stability)

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.

\* In case any questions arise about test procedure, KDB 206256 D01 Wireless Microphones v02 and ANSI C63.26: 2015 are also referred.

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### **Supplied Voltage Information**

The test was performed with the New Battery and the stable voltage was supplied to the EUT during the tests.

### **Antenna Information**

The antenna is not removable from the EUT.

### **3.3 Addition to standard**

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  $k = 2$ .

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#### **Conducted emission**

| using Item | Frequency range       | Uncertainty (+/-) |
|------------|-----------------------|-------------------|
| AMN (LISN) | 0.009 MHz to 0.15 MHz | 3.8 dB            |
|            | 0.15 MHz to 30 MHz    | 3.4 dB            |

| Spurious Emission (EUT height: 1.5m) | dB  |
|--------------------------------------|-----|
| Mesurment Distance 3m                |     |
| • 25 MHz - 200 MHz                   | 5.6 |
| • 200 MHz - 1000 MHz                 | 4.0 |
| • 1 GHz - 12.75 GHz                  | 4.6 |

| Antenna terminal test                   | Uncertainty (+/-) |
|-----------------------------------------|-------------------|
| RF output power                         | 1.3 dB            |
| Occupied bandwidth                      |                   |
| Span 1 MHz                              | 0.96%             |
| Emission mask                           | 1.9 dB            |
| Frequency stability                     | 0.0154 ppm        |
| Spurious emissions at antenna terminals | 2.3 dB            |

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### 3.5 Test Location

UL Japan, Inc. Ise EMC Lab.

\*NVLAP Lab. code: 200572-0 / FCC Test Firm Registration Number: 199967 / ISSED Lab Company Number: 2973C

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| 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.11 measurement room     | 6.2 x 4.7 x 3.0            | 4.8 x 4.6                                                        | -                      | -                            |

\* Size of vertical conducting plane (for Conducted Emission test) : 2.0 x 2.0 m for No.1, No.2, No.3, and No.4 semi-anechoic chambers and No.3 and No.4 shielded rooms.

### 3.6 Data of Radio, Test instruments, and Test set up

Refer to APPENDIX.

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

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

| <b>Mode</b>                                                                                                                                                                                                                                                                                                                                                                 | <b>Remarks</b> |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|
| Transmitting (Tx), Power setting: 5 mW                                                                                                                                                                                                                                                                                                                                      | Typ. 5 mW      |
| Transmitting (Tx), Power setting: 40 mW                                                                                                                                                                                                                                                                                                                                     | Typ. 40 mW     |
| *Transmitting duty was 100 % on all tests.                                                                                                                                                                                                                                                                                                                                  |                |
| *Power of the EUT was set by the software as follows;<br>Power settings: Low (5 mW), High (40 mW)<br>Software: T.107<br>*This setting of software is the worst case.<br>Any conditions under the normal use do not exceed the condition of setting.<br>In addition, end users cannot change the settings of the output power of the product without 5 mW or 40 mW settings. |                |

\*The details of Operating mode(s)

| Test Item                               | Tested frequency |           | Power setting  | Modulation                       | Remarks |
|-----------------------------------------|------------------|-----------|----------------|----------------------------------|---------|
| Conducted emission                      | 470.125 MHz      | (Low) *4) | 5 mW,<br>40 mW | None<br>(No modulation)          | -       |
|                                         | 941.625 MHz      | (Low) *4) | 5 mW,<br>40 mW |                                  |         |
| Modulation Characteristics              | 539.000 MHz      | (Mid)     | 5 mW,<br>40 mW | See data.                        | *1)     |
|                                         | 950.625 MHz      | (Mid1)    | 5 mW,<br>40 mW |                                  |         |
| RF power output                         | 470.125 MHz      | (Low)     | 5 mW,<br>40 mW | None<br>(No modulation)          | -       |
|                                         | 539.000 MHz      | (Mid)     |                |                                  |         |
|                                         | 607.875 MHz      | (High)    |                |                                  |         |
|                                         | 941.625 MHz      | (Low)     | 5 mW,<br>40 mW |                                  |         |
|                                         | 950.625 MHz      | (Mid1)    |                |                                  |         |
|                                         | 954.625 MHz      | (Mid2)    |                |                                  |         |
| 959.625 MHz                             | (High)           |           |                |                                  |         |
| Occupied Bandwidth                      | 470.125 MHz      | (Low)     | 5 mW,<br>40 mW | -19.7 dBV, 2500 Hz,<br>Sine wave | *2)     |
|                                         | 539.000 MHz      | (Mid)     |                |                                  |         |
|                                         | 607.875 MHz      | (High)    |                |                                  |         |
|                                         | 941.625 MHz      | (Low)     | 5 mW,<br>40 mW |                                  |         |
|                                         | 950.625 MHz      | (Mid1)    |                |                                  |         |
|                                         | 959.625 MHz      | (High)    |                |                                  |         |
| Spurious emissions at antenna terminals | 470.125 MHz      | (Low)     | 5 mW,<br>40 mW | -19.7 dBV, 2500 Hz,<br>Sine wave | *2)     |
|                                         | 539.000 MHz      | (Mid)     |                |                                  |         |
|                                         | 607.875 MHz      | (High)    |                |                                  |         |
| Necessary bandwidth                     | 470.125 MHz      | (Low)     | 5 mW,<br>40 mW | See SECTION 9                    | -       |
|                                         | 539.000 MHz      | (Mid)     |                |                                  |         |
|                                         | 607.875 MHz      | (High)    |                |                                  |         |
|                                         | 941.625 MHz      | (Low)     | 5 mW,<br>40 mW |                                  |         |
|                                         | 950.625 MHz      | (Mid1)    |                |                                  |         |
|                                         | 959.625 MHz      | (High)    |                |                                  |         |
| Field strength of spurious radiation    | 470.125 MHz      | (Low)     | 40 mW          | None<br>(No modulation)          | -       |
|                                         | 539.000 MHz      | (Mid)     |                |                                  |         |
|                                         | 607.875 MHz      | (High)    |                |                                  |         |
|                                         | 941.625 MHz      | (Low)     | 40 mW          |                                  |         |
|                                         | 950.625 MHz      | (Mid1)    |                |                                  |         |
|                                         | 959.625 MHz      | (High)    |                |                                  |         |
| Frequency stability                     | 539.000 MHz      | (Mid)     | 40 mW          | None<br>(No modulation)          | *3)     |
|                                         | 950.625 MHz      | (Mid1)    | 40 mW          |                                  |         |

\*The isolator of RF filter circuit is consisted of passive component. It does not contain non-linear component.

Therefore the test was performed on lowest, near middle and highest frequency that was chosen from available frequency band.

\*1) There is no difference in audio part on each channel. Therefore the test was performed on Mid channel as a representative.

\*2) When modulated by a 2500 Hz tone at an input level 16 dB greater than that necessary to produce 50 percent modulation.

\*3) There is no difference in frequency generating method on each frequency. Therefore the test was performed on Mid channel as a representative.

\*4) The mode was tested as a representative, because it had the highest power at antenna terminal test.

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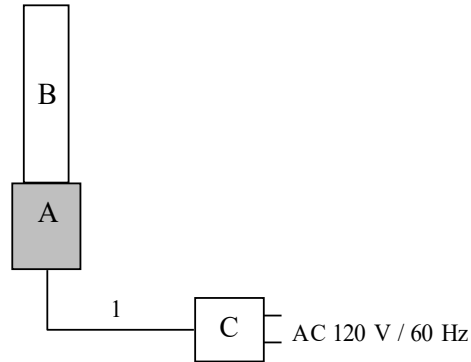
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## 4.2 Configuration and peripherals

### For Conducted emission test



↑  
\* Conducted Emission test was performed on this port.

\* Cabling and setup(s) were taken into consideration and test data was taken under worse case conditions.

### Description of EUT and support equipment

| No. | Item                        | Model number | Serial number                                            | Manufacturer     | Remarks |
|-----|-----------------------------|--------------|----------------------------------------------------------|------------------|---------|
| A   | UHF SYNTHESIZED TRANSMITTER | UTX-P40      | No.001(UC14) *1)<br>No.001(UC25) *2)<br>No.001(UC90) *3) | Sony Corporation | EUT     |
| B   | Microphone (Mic)            | F-112        | 14282                                                    | Sony Corporation | -       |
| C   | AC Adapter                  | CP-AD2       | 5385990                                                  | Sony Corporation | -       |

\*1) For tested frequency 470.125 MHz(Low), 539.000 MHz(Mid)

\*2) For tested frequency 607.875 MHz(High)

\*3) For tested frequency 941.625 MHz(Low), 950.625 MHz(Mid1), 959.625 MHz (High)

### List of cables used

| No. | Name      | Length (m) | Shield   |           | Remarks |
|-----|-----------|------------|----------|-----------|---------|
|     |           |            | Cable    | Connector |         |
| 1   | USB Cable | 1.0        | Shielded | Shielded  | -       |

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**For Field strength of spurious radiation test**



- \* Cabling and setup(s) were taken into consideration and test data was taken under worse case conditions.  
\* This EUT has two patterns of power supply, USB supply and Battery supply. The test was conducted on the EUT with USB supply had the worst level of spurious.

**Description of EUT and Support equipment**

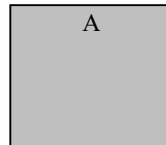
| No. | Item                        | Model number | Serial number                                            | Manufacturer     | Remarks |
|-----|-----------------------------|--------------|----------------------------------------------------------|------------------|---------|
| A   | UHF SYNTHESIZED TRANSMITTER | UTX-P40      | No.001(UC14) *1)<br>No.001(UC25) *2)<br>No.001(UC90) *3) | Sony Corporation | EUT     |
| B   | Microphone (Mic)            | F-112        | 14282                                                    | Sony Corporation | -       |

\*1) For tested frequency 470.125 MHz(Low), 539.000 MHz(Mid)

\*2) For tested frequency 607.875 MHz(High)

\*3) For tested frequency 941.625 MHz(Low), 950.625 MHz(Mid1), 959.625 MHz (High)

**For Antenna terminal conducted tests**



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

**Description of EUT**

| No. | Item                        | Model number | Serial number                                            | Manufacturer     | Remark |
|-----|-----------------------------|--------------|----------------------------------------------------------|------------------|--------|
| A   | UHF SYNTHESIZED TRANSMITTER | UTX-P40      | No.001(UC14) *1)<br>No.001(UC25) *2)<br>No.001(UC90) *3) | Sony Corporation | EUT    |

\*1) For tested frequency 470.125 MHz(Low), 539.000 MHz(Mid)

\*2) For tested frequency 607.875 MHz(High)

\*3) For tested frequency 941.625 MHz(Low), 950.625 MHz(Mid1), 954.625 MHz(Mid2), 959.625 MHz (High)

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## **SECTION 5: Conducted Emission**

### **Test Procedure and conditions**

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 rear of tabletop was located 40 cm to the vertical conducting plane. The rear of EUT, including peripherals aligned and flushed with rear of tabletop. All other surfaces of tabletop were at least 80 cm from any other grounded conducting surface. EUT was located 80 cm from a Line Impedance Stabilization Network (LISN) / Artificial mains Network (AMN) and excess AC cable was bundled in center.

#### **1) For the tests on EUT with other peripherals (as a whole system)**

I/O cables that were connected to the peripherals were bundled in center. They were folded back and forth forming a bundle 30 cm to 40 cm long and were hanged at a 40 cm height to the ground plane. All unused 50 ohm connectors of the LISN (AMN) were resistivity terminated in 50 ohm when not connected to the measuring equipment.

The AC Mains Terminal Continuous disturbance Voltage has been measured with the EUT in a Semi Anechoic Chamber.

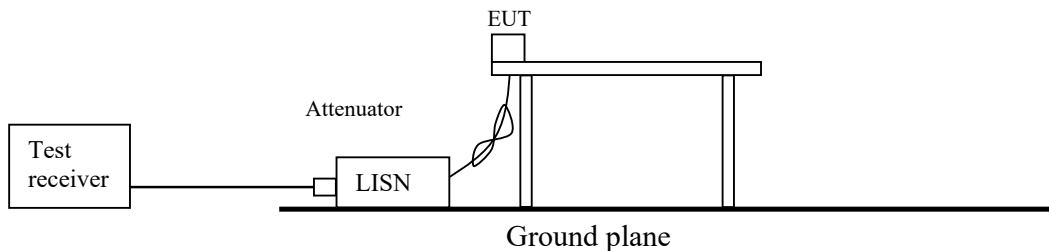
The EUT was connected to a LISN (AMN).

An overview sweep with peak detection has been performed.

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

|                          |                            |
|--------------------------|----------------------------|
| <b>Detector</b>          | <b>: QP and CISPR AV</b>   |
| <b>Measurement range</b> | <b>: 0.15 MHz - 30 MHz</b> |
| <b>Test data</b>         | <b>: APPENDIX</b>          |
| <b>Test result</b>       | <b>: Pass</b>              |

**Figure 1: Test Setup**



## **SECTION 6: Field strength of spurious radiation**

### **Test Procedure**

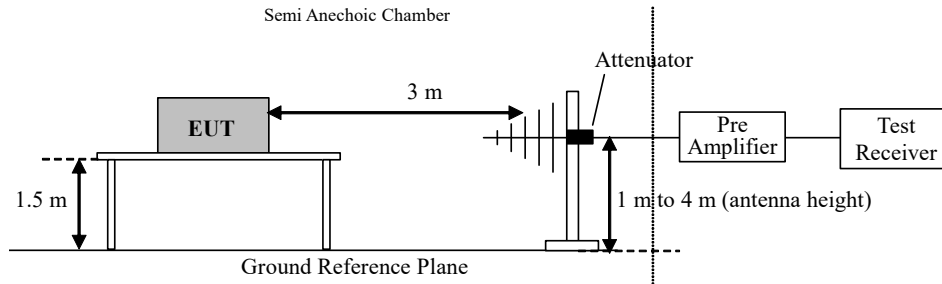
- 1) EUT was placed on a platform of nominal size, 0.5 m by 0.5 m, raised 1.5 m above the conducting ground plane. Test was made with the antenna positioned in both the horizontal and vertical planes of polarization. The Radiated Electric Field Strength has been measured in semi anechoic chamber at a distance of 3 m. The measuring antenna height was varied between 1 to 4 m and the turn table was rotated a full revolution in order to obtain the maximum value of the electric field strength. The measurements were performed for both vertical and horizontal antenna polarization.
  
- 2) Exchanged the EUT to the Substitution Antenna, the measurement was set for the same height 1.5 m as the EUT. The frequency below 1 GHz of the Substitution Antenna was used the Half wave dipole Antenna, which was tuned the measured frequency in 1). The frequency above 1 GHz of the Substitution Antenna was used Horn Antenna. The Substitution Antenna was connected to the Signal Generator, and the polarized electromagnetic radiation of the Substitution Antenna was matched with the one of the measuring Antenna, which was set with the Signal Generator to the measured frequency in 1). Then, we set with the Output power (CW) of the Signal Generator where the measuring electromagnetic field strength is equal to the measured value in 1) by means of varying the measuring antenna height between 1 to 4 m to obtain maximum receiving level. Its Output power of Signal Generator was recorded.
  
- 3) Effective radiated power was calculated by subtracting the cable loss and the attenuator loss connected between the Signal Generator and the Substitution Antenna from the Output power of the Signal Generator recorded in 2).  
For the usage of the Antenna (Horn Antenna) except for the Half wave dipole Antenna (2.15dBi) for the Substitution Antenna, the Effective radiated power was calculated by compensating the finite difference in the Antenna gain of the Half wave dipole Antenna, and Substitution Antenna.

|              |                   |                  |             |
|--------------|-------------------|------------------|-------------|
| Frequency    | 25 MHz to 200 MHz | 200 MHz to 1 GHz | Above 1 GHz |
| Antenna Type | Biconical         | Logperiodic      | Horn        |

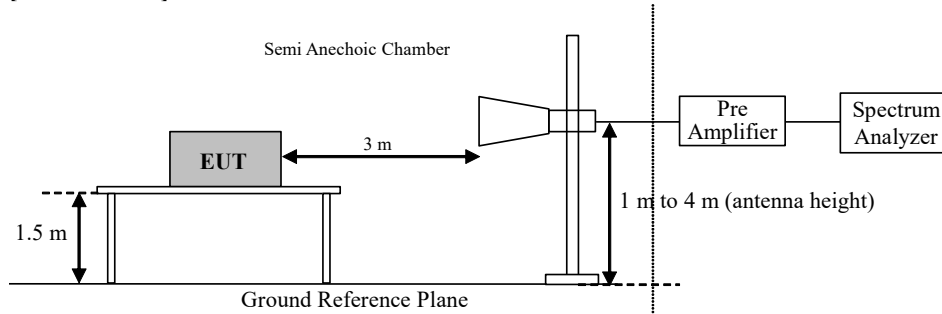
|                 |                            |                              |                          |
|-----------------|----------------------------|------------------------------|--------------------------|
| Frequency       | 25 MHz to 30 MHz           | 30 MHz to 1 GHz              | Above 1 GHz              |
| Instrument used | Spectrum Analyzer          |                              |                          |
| Detector        | RMS Average                |                              |                          |
| IF Bandwidth    | RBW: 10 kHz<br>VBW: 30 kHz | RBW: 100 kHz<br>VBW: 300 kHz | RBW: 1 MHz<br>VBW: 3 MHz |
| Test Distance   | 3 m                        |                              |                          |

**Figure 1: Test Setup**

**[25 MHz - 1 GHz]**



**[Above 1 GHz]**



- 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.

- EUT has 2 kinds of power supply condition (USB power Supply/ Battery power Supply), the test was performed with the worst case which was confirmed in pre-check.

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

**Measurement range** : 25 MHz - 10 GHz  
**Test data** : APPENDIX  
**Test result** : Pass

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## **SECTION 7: Modulation Characteristics**

### **Deviation versus Audio input level and Audio Frequency**

#### **Test Procedure**

The frequency deviations were measured when input level and frequency were varied. It was measured with Spectrum analyzer and signal generator.

|                   |                                                                                      |
|-------------------|--------------------------------------------------------------------------------------|
| Audio input level | -80 dBV to -20 dBV, 5 dB step                                                        |
| Audio frequency   | 40 Hz, 100 Hz, 300 Hz, 500 Hz, 700 Hz, 1 kHz, 3 kHz, 5 kHz, 7 kHz,<br>10 kHz, 18 kHz |

### **Audio Frequency Response**

#### **Test Procedure**

The audio input level was measured when frequency deviation indicates 50% modulation which measured with Test receiver and Audio Analyzer.

|                 |                                                                                                            |
|-----------------|------------------------------------------------------------------------------------------------------------|
| Audio frequency | 40 Hz, 70 Hz, 100 Hz, 300 Hz, 500 Hz, 700 Hz, 1 kHz, 2 kHz, 3 kHz, 5 kHz,<br>7 kHz, 10 kHz, 15 kHz, 18 kHz |
|-----------------|------------------------------------------------------------------------------------------------------------|

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

Test data : APPENDIX  
Test result : Pass

## **SECTION 8: Antenna terminal tests**

### **Test Procedure**

The tests were made with below setting connected to the antenna port.

| Test                                                                                                                                                                                                                                                                                                             | Span                                    | RBW                           | VBW                | Sweep time | Detector | Trace        | Instrument used                    |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------|-------------------------------|--------------------|------------|----------|--------------|------------------------------------|
| RF power output                                                                                                                                                                                                                                                                                                  | -                                       | -                             | -                  | Auto       | Average  | -            | Power Meter<br>(Sensor: 50 MHz BW) |
| Occupied Bandwidth                                                                                                                                                                                                                                                                                               | Enough width to display emission skirts | 1 to 5% of Occupied bandwidth | Three times of RBW | Auto       | Peak *1) | Max Hold *1) | Spectrum Analyzer                  |
| Spurious emissions at antenna terminals                                                                                                                                                                                                                                                                          | 9 kHz -150 kHz                          | 200 Hz                        | 620 Hz             | Auto       | Peak     | Max Hold     | Spectrum Analyzer *2)              |
|                                                                                                                                                                                                                                                                                                                  | 150 kHz - 30 MHz                        | 10 kHz                        | 30 kHz             |            |          |              |                                    |
|                                                                                                                                                                                                                                                                                                                  | 30 MHz - 1 GHz                          | 100 kHz                       | 300 kHz            |            |          |              |                                    |
|                                                                                                                                                                                                                                                                                                                  | Above 1 GHz                             | 1 MHz                         | 3 MHz              |            |          |              |                                    |
| Frequency stability                                                                                                                                                                                                                                                                                              | -                                       | -                             | -                  | -          | -        | -            | Frequency Counter                  |
| *1) The measurement was performed with Peak and Max Hold since the modulation method was FM.<br>*2) In the frequency range below 30 MHz, RBW was narrowed to separate the noise contents. Then, wide-band noise near the limit was checked separately, however the noise was not detected as shown in the chart. |                                         |                               |                    |            |          |              |                                    |

### **[Frequency stability]**

The power supply set to 100 % nominal setting, raise EUT operating temperature to 50 deg. C.

Record the frequency of the EUT.

Repeat measurements at each 10 deg. C decrement to -30 deg. C.

EUT power supply was varied between 85 % and 115 % of nominal and the frequency of the EUT was recorded when temperature is 20 deg. C. The additional test was performed at battery end point voltage.

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

**Test data** : APPENDIX

**Test result** : Pass

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## **SECTION 9: Necessary bandwidth**

### **Test procedure**

In accordance with section 8.3 of ETSI EN 300 422-1, a weighted noise source through a weighting filter based on ITU-R Recommendation BS.559-2 was applied to the audio input of transmitter.

The transmitter RF output spectrums were measured at each channel using a receiving antenna and a spectrum analyzer with settings specified in the section 8.3.1 of ETSI EN 300 422-1. The input level of both white noise and filter to EUT was -12 dBV according to the following result.

|                                                                  | lim-8dB   | lim     | lim+12dB  | Difference of Demodulation level lim-8dB and lim+12dB | White noise +Filter input level |
|------------------------------------------------------------------|-----------|---------|-----------|-------------------------------------------------------|---------------------------------|
| EUT input level                                                  | -32.0 dBV | -24 dBV | -12.0 dBV |                                                       | -12 dBV                         |
| Demodulation level                                               | -28.2 dBV | -       | -19.6 dBV | 8.6 dB < 10 dB                                        |                                 |
| "lim" means "audio limiting threshold" declared by manufacturer. |           |         |           |                                                       |                                 |

**Test data**  
**Test result**

**APPENDIX.**  
**Pass**

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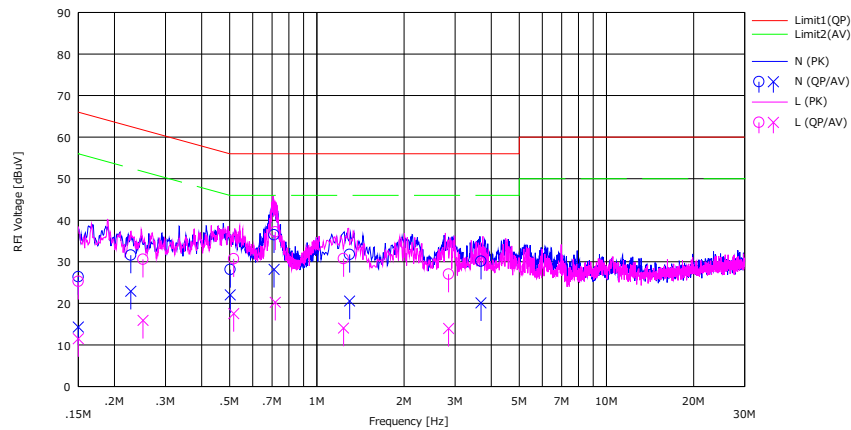
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## APPENDIX 1: Data of EMI test

### Conducted Emission

Report No. 12890237H  
Test place Ise EMC Lab.  
Semi Anechoic Chamber No.3  
Date August 31, 2019  
Temperature / Humidity 23 deg. C / 70 % RH  
Engineer Yuichiro Yamazaki  
Mode Tx 470.125 MHz , 5 mW

Limit : FCC\_Part 15 Subpart C(15.207)



| No. | Freq.<br>[MHz] | Reading        |                | USN  | LOSS  | Results        |                | Limit          |                | Margin       |              | Phase | Comment |
|-----|----------------|----------------|----------------|------|-------|----------------|----------------|----------------|----------------|--------------|--------------|-------|---------|
|     |                | (QP)<br>[dBuV] | (AV)<br>[dBuV] |      |       | (QP)<br>[dBuV] | (AV)<br>[dBuV] | (QP)<br>[dBuV] | (AV)<br>[dBuV] | (QP)<br>[dB] | (AV)<br>[dB] |       |         |
| 1   | 0.15000        | 13.10          | 1.00           | 0.14 | 13.15 | 26.39          | 14.29          | 66.00          | 56.00          | 39.61        | 41.71        | N     |         |
| 2   | 0.22765        | 18.30          | 9.60           | 0.14 | 13.16 | 31.60          | 22.90          | 62.50          | 52.50          | 30.90        | 29.60        | N     |         |
| 3   | 0.50234        | 14.80          | 8.70           | 0.15 | 13.18 | 28.13          | 22.03          | 56.00          | 46.00          | 27.87        | 23.97        | N     |         |
| 4   | 0.71103        | 23.10          | 14.80          | 0.16 | 13.20 | 36.46          | 28.16          | 56.00          | 46.00          | 19.54        | 17.84        | N     |         |
| 5   | 1.29722        | 18.30          | 7.10           | 0.21 | 13.25 | 31.76          | 20.56          | 56.00          | 46.00          | 24.24        | 25.44        | N     |         |
| 6   | 3.68888        | 16.40          | 6.40           | 0.35 | 13.38 | 30.13          | 20.13          | 56.00          | 46.00          | 25.87        | 25.87        | N     |         |
| 7   | 0.15000        | 12.00          | -1.80          | 0.14 | 13.15 | 25.29          | 11.49          | 66.00          | 56.00          | 40.71        | 44.51        | L     |         |
| 8   | 0.25095        | 17.30          | 2.60           | 0.14 | 13.16 | 30.60          | 15.90          | 61.70          | 51.70          | 31.10        | 35.80        | L     |         |
| 9   | 0.51635        | 17.40          | 4.20           | 0.15 | 13.18 | 30.73          | 17.53          | 56.00          | 46.00          | 25.27        | 28.47        | L     |         |
| 10  | 0.71827        | 23.80          | 6.90           | 0.16 | 13.20 | 37.16          | 20.26          | 56.00          | 46.00          | 18.84        | 25.74        | L     |         |
| 11  | 1.23603        | 17.30          | 0.60           | 0.20 | 13.24 | 30.74          | 14.04          | 56.00          | 46.00          | 25.26        | 31.96        | L     |         |
| 12  | 2.85088        | 13.40          | 0.30           | 0.29 | 13.34 | 27.03          | 13.93          | 56.00          | 46.00          | 28.97        | 32.07        | L     |         |

CHART: WITH FACTOR Peak hold data. CALCULATION : RESULT = READING + LISN + LOSS (CABLE + ATT)  
Except for the above table: adequate margin data below the limits.

