



# RADIO TEST REPORT

Test Report No. 13806752S-A-R2

|                     |                               |
|---------------------|-------------------------------|
| Customer            | NITTOKU CO., LTD.             |
| Description of EUT  | LF-Band RFID READER/WRITER    |
| Model Number of EUT | ITS-LRW210                    |
| FCC ID              | 2A29T-ITSLRW210V11            |
| Test Regulation     | FCC Part 15 Subpart C: 2021   |
| Test Result         | Complied (Refer to SECTION 3) |
| Issue Date          | March 31, 2022                |
| Remarks             | -                             |

Representative Test Engineer

*Y. Murakami*

Yosuke Murakami  
Engineer

Approved By

*K. Noda*

Kazuya Noda  
Leader



CERTIFICATE 1266.03

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

Report Cover Page - Form-ULID-003532 (DCS:13-EM-F0429) Issue# 20.0

## ANNOUNCEMENT

- This test report shall not be reproduced in full or partial, without the written approval of UL Japan, Inc.
- The results in this report apply only to the sample tested.
- This sample tested is in compliance with the limits of the above regulation.
- The test results in this test report are traceable to the national or international standards.
- This test report must not be used by the customer to claim product certification, approval, or endorsement by the A2LA accreditation body.
- This test report covers Radio technical requirements.  
It does not cover administrative issues such as Manual or non-Radio test related Requirements. (if applicable)
- The all test items in this test report are conducted by UL Japan, Inc Shonan EMC Lab.
- The opinions and the interpretations to the result of the description in this report are outside scopes where UL Japan, Inc. has been accredited.
- The information provided from the applicant for this report is identified in Section 1.
- For test report(s) referred in this report, the latest version (including any revisions) is always referred.

## REVISION HISTORY

### Original Test Report No.: 13806752S-A

This report is a revised version of 13806752S-A-R1. 13806752S-A-R1 is replaced with this report.