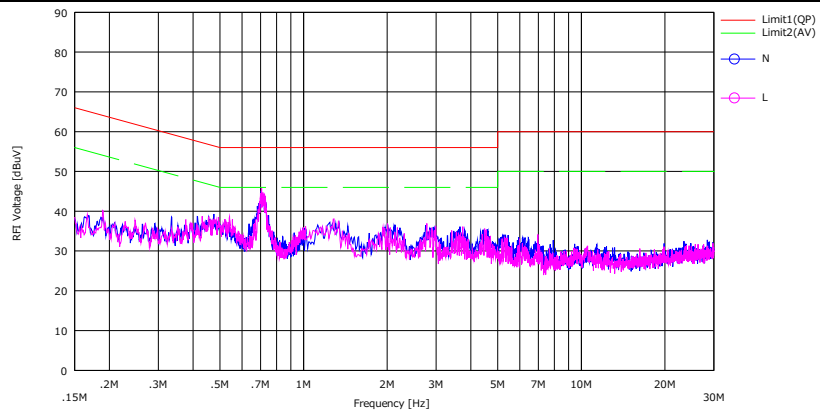
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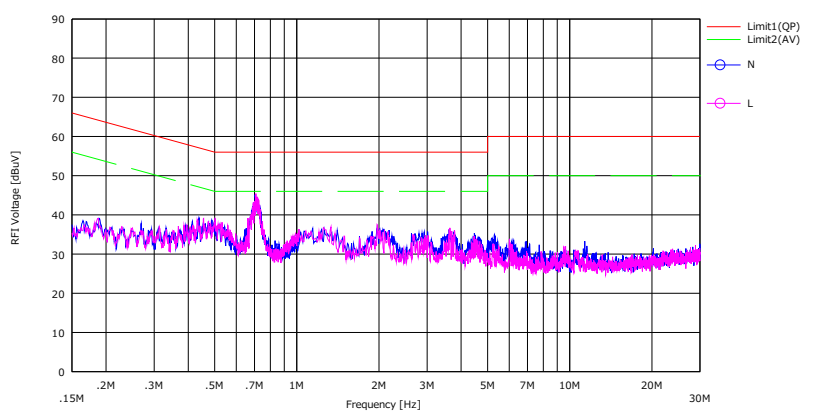
## Conducted Emission

Report No. 12890237H  
Test place Ise EMC Lab.  
Semi Anechoic Chamber No.3  
Date August 31, 2019  
Temperature / Humidity 23 deg. C / 70 % RH  
Engineer Yuichiro Yamazaki  
Mode Tx, 5 mW

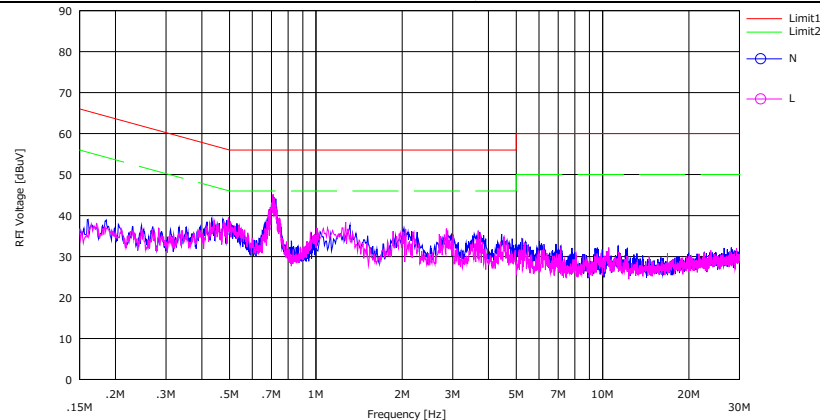
Tx 470.125 MHz, 5 mW



Tx 539.000 MHz, 5 mW



Tx 607.875 MHz, 5 mW



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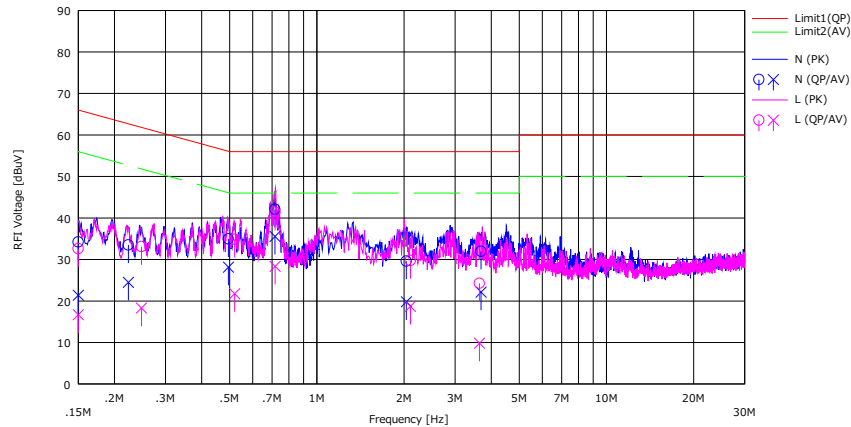
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## Conducted Emission

Report No. 12890237H  
Test place Ise EMC Lab.  
Semi Anechoic Chamber No.3  
Date August 31, 2019  
Temperature / Humidity 23 deg. C / 70 % RH  
Engineer Yuichiro Yamazaki  
Mode Tx 470.125 MHz , 40 mW

Limit : FCC\_Part 15 Subpart C(15.207)



| No. | Freq.<br>[MHz] | Reading        |                | USN<br>[dB] | LOSS<br>[dB] | Results        |                | Limit          |                | Margin       |              | Phase | Comment |
|-----|----------------|----------------|----------------|-------------|--------------|----------------|----------------|----------------|----------------|--------------|--------------|-------|---------|
|     |                | (QP)<br>[dBuV] | (AV)<br>[dBuV] |             |              | (QP)<br>[dBuV] | (AV)<br>[dBuV] | (QP)<br>[dBuV] | (AV)<br>[dBuV] | (QP)<br>[dB] | (AV)<br>[dB] |       |         |
| 1   | 0.15000        | 20.90          | 8.10           | 0.14        | 13.15        | 34.19          | 21.39          | 66.00          | 56.00          | 31.81        | 34.61        | N     |         |
| 2   | 0.22331        | 20.20          | 11.20          | 0.14        | 13.15        | 33.49          | 24.49          | 62.70          | 52.70          | 29.21        | 28.21        | N     |         |
| 3   | 0.49524        | 21.60          | 14.80          | 0.15        | 13.18        | 34.93          | 28.13          | 56.10          | 46.10          | 21.17        | 17.97        | N     |         |
| 4   | 0.71697        | 28.70          | 22.20          | 0.16        | 13.20        | 42.06          | 35.56          | 56.00          | 46.00          | 13.94        | 10.44        | N     |         |
| 5   | 2.03805        | 16.00          | 6.20           | 0.31        | 13.29        | 29.60          | 19.80          | 56.00          | 46.00          | 26.40        | 26.20        | N     |         |
| 6   | 3.69066        | 18.20          | 8.40           | 0.35        | 13.38        | 31.93          | 22.13          | 56.00          | 46.00          | 24.07        | 23.87        | N     |         |
| 7   | 0.15000        | 19.30          | 3.40           | 0.14        | 13.15        | 32.59          | 16.69          | 66.00          | 56.00          | 33.41        | 39.31        | L     |         |
| 8   | 0.24796        | 19.80          | 5.00           | 0.14        | 13.16        | 33.10          | 18.30          | 61.80          | 51.80          | 28.70        | 33.50        | L     |         |
| 9   | 0.51988        | 21.50          | 8.40           | 0.15        | 13.18        | 34.83          | 21.73          | 56.00          | 46.00          | 21.17        | 24.27        | L     |         |
| 10  | 0.71724        | 28.00          | 15.00          | 0.16        | 13.20        | 41.36          | 28.36          | 56.00          | 46.00          | 14.64        | 17.64        | L     |         |
| 11  | 2.10334        | 16.10          | 5.10           | 0.31        | 13.30        | 29.71          | 18.71          | 56.00          | 46.00          | 26.29        | 27.29        | L     |         |
| 12  | 3.64451        | 10.50          | -3.90          | 0.35        | 13.38        | 24.23          | 9.83           | 56.00          | 46.00          | 31.77        | 36.17        | L     |         |

CHART: WITH FACTOR Peak hold data. CALCULATION : RESULT = READING + LISN + LOSS (CABLE + ATT)  
Except for the above table: adequate margin data below the limits.

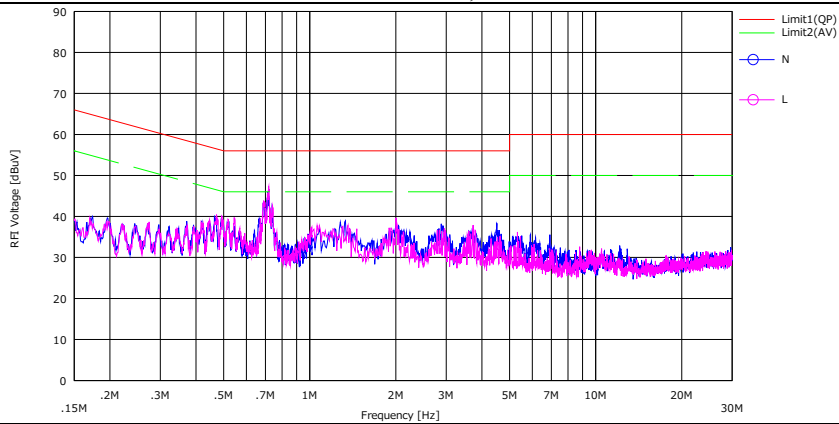
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Facsimile : +81 596 24 8124

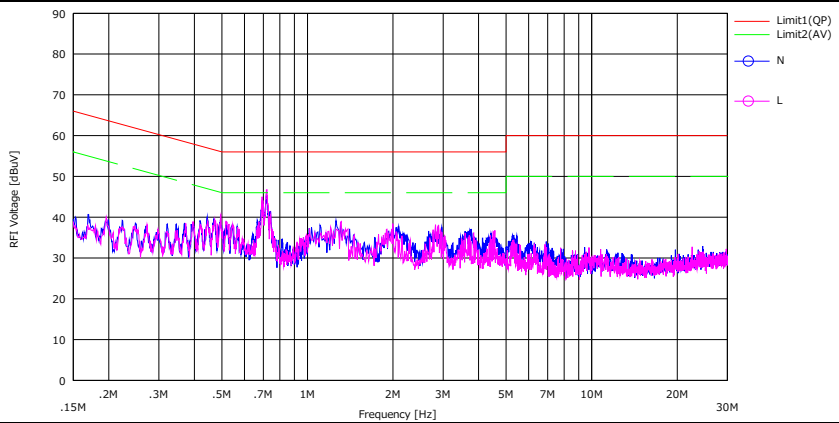
## Conducted Emission

Report No. 12890237H  
Test place Ise EMC Lab.  
Semi Anechoic Chamber No.3  
Date August 31, 2019  
Temperature / Humidity 23 deg. C / 70 % RH  
Engineer Yuichiro Yamazaki  
Mode Tx, 40 mW

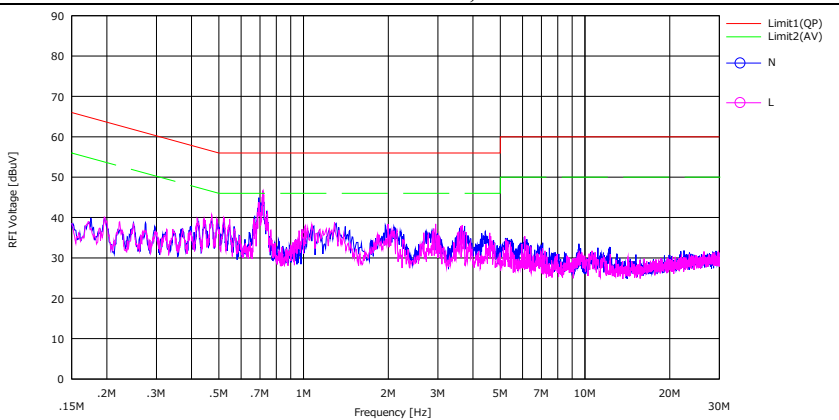
**Tx 470.125 MHz, 40 mW**



**Tx 539.000 MHz, 40 mW**



**Tx 607.875 MHz, 40 mW**



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**Ise EMC Lab.**

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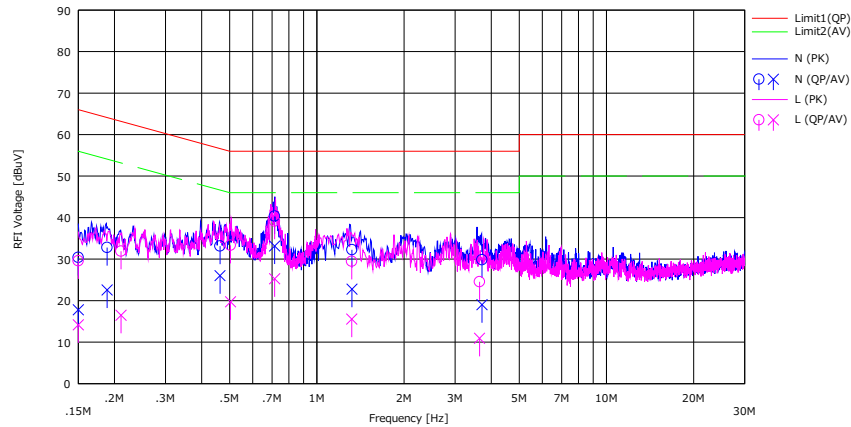
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Facsimile : +81 596 24 8124

## Conducted Emission

Report No. 12890237H  
Test place Ise EMC Lab.  
Semi Anechoic Chamber No.3  
Date August 31, 2019  
Temperature / Humidity 23 deg. C / 70 % RH  
Engineer Yuichiro Yamazaki  
Mode Tx 941.625 MHz , 5 mW

Limit : FCC\_Part 15 Subpart C(15.207)



| No. | Freq.<br>[MHz] | Reading        |                | LISN<br>[dB] | LOSS<br>[dB] | Results        |                | Limit          |                | Margin       |              | Phase | Comment |
|-----|----------------|----------------|----------------|--------------|--------------|----------------|----------------|----------------|----------------|--------------|--------------|-------|---------|
|     |                | (QP)<br>[dBuV] | (AV)<br>[dBuV] |              |              | (QP)<br>[dBuV] | (AV)<br>[dBuV] | (QP)<br>[dBuV] | (AV)<br>[dBuV] | (QP)<br>[dB] | (AV)<br>[dB] |       |         |
| 1   | 0.15000        | 17.10          | 4.50           | 0.14         | 13.15        | 30.39          | 17.79          | 66.00          | 56.00          | 35.61        | 38.21        | N     |         |
| 2   | 0.18861        | 19.50          | 9.30           | 0.14         | 13.15        | 32.79          | 22.59          | 64.10          | 54.10          | 31.31        | 31.51        | N     |         |
| 3   | 0.46293        | 19.80          | 12.70          | 0.15         | 13.18        | 33.13          | 26.03          | 56.60          | 46.60          | 23.47        | 20.57        | N     |         |
| 4   | 0.71459        | 27.00          | 19.80          | 0.16         | 13.20        | 40.36          | 33.16          | 56.00          | 46.00          | 15.64        | 12.84        | N     |         |
| 5   | 1.32124        | 18.80          | 9.30           | 0.21         | 13.25        | 32.26          | 22.76          | 56.00          | 46.00          | 23.74        | 23.24        | N     |         |
| 6   | 3.71742        | 16.10          | 5.30           | 0.35         | 13.38        | 29.83          | 19.03          | 56.00          | 46.00          | 26.17        | 26.97        | N     |         |
| 7   | 0.15000        | 16.30          | 0.90           | 0.14         | 13.15        | 29.59          | 14.19          | 66.00          | 56.00          | 36.41        | 41.81        | L     |         |
| 8   | 0.21069        | 18.60          | 3.20           | 0.14         | 13.15        | 31.89          | 16.49          | 63.20          | 53.20          | 31.31        | 36.71        | L     |         |
| 9   | 0.50323        | 20.00          | 6.40           | 0.15         | 13.18        | 33.33          | 19.73          | 56.00          | 46.00          | 22.67        | 26.27        | L     |         |
| 10  | 0.71453        | 25.80          | 11.90          | 0.16         | 13.20        | 39.16          | 25.26          | 56.00          | 46.00          | 16.84        | 20.74        | L     |         |
| 11  | 1.31942        | 16.00          | 2.10           | 0.21         | 13.25        | 29.46          | 15.56          | 56.00          | 46.00          | 26.54        | 30.44        | L     |         |
| 12  | 3.64662        | 10.80          | -2.80          | 0.35         | 13.38        | 24.53          | 10.93          | 56.00          | 46.00          | 31.47        | 35.07        | L     |         |

CHART: WITH FACTOR Peak hold data. CALCULATION : RESULT = READING + LISN + LOSS (CABLE + ATT)  
Except for the above table: adequate margin data below the limits.

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**Ise EMC Lab.**

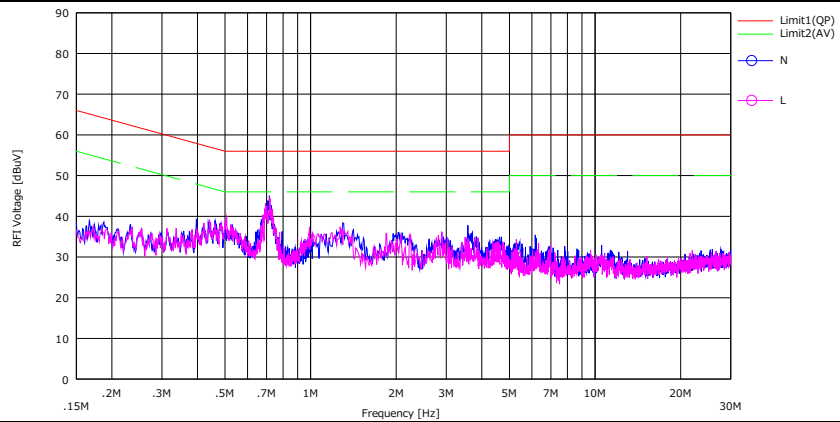
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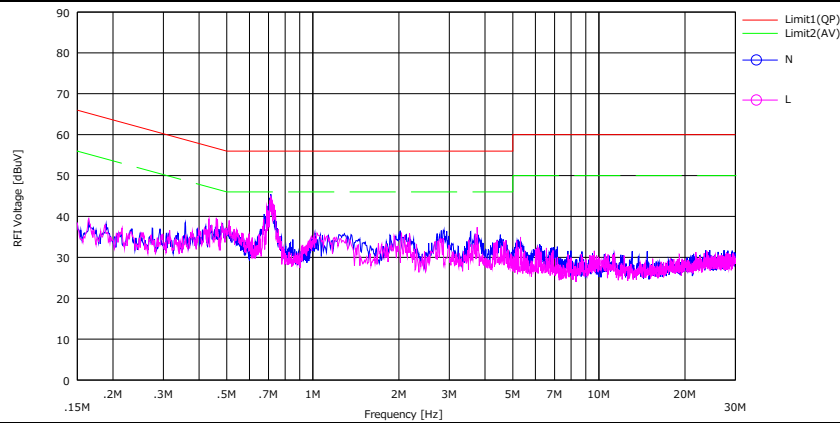
## Conducted Emission

Report No. 12890237H  
Test place Ise EMC Lab.  
Semi Anechoic Chamber No.3  
Date August 31, 2019  
Temperature / Humidity 23 deg. C / 70 % RH  
Engineer Yuichiro Yamazaki  
Mode Tx, 5 mW

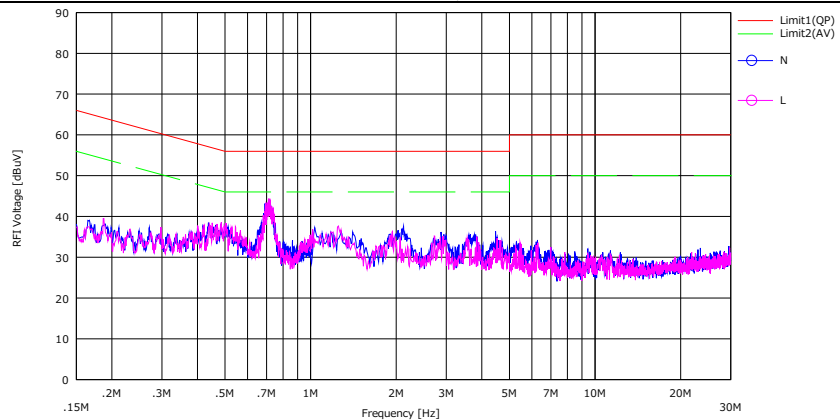
**Tx 941.625 MHz, 5 mW**



**Tx 950.625 MHz, 5 mW**



**Tx 959.625 MHz, 5 mW**



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**Ise EMC Lab.**

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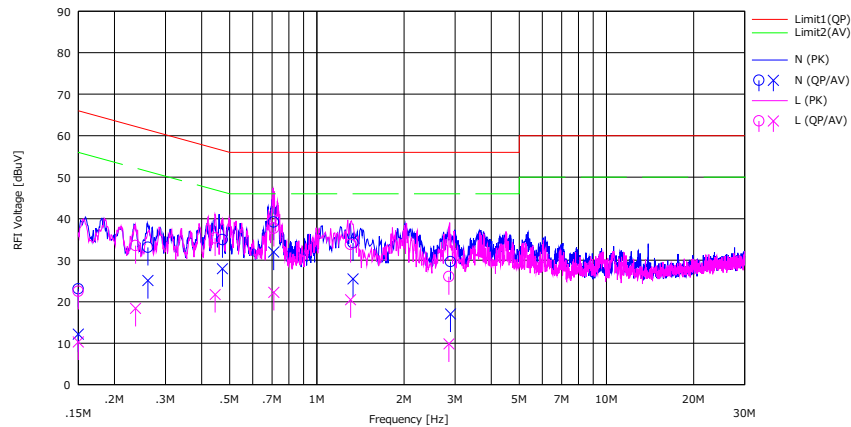
Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

## Conducted Emission

Report No. 12890237H  
Test place Ise EMC Lab.  
Semi Anechoic Chamber No.3  
Date August 31, 2019  
Temperature / Humidity 23 deg. C / 70 % RH  
Engineer Yuichiro Yamazaki  
Mode Tx 941.625 MHz , 40 mW

Limit : FCC\_Part 15 Subpart C(15.207)



| No. | Freq.<br>[MHz] | Reading        |                | USN<br>[dB] | LOSS<br>[dB] | Results        |                | Limit          |                | Margin       |              | Phase | Comment |
|-----|----------------|----------------|----------------|-------------|--------------|----------------|----------------|----------------|----------------|--------------|--------------|-------|---------|
|     |                | (QP)<br>[dBuV] | (AV)<br>[dBuV] |             |              | (QP)<br>[dBuV] | (AV)<br>[dBuV] | (QP)<br>[dBuV] | (AV)<br>[dBuV] | (QP)<br>[dB] | (AV)<br>[dB] |       |         |
| 1   | 0.15000        | 9.80           | -1.10          | 0.14        | 13.15        | 23.09          | 12.19          | 66.00          | 56.00          | 42.91        | 43.81        | N     |         |
| 2   | 0.26100        | 19.80          | 11.80          | 0.14        | 13.16        | 33.10          | 25.10          | 61.40          | 51.40          | 28.30        | 26.30        | N     |         |
| 3   | 0.47214        | 21.60          | 14.60          | 0.15        | 13.18        | 34.93          | 27.93          | 56.50          | 46.50          | 21.57        | 18.57        | N     |         |
| 4   | 0.70933        | 25.80          | 18.60          | 0.16        | 13.20        | 39.16          | 31.96          | 56.00          | 46.00          | 16.84        | 14.04        | N     |         |
| 5   | 1.33306        | 20.70          | 12.00          | 0.22        | 13.25        | 34.17          | 25.47          | 56.00          | 46.00          | 21.83        | 20.53        | N     |         |
| 6   | 2.89375        | 16.00          | 3.40           | 0.29        | 13.34        | 29.63          | 17.03          | 56.00          | 46.00          | 26.37        | 28.97        | N     |         |
| 7   | 0.15000        | 9.20           | -3.00          | 0.14        | 13.15        | 22.49          | 10.29          | 66.00          | 56.00          | 43.51        | 45.71        | L     |         |
| 8   | 0.23646        | 20.20          | 5.10           | 0.14        | 13.16        | 33.50          | 18.40          | 62.20          | 52.20          | 28.70        | 33.80        | L     |         |
| 9   | 0.44543        | 22.00          | 8.40           | 0.15        | 13.18        | 35.33          | 21.73          | 57.00          | 47.00          | 21.67        | 25.27        | L     |         |
| 10  | 0.71014        | 24.30          | 8.90           | 0.16        | 13.20        | 37.66          | 22.26          | 56.00          | 46.00          | 18.34        | 23.74        | L     |         |
| 11  | 1.30746        | 20.30          | 7.00           | 0.21        | 13.25        | 33.76          | 20.46          | 56.00          | 46.00          | 22.24        | 25.54        | L     |         |
| 12  | 2.85594        | 12.40          | -3.80          | 0.29        | 13.34        | 26.03          | 9.83           | 56.00          | 46.00          | 29.97        | 36.17        | L     |         |

CHART: WITH FACTOR Peak hold data. CALCULATION : RESULT = READING + LISN + LOSS (CABLE + ATT)  
Except for the above table: adequate margin data below the limits.

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

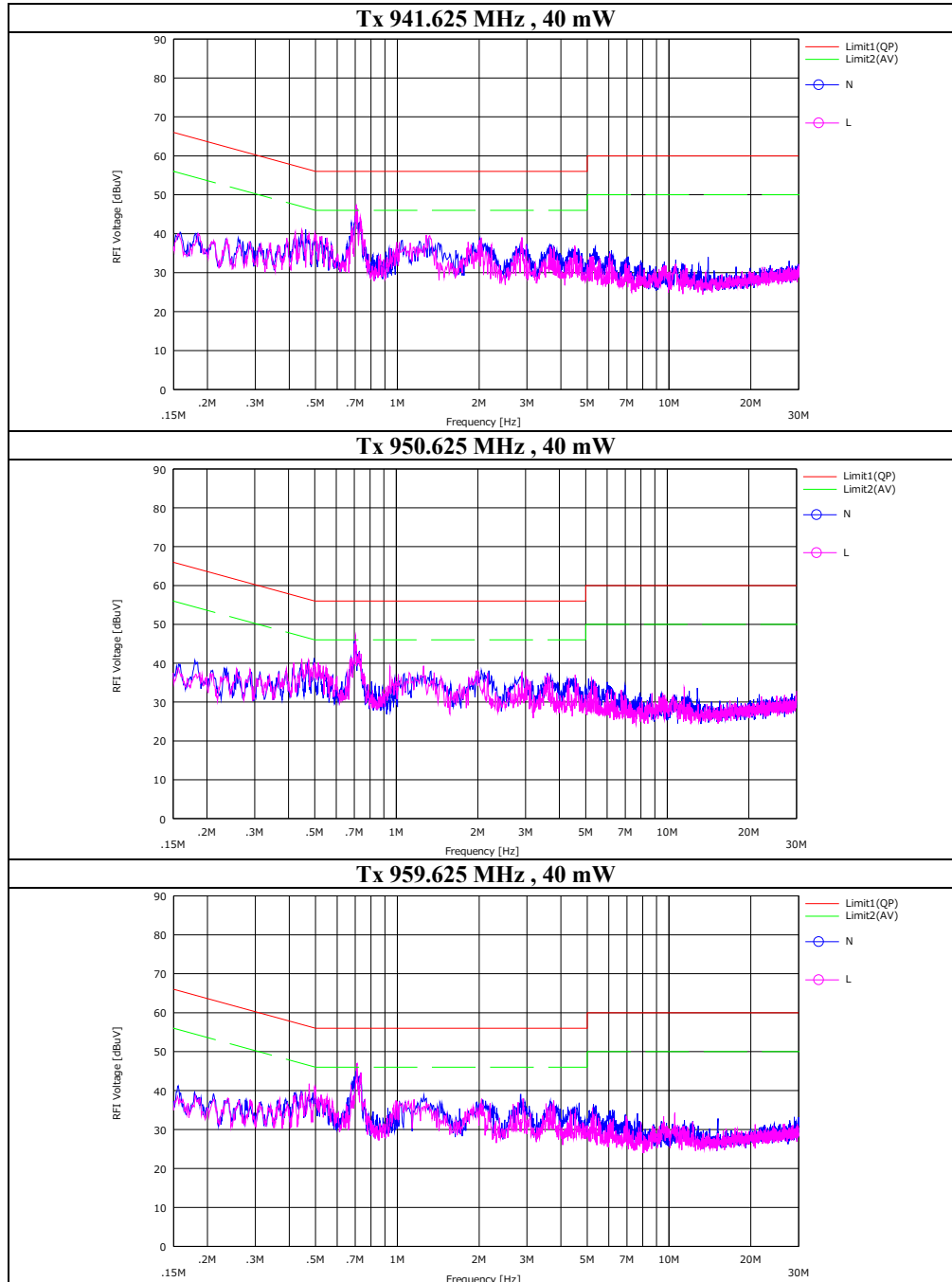
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

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Facsimile : +81 596 24 8124

## Conducted Emission

Report No. 12890237H  
Test place Ise EMC Lab.  
Semi Anechoic Chamber No.3  
Date August 31, 2019  
Temperature / Humidity 23 deg. C / 70 % RH  
Engineer Yuichiro Yamazaki  
Mode Tx, 40 mW



**UL Japan, Inc.**  
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## RF Output Power

Report No. 12890237H  
Test place Ise EMC Lab. No.6 Measurement Room  
Date August 26, 2019  
Temperature/ Humidity 25 deg. C / 49 % RH  
Engineer Akihiko Maeda  
Mode Tx (470.125 MHz – 607.875 MHz)

| Power<br>Setting | Channel | Freq.<br>[MHz] | Reading          | Cable        | Atten.       | Result<br>Average<br>[Conducted] |       | Limit<br>[Conducted] | Margin | Remarks |
|------------------|---------|----------------|------------------|--------------|--------------|----------------------------------|-------|----------------------|--------|---------|
|                  |         |                | Average<br>[dBm] | Loss<br>[dB] | Loss<br>[dB] | [dBm]                            | [mW]  | [mW]                 | [dB]   |         |
| 5 mW             | Low     | 470.125        | -14.03           | 0.87         | 19.90        | 6.74                             | 4.72  | 250                  | 17.24  |         |
|                  | Mid     | 539.000        | -13.77           | 0.85         | 19.90        | 6.98                             | 4.99  | 250                  | 17.00  |         |
|                  | High    | 607.875        | -13.83           | 0.82         | 19.90        | 6.89                             | 4.89  | 250                  | 17.09  |         |
| 40 mW            | Low     | 470.125        | -6.22            | 0.87         | 19.90        | 14.55                            | 28.51 | 250                  | 9.43   |         |
|                  | Mid     | 539.000        | -5.87            | 0.85         | 19.90        | 14.88                            | 30.76 | 250                  | 9.10   |         |
|                  | High    | 607.875        | -5.80            | 0.82         | 19.90        | 14.92                            | 31.05 | 250                  | 9.06   |         |

Calculation formula:

$$\text{Result} = \text{Reading} + \text{Cable Loss} + \text{Atten. Loss}$$

Cable or Atten. was not used for factor 0.00dB of the above table.

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

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Facsimile : +81 596 24 8124

## RF Output Power

Report No. 12890237H  
Test place Ise EMC Lab. No.6 Measurement Room  
Date August 26, 2019 November 6, 2019  
Temperature/ Humidity 25 deg. C / 49 % RH 22 deg. C / 41 % RH  
Engineer Akihiko Maeda Akihiko Maeda  
Mode Tx (941.625 MHz – 959.625 MHz)

| Power<br>Setting | Channel | Freq.<br>[MHz] | Reading          | Cable<br>Loss<br>[dB] | Atten.<br>Loss<br>[dB] | Result<br>Average<br>[Conducted] |       | Limit<br>[Conducted]<br>[mW] | Margin<br>[dB] | Remarks |
|------------------|---------|----------------|------------------|-----------------------|------------------------|----------------------------------|-------|------------------------------|----------------|---------|
|                  |         |                | Average<br>[dBm] |                       |                        | [dBm]                            | [mW]  |                              |                |         |
| 5 mW             | Low     | 941.625        | -13.98           | 1.00                  | 19.90                  | 6.92                             | 4.92  | 1000                         | 23.08          |         |
|                  | Mid 1   | 950.625        | -14.07           | 1.00                  | 19.90                  | 6.83                             | 4.82  | 1000                         | 23.17          |         |
|                  | Mid 2   | 954.625        | -14.11           | 1.00                  | 19.90                  | 6.79                             | 4.78  | 1000                         | 23.21          |         |
|                  | High    | 959.625        | -14.15           | 1.01                  | 19.91                  | 6.77                             | 4.75  | 1000                         | 23.23          |         |
| 40 mW            | Low     | 941.625        | -6.22            | 1.00                  | 19.90                  | 14.68                            | 29.38 | 1000                         | 15.32          |         |
|                  | Mid 1   | 950.625        | -6.29            | 1.00                  | 19.90                  | 14.61                            | 28.91 | 1000                         | 15.39          |         |
|                  | Mid 2   | 954.625        | -6.33            | 1.00                  | 19.90                  | 14.57                            | 28.64 | 1000                         | 15.43          |         |
|                  | High    | 959.625        | -6.38            | 1.01                  | 19.91                  | 14.54                            | 28.44 | 1000                         | 15.46          |         |

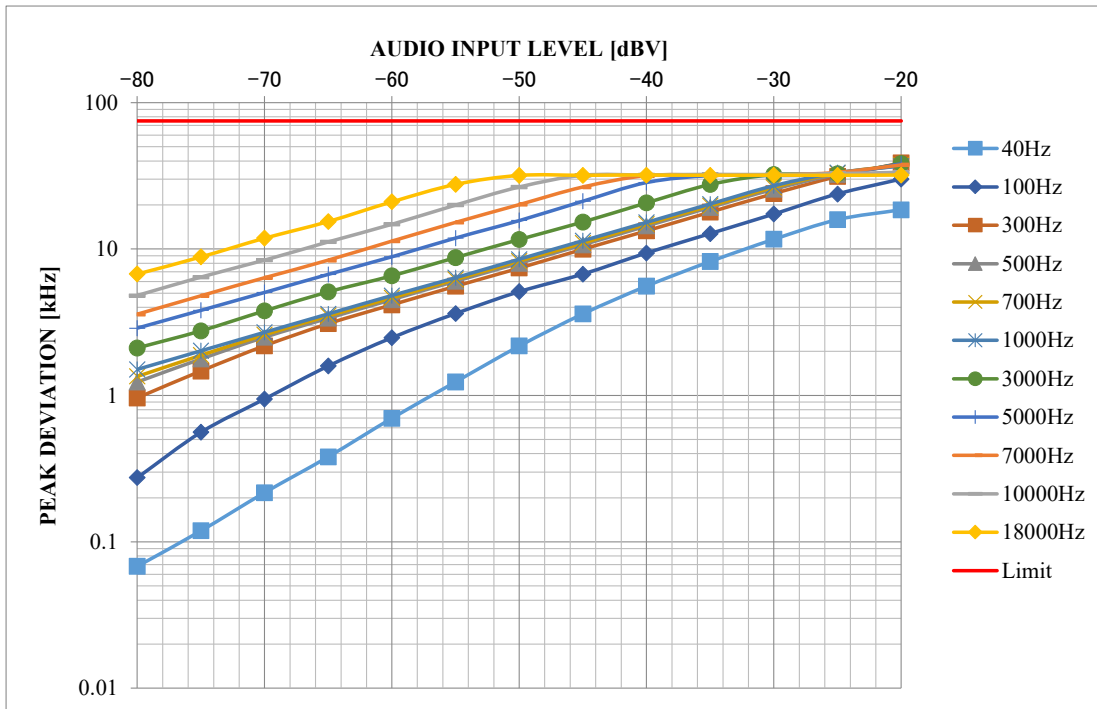
Calculation formula:

Result = Reading + Cable Loss + Atten. Loss

**Modulation Characteristics**  
**[Deviation versus Audio input level and Audio Frequency]**

Report No. 12890237H  
Test place Ise EMC Lab. No.6 Shielded Room  
Date September 14, 2019  
Temperature / Humidity 25 deg. C / 51 % RH  
Engineer Akihiko Maeda  
Mode Tx 539.000 MHz, 5 mW

| AF Level | AF Frequency [Hz] / Peak Deviation [kHz] |        |        |        |        |        |        |        |        |        |        | Limit |
|----------|------------------------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|-------|
| [dBV]    | 40                                       | 100    | 300    | 500    | 700    | 1000   | 3000   | 5000   | 7000   | 10000  | 18000  | [kHz] |
| -80      | 0.068                                    | 0.275  | 0.962  | 1.234  | 1.352  | 1.507  | 2.110  | 2.882  | 3.584  | 4.815  | 6.763  | 75    |
| -75      | 0.119                                    | 0.561  | 1.469  | 1.776  | 1.885  | 2.016  | 2.760  | 3.810  | 4.797  | 6.431  | 8.847  | 75    |
| -70      | 0.217                                    | 0.946  | 2.183  | 2.501  | 2.598  | 2.697  | 3.780  | 5.054  | 6.366  | 8.407  | 11.864 | 75    |
| -65      | 0.381                                    | 1.591  | 3.092  | 3.370  | 3.500  | 3.609  | 5.099  | 6.714  | 8.390  | 11.186 | 15.439 | 75    |
| -60      | 0.699                                    | 2.482  | 4.160  | 4.516  | 4.643  | 4.815  | 6.568  | 8.853  | 11.325 | 14.758 | 21.026 | 75    |
| -55      | 1.237                                    | 3.630  | 5.571  | 6.023  | 6.205  | 6.366  | 8.753  | 11.881 | 15.200 | 19.982 | 27.634 | 75    |
| -50      | 2.177                                    | 5.117  | 7.421  | 8.002  | 8.279  | 8.532  | 11.645 | 15.658 | 20.137 | 26.521 | 31.827 | 75    |
| -45      | 3.604                                    | 6.740  | 9.980  | 10.695 | 10.988 | 11.380 | 15.298 | 21.210 | 26.563 | 31.902 | 31.911 | 75    |
| -40      | 5.583                                    | 9.396  | 13.328 | 14.373 | 14.810 | 15.211 | 20.715 | 28.457 | 31.779 | 32.072 | 32.036 | 75    |
| -35      | 8.223                                    | 12.749 | 17.902 | 19.256 | 19.741 | 20.299 | 27.646 | 31.746 | 32.005 | 32.384 | 31.865 | 75    |
| -30      | 11.661                                   | 17.345 | 23.964 | 25.636 | 26.412 | 27.053 | 32.330 | 31.786 | 32.075 | 32.264 | 31.956 | 75    |
| -25      | 15.890                                   | 23.780 | 31.359 | 32.362 | 33.022 | 33.193 | 32.750 | 32.556 | 33.417 | 32.764 | 31.883 | 75    |
| -20      | 18.556                                   | 30.023 | 38.756 | 37.362 | 37.392 | 36.853 | 38.431 | 38.186 | 37.557 | 33.454 | 32.012 | 75    |

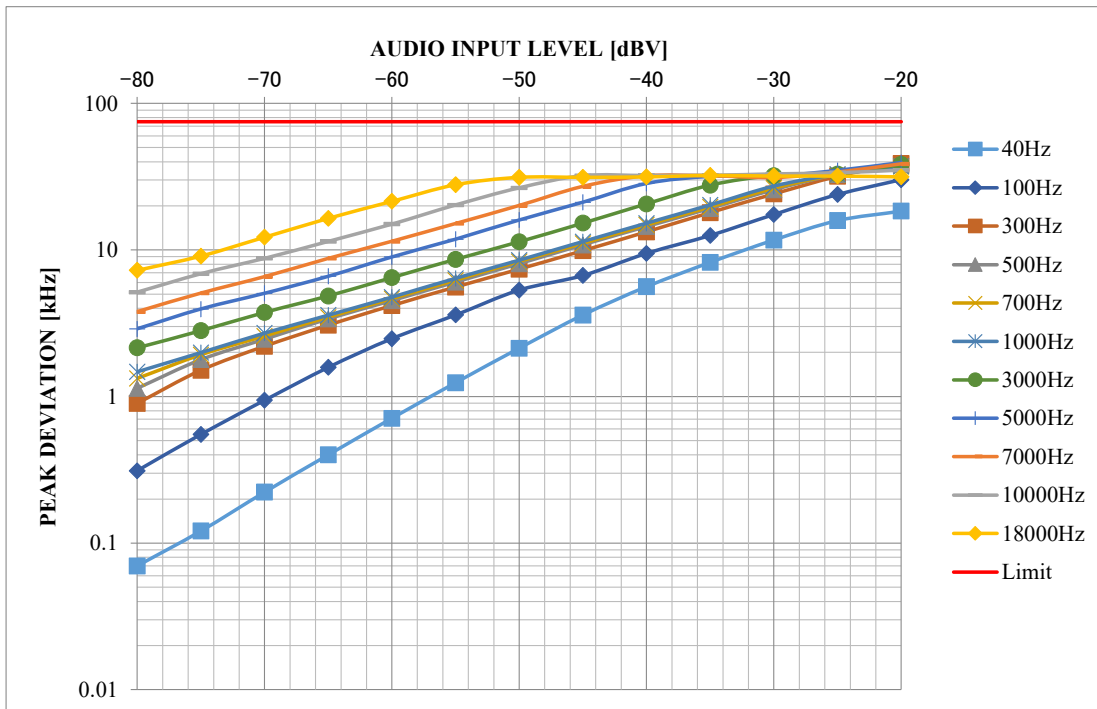


## Modulation Characteristics

### [Deviation versus Audio input level and Audio Frequency]

Report No. 12890237H  
Test place Ise EMC Lab. No.6 Shielded Room  
Date September 13, 2019  
Temperature / Humidity 23 deg. C / 58 % RH  
Engineer Akihiko Maeda  
Mode Tx 539.000 MHz, 40 mW

| AF Level<br>[dBV] | AF Frequency [Hz] / Peak Deviation [kHz] |        |        |        |        |        |        |        |        |        |        | Limit<br>[kHz] |
|-------------------|------------------------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|----------------|
|                   | 40                                       | 100    | 300    | 500    | 700    | 1000   | 3000   | 5000   | 7000   | 10000  | 18000  |                |
| -80               | 0.070                                    | 0.312  | 0.899  | 1.136  | 1.330  | 1.476  | 2.150  | 2.895  | 3.789  | 5.150  | 7.260  | 75             |
| -75               | 0.121                                    | 0.552  | 1.511  | 1.785  | 1.925  | 1.994  | 2.814  | 3.957  | 5.081  | 6.886  | 9.090  | 75             |
| -70               | 0.223                                    | 0.944  | 2.203  | 2.459  | 2.589  | 2.709  | 3.754  | 5.068  | 6.580  | 8.765  | 12.232 | 75             |
| -65               | 0.400                                    | 1.581  | 3.069  | 3.384  | 3.475  | 3.589  | 4.857  | 6.614  | 8.760  | 11.427 | 16.432 | 75             |
| -60               | 0.711                                    | 2.483  | 4.179  | 4.511  | 4.655  | 4.773  | 6.493  | 8.962  | 11.449 | 15.006 | 21.494 | 75             |
| -55               | 1.243                                    | 3.603  | 5.590  | 6.037  | 6.220  | 6.400  | 8.632  | 11.850 | 15.145 | 20.255 | 27.884 | 75             |
| -50               | 2.140                                    | 5.323  | 7.410  | 8.058  | 8.353  | 8.517  | 11.377 | 16.028 | 20.105 | 26.552 | 31.361 | 75             |
| -45               | 3.600                                    | 6.693  | 9.895  | 10.834 | 11.097 | 11.405 | 15.259 | 21.163 | 27.125 | 32.126 | 31.351 | 75             |
| -40               | 5.627                                    | 9.483  | 13.301 | 14.432 | 14.813 | 15.233 | 20.654 | 28.452 | 32.025 | 32.201 | 31.598 | 75             |
| -35               | 8.237                                    | 12.568 | 18.004 | 19.199 | 19.649 | 20.290 | 27.704 | 31.725 | 32.067 | 32.351 | 32.321 | 75             |
| -30               | 11.705                                   | 17.471 | 24.122 | 25.759 | 26.359 | 27.242 | 32.185 | 31.927 | 31.195 | 32.991 | 31.987 | 75             |
| -25               | 15.868                                   | 23.882 | 31.819 | 32.729 | 32.749 | 32.858 | 32.955 | 34.915 | 33.975 | 33.621 | 31.967 | 75             |
| -20               | 18.416                                   | 30.194 | 39.019 | 38.129 | 37.169 | 37.328 | 38.375 | 39.515 | 38.635 | 35.041 | 31.576 | 75             |

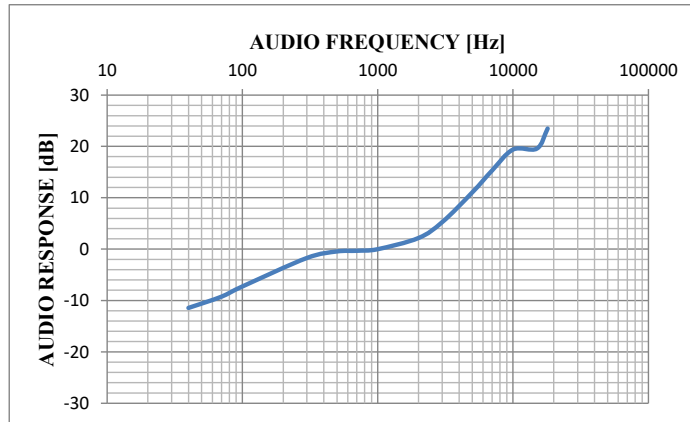


## Modulation Characteristics [Audio Frequency Response]

Report No. 12890237H  
Test place Ise EMC Lab. No.6 Shielded Room  
Date September 15, 2019  
Temperature / Humidity 25 deg. C / 54 % RH  
Engineer Yuta Moriya  
Mode Tx 539.000 MHz

[Power Setting: High]

| AF Frequency<br>[Hz] | AF Level<br>[mV] | AF Response<br>[dB] |
|----------------------|------------------|---------------------|
| 40                   | 68.12            | -11.46              |
| 70                   | 52.90            | -9.26               |
| 100                  | 42.10            | -7.28               |
| 300                  | 22.20            | -1.72               |
| 500                  | 19.20            | -0.46               |
| 700                  | 18.90            | -0.32               |
| 1000                 | 18.21            | 0.00                |
| 2000                 | 14.21            | 2.15                |
| 3000                 | 9.91             | 5.28                |
| 5000                 | 5.11             | 11.04               |
| 7000                 | 3.12             | 15.32               |
| 10000                | 1.95             | 19.41               |
| 15000                | 1.91             | 19.59               |
| 18000                | 1.22             | 23.48               |

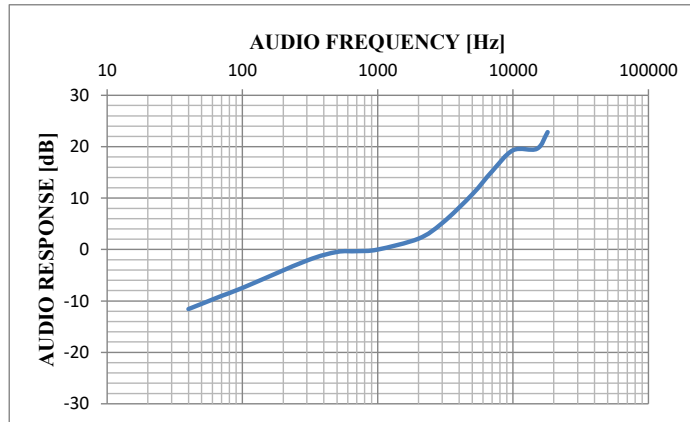


Calculation formula:

$$\text{AF Response} = 20 * \log(\text{AF Level of 1kHz} / \text{AF level})$$

[Power Setting: Low]

| AF Frequency<br>[Hz] | AF Level<br>[mV] | AF Response<br>[dB] |
|----------------------|------------------|---------------------|
| 40                   | 69.32            | -11.56              |
| 70                   | 51.80            | -9.03               |
| 100                  | 43.20            | -7.46               |
| 300                  | 23.40            | -2.13               |
| 500                  | 19.32            | -0.47               |
| 700                  | 18.99            | -0.32               |
| 1000                 | 18.31            | 0.00                |
| 2000                 | 14.32            | 2.13                |
| 3000                 | 10.11            | 5.16                |
| 5000                 | 5.32             | 10.74               |
| 7000                 | 3.18             | 15.21               |
| 10000                | 1.98             | 19.32               |
| 15000                | 1.92             | 19.59               |
| 18000                | 1.32             | 22.84               |



Calculation formula:

$$\text{AF Response} = 20 * \log(\text{AF Level of 1kHz} / \text{AF level})$$

**UL Japan, Inc.**  
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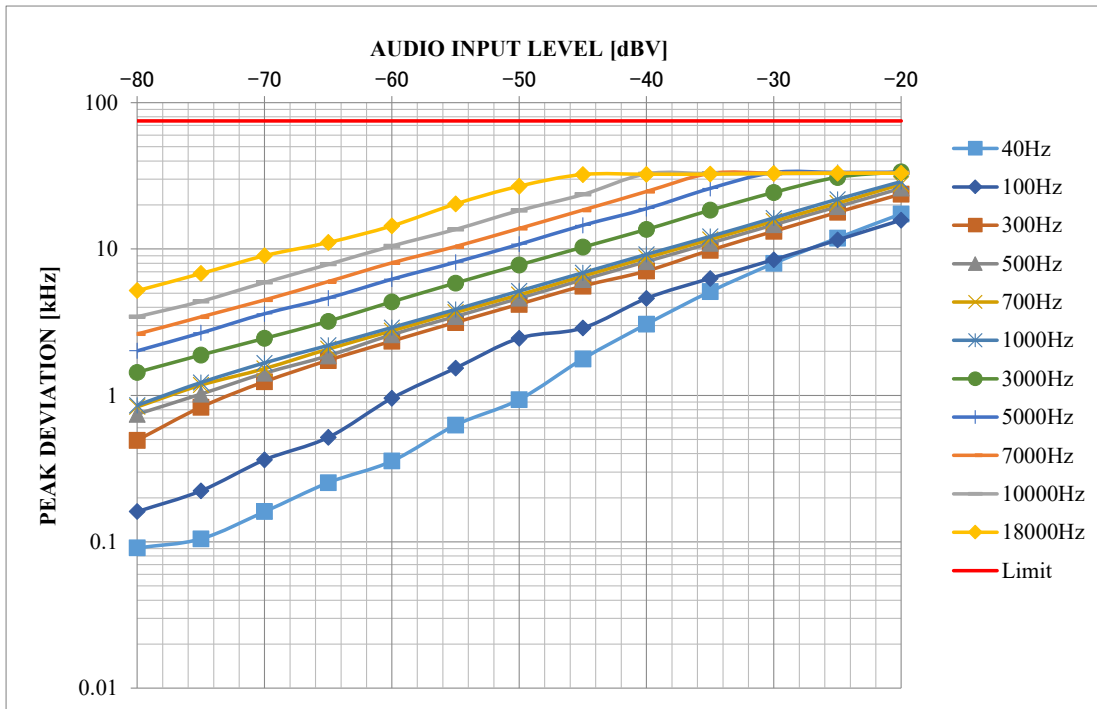


## Modulation Characteristics

### [Deviation versus Audio input level and Audio Frequency]

Report No. 12890237H  
Test place Ise EMC Lab. No.6 Shielded Room  
Date September 15, 2019  
Temperature / Humidity 25 deg. C / 54 % RH  
Engineer Yuta Moriya  
Mode Tx 950.625 MHz, 5 mW

| AF Level<br>[dBV] | AF Frequency [Hz] / Peak Deviation [kHz] |        |        |        |        |        |        |        |        |        |        | Limit<br>[kHz] |
|-------------------|------------------------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|----------------|
|                   | 40                                       | 100    | 300    | 500    | 700    | 1000   | 3000   | 5000   | 7000   | 10000  | 18000  |                |
| -80               | 0.091                                    | 0.161  | 0.494  | 0.744  | 0.838  | 0.858  | 1.438  | 2.018  | 2.628  | 3.458  | 5.209  | 75             |
| -75               | 0.105                                    | 0.223  | 0.831  | 1.020  | 1.178  | 1.225  | 1.888  | 2.678  | 3.438  | 4.399  | 6.808  | 75             |
| -70               | 0.161                                    | 0.363  | 1.240  | 1.417  | 1.528  | 1.669  | 2.454  | 3.618  | 4.498  | 5.922  | 9.018  | 75             |
| -65               | 0.254                                    | 0.517  | 1.735  | 1.866  | 2.078  | 2.199  | 3.210  | 4.629  | 5.995  | 7.872  | 11.102 | 75             |
| -60               | 0.357                                    | 0.957  | 2.349  | 2.600  | 2.767  | 2.910  | 4.360  | 6.228  | 8.065  | 10.513 | 14.407 | 75             |
| -55               | 0.628                                    | 1.538  | 3.148  | 3.465  | 3.697  | 3.872  | 5.850  | 8.136  | 10.405 | 13.643 | 20.347 | 75             |
| -50               | 0.938                                    | 2.458  | 4.194  | 4.617  | 4.881  | 5.166  | 7.780  | 10.797 | 13.852 | 18.356 | 26.907 | 75             |
| -45               | 1.778                                    | 2.888  | 5.584  | 6.171  | 6.548  | 6.888  | 10.300 | 14.537 | 18.475 | 23.624 | 32.294 | 75             |
| -40               | 3.068                                    | 4.599  | 7.074  | 8.210  | 8.732  | 9.199  | 13.604 | 18.886 | 24.719 | 32.701 | 32.434 | 75             |
| -35               | 5.118                                    | 6.300  | 9.810  | 10.963 | 11.645 | 12.179 | 18.407 | 25.976 | 32.853 | 32.784 | 32.494 | 75             |
| -30               | 7.988                                    | 8.461  | 13.203 | 14.672 | 15.531 | 16.332 | 24.353 | 33.336 | 33.036 | 32.833 | 32.887 | 75             |
| -25               | 11.888                                   | 11.531 | 17.803 | 19.498 | 20.621 | 21.892 | 30.853 | 33.393 | 33.094 | 32.999 | 32.990 | 75             |
| -20               | 17.388                                   | 15.756 | 23.730 | 26.018 | 27.771 | 28.932 | 33.679 | 33.439 | 33.098 | 33.011 | 32.989 | 75             |

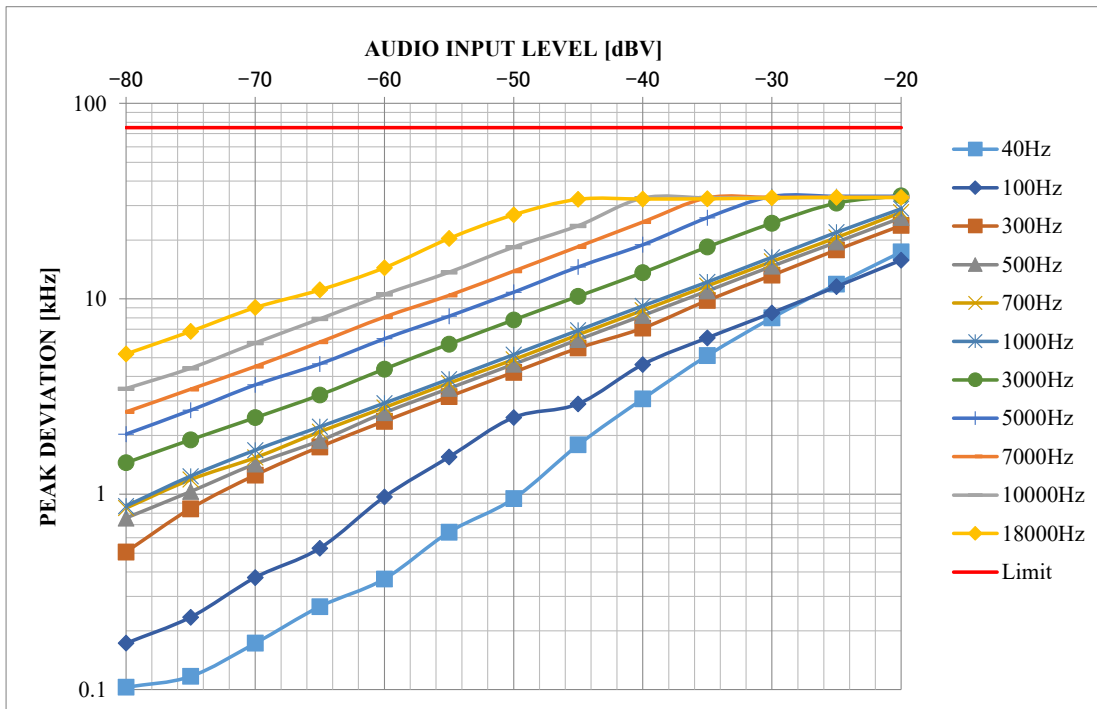


## Modulation Characteristics

### [Deviation versus Audio input level and Audio Frequency]

Report No. 12890237H  
Test place Ise EMC Lab. No.6 Shielded Room  
Date September 15, 2019  
Temperature / Humidity 25 deg. C / 54 % RH  
Engineer Yuta Moriya  
Mode Tx 950.625 MHz, 40 mW

| AF Level<br>[dBV] | AF Frequency [Hz] / Peak Deviation [kHz] |        |        |        |        |        |        |        |        |        |        | Limit<br>[kHz] |
|-------------------|------------------------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|----------------|
|                   | 40                                       | 100    | 300    | 500    | 700    | 1000   | 3000   | 5000   | 7000   | 10000  | 18000  |                |
| -80               | 0.103                                    | 0.173  | 0.506  | 0.756  | 0.850  | 0.870  | 1.450  | 2.030  | 2.640  | 3.470  | 5.221  | 75             |
| -75               | 0.117                                    | 0.235  | 0.843  | 1.032  | 1.190  | 1.237  | 1.900  | 2.690  | 3.450  | 4.411  | 6.820  | 75             |
| -70               | 0.173                                    | 0.375  | 1.252  | 1.429  | 1.540  | 1.681  | 2.466  | 3.630  | 4.510  | 5.934  | 9.030  | 75             |
| -65               | 0.266                                    | 0.529  | 1.747  | 1.878  | 2.090  | 2.211  | 3.222  | 4.641  | 6.007  | 7.884  | 11.114 | 75             |
| -60               | 0.369                                    | 0.969  | 2.361  | 2.612  | 2.779  | 2.922  | 4.372  | 6.240  | 8.077  | 10.525 | 14.419 | 75             |
| -55               | 0.640                                    | 1.550  | 3.160  | 3.477  | 3.709  | 3.884  | 5.862  | 8.148  | 10.417 | 13.655 | 20.359 | 75             |
| -50               | 0.950                                    | 2.470  | 4.206  | 4.629  | 4.893  | 5.178  | 7.792  | 10.809 | 13.864 | 18.368 | 26.919 | 75             |
| -45               | 1.790                                    | 2.900  | 5.596  | 6.183  | 6.560  | 6.900  | 10.312 | 14.549 | 18.487 | 23.636 | 32.306 | 75             |
| -40               | 3.080                                    | 4.611  | 7.086  | 8.222  | 8.744  | 9.211  | 13.616 | 18.898 | 24.731 | 32.713 | 32.446 | 75             |
| -35               | 5.130                                    | 6.312  | 9.822  | 10.975 | 11.657 | 12.191 | 18.419 | 25.988 | 32.865 | 32.796 | 32.506 | 75             |
| -30               | 8.000                                    | 8.473  | 13.215 | 14.684 | 15.543 | 16.344 | 24.365 | 33.348 | 33.048 | 32.845 | 32.899 | 75             |
| -25               | 11.900                                   | 11.543 | 17.815 | 19.510 | 20.633 | 21.904 | 30.865 | 33.405 | 33.106 | 33.011 | 33.002 | 75             |
| -20               | 17.400                                   | 15.768 | 23.742 | 26.030 | 27.783 | 28.944 | 33.691 | 33.451 | 33.110 | 33.023 | 33.001 | 75             |



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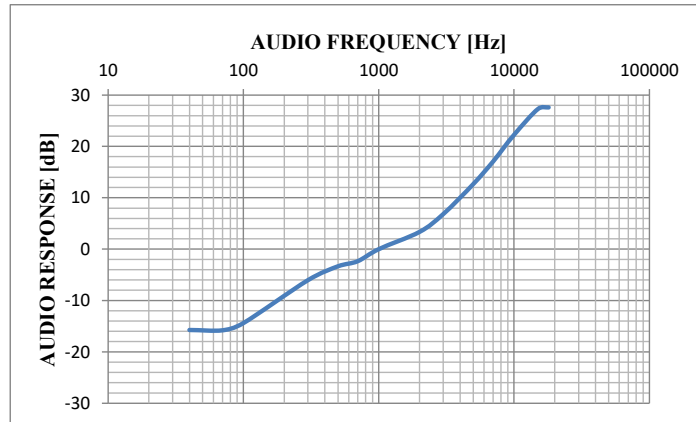
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Facsimile : +81 596 24 8124

## Modulation Characteristics [Audio Frequency Response]

Report No. 12890237H  
Test place Ise EMC Lab. No.6 Shielded Room  
Date September 15, 2019  
Temperature / Humidity 25 deg. C / 54 % RH  
Engineer Yuta Moriya  
Mode Tx 950.625 MHz

[Power Setting: High]

| AF Frequency<br>[Hz] | AF Level<br>[mV] | AF Response<br>[dB] |
|----------------------|------------------|---------------------|
| 40                   | 280.00           | -15.74              |
| 70                   | 282.00           | -15.80              |
| 100                  | 240.10           | -14.41              |
| 300                  | 91.80            | -6.05               |
| 500                  | 67.30            | -3.36               |
| 700                  | 59.80            | -2.33               |
| 1000                 | 45.72            | 0.00                |
| 2000                 | 31.10            | 3.35                |
| 3000                 | 20.80            | 6.84                |
| 5000                 | 10.61            | 12.69               |
| 7000                 | 6.40             | 17.08               |
| 10000                | 3.51             | 22.30               |
| 15000                | 1.97             | 27.31               |
| 18000                | 1.90             | 27.62               |