| Revision                                               | Test Report No.   | Date              | Revised Contents                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                |                 |                   |  |  |  |                |                |                |                |                                   |                |        |        |        |        |                                                  |              |        |        |        |   |                |        |        |        |   |               |        |        |        |   |             |        |        |        |   |              |        |        |        |   |                                                  |               |        |        |        |   |              |        |        |        |   |                              |  |               |        |        |        |   |                                                        |  |  |  |  |  |            |                   |                       |         |                                 |        |      |                 |                   |  |  |  |                |                |                |                |                                   |                |        |        |        |        |                                                  |              |        |        |        |   |                |        |        |        |   |               |        |        |        |   |             |        |        |        |   |              |        |        |        |   |                                                  |               |        |        |        |   |              |        |        |        |   |                              |  |               |        |        |        |   |                                                        |  |  |  |  |  |            |                   |                       |         |
|--------------------------------------------------------|-------------------|-------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|-----------------|-------------------|--|--|--|----------------|----------------|----------------|----------------|-----------------------------------|----------------|--------|--------|--------|--------|--------------------------------------------------|--------------|--------|--------|--------|---|----------------|--------|--------|--------|---|---------------|--------|--------|--------|---|-------------|--------|--------|--------|---|--------------|--------|--------|--------|---|--------------------------------------------------|---------------|--------|--------|--------|---|--------------|--------|--------|--------|---|------------------------------|--|---------------|--------|--------|--------|---|--------------------------------------------------------|--|--|--|--|--|------------|-------------------|-----------------------|---------|---------------------------------|--------|------|-----------------|-------------------|--|--|--|----------------|----------------|----------------|----------------|-----------------------------------|----------------|--------|--------|--------|--------|--------------------------------------------------|--------------|--------|--------|--------|---|----------------|--------|--------|--------|---|---------------|--------|--------|--------|---|-------------|--------|--------|--------|---|--------------|--------|--------|--------|---|--------------------------------------------------|---------------|--------|--------|--------|---|--------------|--------|--------|--------|---|------------------------------|--|---------------|--------|--------|--------|---|--------------------------------------------------------|--|--|--|--|--|------------|-------------------|-----------------------|---------|
| - (Original)                                           | 13806752S-A       | March 18, 2022    | -                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                |                 |                   |  |  |  |                |                |                |                |                                   |                |        |        |        |        |                                                  |              |        |        |        |   |                |        |        |        |   |               |        |        |        |   |             |        |        |        |   |              |        |        |        |   |                                                  |               |        |        |        |   |              |        |        |        |   |                              |  |               |        |        |        |   |                                                        |  |  |  |  |  |            |                   |                       |         |                                 |        |      |                 |                   |  |  |  |                |                |                |                |                                   |                |        |        |        |        |                                                  |              |        |        |        |   |                |        |        |        |   |               |        |        |        |   |             |        |        |        |   |              |        |        |        |   |                                                  |               |        |        |        |   |              |        |        |        |   |                              |  |               |        |        |        |   |                                                        |  |  |  |  |  |            |                   |                       |         |
| 1                                                      | 13806752S-A-R1    | March 28, 2022    | <div>SECTION 3.2: Correction of worst margin for “Electric Field Strength of Fundamental Emission”.</div> <div>From: To:</div> <div><b>Without magnetic sheet</b><br/><b>PK with DCCF</b><br/>4.3 dB, 0.1342 MHz, Vertical</div> <div><b>Without magnetic sheet</b><br/>2.2 dB, 0.1342 MHz, Vertical</div> <div><b>With magnetic sheet</b><br/><b>PK with DCCF</b><br/>3.5 dB, 0.1342 MHz, Vertical</div> <div><b>With magnetic sheet</b><br/>1.3 dB, 0.1342 MHz, Vertical</div> <div>SECTION 3.4: Correction of Uncertainty.</div> <div>From:</div> <table><thead><tr><th rowspan="2">Item</th><th rowspan="2">Frequency range</th><th colspan="4">Uncertainty (+/-)</th></tr><tr><th>No. 1 SAC / SR</th><th>No. 2 SAC / SR</th><th>No. 3 SAC / SR</th><th>No. 4,5,6,8 SR</th></tr></thead><tbody><tr><td>Conducted emission (AC Main) LISN</td><td>150 kHz-30 MHz</td><td>2.0 dB</td><td>2.0 dB</td><td>2.7 dB</td><td>2.7 dB</td></tr><tr><td rowspan="5">Radiated emission<br/>(Measurement distance: 3 m)</td><td>9 kHz-30 MHz</td><td>2.9 dB</td><td>2.9 dB</td><td>2.9 dB</td><td>-</td></tr><tr><td>30 MHz-100 MHz</td><td>4.0 dB</td><td>4.0 dB</td><td>4.0 dB</td><td>-</td></tr><tr><td>200 MHz-1 GHz</td><td>6.0 dB</td><td>6.0 dB</td><td>6.0 dB</td><td>-</td></tr><tr><td>1 GHz-6 GHz</td><td>4.0 dB</td><td>4.0 dB</td><td>4.0 dB</td><td>-</td></tr><tr><td>6 GHz-18 GHz</td><td>5.4 dB</td><td>5.4 dB</td><td>5.4 dB</td><td>-</td></tr><tr><td rowspan="2">Radiated emission<br/>(Measurement distance: 1 m)</td><td>18 GHz-40 GHz</td><td>5.0 dB</td><td>5.0 dB</td><td>5.7 dB</td><td>-</td></tr><tr><td>1 GHz-18 GHz</td><td>5.7 dB</td><td>5.7 dB</td><td>5.7 dB</td><td>-</td></tr><tr><td colspan="2">SAC=Shielded Antenna Chamber</td><td>18 GHz-40 GHz</td><td>5.9 dB</td><td>5.9 dB</td><td>5.9 dB</td><td>-</td></tr><tr><td colspan="6">SR= Shielded Room is applied besides radiated emission</td></tr></tbody></table> <table><thead><tr><th>Other test</th><th>Uncertainty (+/-)</th></tr></thead><tbody><tr><td>Bandwidth Measurement</td><td>0.012 %</td></tr><tr><td>Duty cycle and Tare Measurement</td><td>0.27 %</td></tr></tbody></table> <div>To:</div> <table><thead><tr><th rowspan="2">Item</th><th rowspan="2">Frequency range</th><th colspan="4">Uncertainty (+/-)</th></tr><tr><th>No. 1 SAC / SR</th><th>No. 2 SAC / SR</th><th>No. 3 SAC / SR</th><th>No. 4,5,6,8 SR</th></tr></thead><tbody><tr><td>Conducted emission (AC Main) LISN</td><td>150 kHz-30 MHz</td><td>2.0 dB</td><td>2.0 dB</td><td>2.0 dB</td><td>2.0 dB</td></tr><tr><td rowspan="5">Radiated emission<br/>(Measurement distance: 3 m)</td><td>9 kHz-30 MHz</td><td>3.2 dB</td><td>3.1 dB</td><td>3.1 dB</td><td>-</td></tr><tr><td>30 MHz-100 MHz</td><td>4.0 dB</td><td>4.0 dB</td><td>4.0 dB</td><td>-</td></tr><tr><td>200 MHz-1 GHz</td><td>6.0 dB</td><td>6.1 dB</td><td>6.1 dB</td><td>-</td></tr><tr><td>1 GHz-6 GHz</td><td>4.7 dB</td><td>4.7 dB</td><td>4.7 dB</td><td>-</td></tr><tr><td>6 GHz-18 GHz</td><td>5.3 dB</td><td>5.3 dB</td><td>5.3 dB</td><td>-</td></tr><tr><td rowspan="2">Radiated emission<br/>(Measurement distance: 1 m)</td><td>18 GHz-40 GHz</td><td>5.4 dB</td><td>5.3 dB</td><td>5.3 dB</td><td>-</td></tr><tr><td>1 GHz-18 GHz</td><td>5.6 dB</td><td>5.6 dB</td><td>5.6 dB</td><td>-</td></tr><tr><td colspan="2">SAC=Shielded Antenna Chamber</td><td>18 GHz-40 GHz</td><td>5.8 dB</td><td>5.8 dB</td><td>5.8 dB</td><td>-</td></tr><tr><td colspan="6">SR= Shielded Room is applied besides radiated emission</td></tr></tbody></table> <table><thead><tr><th>Other test</th><th>Uncertainty (+/-)</th></tr></thead><tbody><tr><td>Bandwidth Measurement</td><td>0.012 %</td></tr></tbody></table> <div>APPENDIX 1: Deletion of DCCF test data.</div> <div>-Radiated Emission: Correction of DCCF Value.</div> | Item           | Frequency range | Uncertainty (+/-) |  |  |  | No. 1 SAC / SR | No. 2 SAC / SR | No. 3 SAC / SR | No. 4,5,6,8 SR | Conducted emission (AC Main) LISN | 150 kHz-30 MHz | 2.0 dB | 2.0 dB | 2.7 dB | 2.7 dB | Radiated emission<br>(Measurement distance: 3 m) | 9 kHz-30 MHz | 2.9 dB | 2.9 dB | 2.9 dB | - | 30 MHz-100 MHz | 4.0 dB | 4.0 dB | 4.0 dB | - | 200 MHz-1 GHz | 6.0 dB | 6.0 dB | 6.0 dB | - | 1 GHz-6 GHz | 4.0 dB | 4.0 dB | 4.0 dB | - | 6 GHz-18 GHz | 5.4 dB | 5.4 dB | 5.4 dB | - | Radiated emission<br>(Measurement distance: 1 m) | 18 GHz-40 GHz | 5.0 dB | 5.0 dB | 5.7 dB | - | 1 GHz-18 GHz | 5.7 dB | 5.7 dB | 5.7 dB | - | SAC=Shielded Antenna Chamber |  | 18 GHz-40 GHz | 5.9 dB | 5.9 dB | 5.9 dB | - | SR= Shielded Room is applied besides radiated emission |  |  |  |  |  | Other test | Uncertainty (+/-) | Bandwidth Measurement | 0.012 % | Duty cycle and Tare Measurement | 0.27 % | Item | Frequency range | Uncertainty (+/-) |  |  |  | No. 1 SAC / SR | No. 2 SAC / SR | No. 3 SAC / SR | No. 4,5,6,8 SR | Conducted emission (AC Main) LISN | 150 kHz-30 MHz | 2.0 dB | 2.0 dB | 2.0 dB | 2.0 dB | Radiated emission<br>(Measurement distance: 3 m) | 9 kHz-30 MHz | 3.2 dB | 3.1 dB | 3.1 dB | - | 30 MHz-100 MHz | 4.0 dB | 4.0 dB | 4.0 dB | - | 200 MHz-1 GHz | 6.0 dB | 6.1 dB | 6.1 dB | - | 1 GHz-6 GHz | 4.7 dB | 4.7 dB | 4.7 dB | - | 6 GHz-18 GHz | 5.3 dB | 5.3 dB | 5.3 dB | - | Radiated emission<br>(Measurement distance: 1 m) | 18 GHz-40 GHz | 5.4 dB | 5.3 dB | 5.3 dB | - | 1 GHz-18 GHz | 5.6 dB | 5.6 dB | 5.6 dB | - | SAC=Shielded Antenna Chamber |  | 18 GHz-40 GHz | 5.8 dB | 5.8 dB | 5.8 dB | - | SR= Shielded Room is applied besides radiated emission |  |  |  |  |  | Other test | Uncertainty (+/-) | Bandwidth Measurement | 0.012 % |