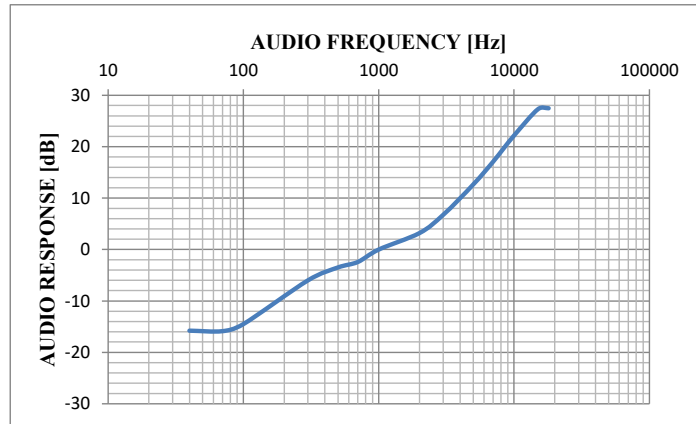


Calculation formula:

$$\text{AF Response} = 20 * \log(\text{AF Level of 1kHz} / \text{AF level})$$

[Power Setting: Low]

| AF Frequency<br>[Hz] | AF Level<br>[mV] | AF Response<br>[dB] |
|----------------------|------------------|---------------------|
| 40                   | 278.30           | -15.79              |
| 70                   | 281.20           | -15.88              |
| 100                  | 239.80           | -14.49              |
| 300                  | 90.10            | -5.99               |
| 500                  | 67.44            | -3.48               |
| 700                  | 59.70            | -2.42               |
| 1000                 | 45.20            | 0.00                |
| 2000                 | 31.23            | 3.21                |
| 3000                 | 20.74            | 6.77                |
| 5000                 | 10.53            | 12.65               |
| 7000                 | 6.32             | 17.09               |
| 10000                | 3.52             | 22.17               |
| 15000                | 1.95             | 27.30               |
| 18000                | 1.91             | 27.48               |



Calculation formula:

$$\text{AF Response} = 20 * \log(\text{AF Level of 1kHz} / \text{AF level})$$

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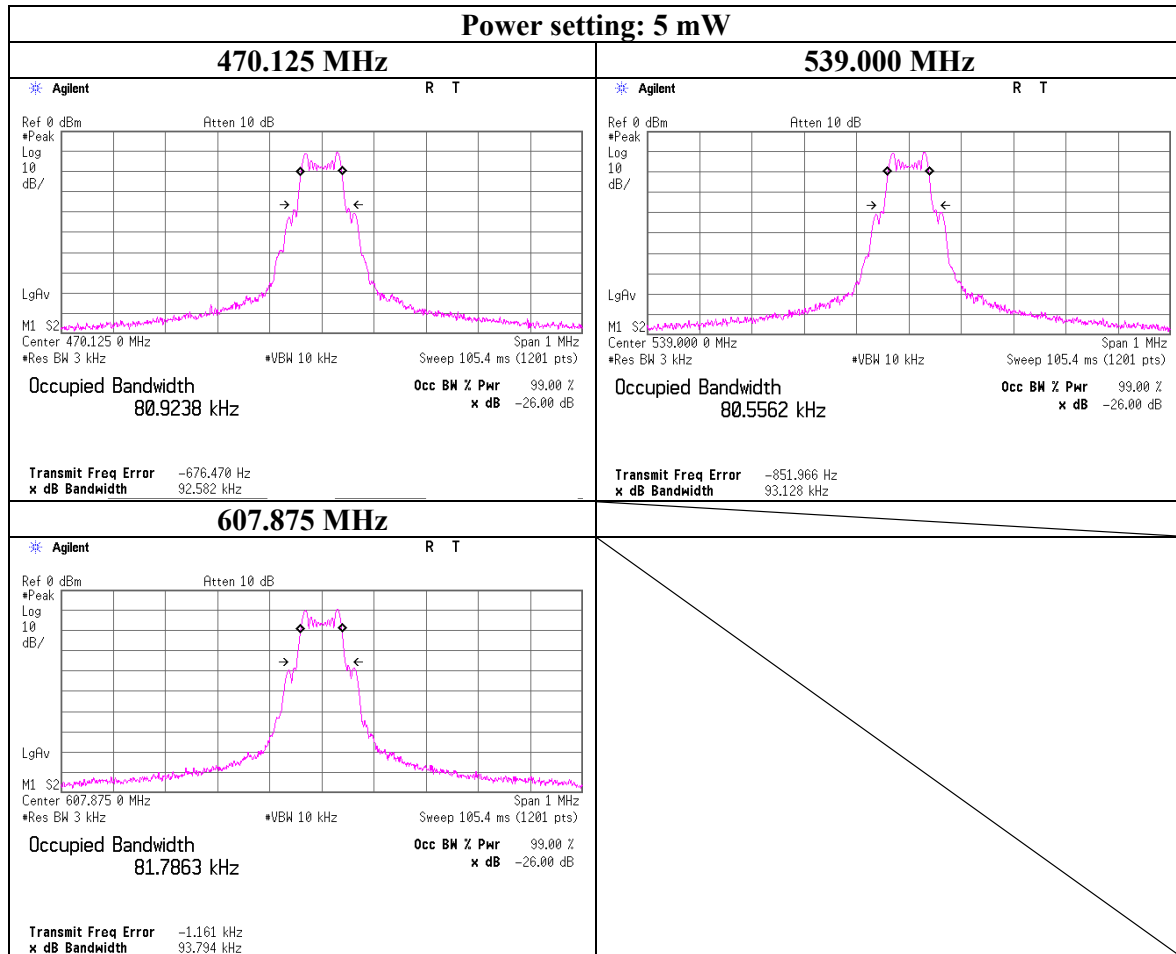
### **Occupied Bandwidth**

Report No. 12890237H  
Test place Ise EMC Lab. No.6 Measurement Room  
Date August 26, 2019  
Temperature/ Humidity 25 deg. C / 49 % RH  
Engineer Akihiko Maeda  
Mode Tx (470.125 MHz – 607.875 MHz)

| Power Setting | Channel | Freq.<br>[MHz] | 99% Occupied Bandwidth<br>[kHz] | Limit<br>[kHz] | Margin<br>[kHz] |
|---------------|---------|----------------|---------------------------------|----------------|-----------------|
| 5 mW          | Low     | 470.125        | 80.9238                         | 200            | 119.0762        |
|               | Mid     | 539.000        | 80.5562                         | 200            | 119.4438        |
|               | High    | 607.875        | 81.7863                         | 200            | 118.2137        |
| 40 mW         | Low     | 470.125        | 80.9020                         | 200            | 119.0980        |
|               | Mid     | 539.000        | 80.6056                         | 200            | 119.3944        |
|               | High    | 607.875        | 81.8148                         | 200            | 118.1852        |

## Occupied Bandwidth

Report No. 12890237H  
Test place Ise EMC Lab. No.6 Measurement Room  
Date August 26, 2019  
Temperature/ Humidity 25 deg. C / 49 % RH  
Engineer Akihiko Maeda  
Mode Tx (470.125 MHz – 607.875 MHz)

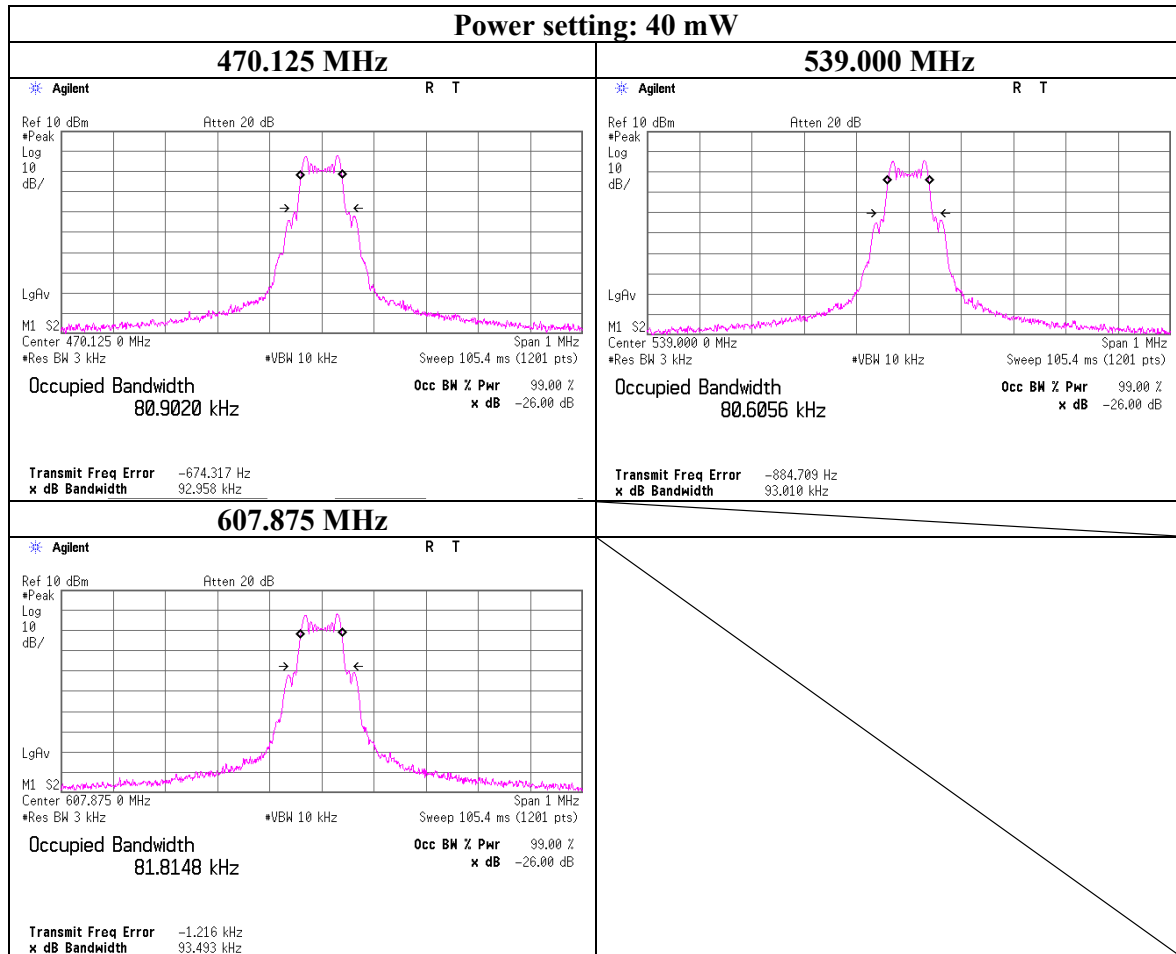


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## Occupied Bandwidth

Report No. 12890237H  
Test place Ise EMC Lab. No.6 Measurement Room  
Date August 26, 2019  
Temperature/ Humidity 25 deg. C / 49 % RH  
Engineer Akihiko Maeda  
Mode Tx (470.125 MHz – 607.875 MHz)



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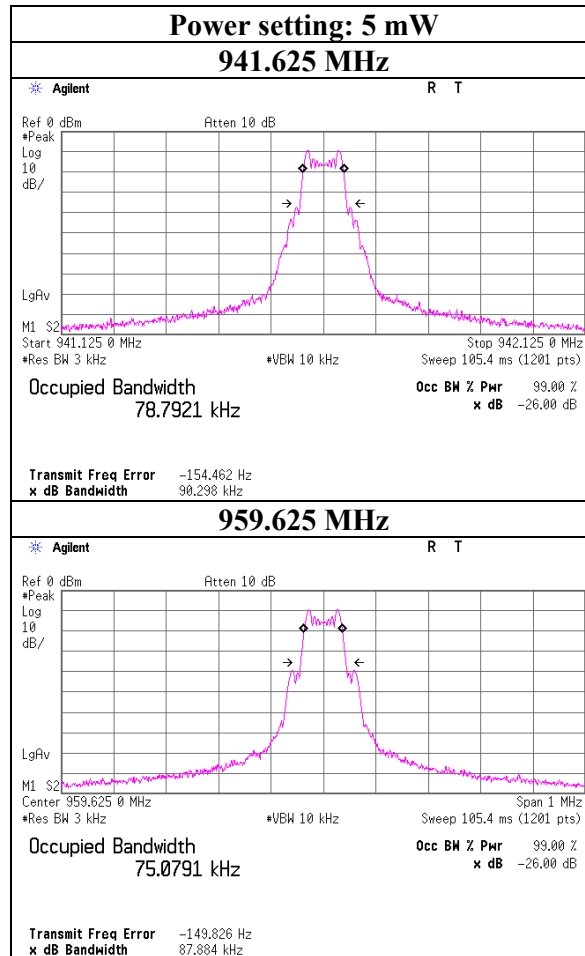
### Occupied Bandwidth

Report No. 12890237H  
Test place Ise EMC Lab. No.6 Measurement Room  
Date August 26, 2019  
Temperature/ Humidity 25 deg. C / 49 % RH  
Engineer Akihiko Maeda  
Mode Tx (941.625 MHz – 959.625 MHz)

| Power Setting | Frequency [MHz] | Bandwidth [kHz] | Frequency Error [Hz] | Result [MHz] | Limit [MHz] |
|---------------|-----------------|-----------------|----------------------|--------------|-------------|
| 5 mW          | 941.625         | 78.7921         | -154.462             | 941.5854     | > 941.5     |
|               | 959.625         | 75.0791         | -149.826             | 959.6624     | < 959.85    |
| 40 mW         | 941.625         | 78.7578         | -140.985             | 941.5855     | > 941.5     |
|               | 959.625         | 75.0986         | -167.594             | 959.6624     | < 959.85    |

## Occupied Bandwidth

Report No. 12890237H  
Test place Ise EMC Lab. No.6 Measurement Room  
Date August 26, 2019  
Temperature/ Humidity 25 deg. C / 49 % RH  
Engineer Akihiko Maeda  
Mode Tx (941.625 MHz – 959.625 MHz)



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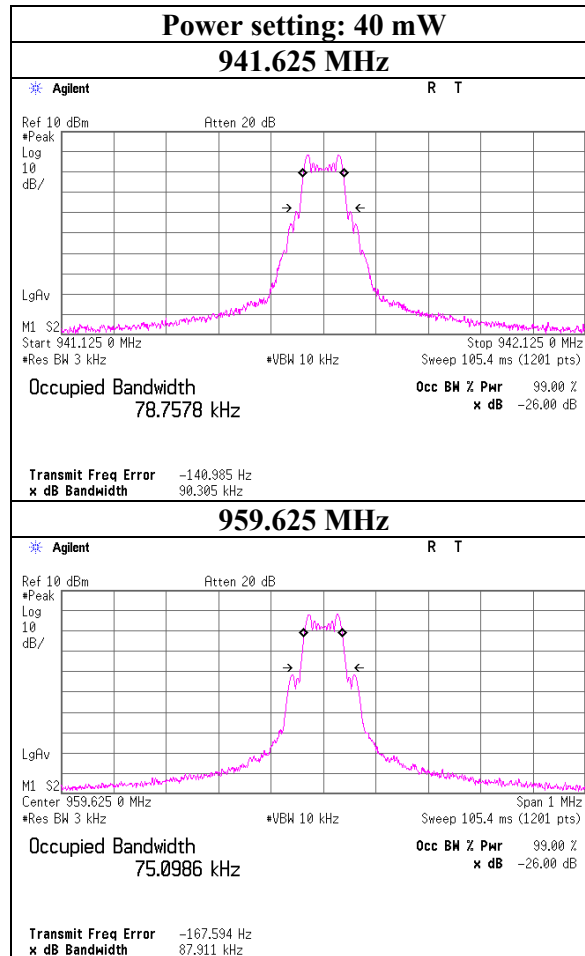
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## Occupied Bandwidth

Report No. 12890237H  
Test place Ise EMC Lab. No.6 Measurement Room  
Date August 26, 2019  
Temperature/ Humidity 25 deg. C / 49 % RH  
Engineer Akihiko Maeda  
Mode Tx (941.625 MHz – 959.625 MHz)



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### Spurious emissions at antenna terminals

Report No. 12890237H  
Test place Ise EMC Lab. No.6 Measurement Room  
Date August 26, 2019  
Temperature/ Humidity 25 deg. C / 49 % RH  
Engineer Akihiko Maeda  
Mode Tx (470.125 MHz – 607.875 MHz)

| Power Setting | Channel | Tested Freq. [MHz] | Reading     |             | Cable Loss [dB] | Atten. Loss [dB] | Result [dBm] | Limit [dBm] | Margin [dB] |
|---------------|---------|--------------------|-------------|-------------|-----------------|------------------|--------------|-------------|-------------|
|               |         |                    | Freq. [MHz] | Level [dBm] |                 |                  |              |             |             |
| 5 mW          | Low     | 470.125            | 0.01206     | -75.38      | 0.10            | 9.84             | -65.44       | -13         | 52.44       |
|               |         |                    | 0.523       | -91.49      | 0.11            | 9.81             | -81.57       | -13         | 68.57       |
|               |         |                    | 940.2       | -70.17      | 1.00            | 9.90             | -59.27       | -13         | 46.27       |
|               |         |                    | 3117        | -68.38      | 1.25            | 10.02            | -57.11       | -13         | 44.11       |
|               | Mid     | 539.000            | 0.01206     | -74.96      | 0.10            | 9.84             | -65.02       | -13         | 52.02       |
|               |         |                    | 0.15        | -89.15      | 0.11            | 9.81             | -79.23       | -13         | 66.23       |
|               |         |                    | 606.3       | -73.97      | 0.82            | 9.88             | -63.27       | -13         | 50.27       |
|               |         |                    | 1078.75     | -65.07      | 0.79            | 9.99             | -54.29       | -13         | 41.29       |
|               | High    | 607.875            | 0.01206     | -75.31      | 0.10            | 9.84             | -65.37       | -13         | 52.37       |
|               |         |                    | 0.2         | -90.19      | 0.11            | 9.81             | -80.27       | -13         | 67.27       |
|               |         |                    | 853.7       | -82.12      | 0.82            | 9.88             | -71.42       | -13         | 58.42       |
|               |         |                    | 1949        | -64.28      | 1.02            | 9.98             | -53.28       | -13         | 40.28       |
| 40 mW         | Low     | 470.125            | 0.01206     | -75.43      | 0.10            | 9.84             | -65.49       | -13         | 52.49       |
|               |         |                    | 0.15        | -89.25      | 0.11            | 9.81             | -79.33       | -13         | 66.33       |
|               |         |                    | 940.2       | -63.90      | 1.00            | 9.90             | -53.00       | -13         | 40.00       |
|               |         |                    | 3077        | -59.17      | 1.25            | 10.02            | -47.90       | -13         | 34.90       |
|               | Mid     | 539.000            | 0.01206     | -75.26      | 0.10            | 9.84             | -65.32       | -13         | 52.32       |
|               |         |                    | 0.15        | -89.74      | 0.11            | 9.81             | -79.82       | -13         | 66.82       |
|               |         |                    | 374.4       | -71.38      | 0.76            | 9.86             | -60.76       | -13         | 47.76       |
|               |         |                    | 1078.75     | -58.41      | 0.79            | 9.99             | -47.63       | -13         | 34.63       |
|               | High    | 607.875            | 0.01206     | -75.18      | 0.10            | 9.84             | -65.24       | -13         | 52.24       |
|               |         |                    | 0.175       | -90.65      | 0.11            | 9.81             | -80.73       | -13         | 67.73       |
|               |         |                    | 444.7       | -71.99      | 0.85            | 9.87             | -61.27       | -13         | 48.27       |
|               |         |                    | 3131        | -58.76      | 1.26            | 10.02            | -47.48       | -13         | 34.48       |

Calculation formula:

Result = Reading + Cable Loss + Attenuator Loss

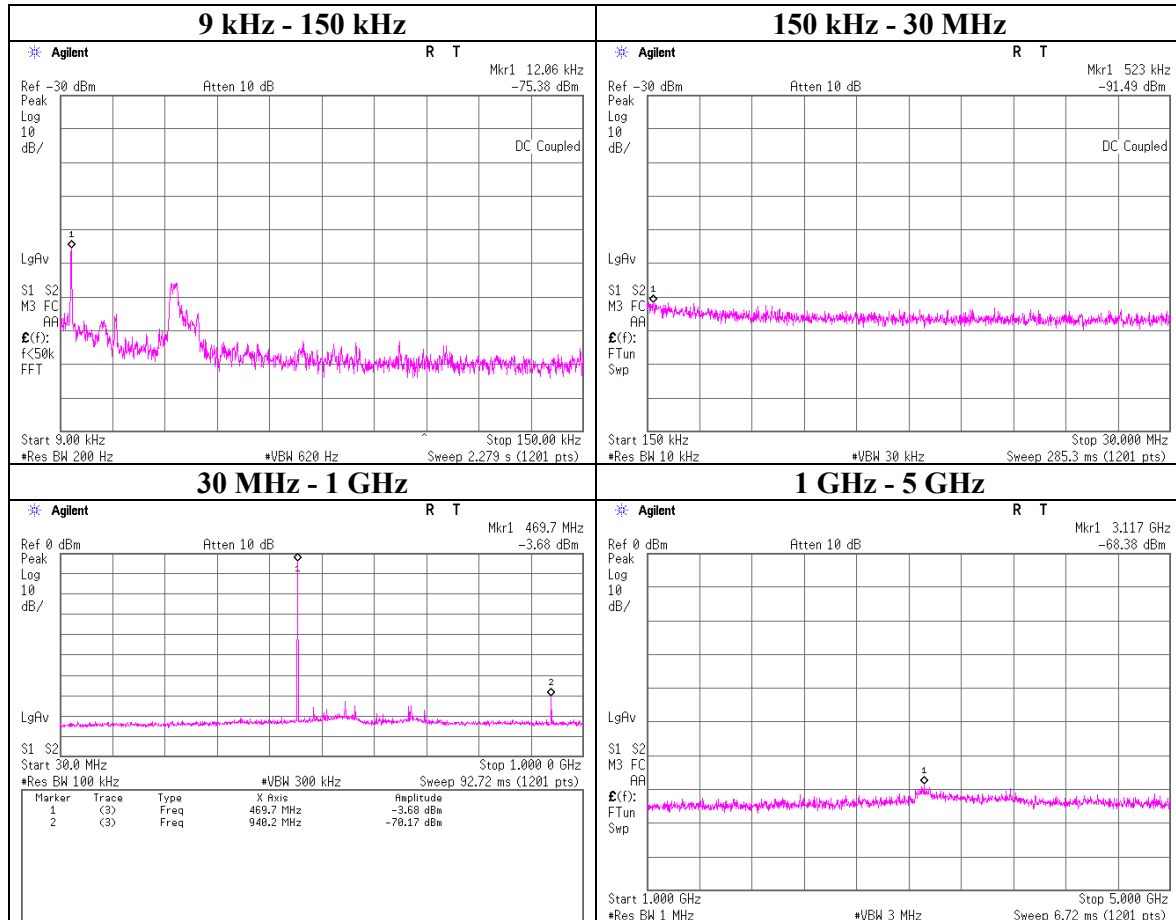
Limit = mean output power in dBm - (43+10log<sub>10</sub> (mean output power in watts)) dB = -13dBm

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## Spurious emissions at antenna terminals

Report No. 12890237H  
Test place Ise EMC Lab. No.6 Measurement Room  
Date August 26, 2019  
Temperature/ Humidity 25 deg. C / 49 % RH  
Engineer Akihiko Maeda  
Mode Tx 470.125 MHz, 5 mW



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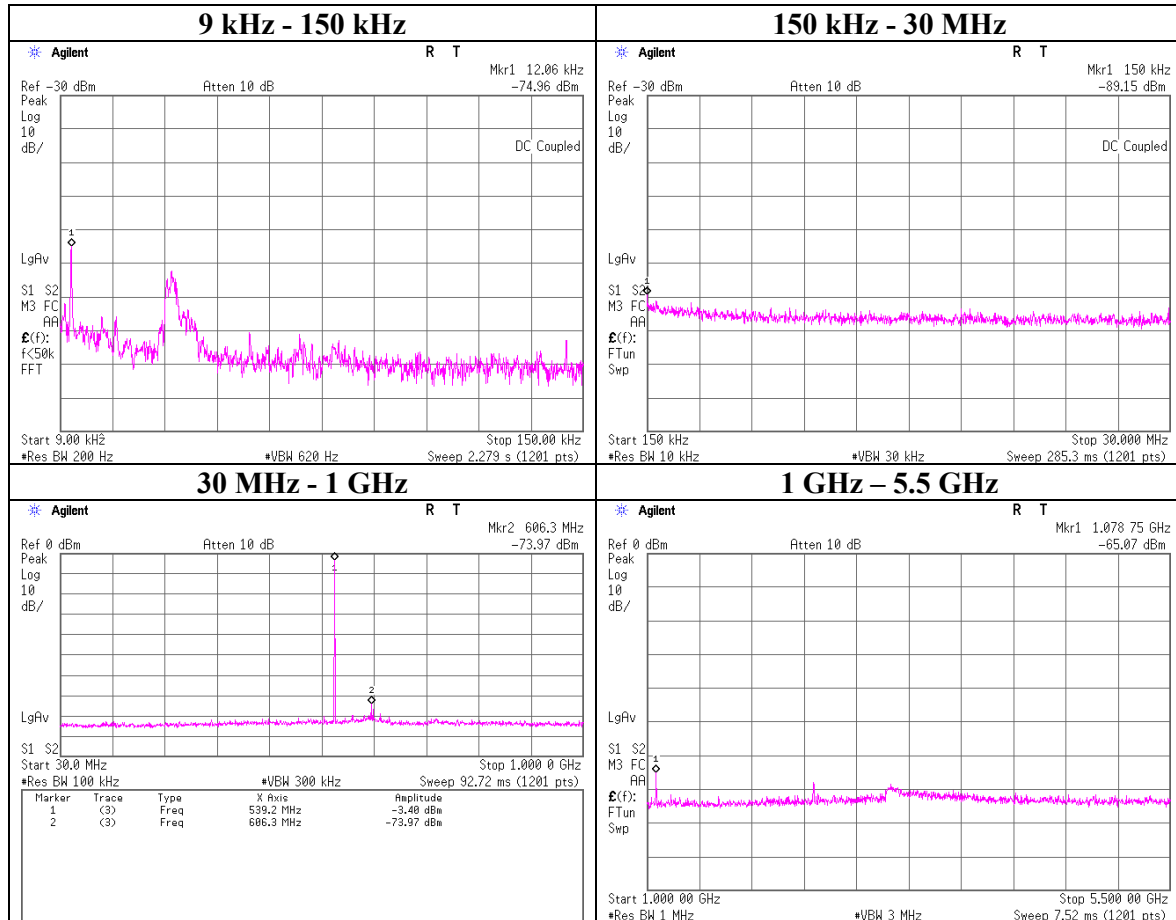
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## Spurious emissions at antenna terminals

Report No. 12890237H  
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Date August 26, 2019  
Temperature/ Humidity 25 deg. C / 49 % RH  
Engineer Akihiko Maeda  
Mode Tx 539.000 MHz, 5 mW



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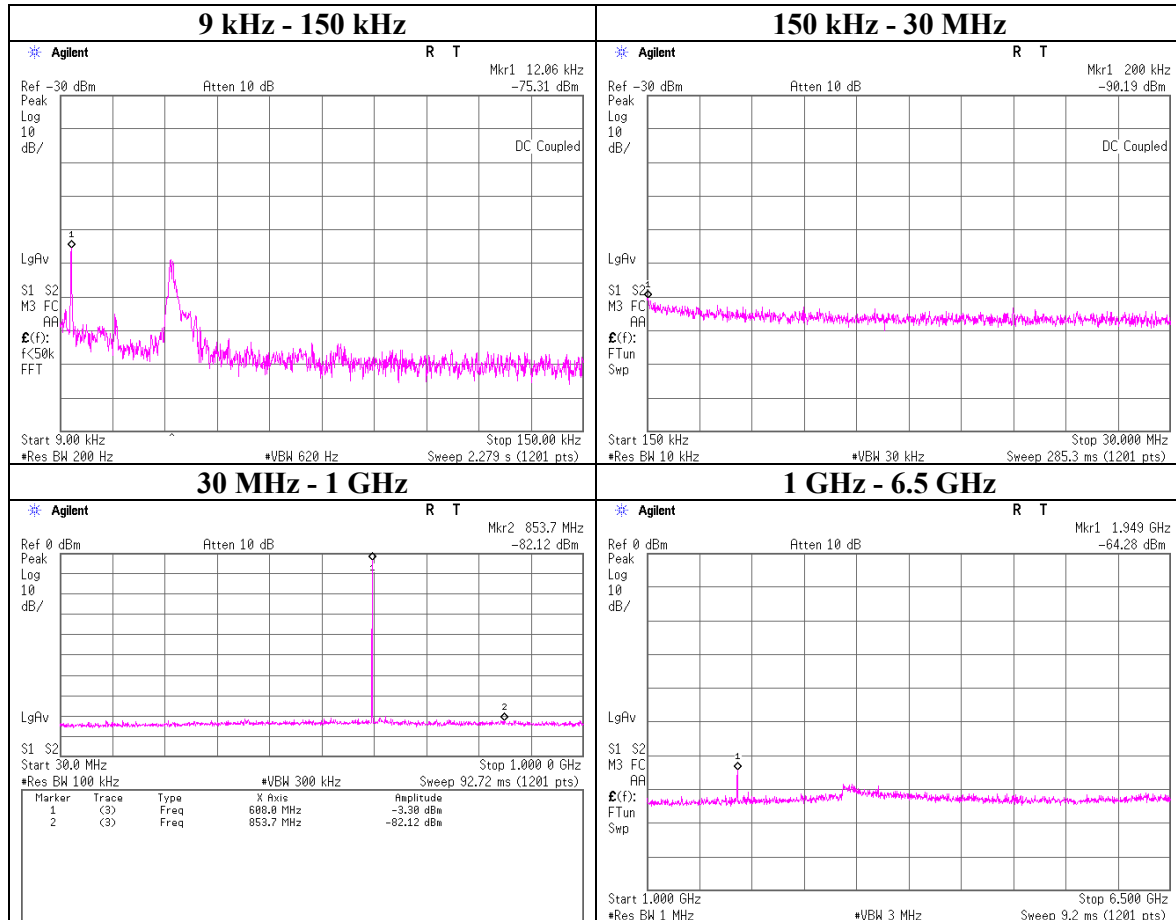
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## Spurious emissions at antenna terminals