| Item                                                   | Frequency range   | Uncertainty (+/-) |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                |                 |                   |  |  |  |                |                |                |                |                                   |                |        |        |        |        |                                                  |              |        |        |        |   |                |        |        |        |   |               |        |        |        |   |             |        |        |        |   |              |        |        |        |   |                                                  |               |        |        |        |   |              |        |        |        |   |                              |  |               |        |        |        |   |                                                        |  |  |  |  |  |            |                   |                       |         |                                 |        |      |                 |                   |  |  |  |                |                |                |                |                                   |                |        |        |        |        |                                                  |              |        |        |        |   |                |        |        |        |   |               |        |        |        |   |             |        |        |        |   |              |        |        |        |   |                                                  |               |        |        |        |   |              |        |        |        |   |                              |  |               |        |        |        |   |                                                        |  |  |  |  |  |            |                   |                       |         |
|                                                        |                   | No. 1 SAC / SR    | No. 2 SAC / SR                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | No. 3 SAC / SR | No. 4,5,6,8 SR  |                   |  |  |  |                |                |                |                |                                   |                |        |        |        |        |                                                  |              |        |        |        |   |                |        |        |        |   |               |        |        |        |   |             |        |        |        |   |              |        |        |        |   |                                                  |               |        |        |        |   |              |        |        |        |   |                              |  |               |        |        |        |   |                                                        |  |  |  |  |  |            |                   |                       |         |                                 |        |      |                 |                   |  |  |  |                |                |                |                |                                   |                |        |        |        |        |                                                  |              |        |        |        |   |                |        |        |        |   |               |        |        |        |   |             |        |        |        |   |              |        |        |        |   |                                                  |               |        |        |        |   |              |        |        |        |   |                              |  |               |        |        |        |   |                                                        |  |  |  |  |  |            |                   |                       |         |
| Conducted emission (AC Main) LISN                      | 150 kHz-30 MHz    | 2.0 dB            | 2.0 dB                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 2.7 dB         | 2.7 dB          |                   |  |  |  |                |                |                |                |                                   |                |        |        |        |        |                                                  |              |        |        |        |   |                |        |        |        |   |               |        |        |        |   |             |        |        |        |   |              |        |        |        |   |                                                  |               |        |        |        |   |              |        |        |        |   |                              |  |               |        |        |        |   |                                                        |  |  |  |  |  |            |                   |                       |         |                                 |        |      |                 |                   |  |  |  |                |                |                |                |                                   |                |        |        |        |        |                                                  |              |        |        |        |   |                |        |        |        |   |               |        |        |        |   |             |        |        |        |   |              |        |        |        |   |                                                  |               |        |        |        |   |              |        |        |        |   |                              |  |               |        |        |        |   |                                                        |  |  |  |  |  |            |                   |                       |         |
| Radiated emission<br>(Measurement distance: 3 m)       | 9 kHz-30 MHz      | 2.9 dB            | 2.9 dB                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 2.9 dB         | -               |                   |  |  |  |                |                |                |                |                                   |                |        |        |        |        |                                                  |              |        |        |        |   |                |        |        |        |   |               |        |        |        |   |             |        |        |        |   |              |        |        |        |   |                                                  |               |        |        |        |   |              |        |        |        |   |                              |  |               |        |        |        |   |                                                        |  |  |  |  |  |            |                   |                       |         |                                 |        |      |                 |                   |  |  |  |                |                |                |                |                                   |                |        |        |        |        |                                                  |              |        |        |        |   |                |        |        |        |   |               |        |        |        |   |             |        |        |        |   |              |        |        |        |   |                                                  |               |        |        |        |   |              |        |        |        |   |                              |  |               |        |        |        |   |                                                        |  |  |  |  |  |            |                   |                       |         |
|                                                        | 30 MHz-100 MHz    | 4.0 dB            | 4.0 dB                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 4.0 dB         | -               |                   |  |  |  |                |                |                |                |                                   |                |        |        |        |        |                                                  |              |        |        |        |   |                |        |        |        |   |               |        |        |        |   |             |        |        |        |   |              |        |        |        |   |                                                  |               |        |        |        |   |              |        |        |        |   |                              |  |               |        |        |        |   |                                                        |  |  |  |  |  |            |                   |                       |         |                                 |        |      |                 |                   |  |  |  |                |                |                |                |                                   |                |        |        |        |        |                                                  |              |        |        |        |   |                |        |        |        |   |               |        |        |        |   |             |        |        |        |   |              |        |        |        |   |                                                  |               |        |        |        |   |              |        |        |        |   |                              |  |               |        |        |        |   |                                                        |  |  |  |  |  |            |                   |                       |         |
|                                                        | 200 MHz-1 GHz     | 6.0 dB            | 6.0 dB                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 6.0 dB         | -               |                   |  |  |  |                |                |                |                |                                   |                |        |        |        |        |                                                  |              |        |        |        |   |                |        |        |        |   |               |        |        |        |   |             |        |        |        |   |              |        |        |        |   |                                                  |               |        |        |        |   |              |        |        |        |   |                              |  |               |        |        |        |   |                                                        |  |  |  |  |  |            |                   |                       |         |                                 |        |      |                 |                   |  |  |  |                |                |                |                |                                   |                |        |        |        |        |                                                  |              |        |        |        |   |                |        |        |        |   |               |        |        |        |   |             |        |        |        |   |              |        |        |        |   |                                                  |               |        |        |        |   |              |        |        |        |   |                              |  |               |        |        |        |   |                                                        |  |  |  |  |  |            |                   |                       |         |