Report No. 12890237H  
Test place Ise EMC Lab. No.6 Measurement Room  
Date August 26, 2019  
Temperature/ Humidity 25 deg. C / 49 % RH  
Engineer Akihiko Maeda  
Mode Tx 607.875 MHz, 5 mW

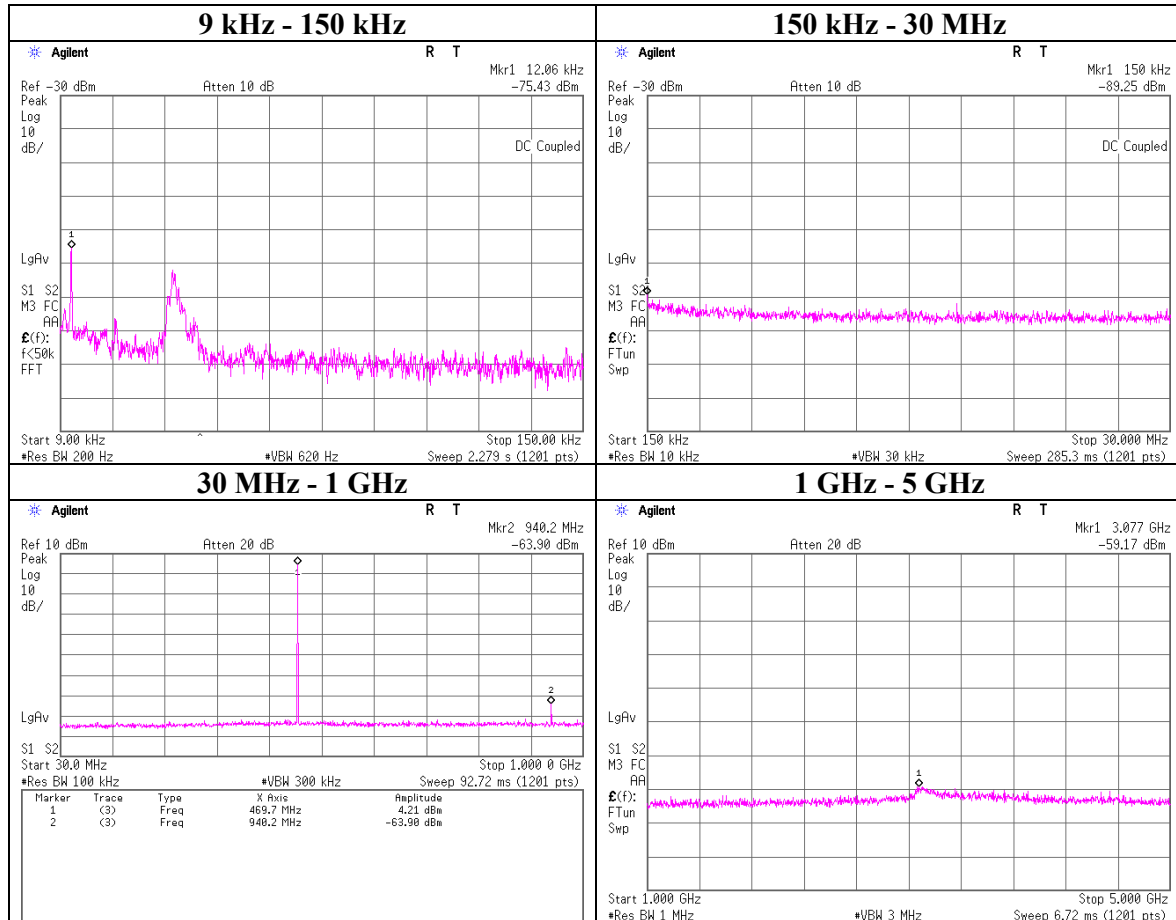


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## Spurious emissions at antenna terminals

Report No. 12890237H  
Test place Ise EMC Lab. No.6 Measurement Room  
Date August 26, 2019  
Temperature/ Humidity 25 deg. C / 49 % RH  
Engineer Akihiko Maeda  
Mode Tx 470.125 MHz, 40 mW

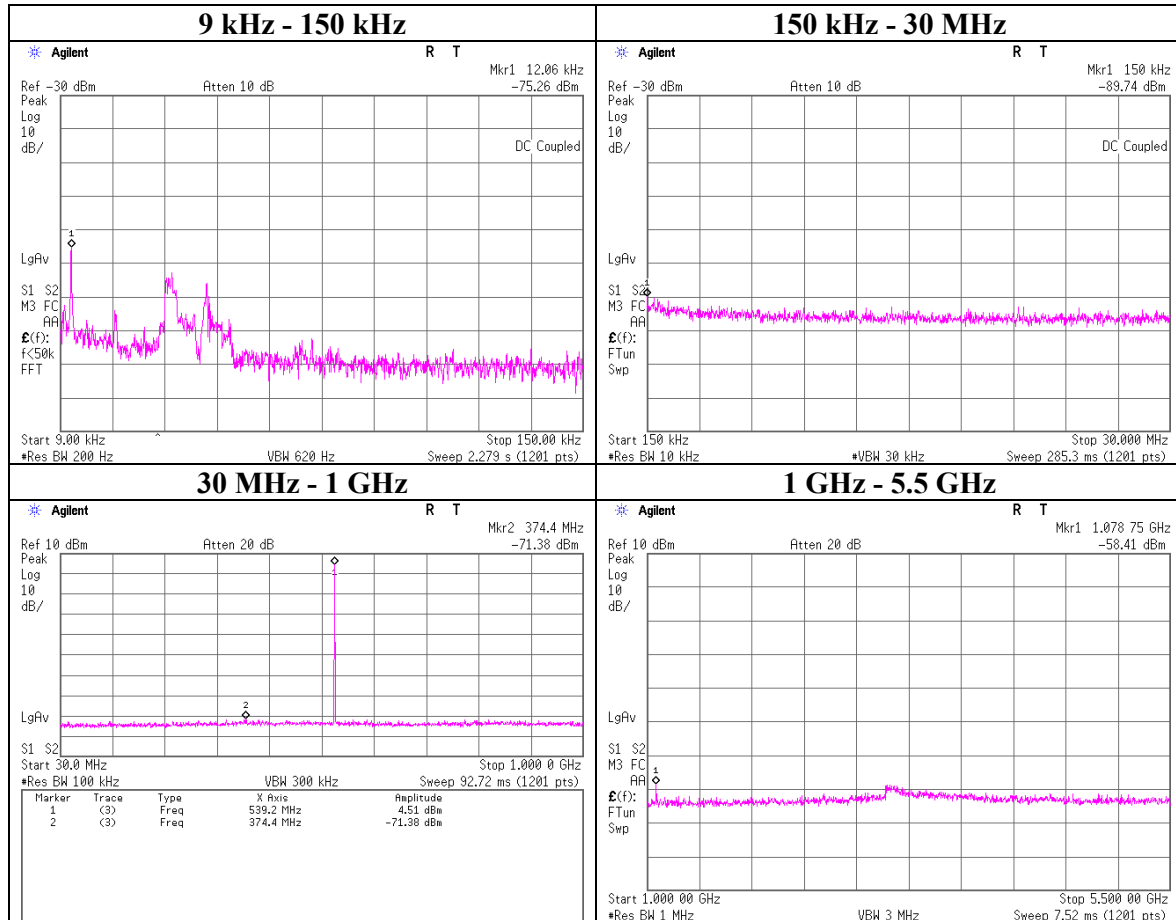


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## Spurious emissions at antenna terminals

Report No. 12890237H  
Test place Ise EMC Lab. No.6 Measurement Room  
Date August 26, 2019  
Temperature/ Humidity 25 deg. C / 49 % RH  
Engineer Akihiko Maeda  
Mode Tx 539.000 MHz, 40 mW



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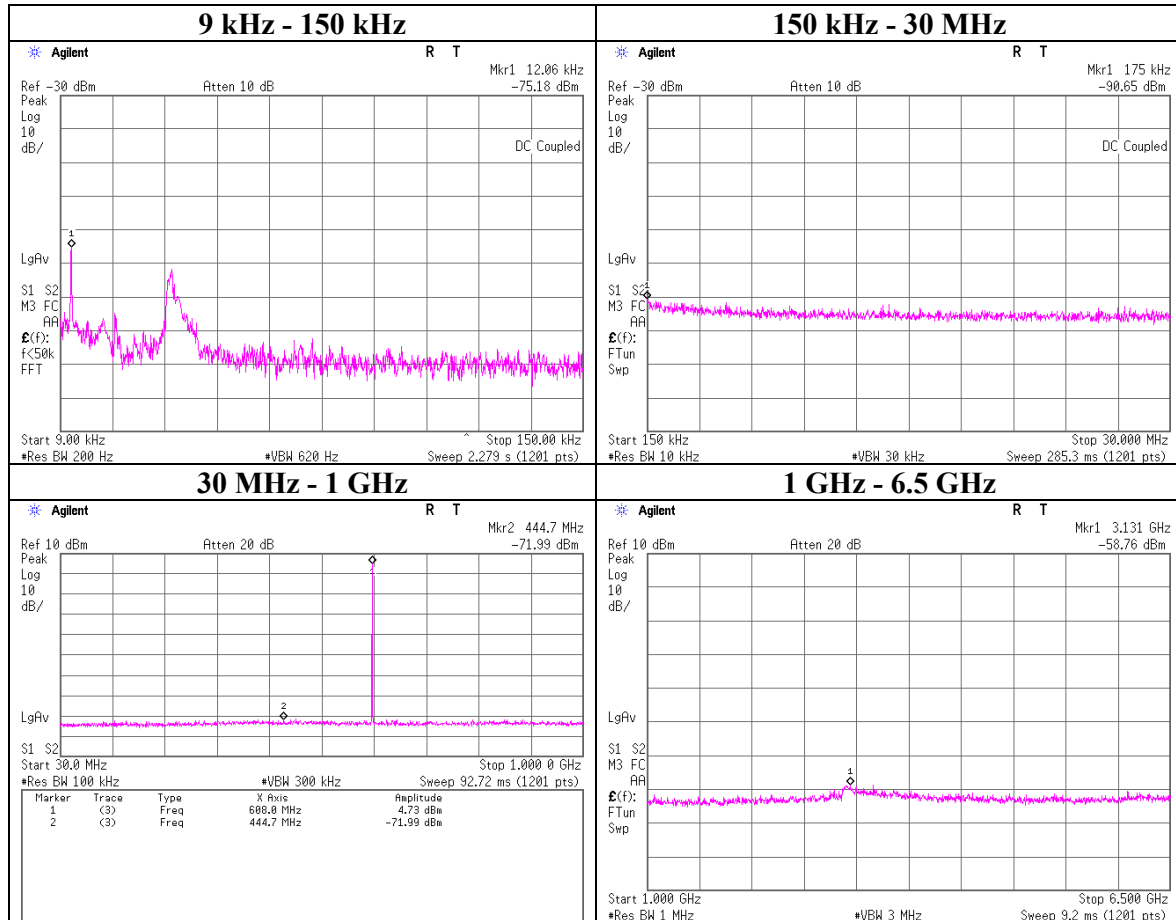
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## Spurious emissions at antenna terminals

Report No. 12890237H  
Test place Ise EMC Lab. No.6 Measurement Room  
Date August 26, 2019  
Temperature/ Humidity 25 deg. C / 49 % RH  
Engineer Akihiko Maeda  
Mode Tx 607.875 MHz, 40 mW



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### Spurious emissions at antenna terminals

Report No. 12890237H  
Test place Ise EMC Lab. No.6 Measurement Room  
Date August 26, 2019  
Temperature/ Humidity 25 deg. C / 49 % RH  
Engineer Akihiko Maeda  
Mode Tx (941.625 MHz – 959.625 MHz)

| Power Setting | Channel | Tested Freq. [MHz] | Reading     |             | Cable Loss [dB] | Atten. Loss [dB] | Result [dBm] | Limit [dBm] | Margin [dB] |
|---------------|---------|--------------------|-------------|-------------|-----------------|------------------|--------------|-------------|-------------|
|               |         |                    | Freq. [MHz] | Level [dBm] |                 |                  |              |             |             |
| 5 mW          | Low     | 941.625            | 0.01206     | -73.22      | 0.10            | 9.84             | -63.28       | -13         | 50.28       |
|               |         |                    | 0.25        | -91.35      | 0.11            | 9.81             | -81.43       | -13         | 68.43       |
|               |         |                    | 366.3       | -81.91      | 0.74            | 9.86             | -71.31       | -13         | 58.31       |
|               |         |                    | 1953        | -68.21      | 0.10            | 9.98             | -58.13       | -13         | 45.13       |
|               |         |                    | 6638        | -68.10      | 1.82            | 10.08            | -56.20       | -13         | 43.20       |
|               | Mid     | 950.625            | 0.01206     | -73.06      | 0.10            | 9.84             | -63.12       | -13         | 50.12       |
|               |         |                    | 0.225       | -88.89      | 0.11            | 9.81             | -78.97       | -13         | 65.97       |
|               |         |                    | 421.2       | -82.46      | 0.83            | 9.87             | -71.76       | -13         | 58.76       |
|               |         |                    | 1943        | -65.33      | 1.02            | 9.98             | -54.33       | -13         | 41.33       |
|               |         |                    | 8758        | -68.23      | 2.14            | 10.16            | -55.93       | -13         | 42.93       |
|               | High    | 959.625            | 0.01206     | -72.78      | 0.10            | 9.84             | -62.84       | -13         | 49.84       |
|               |         |                    | 0.2         | -90.28      | 0.11            | 9.81             | -80.36       | -13         | 67.36       |
|               |         |                    | 404.3       | -82.41      | 0.81            | 9.86             | -71.74       | -13         | 58.74       |
|               |         |                    | 1943        | -67.17      | 1.02            | 9.98             | -56.17       | -13         | 43.17       |
|               |         |                    | 7871        | -68.24      | 2.14            | 10.16            | -55.94       | -13         | 42.94       |
| 40 mW         | Low     | 941.625            | 0.01206     | -72.77      | 0.10            | 9.84             | -62.83       | -13         | 49.83       |
|               |         |                    | 0.15        | -89.74      | 0.11            | 9.81             | -79.82       | -13         | 66.82       |
|               |         |                    | 717.1       | -71.48      | 0.85            | 9.89             | -60.74       | -13         | 47.74       |
|               |         |                    | 3103        | -59.08      | 1.25            | 10.02            | -47.81       | -13         | 34.81       |
|               |         |                    | 7321        | -58.20      | 1.92            | 10.10            | -46.18       | -13         | 33.18       |
|               | Mid     | 950.625            | 0.01206     | -73.45      | 0.10            | 9.84             | -63.51       | -13         | 50.51       |
|               |         |                    | 0.797       | -90.25      | 0.12            | 9.81             | -80.32       | -13         | 67.32       |
|               |         |                    | 636.2       | -72.97      | 0.82            | 9.88             | -62.27       | -13         | 49.27       |
|               |         |                    | 3183        | -58.89      | 1.27            | 10.03            | -47.59       | -13         | 34.59       |
|               |         |                    | 8546        | -58.27      | 2.11            | 10.15            | -46.01       | -13         | 33.01       |
|               | High    | 959.625            | 0.01206     | -72.35      | 0.10            | 9.84             | -62.41       | -13         | 49.41       |
|               |         |                    | 0.15        | -90.27      | 0.11            | 9.81             | -80.35       | -13         | 67.35       |
|               |         |                    | 432.6       | -71.45      | 0.84            | 9.87             | -60.74       | -13         | 47.74       |
|               |         |                    | 1920        | -61.04      | 1.01            | 9.99             | -50.04       | -13         | 37.04       |
|               |         |                    | 7300        | -58.28      | 1.91            | 10.10            | -46.27       | -13         | 33.27       |

Calculation formula:

Result = Reading + Cable Loss + Attenuator Loss

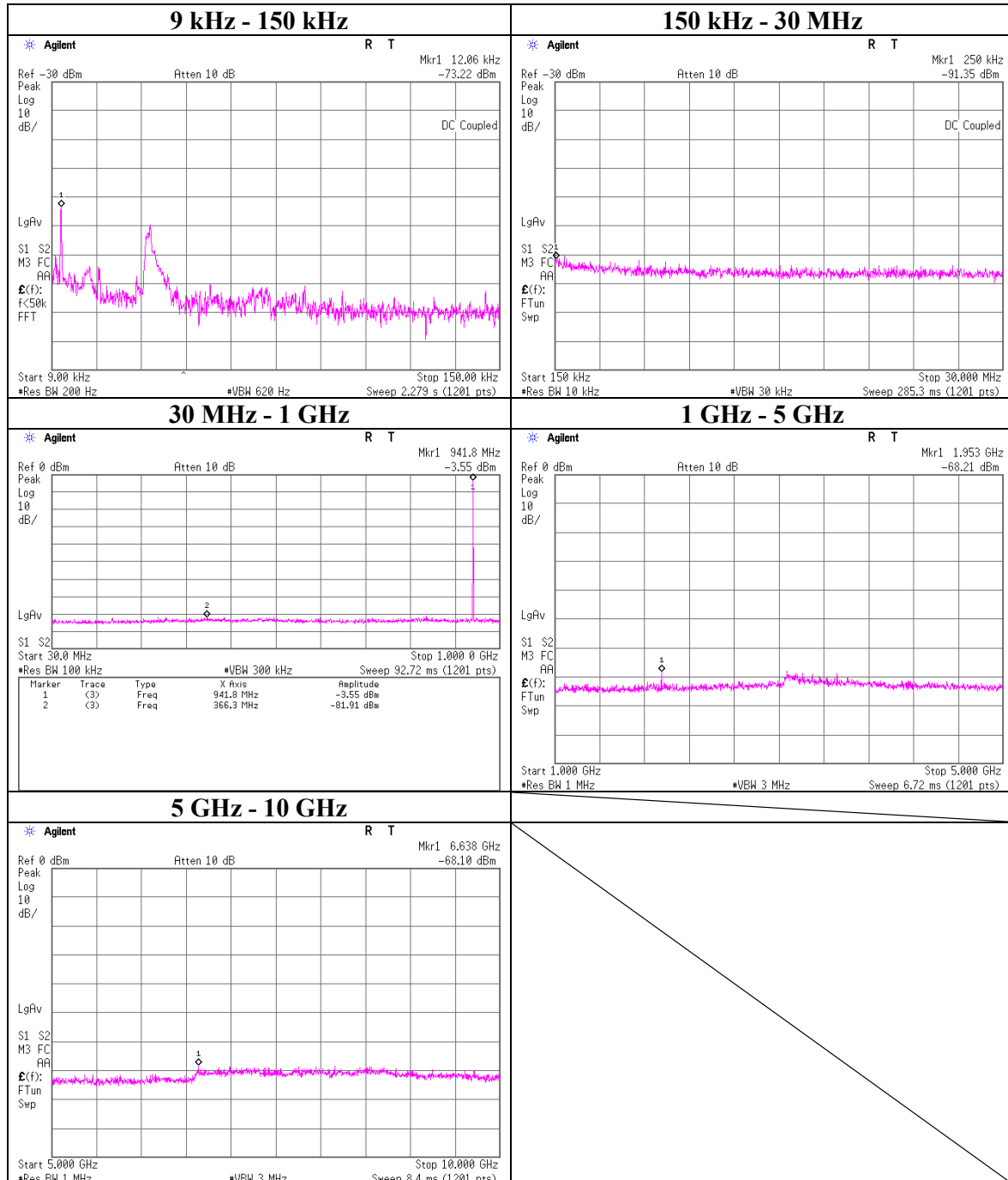
Limit = mean output power in dBm - (43+10log<sub>10</sub> (mean output power in watts)) dB = -13dBm

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## Spurious emissions at antenna terminals

Report No. 12890237H  
Test place Ise EMC Lab. No.6 Measurement Room  
Date August 26, 2019  
Temperature/ Humidity 25 deg. C / 49 % RH  
Engineer Akihiko Maeda  
Mode Tx 941.625 MHz, 5 mW



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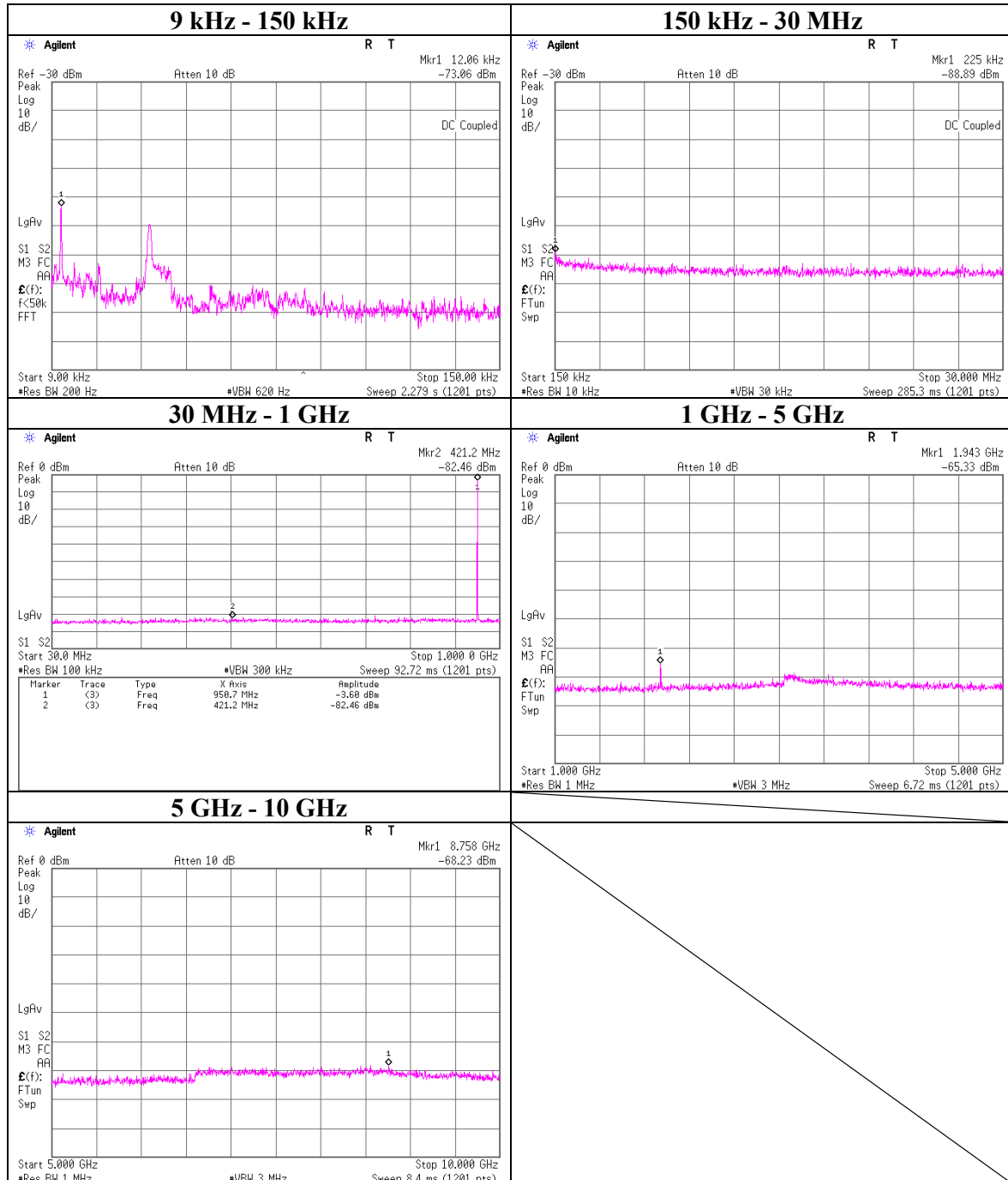
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## Spurious emissions at antenna terminals

Report No. 12890237H  
Test place Ise EMC Lab. No.6 Measurement Room  
Date August 26, 2019  
Temperature/ Humidity 25 deg. C / 49 % RH  
Engineer Akihiko Maeda  
Mode Tx 950.625 MHz, 5 mW



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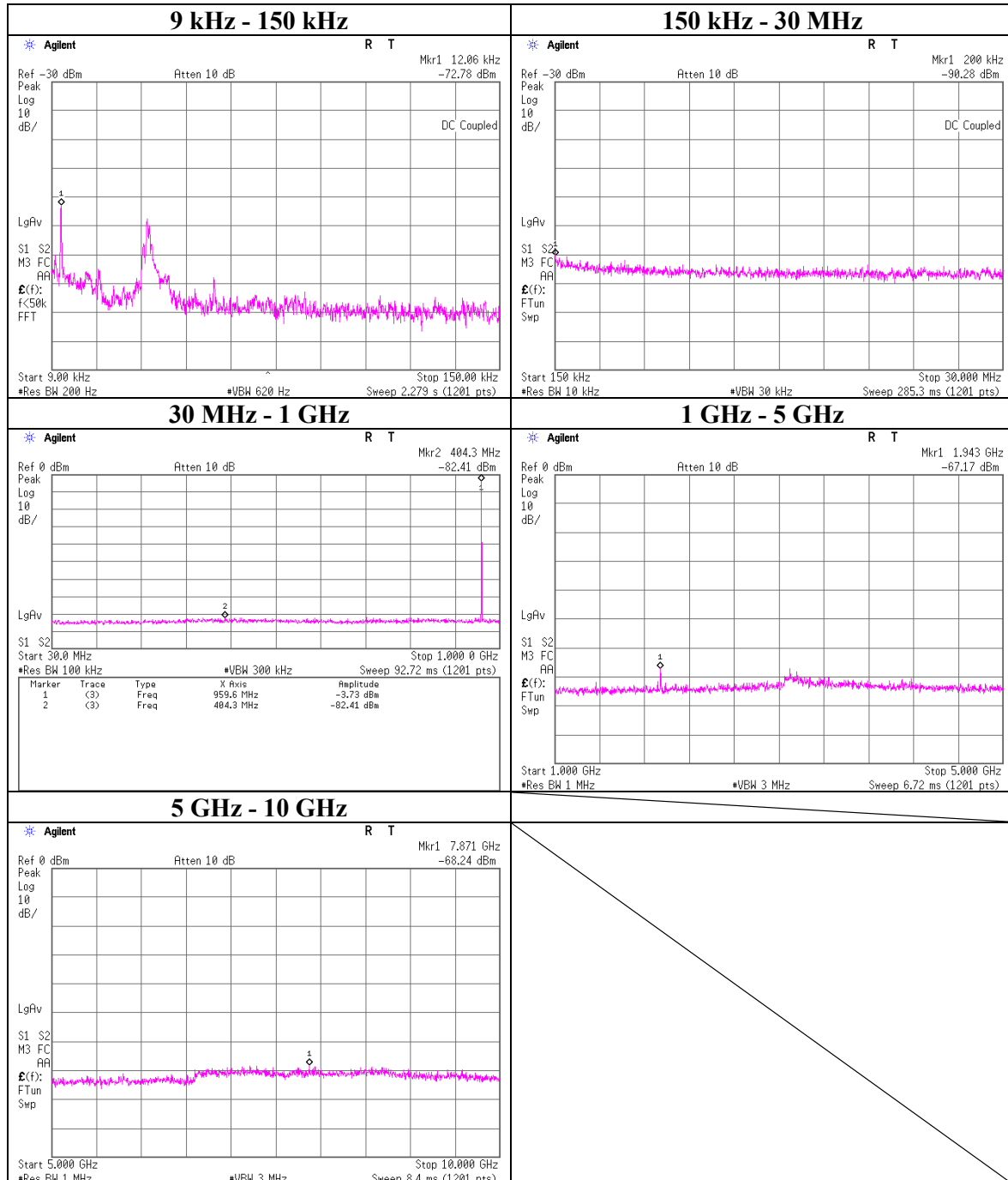
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## Spurious emissions at antenna terminals

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Temperature/ Humidity 25 deg. C / 49 % RH  
Engineer Akihiko Maeda  
Mode Tx 959.625 MHz, 5 mW



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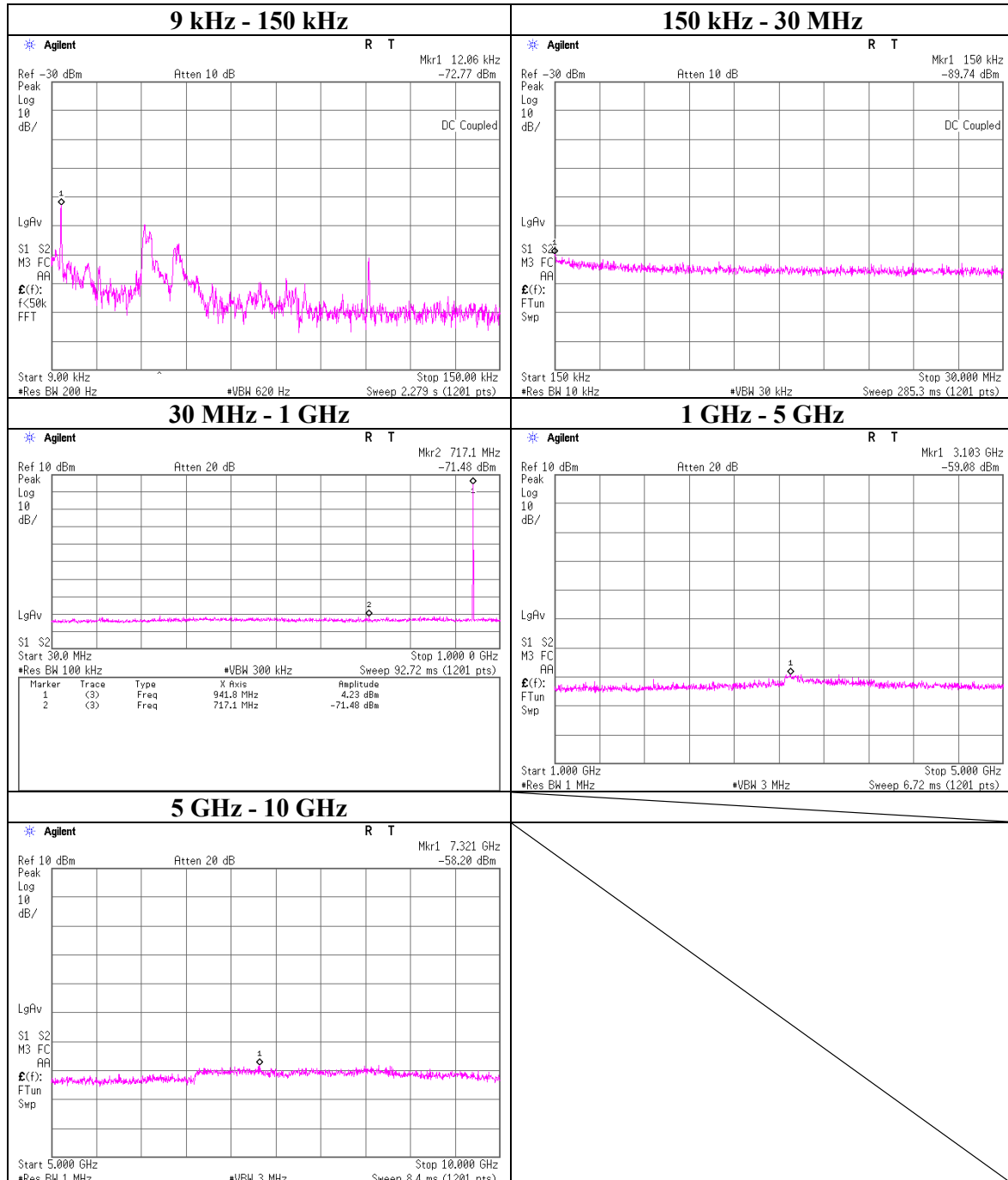
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## Spurious emissions at antenna terminals

Report No. 12890237H  
Test place Ise EMC Lab. No.6 Measurement Room  
Date August 26, 2019  
Temperature/ Humidity 25 deg. C / 49 % RH  
Engineer Akihiko Maeda  
Mode Tx 941.625 MHz, 40 mW



UL Japan, Inc.