|                                                        | 1 GHz-6 GHz       | 4.0 dB            | 4.0 dB                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 4.0 dB         | -               |                   |  |  |  |                |                |                |                |                                   |                |        |        |        |        |                                                  |              |        |        |        |   |                |        |        |        |   |               |        |        |        |   |             |        |        |        |   |              |        |        |        |   |                                                  |               |        |        |        |   |              |        |        |        |   |                              |  |               |        |        |        |   |                                                        |  |  |  |  |  |            |                   |                       |         |                                 |        |      |                 |                   |  |  |  |                |                |                |                |                                   |                |        |        |        |        |                                                  |              |        |        |        |   |                |        |        |        |   |               |        |        |        |   |             |        |        |        |   |              |        |        |        |   |                                                  |               |        |        |        |   |              |        |        |        |   |                              |  |               |        |        |        |   |                                                        |  |  |  |  |  |            |                   |                       |         |
|                                                        | 6 GHz-18 GHz      | 5.4 dB            | 5.4 dB                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 5.4 dB         | -               |                   |  |  |  |                |                |                |                |                                   |                |        |        |        |        |                                                  |              |        |        |        |   |                |        |        |        |   |               |        |        |        |   |             |        |        |        |   |              |        |        |        |   |                                                  |               |        |        |        |   |              |        |        |        |   |                              |  |               |        |        |        |   |                                                        |  |  |  |  |  |            |                   |                       |         |                                 |        |      |                 |                   |  |  |  |                |                |                |                |                                   |                |        |        |        |        |                                                  |              |        |        |        |   |                |        |        |        |   |               |        |        |        |   |             |        |        |        |   |              |        |        |        |   |                                                  |               |        |        |        |   |              |        |        |        |   |                              |  |               |        |        |        |   |                                                        |  |  |  |  |  |            |                   |                       |         |
| Radiated emission<br>(Measurement distance: 1 m)       | 18 GHz-40 GHz     | 5.0 dB            | 5.0 dB                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 5.7 dB         | -               |                   |  |  |  |                |                |                |                |                                   |                |        |        |        |        |                                                  |              |        |        |        |   |                |        |        |        |   |               |        |        |        |   |             |        |        |        |   |              |        |        |        |   |                                                  |               |        |        |        |   |              |        |        |        |   |                              |  |               |        |        |        |   |                                                        |  |  |  |  |  |            |                   |                       |         |                                 |        |      |                 |                   |  |  |  |                |                |                |                |                                   |                |        |        |        |        |                                                  |              |        |        |        |   |                |        |        |        |   |               |        |        |        |   |             |        |        |        |   |              |        |        |        |   |                                                  |               |        |        |        |   |              |        |        |        |   |                              |  |               |        |        |        |   |                                                        |  |  |  |  |  |            |                   |                       |         |
|                                                        | 1 GHz-18 GHz      | 5.7 dB            | 5.7 dB                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 5.7 dB         | -               |                   |  |  |  |                |                |                |                |                                   |                |        |        |        |        |                                                  |              |        |        |        |   |                |        |        |        |   |               |        |        |        |   |             |        |        |        |   |              |        |        |        |   |                                                  |               |        |        |        |   |              |        |        |        |   |                              |  |               |        |        |        |   |                                                        |  |  |  |  |  |            |                   |                       |         |                                 |        |      |                 |                   |  |  |  |                |                |                |                |                                   |                |        |        |        |        |                                                  |              |        |        |        |   |                |        |        |        |   |               |        |        |        |   |             |        |        |        |   |              |        |        |        |   |                                                  |               |        |        |        |   |              |        |        |        |   |                              |  |               |        |        |        |   |                                                        |  |  |  |  |  |            |                   |                       |         |
| SAC=Shielded Antenna Chamber                           |                   | 18 GHz-40 GHz     | 5.9 dB                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 5.9 dB         | 5.9 dB          | -                 |  |  |  |                |                |                |                |                                   |                |        |        |        |        |                                                  |              |        |        |        |   |                |        |        |        |   |               |        |        |        |   |             |        |        |        |   |              |        |        |        |   |                                                  |               |        |        |        |   |              |        |        |        |   |                              |  |               |        |        |        |   |                                                        |  |  |  |  |  |            |                   |                       |         |                                 |        |      |                 |                   |  |  |  |                |                |                |                |                                   |                |        |        |        |        |                                                  |              |        |        |        |   |                |        |        |        |   |               |        |        |        |   |             |        |        |        |   |              |        |        |        |   |                                                  |               |        |        |        |   |              |        |        |        |   |                              |  |               |        |        |        |   |                                                        |  |  |  |  |  |            |                   |                       |         |
| SR= Shielded Room is applied besides radiated emission |                   |                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                |                 |                   |  |  |  |                |                |                |                |                                   |                |        |        |        |        |                                                  |              |        |        |        |   |                |        |        |        |   |               |        |        |        |   |             |        |        |        |   |              |        |        |        |   |                                                  |               |        |        |        |   |              |        |        |        |   |                              |  |               |        |        |        |   |                                                        |  |  |  |  |  |            |                   |                       |         |                                 |        |      |                 |                   |  |  |  |                |                |                |                |                                   |                |        |        |        |        |                                                  |              |        |        |        |   |                |        |        |        |   |               |        |        |        |   |             |        |        |        |   |              |        |        |        |   |                                                  |               |        |        |        |   |              |        |        |        |   |                              |  |               |        |        |        |   |                                                        |  |  |  |  |  |            |                   |                       |         |