Ise EMC Lab.

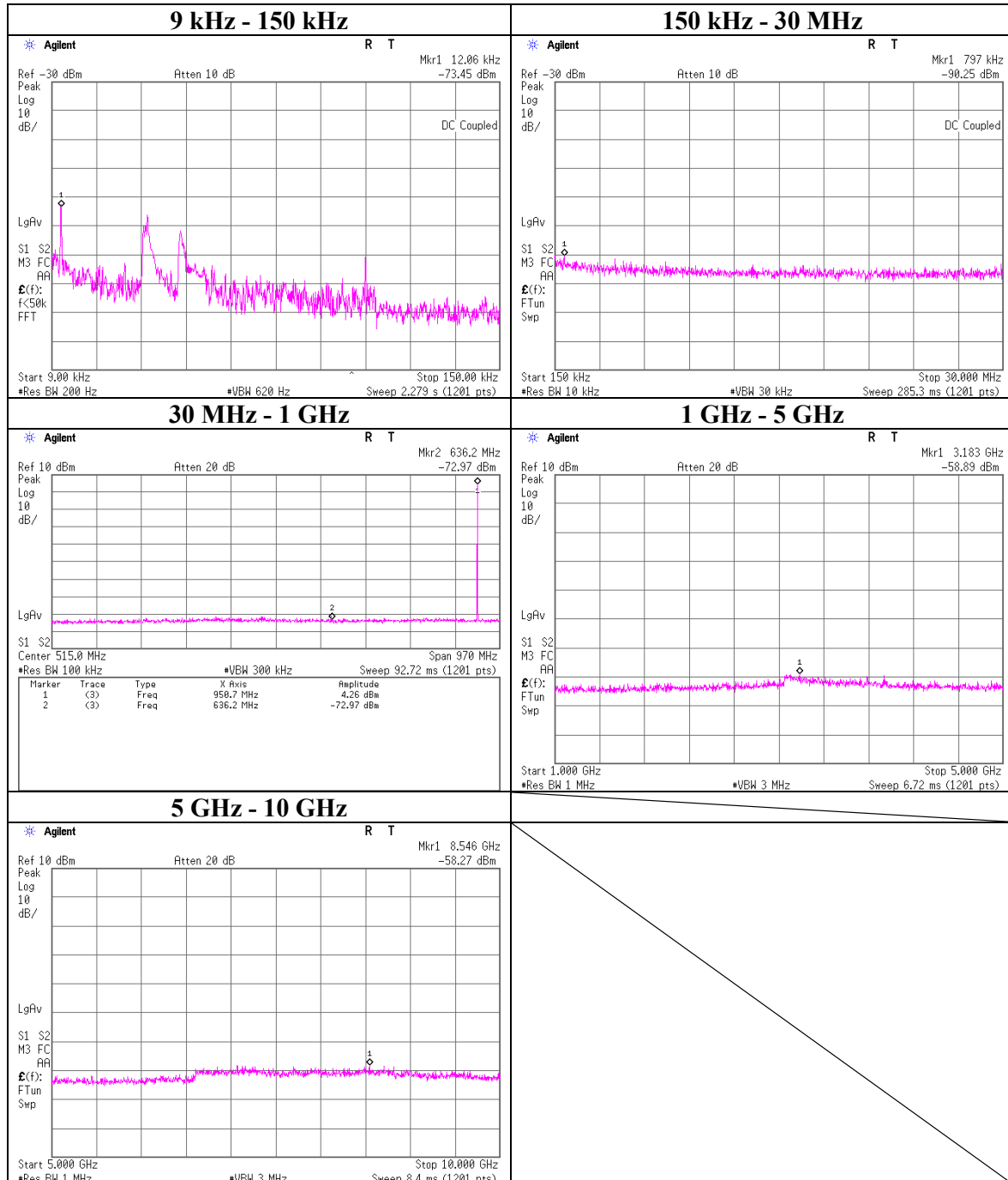
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## Spurious emissions at antenna terminals

Report No. 12890237H  
Test place Ise EMC Lab. No.6 Measurement Room  
Date August 26, 2019  
Temperature/ Humidity 25 deg. C / 49 % RH  
Engineer Akihiko Maeda  
Mode Tx 950.625 MHz, 40 mW



UL Japan, Inc.

Ise EMC Lab.

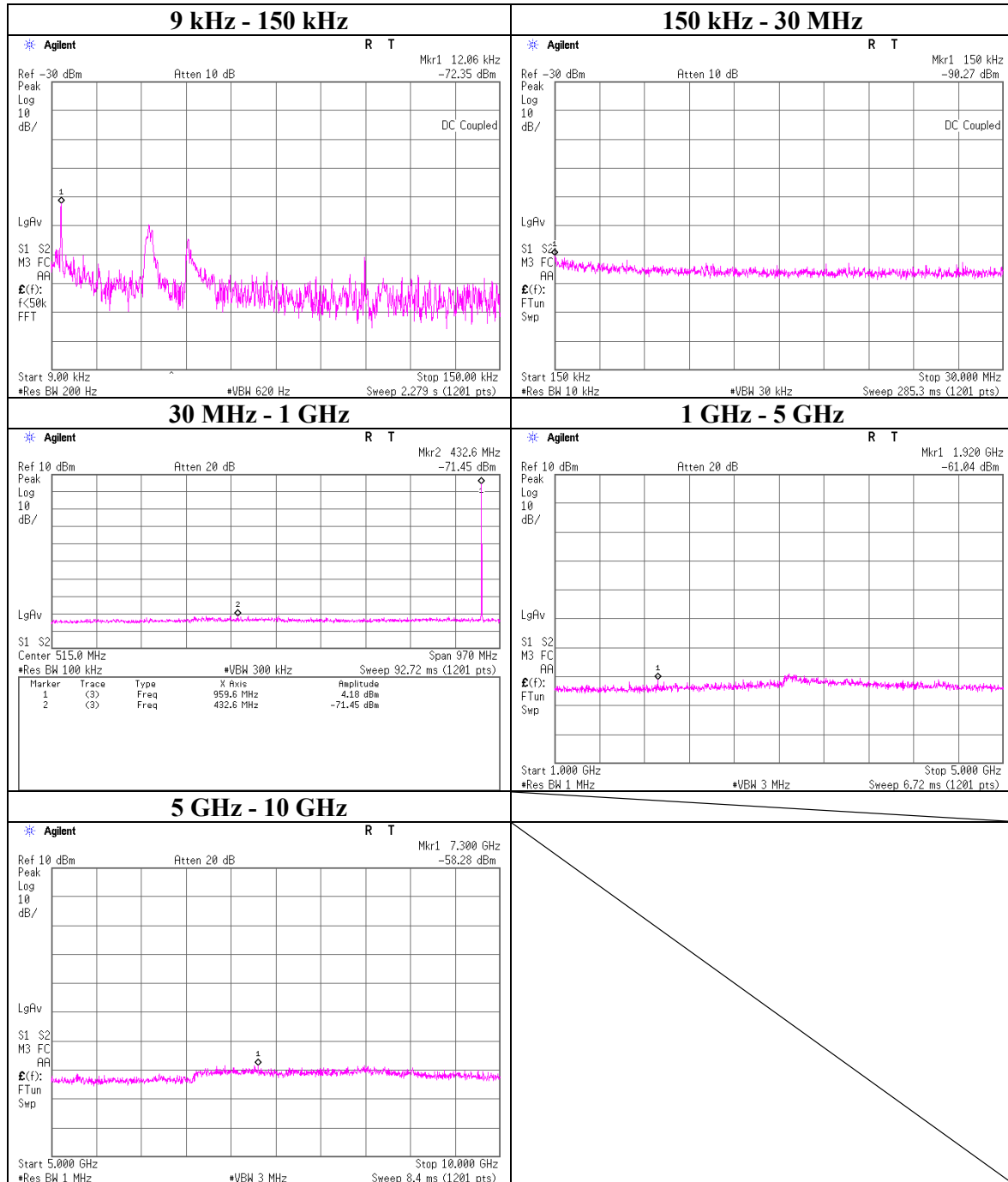
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## Spurious emissions at antenna terminals

Report No. 12890237H  
Test place Ise EMC Lab. No.6 Measurement Room  
Date August 26, 2019  
Temperature/ Humidity 25 deg. C / 49 % RH  
Engineer Akihiko Maeda  
Mode Tx 959.625 MHz, 40 mW



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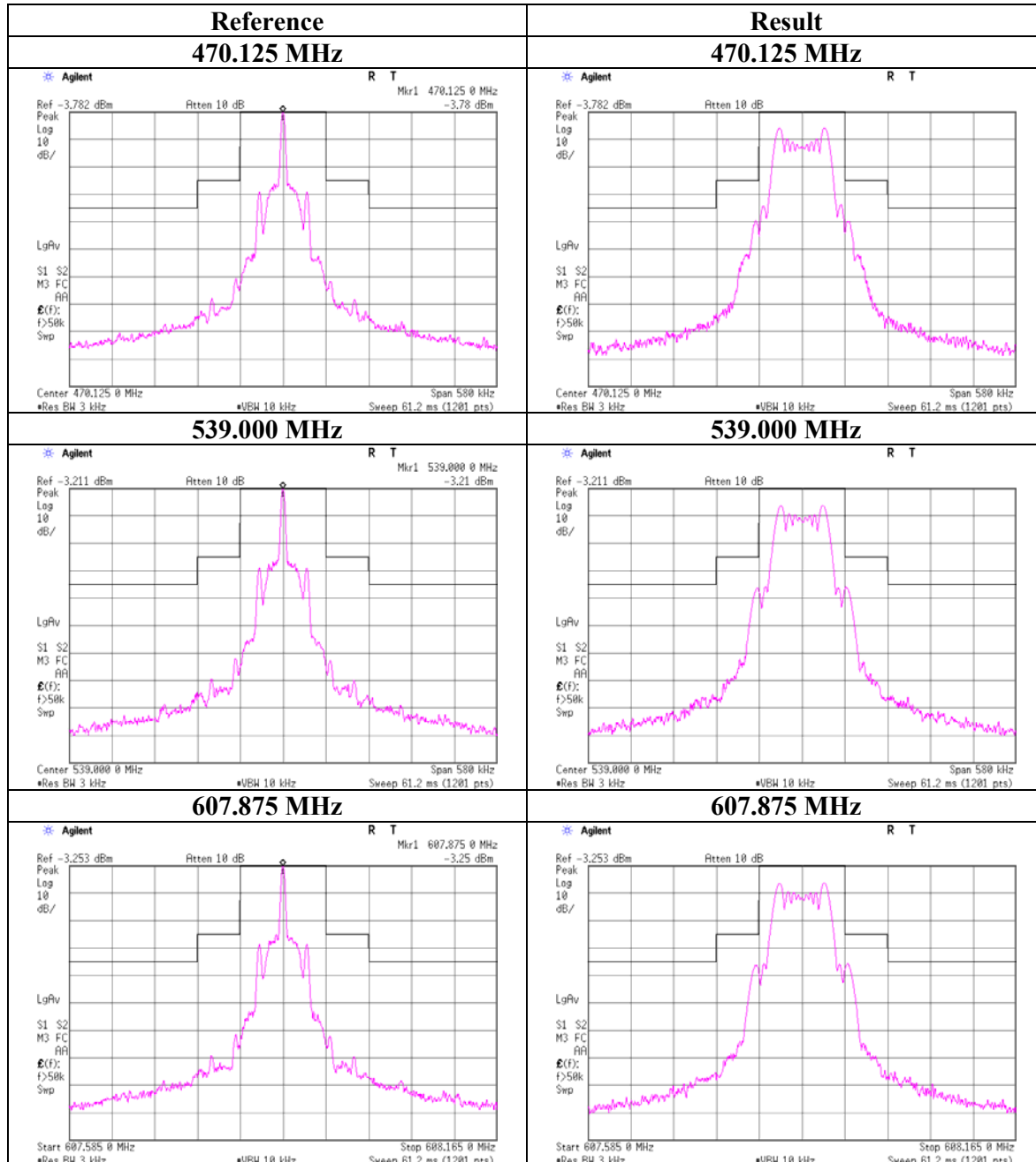
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**Spurious emissions at antenna terminals**  
[Side band spectrum measurement]

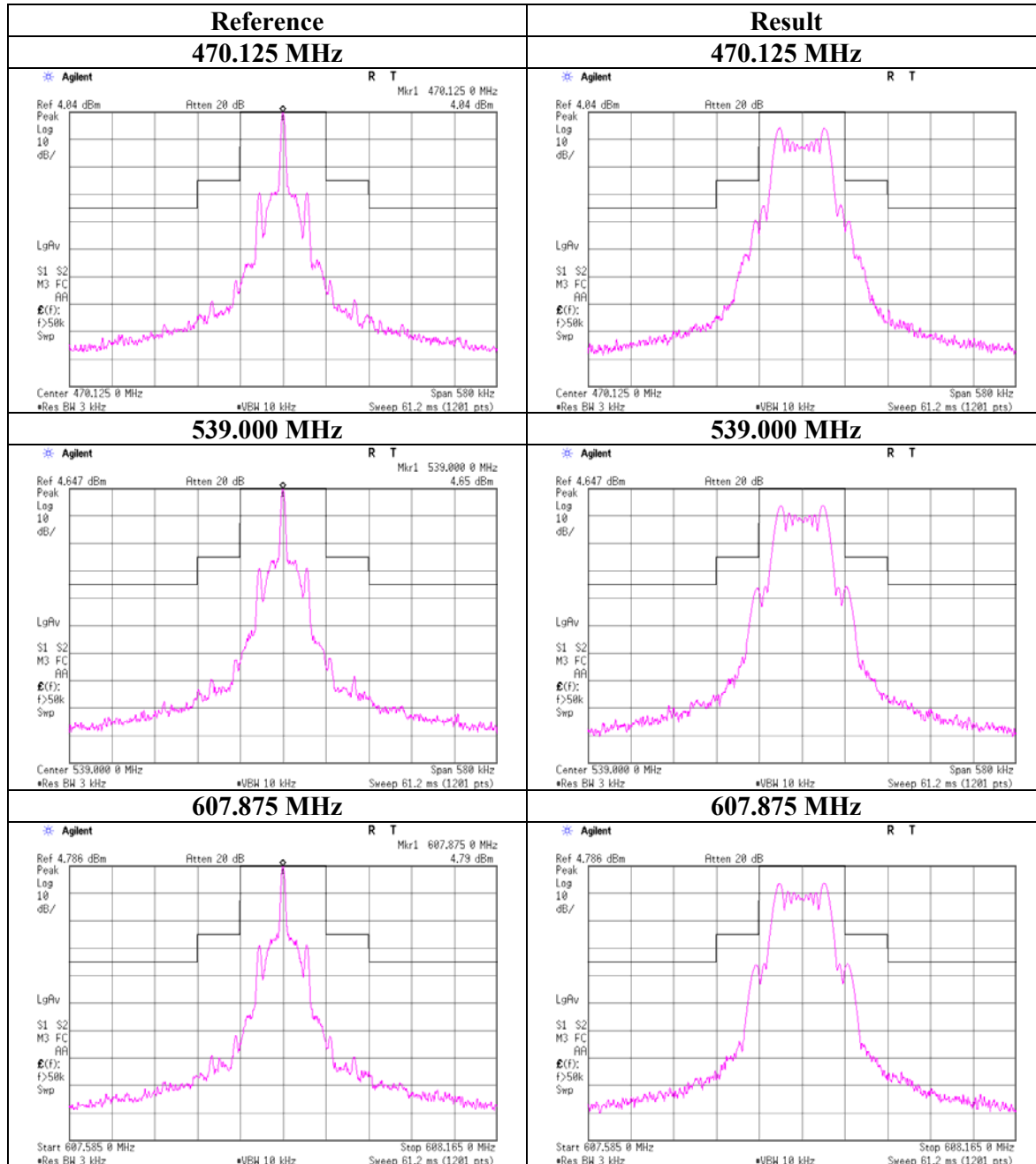
Report No. 12890237H  
Test place Ise EMC Lab. No.7 Measurement Room  
Date August 30, 2019  
Temperature/ Humidity 23 deg. C / 55 % RH  
Engineer Akihiko Maeda  
Mode Tx (470.125 MHz – 607.875 MHz), 5 mW





**Spurious emissions at antenna terminals**  
[Side band spectrum measurement]

Report No. 12890237H  
Test place Ise EMC Lab. No.7 Measurement Room  
Date August 30, 2019  
Temperature/ Humidity 23 deg. C / 55 % RH  
Engineer Akihiko Maeda  
Mode Tx (470.125 MHz – 607.875 MHz), 40 mW

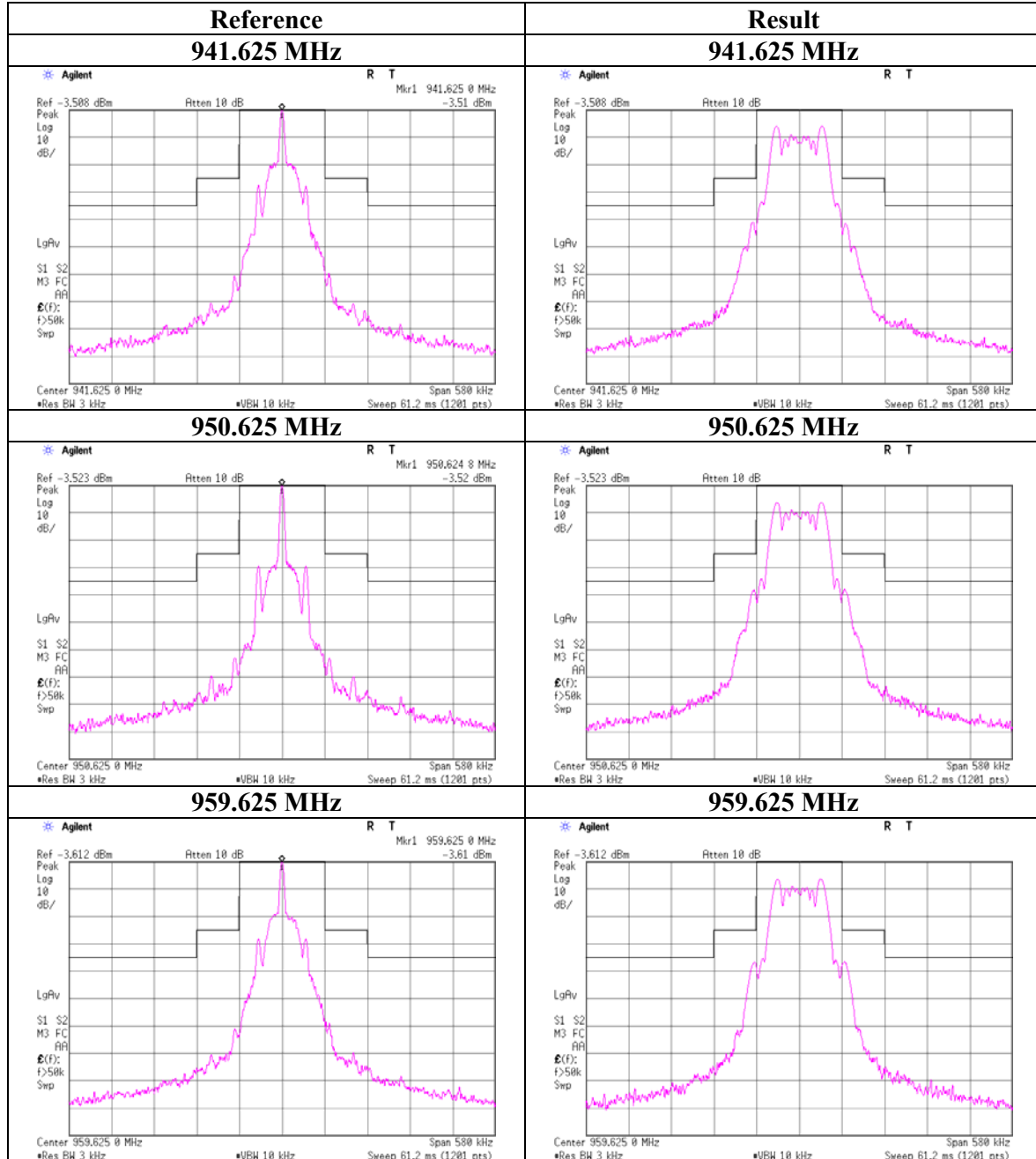


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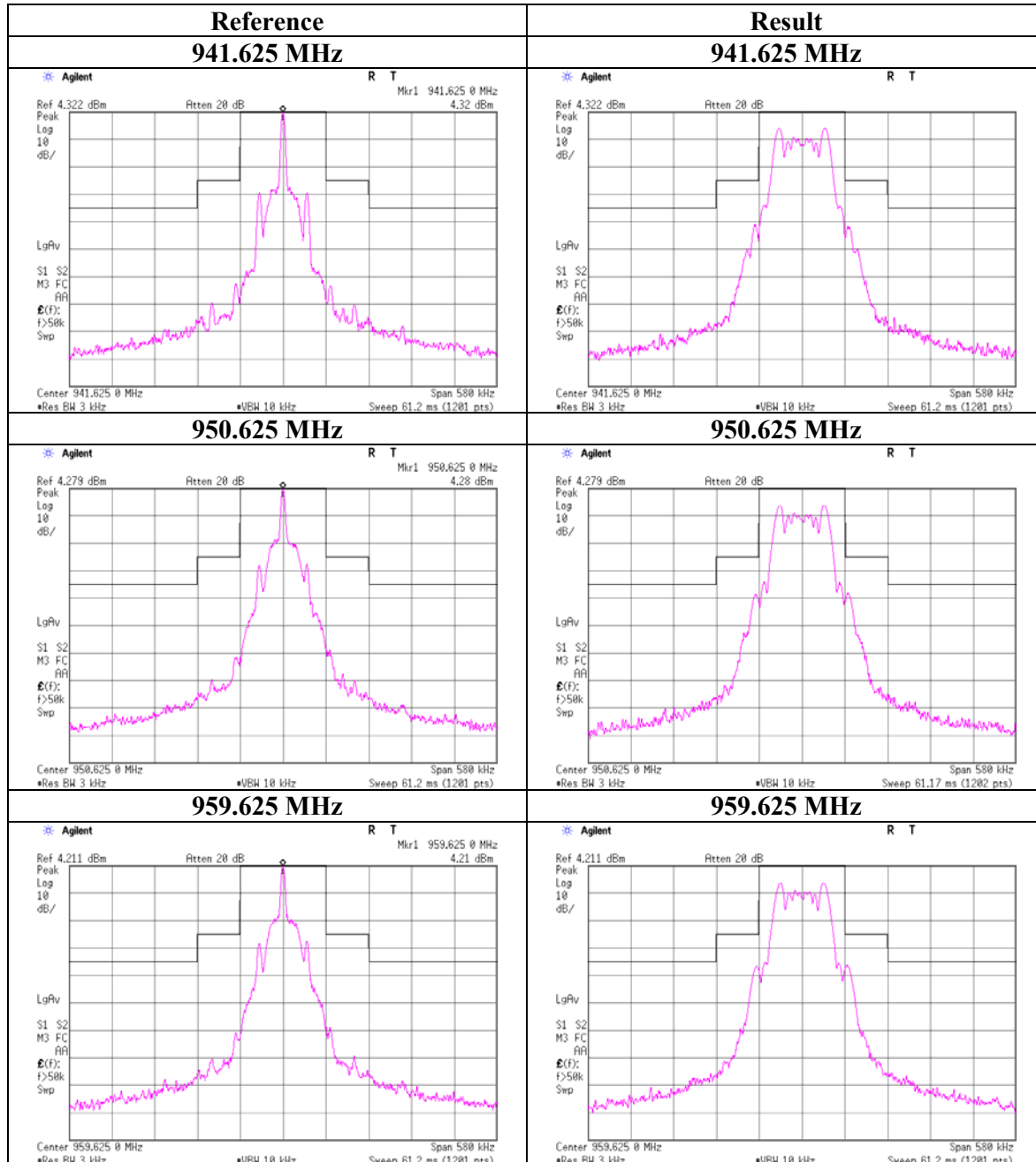
**Spurious emissions at antenna terminals**  
[Side band spectrum measurement]

Report No. 12890237H  
Test place Ise EMC Lab. No.7 Measurement Room  
Date August 30, 2019  
Temperature/ Humidity 23 deg. C / 55 % RH  
Engineer Akihiko Maeda  
Mode Tx (941.625 MHz – 959.625 MHz), 5 mW



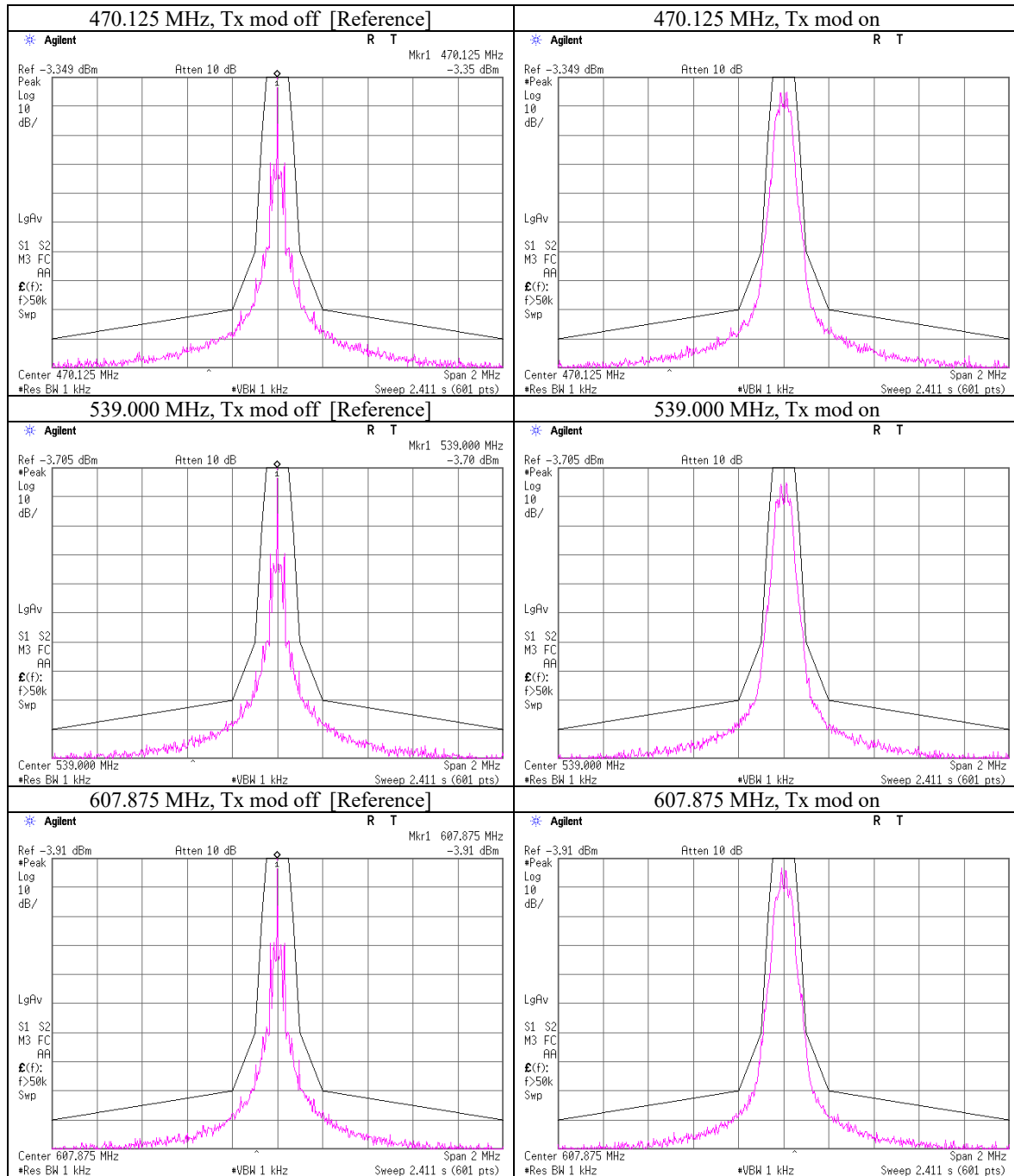
**Spurious emissions at antenna terminals**  
[Side band spectrum measurement]