| Other test                                             | Uncertainty (+/-) |                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                |                 |                   |  |  |  |                |                |                |                |                                   |                |        |        |        |        |                                                  |              |        |        |        |   |                |        |        |        |   |               |        |        |        |   |             |        |        |        |   |              |        |        |        |   |                                                  |               |        |        |        |   |              |        |        |        |   |                              |  |               |        |        |        |   |                                                        |  |  |  |  |  |            |                   |                       |         |                                 |        |      |                 |                   |  |  |  |                |                |                |                |                                   |                |        |        |        |        |                                                  |              |        |        |        |   |                |        |        |        |   |               |        |        |        |   |             |        |        |        |   |              |        |        |        |   |                                                  |               |        |        |        |   |              |        |        |        |   |                              |  |               |        |        |        |   |                                                        |  |  |  |  |  |            |                   |                       |         |
| Bandwidth Measurement                                  | 0.012 %           |                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                |                 |                   |  |  |  |                |                |                |                |                                   |                |        |        |        |        |                                                  |              |        |        |        |   |                |        |        |        |   |               |        |        |        |   |             |        |        |        |   |              |        |        |        |   |                                                  |               |        |        |        |   |              |        |        |        |   |                              |  |               |        |        |        |   |                                                        |  |  |  |  |  |            |                   |                       |         |                                 |        |      |                 |                   |  |  |  |                |                |                |                |                                   |                |        |        |        |        |                                                  |              |        |        |        |   |                |        |        |        |   |               |        |        |        |   |             |        |        |        |   |              |        |        |        |   |                                                  |               |        |        |        |   |              |        |        |        |   |                              |  |               |        |        |        |   |                                                        |  |  |  |  |  |            |                   |                       |         |
| Duty cycle and Tare Measurement                        | 0.27 %            |                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                |                 |                   |  |  |  |                |                |                |                |                                   |                |        |        |        |        |                                                  |              |        |        |        |   |                |        |        |        |   |               |        |        |        |   |             |        |        |        |   |              |        |        |        |   |                                                  |               |        |        |        |   |              |        |        |        |   |                              |  |               |        |        |        |   |                                                        |  |  |  |  |  |            |                   |                       |         |                                 |        |      |                 |                   |  |  |  |                |                |                |                |                                   |                |        |        |        |        |                                                  |              |        |        |        |   |                |        |        |        |   |               |        |        |        |   |             |        |        |        |   |              |        |        |        |   |                                                  |               |        |        |        |   |              |        |        |        |   |                              |  |               |        |        |        |   |                                                        |  |  |  |  |  |            |                   |                       |         |
| Item                                                   | Frequency range   | Uncertainty (+/-) |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                |                 |                   |  |  |  |                |                |                |                |                                   |                |        |        |        |        |                                                  |              |        |        |        |   |                |        |        |        |   |               |        |        |        |   |             |        |        |        |   |              |        |        |        |   |                                                  |               |        |        |        |   |              |        |        |        |   |                              |  |               |        |        |        |   |                                                        |  |  |  |  |  |            |                   |                       |         |                                 |        |      |                 |                   |  |  |  |                |                |                |                |                                   |                |        |        |        |        |                                                  |              |        |        |        |   |                |        |        |        |   |               |        |        |        |   |             |        |        |        |   |              |        |        |        |   |                                                  |               |        |        |        |   |              |        |        |        |   |                              |  |               |        |        |        |   |                                                        |  |  |  |  |  |            |                   |                       |         |
|                                                        |                   | No. 1 SAC / SR    | No. 2 SAC / SR                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | No. 3 SAC / SR | No. 4,5,6,8 SR  |                   |  |  |  |                |                |                |                |                                   |                |        |        |        |        |                                                  |              |        |        |        |   |                |        |        |        |   |               |        |        |        |   |             |        |        |        |   |              |        |        |        |   |                                                  |               |        |        |        |   |              |        |        |        |   |                              |  |               |        |        |        |   |                                                        |  |  |  |  |  |            |                   |                       |         |                                 |        |      |                 |                   |  |  |  |                |                |                |                |                                   |                |        |        |        |        |                                                  |              |        |        |        |   |                |        |        |        |   |               |        |        |        |   |             |        |        |        |   |              |        |        |        |   |                                                  |               |        |        |        |   |              |        |        |        |   |                              |  |               |        |        |        |   |                                                        |  |  |  |  |  |            |                   |                       |         |
| Conducted emission (AC Main) LISN                      | 150 kHz-30 MHz    | 2.0 dB            | 2.0 dB                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 2.0 dB         | 2.0 dB          |                   |  |  |  |                |                |                |                |                                   |                |        |        |        |        |                                                  |              |        |        |        |   |                |        |        |        |   |               |        |        |        |   |             |        |        |        |   |              |        |        |        |   |                                                  |               |        |        |        |   |              |        |        |        |   |                              |  |               |        |        |        |   |                                                        |  |  |  |  |  |            |                   |                       |         |                                 |        |      |                 |                   |  |  |  |                |                |                |                |                                   |                |        |        |        |        |                                                  |              |        |        |        |   |                |        |        |        |   |               |        |        |        |   |             |        |        |        |   |              |        |        |        |   |                                                  |               |        |        |        |   |              |        |        |        |   |                              |  |               |        |        |        |   |                                                        |  |  |  |  |  |            |                   |                       |         |