Report No. 12890237H  
Test place Ise EMC Lab. No.7 Measurement Room  
Date August 30, 2019  
Temperature/ Humidity 23 deg. C / 55 % RH  
Engineer Akihiko Maeda  
Mode Tx (941.625 MHz – 959.625 MHz), 40 mW



## Necessary bandwidth

|                       |                                      |
|-----------------------|--------------------------------------|
| Report No.            | 12890237H                            |
| Test place            | Ise EMC Lab. No.6 Measurement Room   |
| Date                  | August 27, 2019                      |
| Temperature/ Humidity | 25 deg. C / 43 % RH                  |
| Engineer              | Akihiko Maeda                        |
| Mode                  | Tx (470.125 MHz – 607.875 MHz), 5 mW |



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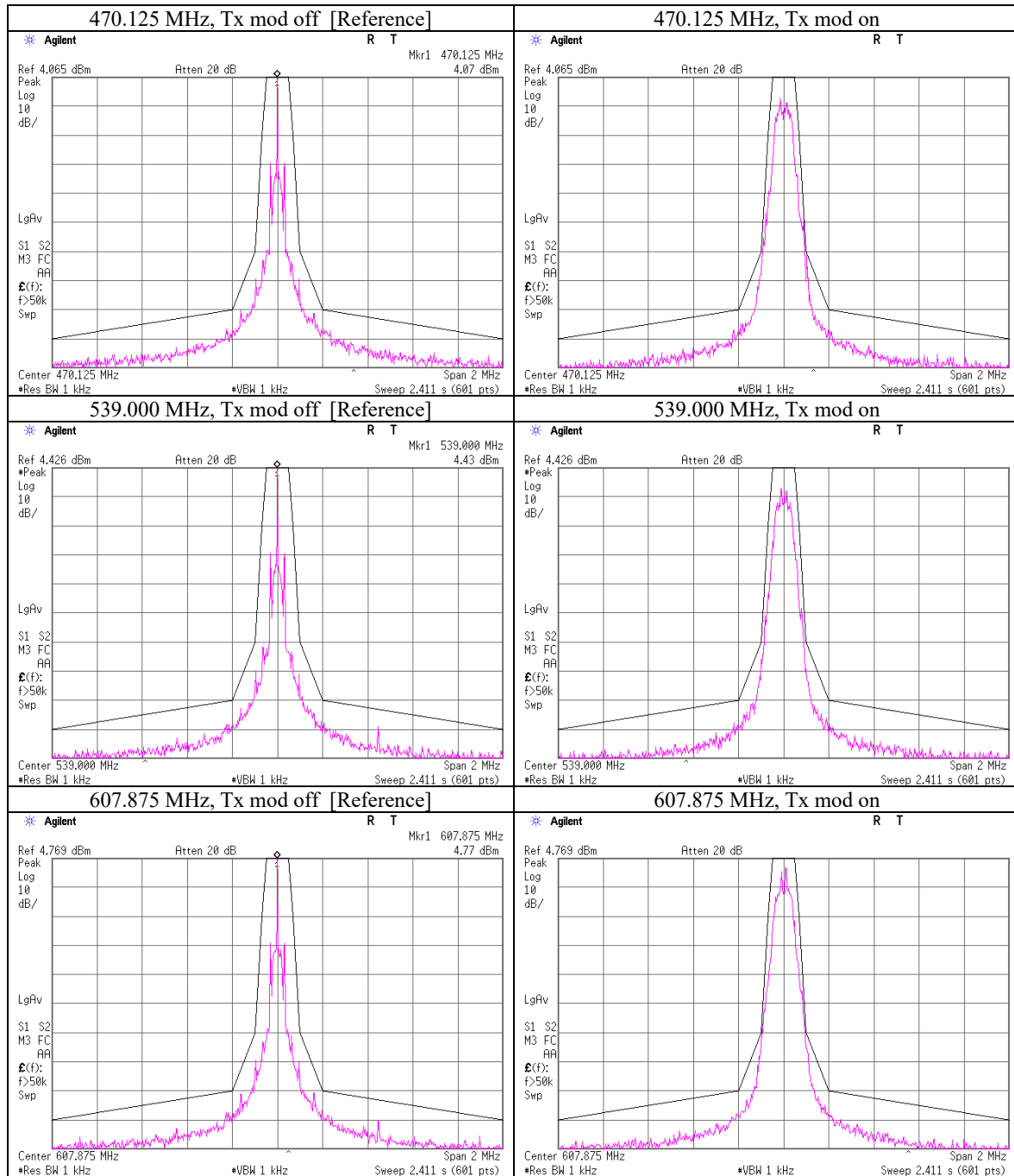
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## Necessary bandwidth

|                       |                                       |
|-----------------------|---------------------------------------|
| Report No.            | 12890237H                             |
| Test place            | Ise EMC Lab. No.6 Measurement Room    |
| Date                  | August 27, 2019                       |
| Temperature/ Humidity | 25 deg. C / 43 % RH                   |
| Engineer              | Akihiko Maeda                         |
| Mode                  | Tx (470.125 MHz – 607.875 MHz), 40 mW |



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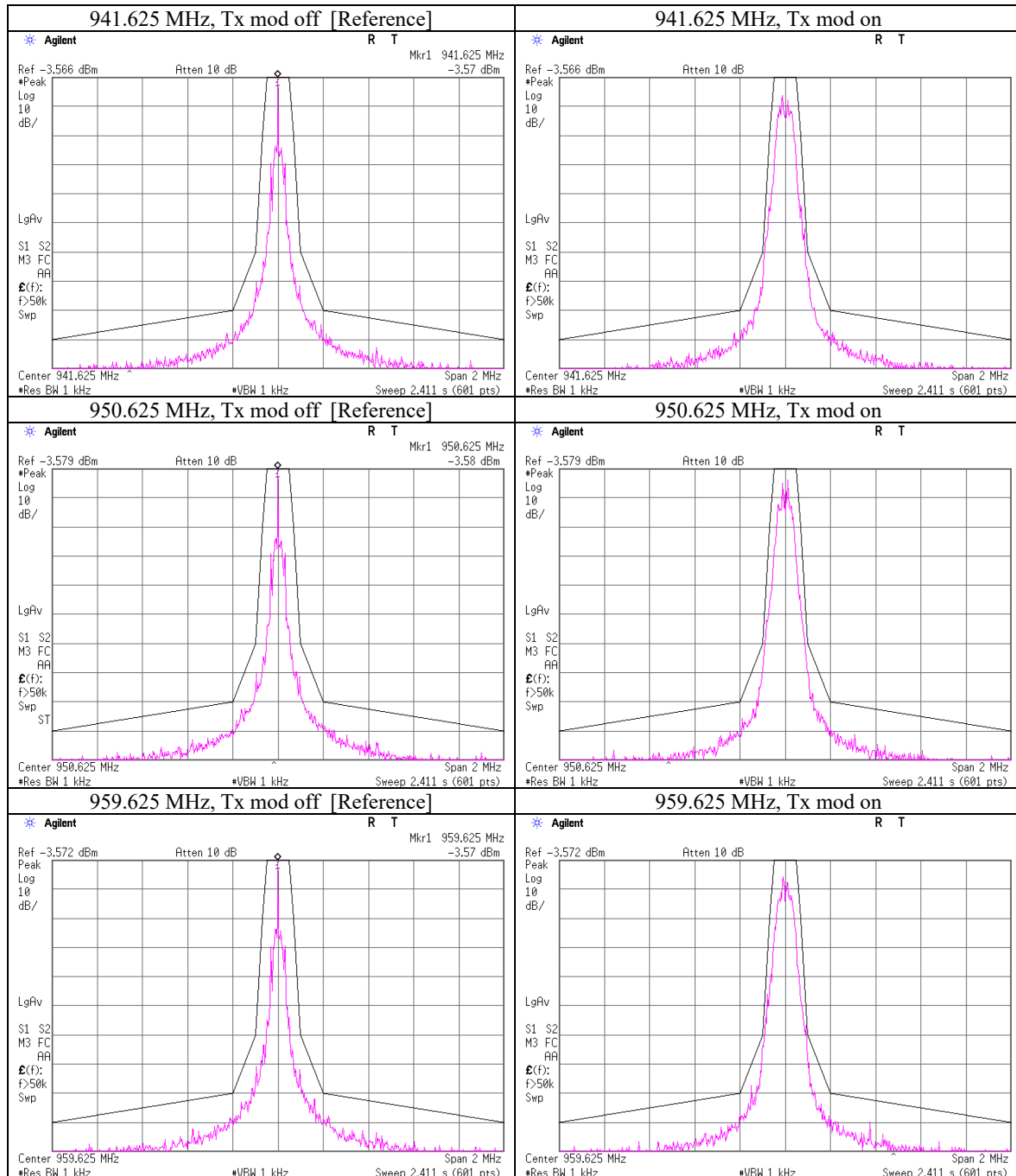
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## Necessary bandwidth

|                       |                                      |
|-----------------------|--------------------------------------|
| Report No.            | 12890237H                            |
| Test place            | Ise EMC Lab. No.6 Measurement Room   |
| Date                  | August 27, 2019                      |
| Temperature/ Humidity | 25 deg. C / 43 % RH                  |
| Engineer              | Akihiko Maeda                        |
| Mode                  | Tx (941.625 MHz – 959.625 MHz), 5 mW |



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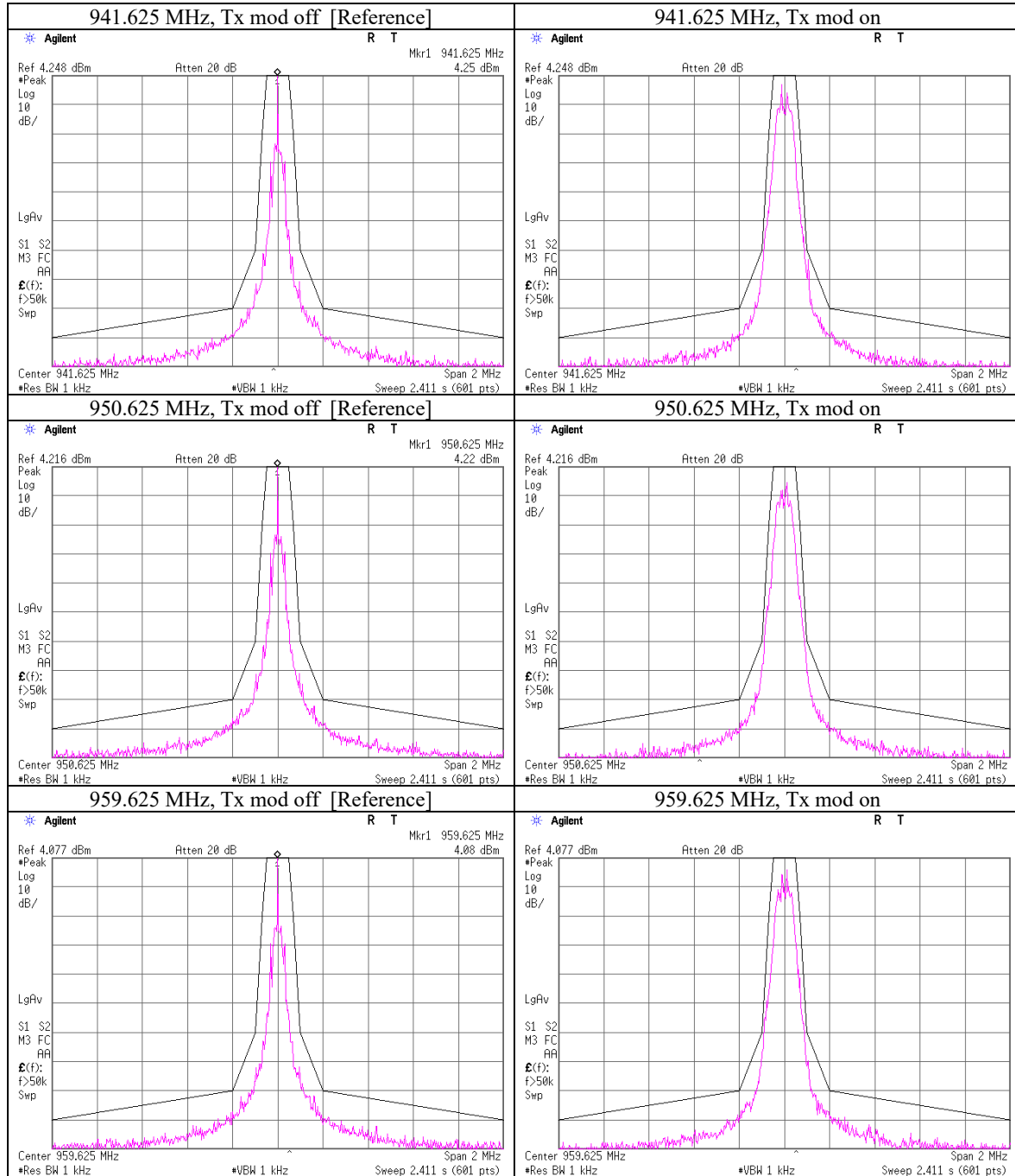
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## Necessary bandwidth

|                       |                                       |
|-----------------------|---------------------------------------|
| Report No.            | 12890237H                             |
| Test place            | Ise EMC Lab. No.6 Measurement Room    |
| Date                  | August 27, 2019                       |
| Temperature/ Humidity | 25 deg. C / 43 % RH                   |
| Engineer              | Akihiko Maeda                         |
| Mode                  | Tx (941.625 MHz – 959.625 MHz), 40 mW |



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### Field strength of spurious radiation

Report No. 12890237H  
Test place Ise EMC Lab.  
Semi Anechoic Chamber No.4  
Date July 19, 2019 No.2  
Temperature / Humidity 20 deg. C / 66 % RH July 18, 2019  
Engineer Koji Yamamoto Akihiko Maeda  
Below 1 GHz Above 1 GHz  
Mode Tx 470.125 MHz

| Frequency<br><br>[MHz] | Rx SA/TR          |      | Tx SG            |       | Tx                    | Tx                    | Result         |       | Limit          | Margin |      | Horizontal                |                         | Vertical                  |                         | Remarks |
|------------------------|-------------------|------|------------------|-------|-----------------------|-----------------------|----------------|-------|----------------|--------|------|---------------------------|-------------------------|---------------------------|-------------------------|---------|
|                        | Reading<br>[dBuV] |      | Reading<br>[dBm] |       | Cable<br>Loss<br>[dB] | Ant.<br>Gain<br>[dBi] | (ERP)<br>[dBm] |       | (ERP)<br>[dBm] | [dB]   |      | Rx Ant.<br>Height<br>[cm] | Turn<br>Table<br>[deg.] | Rx Ant.<br>Height<br>[cm] | Turn<br>Table<br>[deg.] |         |
|                        | HOR               | VER  | HOR              | VER   |                       |                       | HOR            | VER   |                | HOR    | VER  |                           |                         |                           |                         |         |
| 940.25                 | NS                | NS   | -                | -     | -                     | -                     | -              | -     | -36.0          | -      | -    | -                         | -                       | -                         | -                       | -       |
| 1410.38                | 41.3              | 38.6 | -68.1            | -73.7 | 3.2                   | 7.5                   | -65.9          | -71.5 | -30.0          | 35.9   | 41.5 | 112                       | 46                      | 270                       | 359                     |         |
| 1880.50                | NS                | NS   | -                | -     | -                     | -                     | -              | -     | -30.0          | -      | -    | -                         | -                       | -                         | -                       | -       |
| 2350.63                | NS                | NS   | -                | -     | -                     | -                     | -              | -     | -30.0          | -      | -    | -                         | -                       | -                         | -                       | -       |
| 2820.75                | 36.6              | 35.9 | -74.5            | -75.0 | 4.5                   | 10.4                  | -70.7          | -71.2 | -30.0          | 40.7   | 41.2 | 105                       | 342                     | 156                       | 0                       |         |
| 3290.88                | 38.2              | 37.1 | -69.7            | -72.0 | 4.9                   | 11.6                  | -65.1          | -67.4 | -30.0          | 35.1   | 37.4 | 148                       | 333                     | 211                       | 355                     |         |
| 3761.00                | 40.4              | 39.7 | -65.0            | -66.2 | 5.2                   | 12.3                  | -60.1          | -61.3 | -30.0          | 30.1   | 31.3 | 138                       | 168                     | 141                       | 180                     |         |
| 4231.13                | NS                | NS   | -                | -     | -                     | -                     | -              | -     | -30.0          | -      | -    | -                         | -                       | -                         | -                       | -       |
| 4701.25                | NS                | NS   | -                | -     | -                     | -                     | -              | -     | -30.0          | -      | -    | -                         | -                       | -                         | -                       | -       |

Calculation Result = SG Reading - Tx Cable Loss + Tx Antenna Gain - 2.15

Rx-ANTENNA : Biconical Antenna(25 MHz - 200 MHz), Logperiodic Antenna(200 MHz - 1000 MHz), Horn Antenna(1 GHz - the tenth harmonic)

Tx-ANTENNA : 120 MHz tuned Dipole Antenna(30 MHz - 120 MHz), Dipole Antenna(120 MHz - 1000 MHz), Horn Antenna(1 GHz - the tenth harmonic)

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

NS : No signal detect.

Detector : Below 1 GHz: Spectrum Analyzer RMS Average (RBW / VBW: 100 kHz), Above 1 GHz: Spectrum Analyzer RMS Average (RBW: 1 MHz / VBW: 3 MHz)



## Field strength of spurious radiation

|                        |                     |                     |
|------------------------|---------------------|---------------------|
| Report No.             | 12890237H           |                     |
| Test place             | Ise EMC Lab.        |                     |
| Semi Anechoic Chamber  | No.4                | No.2                |
| Date                   | July 19, 2019       | July 18, 2019       |
| Temperature / Humidity | 20 deg. C / 66 % RH | 21 deg. C / 74 % RH |
| Engineer               | Koji Yamamoto       | Akihiko Maeda       |
|                        | Below 1 GHz         | Above 1 GHz         |
| Mode                   | Tx 539.000 MHz      |                     |

| Frequency<br><br>[MHz] | Rx SA/TR          |      | Tx SG            |       | Tx                    | Tx                    | Result         |       | Limit          | Margin |      | Horizontal                |                         | Vertical                  |                         | Remarks |
|------------------------|-------------------|------|------------------|-------|-----------------------|-----------------------|----------------|-------|----------------|--------|------|---------------------------|-------------------------|---------------------------|-------------------------|---------|
|                        | Reading<br>[dBuV] |      | Reading<br>[dBm] |       | Cable<br>Loss<br>[dB] | Ant.<br>Gain<br>[dBi] | (ERP)<br>[dBm] |       | (ERP)<br>[dBm] | [dB]   |      | Rx Ant.<br>Height<br>[cm] | Turn<br>Table<br>[deg.] | Rx Ant.<br>Height<br>[cm] | Turn<br>Table<br>[deg.] |         |
|                        | HOR               | VER  | HOR              | VER   |                       |                       | HOR            | VER   |                | HOR    | VER  |                           |                         |                           |                         |         |
| 1078.00                | 39.2              | NS   | -71.5            | -     | 2.8                   | 5.6                   | -70.8          | -     | -30.0          | 40.8   | -    | 115                       | 46                      | -                         | -                       |         |
| 1617.00                | NS                | NS   | -                | -     | -                     | -                     | -              | -     | -30.0          | -      | -    | -                         | -                       | -                         | -                       |         |
| 2156.00                | 38.8              | NS   | -70.7            | -     | 3.9                   | 10.8                  | -66.0          | -     | -30.0          | 36.0   | -    | 106                       | 31                      | -                         | -                       |         |
| 2695.00                | 38.4              | 37.4 | -70.1            | -72.7 | 4.4                   | 10.2                  | -66.4          | -69.0 | -30.0          | 36.4   | 39.0 | 141                       | 54                      | 147                       | 4                       |         |
| 3234.00                | 41.7              | 38.2 | -64.6            | -71.5 | 4.9                   | 11.9                  | -59.7          | -66.6 | -30.0          | 29.7   | 36.6 | 137                       | 230                     | 168                       | 359                     |         |
| 3773.00                | 47.4              | 43.4 | -56.1            | -61.3 | 5.3                   | 12.3                  | -51.2          | -56.4 | -30.0          | 21.2   | 26.4 | 149                       | 26                      | 113                       | 48                      |         |
| 4312.00                | NS                | NS   | -                | -     | -                     | -                     | -              | -     | -30.0          | -      | -    | -                         | -                       | -                         | -                       |         |
| 4851.00                | NS                | NS   | -                | -     | -                     | -                     | -              | -     | -30.0          | -      | -    | -                         | -                       | -                         | -                       |         |
| 5390.00                | NS                | NS   | -                | -     | -                     | -                     | -              | -     | -30.0          | -      | -    | -                         | -                       | -                         | -                       |         |

Calculation Result = SG Reading - Tx Cable Loss + Tx Antenna Gain - 2.15

Rx-ANTENNA : Biconical Antenna(25 MHz - 200 MHz), Logperiodic Antenna(200 MHz - 1000 MHz), Horn Antenna(1 GHz - the tenth harmonic)

Tx-ANTENNA : 120 MHz tuned Dipole Antenna(30 MHz - 120 MHz), Dipole Antenna(120 MHz - 1000 MHz), Horn Antenna(1 GHz - the tenth harmonic)

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

NS : No signal detect.

Detector : Below 1 GHz: Spectrum Analyzer RMS Average (RBW / VBW: 100 kHz), Above 1 GHz: Spectrum Analyzer RMS Average (RBW: 1 MHz / VBW: 3 MHz)

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## Field strength of spurious radiation

|                        |                     |                     |
|------------------------|---------------------|---------------------|
| Report No.             | 12890237H           |                     |
| Test place             | Ise EMC Lab.        |                     |
| Semi Anechoic Chamber  | No.4                | No.2                |
| Date                   | July 19, 2019       | July 18, 2019       |
| Temperature / Humidity | 20 deg. C / 66 % RH | 21 deg. C / 74 % RH |
| Engineer               | Koji Yamamoto       | Akihiko Maeda       |
|                        | Below 1 GHz         | Above 1 GHz         |
| Mode                   | Tx 607.875 MHz      |                     |

| Frequency<br>[MHz] | Rx SA/TR          |      | Tx SG            |       | Tx                    | Tx                    | Result         |       | Limit          | Margin |      | Horizontal                |                         | Vertical                  |                         | Remarks |
|--------------------|-------------------|------|------------------|-------|-----------------------|-----------------------|----------------|-------|----------------|--------|------|---------------------------|-------------------------|---------------------------|-------------------------|---------|
|                    | Reading<br>[dBuV] |      | Reading<br>[dBm] |       | Cable<br>Loss<br>[dB] | Ant.<br>Gain<br>[dBi] | (ERP)<br>[dBm] |       | (ERP)<br>[dBm] | [dB]   |      | Rx Ant.<br>Height<br>[cm] | Turn<br>Table<br>[deg.] | Rx Ant.<br>Height<br>[cm] | Turn<br>Table<br>[deg.] |         |
|                    | HOR               | VER  | HOR              | VER   |                       |                       | HOR            | VER   |                | HOR    | VER  |                           |                         |                           |                         |         |
| 1215.75            | 44.5              | 41.8 | -63.9            | -68.3 | 3.0                   | 6.3                   | -62.7          | -67.1 | -30.0          | 32.7   | 37.1 | 128                       | 319                     | 294                       | 11                      |         |
| 1823.63            | 44.2              | 40.4 | -65.0            | -71.4 | 3.6                   | 9.7                   | -61.1          | -67.5 | -30.0          | 31.1   | 37.5 | 105                       | 277                     | 248                       | 0                       |         |
| 2431.50            | 49.2              | 48.2 | -57.5            | -57.8 | 4.2                   | 10.5                  | -53.4          | -53.7 | -30.0          | 23.4   | 23.7 | 140                       | 10                      | 113                       | 10                      |         |
| 3039.38            | 43.8              | 42.7 | -60.6            | -63.2 | 4.7                   | 11.1                  | -56.4          | -59.0 | -30.0          | 26.4   | 29.0 | 124                       | 345                     | 173                       | 10                      |         |
| 3647.25            | 58.6              | 56.8 | -44.8            | -47.2 | 5.2                   | 12.2                  | -39.9          | -42.3 | -30.0          | 9.9    | 12.3 | 154                       | 337                     | 169                       | 175                     |         |
| 4255.13            | 43.3              | 44.0 | -58.5            | -58.4 | 5.6                   | 12.3                  | -54.0          | -53.9 | -30.0          | 24.0   | 23.9 | 102                       | 186                     | 143                       | 209                     |         |
| 4863.00            | 44.0              | 39.6 | -55.7            | -61.2 | 6.0                   | 12.3                  | -51.6          | -57.1 | -30.0          | 21.6   | 27.1 | 119                       | 316                     | 124                       | 322                     |         |
| 5470.88            | NS                | NS   | -                | -     | -                     | -                     | -              | -     | -30.0          | -      | -    | -                         | -                       | -                         | -                       |         |
| 6078.75            | NS                | NS   | -                | -     | -                     | -                     | -              | -     | -30.0          | -      | -    | -                         | -                       | -                         | -                       |         |

Calculation Result = SG Reading - Tx Cable Loss + Tx Antenna Gain - 2.15

Rx-ANTENNA : Biconical Antenna(25 MHz - 200 MHz), Logperiodic Antenna(200 MHz - 1000 MHz), Horn Antenna(1 GHz - the tenth harmonic)

Tx-ANTENNA : 120 MHz tuned Dipole Antenna(30 MHz - 120 MHz), Dipole Antenna(120 MHz - 1000 MHz), Horn Antenna(1 GHz - the tenth harmonic)

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

NS : No signal detect.

Detector : Below 1 GHz: Spectrum Analyzer RMS Average (RBW / VBW: 100 kHz), Above 1 GHz: Spectrum Analyzer RMS Average (RBW: 1 MHz / VBW: 3 MHz)

### Field strength of spurious radiation

Report No. 12890237H  
Test place Ise EMC Lab.  
Semi Anechoic Chamber No.4  
Date July 19, 2019 No.2  
Temperature / Humidity 20 deg. C / 66 % RH July 18, 2019  
Engineer Koji Yamamoto 21 deg. C / 74 % RH  
Below 1 GHz Akihiko Maeda  
Above 1 GHz  
Mode Tx 941.625 MHz

| Frequency | Rx SA/TR       |      | Tx SG         |       | Tx              | Tx              | Result      |       | Limit       | Margin |                     | Horizontal        |                     | Vertical          |     | Remarks |
|-----------|----------------|------|---------------|-------|-----------------|-----------------|-------------|-------|-------------|--------|---------------------|-------------------|---------------------|-------------------|-----|---------|
|           | Reading [dBuV] |      | Reading [dBm] |       | Cable Loss [dB] | Ant. Gain [dBi] | (ERP) [dBm] |       | (ERP) [dBm] | [dB]   | Rx Ant. Height [cm] | Turn Table [deg.] | Rx Ant. Height [cm] | Turn Table [deg.] |     |         |
|           | HOR            | VER  | HOR           | VER   |                 |                 | HOR         | VER   |             |        |                     |                   |                     |                   | HOR |         |
| 1883.25   | 41.9           | 39.5 | -67.0         | -71.3 | 3.7             | 10.1            | -62.8       | -67.1 | -30.0       | 32.8   | 37.1                | 121               | 38                  | 110               | 0   |         |
| 2824.88   | 50.3           | 49.4 | -54.1         | -56.4 | 4.5             | 10.4            | -50.4       | -52.7 | -30.0       | 20.4   | 22.7                | 118               | 20                  | 100               | 0   |         |
| 3766.50   | 50.5           | 48.1 | -52.7         | -56.0 | 5.3             | 12.3            | -47.8       | -51.1 | -30.0       | 17.8   | 21.1                | 117               | 240                 | 123               | 324 |         |
| 4708.13   | 54.1           | 51.6 | -45.4         | -48.7 | 5.9             | 11.9            | -41.6       | -44.9 | -30.0       | 11.6   | 14.9                | 116               | 251                 | 143               | 182 |         |
| 5649.75   | 40.4           | 39.0 | -60.1         | -61.7 | 6.6             | 12.9            | -55.9       | -57.5 | -30.0       | 25.9   | 27.5                | 138               | 225                 | 145               | 348 |         |
| 6591.38   | NS             | NS   | -             | -     | -               | -               | -           | -     | -30.0       | -      | -                   | -                 | -                   | -                 | -   |         |
| 7533.00   | NS             | NS   | -             | -     | -               | -               | -           | -     | -30.0       | -      | -                   | -                 | -                   | -                 | -   |         |
| 8474.63   | 39.5           | 39.6 | -53.1         | -54.1 | 8.2             | 11.9            | -51.6       | -52.6 | -30.0       | 21.6   | 22.6                | 195               | 196                 | 102               | 171 |         |
| 9416.25   | NS             | NS   | -             | -     | -               | -               | -           | -     | -30.0       | -      | -                   | -                 | -                   | -                 | -   |         |

Calculation Result = SG Reading - Tx Cable Loss + Tx Antenna Gain - 2.15

Rx-ANTENNA : Biconical Antenna(25 MHz - 200 MHz), Logperiodic Antenna(200 MHz - 1000 MHz), Horn Antenna(1 GHz - the tenth harmonic)

Tx-ANTENNA : 120 MHz tuned Dipole Antenna(30 MHz - 120 MHz), Dipole Antenna(120 MHz - 1000 MHz), Horn Antenna(1 GHz - the tenth harmonic)

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

NS : No signal detect.