| Radiated emission<br>(Measurement distance: 3 m)       | 9 kHz-30 MHz      | 3.2 dB            | 3.1 dB                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 3.1 dB         | -               |                   |  |  |  |                |                |                |                |                                   |                |        |        |        |        |                                                  |              |        |        |        |   |                |        |        |        |   |               |        |        |        |   |             |        |        |        |   |              |        |        |        |   |                                                  |               |        |        |        |   |              |        |        |        |   |                              |  |               |        |        |        |   |                                                        |  |  |  |  |  |            |                   |                       |         |                                 |        |      |                 |                   |  |  |  |                |                |                |                |                                   |                |        |        |        |        |                                                  |              |        |        |        |   |                |        |        |        |   |               |        |        |        |   |             |        |        |        |   |              |        |        |        |   |                                                  |               |        |        |        |   |              |        |        |        |   |                              |  |               |        |        |        |   |                                                        |  |  |  |  |  |            |                   |                       |         |
|                                                        | 30 MHz-100 MHz    | 4.0 dB            | 4.0 dB                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 4.0 dB         | -               |                   |  |  |  |                |                |                |                |                                   |                |        |        |        |        |                                                  |              |        |        |        |   |                |        |        |        |   |               |        |        |        |   |             |        |        |        |   |              |        |        |        |   |                                                  |               |        |        |        |   |              |        |        |        |   |                              |  |               |        |        |        |   |                                                        |  |  |  |  |  |            |                   |                       |         |                                 |        |      |                 |                   |  |  |  |                |                |                |                |                                   |                |        |        |        |        |                                                  |              |        |        |        |   |                |        |        |        |   |               |        |        |        |   |             |        |        |        |   |              |        |        |        |   |                                                  |               |        |        |        |   |              |        |        |        |   |                              |  |               |        |        |        |   |                                                        |  |  |  |  |  |            |                   |                       |         |
|                                                        | 200 MHz-1 GHz     | 6.0 dB            | 6.1 dB                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 6.1 dB         | -               |                   |  |  |  |                |                |                |                |                                   |                |        |        |        |        |                                                  |              |        |        |        |   |                |        |        |        |   |               |        |        |        |   |             |        |        |        |   |              |        |        |        |   |                                                  |               |        |        |        |   |              |        |        |        |   |                              |  |               |        |        |        |   |                                                        |  |  |  |  |  |            |                   |                       |         |                                 |        |      |                 |                   |  |  |  |                |                |                |                |                                   |                |        |        |        |        |                                                  |              |        |        |        |   |                |        |        |        |   |               |        |        |        |   |             |        |        |        |   |              |        |        |        |   |                                                  |               |        |        |        |   |              |        |        |        |   |                              |  |               |        |        |        |   |                                                        |  |  |  |  |  |            |                   |                       |         |
|                                                        | 1 GHz-6 GHz       | 4.7 dB            | 4.7 dB                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 4.7 dB         | -               |                   |  |  |  |                |                |                |                |                                   |                |        |        |        |        |                                                  |              |        |        |        |   |                |        |        |        |   |               |        |        |        |   |             |        |        |        |   |              |        |        |        |   |                                                  |               |        |        |        |   |              |        |        |        |   |                              |  |               |        |        |        |   |                                                        |  |  |  |  |  |            |                   |                       |         |                                 |        |      |                 |                   |  |  |  |                |                |                |                |                                   |                |        |        |        |        |                                                  |              |        |        |        |   |                |        |        |        |   |               |        |        |        |   |             |        |        |        |   |              |        |        |        |   |                                                  |               |        |        |        |   |              |        |        |        |   |                              |  |               |        |        |        |   |                                                        |  |  |  |  |  |            |                   |                       |         |
|                                                        | 6 GHz-18 GHz      | 5.3 dB            | 5.3 dB                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 5.3 dB         | -               |                   |  |  |  |                |                |                |                |                                   |                |        |        |        |        |                                                  |              |        |        |        |   |                |        |        |        |   |               |        |        |        |   |             |        |        |        |   |              |        |        |        |   |                                                  |               |        |        |        |   |              |        |        |        |   |                              |  |               |        |        |        |   |                                                        |  |  |  |  |  |            |                   |                       |         |                                 |        |      |                 |                   |  |  |  |                |                |                |                |                                   |                |        |        |        |        |                                                  |              |        |        |        |   |                |        |        |        |   |               |        |        |        |   |             |        |        |        |   |              |        |        |        |   |                                                  |               |        |        |        |   |              |        |        |        |   |                              |  |               |        |        |        |   |                                                        |  |  |  |  |  |            |                   |                       |         |
| Radiated emission<br>(Measurement distance: 1 m)       | 18 GHz-40 GHz     | 5.4 dB            | 5.3 dB                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 5.3 dB         | -               |                   |  |  |  |                |                |                |                |                                   |                |        |        |        |        |                                                  |              |        |        |        |   |                |        |        |        |   |               |        |        |        |   |             |        |        |        |   |              |        |        |        |   |                                                  |               |        |        |        |   |              |        |        |        |   |                              |  |               |        |        |        |   |                                                        |  |  |  |  |  |            |                   |                       |         |                                 |        |      |                 |                   |  |  |  |                |                |                |                |                                   |                |        |        |        |        |                                                  |              |        |        |        |   |                |        |        |        |   |               |        |        |        |   |             |        |        |        |   |              |        |        |        |   |                                                  |               |        |        |        |   |              |        |        |        |   |                              |  |               |        |        |        |   |                                                        |  |  |  |  |  |            |                   |                       |         |
|                                                        | 1 GHz-18 GHz      | 5.6 dB            | 5.6 dB                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 5.6 dB         | -               |                   |  |  |  |                |                |                |                |                                   |                |        |        |        |        |                                                  |              |        |        |        |   |                |        |        |        |   |               |        |        |        |   |             |        |        |        |   |              |        |        |        |   |                                                  |               |        |        |        |   |              |        |        |        |   |                              |  |               |        |        |        |   |                                                        |  |  |  |  |  |            |                   |                       |         |                                 |        |      |                 |                   |  |  |  |                |                |                |                |                                   |                |        |        |        |        |                                                  |              |        |        |        |   |                |        |        |        |   |               |        |        |        |   |             |        |        |        |   |              |        |        |        |   |                                                  |               |        |        |        |   |              |        |        |        |   |                              |  |               |        |        |        |   |                                                        |  |  |  |  |  |            |                   |                       |         |
| SAC=Shielded Antenna Chamber                           |                   | 18 GHz-40 GHz     | 5.8 dB                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 5.8 dB         | 5.8 dB          | -                 |  |  |  |                |                |                |                |                                   |                |        |        |        |        |                                                  |              |        |        |        |   |                |        |        |        |   |               |        |        |        |   |             |        |        |        |   |              |        |        |        |   |                                                  |               |        |        |        |   |              |        |        |        |   |                              |  |               |        |        |        |   |                                                        |  |  |  |  |  |            |                   |                       |         |                                 |        |      |                 |                   |  |  |  |                |                |                |                |                                   |                |        |        |        |        |                                                  |              |        |        |        |   |                |        |        |        |   |               |        |        |        |   |             |        |        |        |   |              |        |        |        |   |                                                  |               |        |        |        |   |              |        |        |        |   |                              |  |               |        |        |        |   |                                                        |  |  |  |  |  |            |                   |                       |         |
| SR= Shielded Room is applied besides radiated emission |                   |                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                |                 |                   |  |  |  |                |                |                |                |                                   |                |        |        |        |        |                                                  |              |        |        |        |   |                |        |        |        |   |               |        |        |        |   |             |        |        |        |   |              |        |        |        |   |                                                  |               |        |        |        |   |              |        |        |        |   |                              |  |               |        |        |        |   |                                                        |  |  |  |  |  |            |                   |                       |         |                                 |        |      |                 |                   |  |  |  |                |                |                |                |                                   |                |        |        |        |        |                                                  |              |        |        |        |   |                |        |        |        |   |               |        |        |        |   |             |        |        |        |   |              |        |        |        |   |                                                  |               |        |        |        |   |              |        |        |        |   |                              |  |               |        |        |        |   |                                                        |  |  |  |  |  |            |                   |                       |         |
| Other test                                             | Uncertainty (+/-) |                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                |                 |                   |  |  |  |                |                |                |                |                                   |                |        |        |        |        |                                                  |              |        |        |        |   |                |        |        |        |   |               |        |        |        |   |             |        |        |        |   |              |        |        |        |   |                                                  |               |        |        |        |   |              |        |        |        |   |                              |  |               |        |        |        |   |                                                        |  |  |  |  |  |            |                   |                       |         |                                 |        |      |                 |                   |  |  |  |                |                |                |                |                                   |                |        |        |        |        |                                                  |              |        |        |        |   |                |        |        |        |   |               |        |        |        |   |             |        |        |        |   |              |        |        |        |   |                                                  |               |        |        |        |   |              |        |        |        |   |                              |  |               |        |        |        |   |                                                        |  |  |  |  |  |            |                   |                       |         |
| Bandwidth Measurement                                  | 0.012 %           |                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                |                 |                   |  |  |  |                |                |                |                |                                   |                |        |        |        |        |                                                  |              |        |        |        |   |                |        |        |        |   |               |        |        |        |   |             |        |        |        |   |              |        |        |        |   |                                                  |               |        |        |        |   |              |        |        |        |   |                              |  |               |        |        |        |   |                                                        |  |  |  |  |  |            |                   |                       |         |                                 |        |      |                 |                   |  |  |  |                |                |                |                |                                   |                |        |        |        |        |                                                  |              |        |        |        |   |                |        |        |        |   |               |        |        |        |   |             |        |        |        |   |              |        |        |        |   |                                                  |               |        |        |        |   |              |        |        |        |   |                              |  |               |        |        |        |   |                                                        |  |  |  |  |  |            |                   |                       |         |
| 2                                                      | 13806752S-A-R2    | March 31, 2022    | APPENDIX 1: Correction of Radiated Emission Limit.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                |                 |                   |  |  |  |                |                |                |                |                                   |                |        |        |        |        |                                                  |              |        |        |        |   |                |        |        |        |   |               |        |        |        |   |             |        |        |        |   |              |        |        |        |   |                                                  |               |        |        |        |   |              |        |        |        |   |                              |  |               |        |        |        |   |                                                        |  |  |  |  |  |            |                   |                       |         |                                 |        |      |                 |                   |  |  |  |                |                |                |                |                                   |                |        |        |        |        |                                                  |              |        |        |        |   |                |        |        |        |   |               |        |        |        |   |             |        |        |        |   |              |        |        |        |   |                                                  |               |        |        |        |   |              |        |        |        |   |                              |  |               |        |        |        |   |                                                        |  |  |  |  |  |            |                   |                       |         |