Detector : Below 1 GHz: Spectrum Analyzer RMS Average (RBW / VBW: 100 kHz), Above 1 GHz: Spectrum Analyzer RMS Average (RBW: 1 MHz / VBW: 3 MHz)

## Field strength of spurious radiation

|                        |                     |                     |
|------------------------|---------------------|---------------------|
| Report No.             | 12890237H           |                     |
| Test place             | Ise EMC Lab.        |                     |
| Semi Anechoic Chamber  | No.4                | No.2                |
| Date                   | July 19, 2019       | July 18, 2019       |
| Temperature / Humidity | 20 deg. C / 66 % RH | 21 deg. C / 74 % RH |
| Engineer               | Koji Yamamoto       | Akihiko Maeda       |
|                        | Below 1 GHz         | Above 1 GHz         |
| Mode                   | Tx 950.625 MHz      |                     |

| Frequency<br><br>[MHz] | Rx SA/TR          |      | Tx SG            |       | Tx                    | Tx                    | Result         |       | Limit          | Margin |      | Horizontal                |                         | Vertical                  |                         | Remarks |
|------------------------|-------------------|------|------------------|-------|-----------------------|-----------------------|----------------|-------|----------------|--------|------|---------------------------|-------------------------|---------------------------|-------------------------|---------|
|                        | Reading<br>[dBuV] |      | Reading<br>[dBm] |       | Cable<br>Loss<br>[dB] | Ant.<br>Gain<br>[dBi] | (ERP)<br>[dBm] |       | (ERP)<br>[dBm] | [dB]   |      | Rx Ant.<br>Height<br>[cm] | Turn<br>Table<br>[deg.] | Rx Ant.<br>Height<br>[cm] | Turn<br>Table<br>[deg.] |         |
|                        | HOR               | VER  | HOR              | VER   |                       |                       | HOR            | VER   |                | HOR    | VER  |                           |                         |                           |                         |         |
| 1901.25                | 47.0              | 44.4 | -61.5            | -65.1 | 3.7                   | 10.1                  | -57.3          | -60.9 | -30.0          | 27.3   | 30.9 | 125                       | 320                     | 108                       | 0                       |         |
| 2851.88                | 50.5              | 49.6 | -53.6            | -54.8 | 4.5                   | 10.1                  | -50.2          | -51.4 | -30.0          | 20.2   | 21.4 | 117                       | 24                      | 111                       | 0                       |         |
| 3802.50                | 48.7              | 47.2 | -54.2            | -56.1 | 5.3                   | 12.2                  | -49.4          | -51.3 | -30.0          | 19.4   | 21.3 | 138                       | 30                      | 145                       | 187                     |         |
| 4753.13                | 55.3              | 53.0 | -43.9            | -46.9 | 6.0                   | 12.1                  | -39.9          | -42.9 | -30.0          | 9.9    | 12.9 | 106                       | 256                     | 141                       | 182                     |         |
| 5703.75                | 39.0              | 39.2 | -61.8            | -61.3 | 6.6                   | 12.8                  | -57.8          | -57.3 | -30.0          | 27.8   | 27.3 | 128                       | 221                     | 135                       | 347                     |         |
| 6654.38                | NS                | NS   | -                | -     | -                     | -                     | -              | -     | -30.0          | -      | -    | -                         | -                       | -                         | -                       |         |
| 7605.00                | NS                | NS   | -                | -     | -                     | -                     | -              | -     | -30.0          | -      | -    | -                         | -                       | -                         | -                       |         |
| 8555.63                | 38.5              | 38.6 | -56.0            | -55.4 | 8.3                   | 11.7                  | -54.8          | -54.2 | -30.0          | 24.8   | 24.2 | 100                       | 158                     | 106                       | 170                     |         |
| 9506.25                | NS                | NS   | -                | -     | -                     | -                     | -              | -     | -30.0          | -      | -    | -                         | -                       | -                         | -                       |         |

Calculation Result = SG Reading - Tx Cable Loss + Tx Antenna Gain - 2.15

Rx-ANTENNA : Biconical Antenna(25 MHz - 200 MHz), Logperiodic Antenna(200 MHz - 1000 MHz), Horn Antenna(1 GHz - the tenth harmonic)

Tx-ANTENNA : 120 MHz tuned Dipole Antenna(30 MHz - 120 MHz), Dipole Antenna(120 MHz - 1000 MHz), Horn Antenna(1 GHz - the tenth harmonic)

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

NS : No signal detect.

Detector : Below 1 GHz: Spectrum Analyzer RMS Average (RBW / VBW: 100 kHz), Above 1 GHz: Spectrum Analyzer RMS Average (RBW: 1 MHz / VBW: 3 MHz)

### Field strength of spurious radiation

Report No. 12890237H  
Test place Ise EMC Lab.  
Semi Anechoic Chamber No.4  
Date July 19, 2019 No.2  
Temperature / Humidity 20 deg. C / 66 % RH July 18, 2019  
Engineer Koji Yamamoto 21 deg. C / 74 % RH  
Below 1 GHz Akihiko Maeda  
Above 1 GHz  
Mode Tx 959.625 MHz

| Frequency<br><br>[MHz] | Rx SA/TR          |      | Tx SG            |       | Tx                    | Tx                    | Result         |       | Limit          | Margin |      | Horizontal                |                         | Vertical                  |                         | Remarks |
|------------------------|-------------------|------|------------------|-------|-----------------------|-----------------------|----------------|-------|----------------|--------|------|---------------------------|-------------------------|---------------------------|-------------------------|---------|
|                        | Reading<br>[dBuV] |      | Reading<br>[dBm] |       | Cable<br>Loss<br>[dB] | Ant.<br>Gain<br>[dBi] | (ERP)<br>[dBm] |       | (ERP)<br>[dBm] | [dB]   |      | Rx Ant.<br>Height<br>[cm] | Turn<br>Table<br>[deg.] | Rx Ant.<br>Height<br>[cm] | Turn<br>Table<br>[deg.] |         |
|                        | HOR               | VER  | HOR              | VER   |                       |                       | HOR            | VER   |                | HOR    | VER  |                           |                         |                           |                         |         |
| 1919.25                | 56.3              | 48.6 | -50.8            | -59.5 | 3.7                   | 9.8                   | -46.9          | -55.6 | -30.0          | 16.9   | 25.6 | 126                       | 49                      | 104                       | 10                      |         |
| 2878.88                | 50.6              | 48.2 | -53.3            | -56.0 | 4.6                   | 10.6                  | -49.4          | -52.1 | -30.0          | 19.4   | 22.1 | 130                       | 24                      | 110                       | 359                     |         |
| 3838.50                | 49.4              | 45.2 | -53.2            | -59.0 | 5.3                   | 12.2                  | -48.5          | -54.3 | -30.0          | 18.5   | 24.3 | 144                       | 237                     | 144                       | 184                     |         |
| 4798.13                | 55.0              | 52.2 | -44.0            | -47.2 | 6.0                   | 11.9                  | -40.2          | -43.4 | -30.0          | 10.2   | 13.4 | 113                       | 249                     | 139                       | 182                     |         |
| 5757.75                | 38.3              | 38.8 | -61.4            | -65.9 | 6.6                   | 13.0                  | -57.2          | -61.7 | -30.0          | 27.2   | 31.7 | 133                       | 217                     | 155                       | 43                      |         |
| 6717.38                | NS                | NS   | -                | -     | -                     | -                     | -              | -     | -30.0          | -      | -    | -                         | -                       | -                         | -                       | -       |
| 7677.00                | NS                | NS   | -                | -     | -                     | -                     | -              | -     | -30.0          | -      | -    | -                         | -                       | -                         | -                       | -       |
| 8636.63                | NS                | NS   | -                | -     | -                     | -                     | -              | -     | -30.0          | -      | -    | -                         | -                       | -                         | -                       | -       |
| 9596.25                | NS                | NS   | -                | -     | -                     | -                     | -              | -     | -30.0          | -      | -    | -                         | -                       | -                         | -                       | -       |

Calculation Result = SG Reading - Tx Cable Loss + Tx Antenna Gain - 2.15

Rx-ANTENNA : Biconical Antenna(25 MHz - 200 MHz), Logperiodic Antenna(200 MHz - 1000 MHz), Horn Antenna(1 GHz - the tenth harmonic)

Tx-ANTENNA : 120 MHz tuned Dipole Antenna(30 MHz - 120 MHz), Dipole Antenna(120 MHz - 1000 MHz), Horn Antenna(1 GHz - the tenth harmonic)

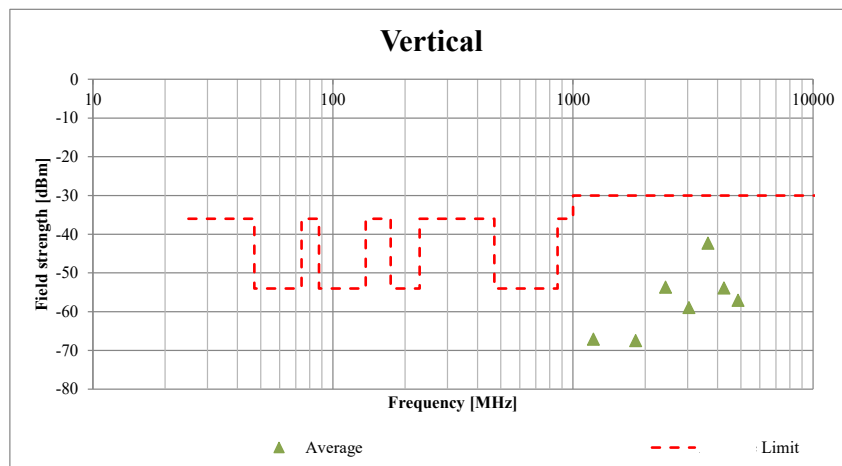
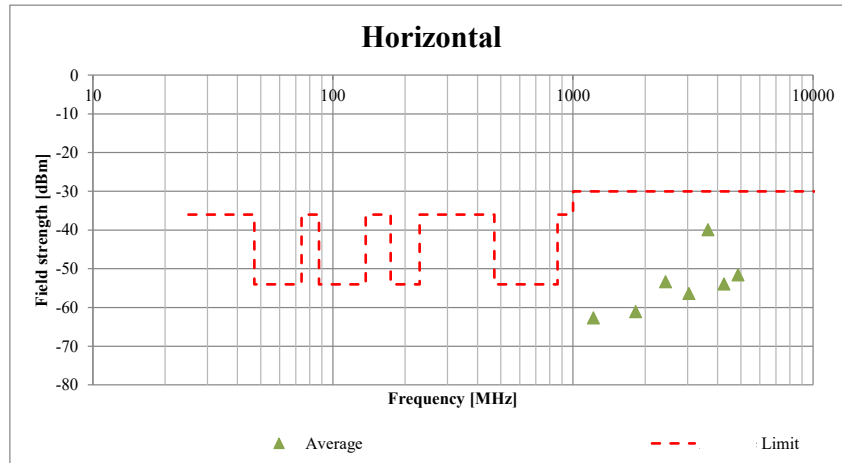
Other frequency noises omitted in this report were not seen or had enough margin (more than 20 dB).

NS : No signal detect.

Detector : Below 1 GHz: Spectrum Analyzer RMS Average (RBW / VBW: 100 kHz), Above 1 GHz: Spectrum Analyzer RMS Average (RBW: 1 MHz / VBW: 3 MHz)

**Field strength of spurious radiation**  
**(Plot data, Worst case)**

|                        |                     |                     |
|------------------------|---------------------|---------------------|
| Report No.             | 12890237H           |                     |
| Test place             | Ise EMC Lab.        |                     |
| Semi Anechoic Chamber  | No.4                | No.2                |
| Date                   | July 19, 2019       | July 18, 2019       |
| Temperature / Humidity | 20 deg. C / 66 % RH | 21 deg. C / 74 % RH |
| Engineer               | Koji Yamamoto       | Akihiko Maeda       |
|                        | Below 1 GHz         | Above 1 GHz         |
| Mode                   | Tx 607.875 MHz      |                     |



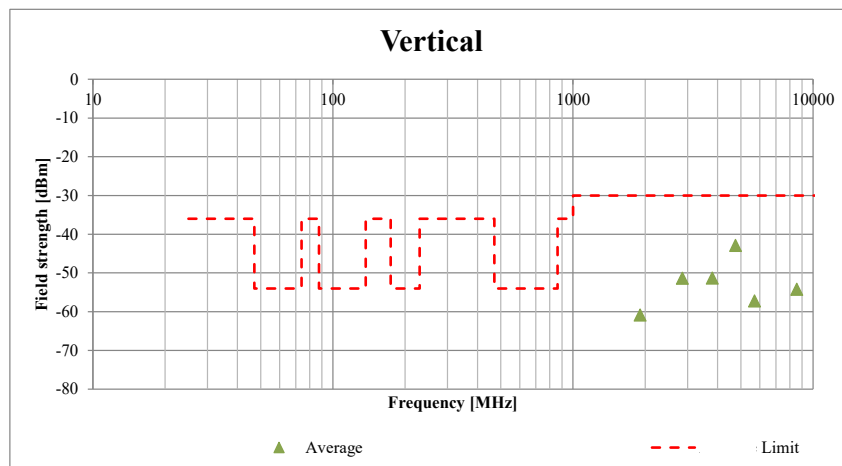
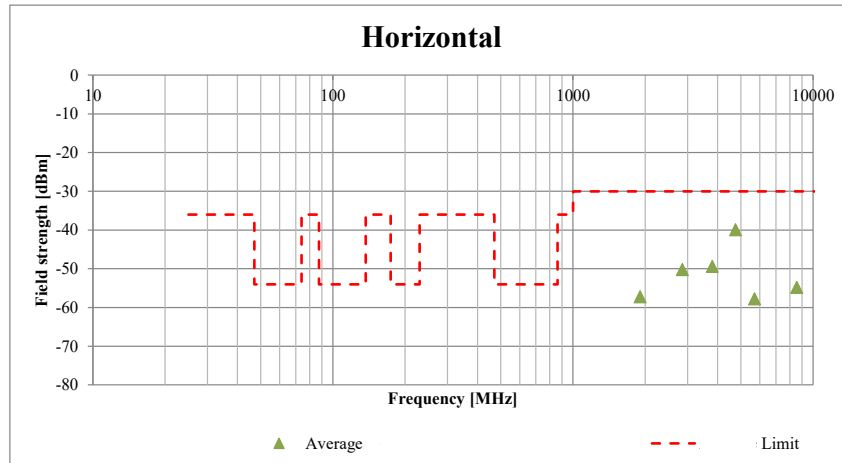
\*These plots data contains sufficient number to show the trend of characteristic features for EUT.

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**Ise EMC Lab.**

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**Field strength of spurious radiation**  
**(Plot data, Worst case)**

|                        |                     |                     |
|------------------------|---------------------|---------------------|
| Report No.             | 12890237H           |                     |
| Test place             | Ise EMC Lab.        |                     |
| Semi Anechoic Chamber  | No.4                | No.2                |
| Date                   | July 19, 2019       | July 18, 2019       |
| Temperature / Humidity | 20 deg. C / 66 % RH | 21 deg. C / 74 % RH |
| Engineer               | Koji Yamamoto       | Akihiko Maeda       |
|                        | Below 1 GHz         | Above 1 GHz         |
| Mode                   | Tx 950.625 MHz      |                     |



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

## Frequency stability

Report No. 12890237H  
Test place Ise EMC Lab. No.7 Measurement Room  
Date August 30, 2019  
Temperature / Humidity 23 deg. C / 49 % RH  
Engineer Akihiko Maeda  
Mode Tx 539.000 MHz

### Varying Temperature

| Test condition    |                | Tested frequency<br>[MHz] | Measured frequency<br>[MHz] | Frequency error<br>[MHz] | Result<br>[%] | Limit<br>[+/- %] | Remarks |
|-------------------|----------------|---------------------------|-----------------------------|--------------------------|---------------|------------------|---------|
| Temp.<br>[deg. C] | Voltage<br>[V] |                           |                             |                          |               |                  |         |
| 50                | 3.00           | 539.000                   | 538.999734                  | -0.000266                | -0.00005      | 0.005            |         |
| 40                | 3.00           | 539.000                   | 538.999773                  | -0.000227                | -0.00004      | 0.005            |         |
| 30                | 3.00           | 539.000                   | 538.999757                  | -0.000243                | -0.00005      | 0.005            |         |
| 20                | 3.00           | 539.000                   | 538.999738                  | -0.000262                | -0.00005      | 0.005            |         |
| 10                | 3.00           | 539.000                   | 538.999782                  | -0.000218                | -0.00004      | 0.005            |         |
| 0                 | 3.00           | 539.000                   | 538.999759                  | -0.000241                | -0.00004      | 0.005            |         |
| -10               | 3.00           | 539.000                   | 538.999788                  | -0.000212                | -0.00004      | 0.005            |         |
| -20               | 3.00           | 539.000                   | 538.999865                  | -0.000135                | -0.00003      | 0.005            |         |
| -30               | 3.00           | 539.000                   | 538.999990                  | -0.000010                | 0.00000       | 0.005            |         |

Calculation formula: Frequency error = Measured frequency - Tested frequency

Result [%] = Frequency error / Tested frequency \* 100

### Varying Supply Voltage

| Test condition    |                | Tested frequency<br>[MHz] | Measured frequency<br>[MHz] | Frequency error<br>[MHz] | Result<br>[%] | Limit<br>[+/- %] | Remarks             |
|-------------------|----------------|---------------------------|-----------------------------|--------------------------|---------------|------------------|---------------------|
| Temp.<br>[deg. C] | Voltage<br>[V] |                           |                             |                          |               |                  |                     |
| 20                | 5.00           | 539.000                   | 538.999736                  | -0.000264                | -0.00005      | 0.005            | USB Power (Nominal) |
| 20                | 4.51           | 539.000                   | 538.999736                  | -0.000264                | -0.00005      | 0.005            | USB Power (*)       |
| 20                | 5.75           | 539.000                   | 538.999736                  | -0.000264                | -0.00005      | 0.005            | USB Power (+15 %)   |
| 20                | 3.00           | 539.000                   | 538.999738                  | -0.000262                | -0.00005      | 0.005            | Battery Power       |
| 20                | 2.10           | 539.000                   | 538.999736                  | -0.000264                | -0.00005      | 0.005            | Battery End Point   |

(\*) Since the EUT could not operate at -15 % (4.25 V), the test was conducted at the minimum voltage at which the EUT could still operate.

Calculation formula: Frequency error = Measured frequency - Tested frequency

Result [%] = Frequency error / Tested frequency \* 100



## Frequency stability

Report No. 12890237H  
Test place Ise EMC Lab. No.7 Measurement Room  
Date August 30, 2019  
Temperature / Humidity 23 deg. C / 49 % RH  
Engineer Akihiko Maeda  
Mode Tx 950.625 MHz

### Varying Temperature

| Test condition    |                | Tested frequency<br>[MHz] | Measured frequency<br>[MHz] | Frequency error<br>[MHz] | Result<br>[%] | Limit<br>[+/- %] | Remarks |
|-------------------|----------------|---------------------------|-----------------------------|--------------------------|---------------|------------------|---------|
| Temp.<br>[deg. C] | Voltage<br>[V] |                           |                             |                          |               |                  |         |
| 50                | 3.00           | 950.625                   | 950.624570                  | -0.000430                | -0.00005      | -                |         |
| 40                | 3.00           | 950.625                   | 950.624737                  | -0.000263                | -0.00003      | -                |         |
| 30                | 3.00           | 950.625                   | 950.624776                  | -0.000224                | -0.00002      | -                |         |
| 20                | 3.00           | 950.625                   | 950.624753                  | -0.000247                | -0.00003      | -                |         |
| 10                | 3.00           | 950.625                   | 950.624688                  | -0.000312                | -0.00003      | -                |         |
| 0                 | 3.00           | 950.625                   | 950.624656                  | -0.000344                | -0.00004      | -                |         |
| -10               | 3.00           | 950.625                   | 950.624755                  | -0.000245                | -0.00003      | -                |         |
| -20               | 3.00           | 950.625                   | 950.624852                  | -0.000148                | -0.00002      | -                |         |
| -30               | 3.00           | 950.625                   | 950.625069                  | 0.000069                 | 0.00001       | -                |         |

Calculation formula: Frequency error = Measured frequency - Tested frequency

Result [%] = Frequency error / Tested frequency \* 100

### Varying Supply Voltage

| Test condition    |                | Tested frequency<br>[MHz] | Measured frequency<br>[MHz] | Frequency error<br>[MHz] | Result<br>[%] | Limit<br>[+/- %] | Remarks             |
|-------------------|----------------|---------------------------|-----------------------------|--------------------------|---------------|------------------|---------------------|
| Temp.<br>[deg. C] | Voltage<br>[V] |                           |                             |                          |               |                  |                     |
| 20                | 5.00           | 950.625                   | 950.624763                  | -0.000237                | -0.00002      | -                | USB Power (Nominal) |
| 20                | 4.49           | 950.625                   | 950.624753                  | -0.000247                | -0.00003      | -                | USB Power (*)       |
| 20                | 5.75           | 950.625                   | 950.624759                  | -0.000241                | -0.00003      | -                | USB Power (+15 %)   |
| 20                | 3.00           | 950.625                   | 950.624753                  | -0.000247                | -0.00003      | -                | Battery Power       |
| 20                | 2.19           | 950.625                   | 950.624744                  | -0.000256                | -0.00003      | -                | Battery End Point   |

(\*) Since the EUT could not operate at -15 % (4.25 V), the test was conducted at the minimum voltage at which the EUT could still operate.

Calculation formula: Frequency error = Measured frequency - Tested frequency

Result [%] = Frequency error / Tested frequency \* 100

## APPENDIX 2: Test instruments

### Test Instruments (1/2)

| Test Item | LIMS ID | Description                          | Manufacturer            | Model                    | Serial                        | Last Calibration Date | Calibration Due Date | Cal Int |
|-----------|---------|--------------------------------------|-------------------------|--------------------------|-------------------------------|-----------------------|----------------------|---------|
| RE        | 141542  | Digital Tester                       | Fluke Corporation       | FLUKE 26-3               | 78030611                      | 08/20/2019            | 08/31/2020           | 12      |
| RE        | 141902  | Spectrum Analyzer                    | AGILENT                 | E4440A                   | MY46187105                    | 10/04/2018            | 10/31/2019           | 12      |
| RE        | 142228  | Measure                              | KOMELON                 | KMC-36                   | -                             | -                     | -                    | -       |
| RE,CE     | 178648  | EMI measurement program              | TSJ                     | TEPTO-DV                 | -                             | -                     | -                    | -       |
| RE        | 141579  | Pre Amplifier                        | AGILENT                 | 8449B                    | 3008A02142                    | 01/21/2019            | 01/31/2020           | 12      |
| RE        | 141556  | Thermo-Hygrometer                    | CUSTOM                  | CTH-201                  | 0003                          | 12/05/2018            | 12/31/2019           | 12      |
| RE        | 141512  | Horn Antenna 1-18GHz                 | Schwarzbeck             | BBHA9120D                | 254                           | 05/09/2019            | 05/31/2020           | 12      |
| RE        | 141392  | Microwave Cable                      | Junkosha                | MWX221                   | 1604S253(1 m) / 1608S087(5 m) | 08/06/2019            | 08/31/2020           | 12      |
| RE        | 141297  | High Pass Filter(1.1-10GHz)          | TOKYO KEIKI             | TF219CD1                 | 1001                          | 01/10/2019            | 01/31/2020           | 12      |
| RE        | 142004  | AC2_Semi Anechoic Chamber(NSA)       | TDK                     | Semi Anechoic Chamber 3m | DA-06902                      | 06/29/2018            | 06/30/2020           | 24      |
| AT        | 141855  | Spectrum Analyzer                    | AGILENT                 | E4440A                   | MY46187750                    | 11/09/2018            | 11/30/2019           | 12      |
| AT        | 141805  | Power Meter                          | ANRITSU                 | ML2495A                  | 6K00003338                    | 10/16/2018            | 10/31/2019           | 12      |
| AT        | 141809  | Power Meter                          | ANRITSU                 | ML2495A                  | 825002                        | 5/16/2019             | 5/31/2020            | 12      |
| AT        | 141327  | Coaxial Cable                        | UL Japan                | -                        | -                             | 02/07/2019            | 02/29/2020           | 12      |
| AT        | 89845   | Audio Analyzer                       | AUDIO PRECISION         | APx525                   | APX2-270709                   | 11/26/2018            | 11/30/2019           | 12      |
| AT        | 141840  | Power sensor                         | ANRITSU                 | MA2411B                  | 11737                         | 10/16/2018            | 10/31/2019           | 12      |
| AT        | 141830  | Power sensor                         | ANRITSU                 | MA2411B                  | 738285                        | 5/16/2019             | 5/31/2020            | 12      |
| AT        | 141561  | Thermo-Hygrometer                    | CUSTOM                  | CTH-201                  | 1401                          | 01/11/2019            | 01/31/2020           | 12      |
| AT        | 141547  | DIGITAL HiTESTER                     | HIOKI                   | 3805                     | 60500120                      | 02/25/2019            | 02/29/2020           | 12      |
| AT        | 141269  | Attenuator(10dB) 1-18GHz             | Orient Microwave        | BX10-0476-00             | -                             | 03/26/2019            | 03/31/2020           | 12      |
| AT        | 141414  | Microwave Cable                      | Junkosha                | MWX221                   | 1207S407                      | 08/06/2019            | 08/31/2020           | 12      |
| AT        | 141156  | Attenuator(10dB)                     | Weinschel Corp          | 2                        | BL1173                        | 11/02/2018            | 11/30/2019           | 12      |
| AT        | 141171  | Attenuator(20dB)_DC-1GHz_N           | Weinschel Corp          | MODEL 1                  | BG0143                        | 12/17/2018            | 12/31/2019           | 12      |
| AT        | 141498  | Microwave Counter                    | ADVANTEST               | R5373                    | 120100309                     | 06/22/2019            | 06/30/2020           | 12      |
| AT        | 141441  | Temperature Chamber                  | ESPEC CORP.             | SU-241                   | 92013843                      | 07/02/2019            | 07/31/2020           | 12      |
| AT        | 142606  | ITU-R BS, 559-2 Colored Noise Filter | UL Japan                | -                        | -                             | -                     | -                    | -       |
| AT        | 141897  | Signal Generator                     | KEYSIGHT                | N5182B                   | MY56200024                    | 11/16/2018            | 11/30/2019           | 12      |
| AT        | 142607  | Video Amplifier                      | UNITEK ELECTROBICS INC. | UTK-200                  | 505001                        | -                     | -                    | -       |
| RE,CE     | 142183  | Measure                              | KOMELON                 | KMC-36                   | -                             | -                     | -                    | -       |
| RE,CE     | 142008  | AC3_Semi Anechoic Chamber(NSA)       | TDK                     | Semi Anechoic Chamber 3m | DA-10005                      | 06/26/2018            | 06/30/2020           | 24      |
| CE        | 141357  | LISN(AMN)                            | Schwarzbeck             | NSLK8127                 | 8127-729                      | 07/05/2019            | 07/31/2020           | 12      |
| CE        | 141580  | MicroWave System Amplifier           | AGILENT                 | 83017A                   | MY39500779                    | 03/05/2019            | 03/31/2020           | 12      |
| RE,CE     | 141554  | Thermo-Hygrometer                    | CUSTOM                  | CTH-180                  | 1301                          | 01/11/2019            | 01/31/2020           | 12      |
| RE,CE     | 141950  | EMI Test Receiver                    | Rohde & Schwarz         | ESU26                    | 100412                        | 06/27/2019            | 06/30/2020           | 12      |
| RE,CE     | 141532  | DIGITAL HiTESTER                     | HIOKI                   | 3805                     | 51201197                      | 01/29/2019            | 01/31/2020           | 12      |
| CE        | 141247  | Attenuator(13dB)                     | JFW Industries, Inc.    | 50FP-013H2 N             | -                             | 12/06/2018            | 12/31/2019           | 12      |

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## Test Instruments (2/2)

| Test Item | LIMS ID | Description                      | Manufacturer      | Model                   | Serial   | Last Calibration Date | Calibration Due Date | Cal Int |
|-----------|---------|----------------------------------|-------------------|-------------------------|----------|-----------------------|----------------------|---------|
| RE        | 141967  | Signal Generator                 | Rohde & Schwarz   | SMT02                   | 51400043 | 08/01/2019            | 08/31/2020           | 12      |
| RE        | 141425  | Biconical Antenna                | Schwarzbec        | BBA9106                 | 1302     | 08/24/2019            | 08/31/2020           | 12      |
| RE        | 141267  | Logperiodic Antenna(200-1000MHz) | Schwarzbeck       | VUSLP9111B              | 911B-192 | 08/24/2019            | 08/31/2020           | 12      |
| RE        | 141318  | Coaxial Cable                    | UL Japan          | -                       | -        | 07/01/2019            | 07/31/2020           | 12      |
| RE        | 141454  | Dipole Antenna                   | Schwarzbeck       | UHAP                    | 991      | 10/23/2018            | 10/31/2019           | 12      |
| RE        | 141397  | Coaxial Cable                    | UL Japan          | -                       | -        | 06/18/2019            | 06/30/2020           | 12      |
| RE        | 141562  | Thermo-Hygrometer                | CUSTOM            | CTH-180                 | 1501     | 01/11/2019            | 01/31/2020           | 12      |
| RE        | 141583  | Pre Amplifier                    | SONOMA INSTRUMENT | 11/5/1900               | 260833   | 02/08/2019            | 02/29/2020           | 12      |
| RE        | 142011  | Semi Anechoic Chamber(NSA)       | TDK               | Semi Anechoic Chamber 3 | DA-10005 | -                     | -                    | -       |

\*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: CE: Conducted Emission test  
RE: Radiated Emission test  
AT: Antenna Terminal Conducted test

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