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

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

---

| <b>CONTENTS</b>                                                               | <b>PAGE</b> |
|-------------------------------------------------------------------------------|-------------|
| <b>SECTION 1: Customer Information .....</b>                                  | <b>5</b>    |
| <b>SECTION 2: Equipment Under Test (EUT).....</b>                             | <b>5</b>    |
| <b>SECTION 3: Test Specification, Procedures &amp; Results.....</b>           | <b>6</b>    |
| <b>SECTION 4: Operation of EUT during testing .....</b>                       | <b>9</b>    |
| <b>SECTION 5: Conducted emission.....</b>                                     | <b>11</b>   |
| <b>SECTION 6: Radiated emission (Fundamental and Spurious Emission) .....</b> | <b>12</b>   |
| <b>SECTION 7: -26 dB Bandwidth.....</b>                                       | <b>14</b>   |
| <b>SECTION 8: 99 % Bandwidth.....</b>                                         | <b>14</b>   |
| <b>APPENDIX 1: Test Data.....</b>                                             | <b>15</b>   |
| Conducted Emission .....                                                      | 15          |
| Radiated Emission (Fundamental and Spurious Emission) .....                   | 17          |
| -26 dB Bandwidth / 99 % Occupied Bandwidth .....                              | 21          |
| <b>APPENDIX 2: Test Instruments .....</b>                                     | <b>22</b>   |
| <b>APPENDIX 3: Photographs of Test Setup .....</b>                            | <b>23</b>   |
| Conducted Emission .....                                                      | 23          |
| Radiated Spurious Emission .....                                              | 24          |
| Pre-check of Worst Case Position.....                                         | 25          |
| Other Tests .....                                                             | 26          |
| Tag used for the Tests .....                                                  | 27          |

## **SECTION 1: Customer Information**

|                  |                                                                     |
|------------------|---------------------------------------------------------------------|
| Company Name     | NITTOKU CO., LTD.                                                   |
| Address          | 330-0841 2-292-1 Azuma-cho,Omiya-ku,Saitama-city,Saitama-pref,Japan |
| Telephone Number | +81-048-615-2117                                                    |
| Contact Person   | Akitomo Kiriyama                                                    |

The information provided from the customer is as follows;

- Customer, Description of EUT, Model Number of EUT, FCC ID on the cover and other relevant pages
  - Operating/Test Mode(s) (Mode(s)) on all the relevant pages
  - SECTION 1: Customer Information
  - SECTION 2: Equipment Under Test (EUT) other than the Receipt Date and Test Date
  - SECTION 4: Operation of EUT during testing
- \* The laboratory is exempted from liability of any test results affected from the above information in SECTION 2 and 4.

## **SECTION 2: Equipment Under Test (EUT)**

### **2.1 Identification of EUT**

|               |                                                                                           |
|---------------|-------------------------------------------------------------------------------------------|
| Description   | LF-Band RFID READER/WRITER                                                                |
| Model Number  | ITS-LRW210                                                                                |
| Serial Number | Refer to SECTION 4.2                                                                      |
| Condition     | Production prototype<br>(Not for Sale: This sample is equivalent to mass-produced items.) |
| Modification  | No Modification by the test lab                                                           |
| Receipt Date  | February 20, 2022                                                                         |
| Test Date     | February 21 to March 4, 2022                                                              |

### **2.2 Product Description**

#### **General Specification**

|                       |                       |
|-----------------------|-----------------------|
| Rating                | DC 24 V               |
| Operating temperature | 0 deg. C to 40 deg. C |

#### **Radio Specification**

##### **LF-Band RFID**

|                        |              |
|------------------------|--------------|
| Equipment Type         | Transceiver  |
| Frequency of Operation | 134.2 kHz    |
| Antenna Type           | Loop Antenna |

## SECTION 3: Test Specification, Procedures & Results

### 3.1 Test Specification

|                    |                                                                                                                                                                                |
|--------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Test Specification | FCC Part 15 Subpart C<br>FCC Part 15 final revised on May 3, 2021 and effective July 2, 2021                                                                                   |
| Title              | FCC 47 CFR Part 15 Radio Frequency Device Subpart C Intentional Radiators<br>Section 15.207 Conducted limits<br>Section 15.209 Radiated emission Limits; general requirements. |

\* 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:<br>ANSI C63.10-2013<br>6. Standard test methods<br>ISED:<br>RSS-Gen 8.8           | FCC:<br>Section 15.207<br>ISED:<br>RSS-Gen 8.8                | Without magnetic sheet<br>QP<br>12.2 dB, 5.49610 MHz, N<br>AV<br>5.0 dB, 7.50599 MHz, N<br><br>With magnetic sheet<br>QP<br>8.0 dB, 26.38174 MHz, L<br>AV<br>1.9 dB, 23.5652 MHz, N | Complied#<br>a) | -        |
| Electric Field Strength of Fundamental Emission | FCC: ANSI C63.10:2013<br>6 Standard test methods<br>ISED: RSS-Gen 6.5, 6.12            | FCC:<br>Section 15.209<br>ISED:<br>RSS-210 4.4<br>RSS-Gen 8.9 | Without magnetic sheet<br>2.2 dB, 0.1342 MHz, Vertical<br><br>With magnetic sheet<br>1.3 dB, 0.1342 MHz, Vertical                                                                   | Complied<br>b)  | Radiated |
| Electric Field Strength of Spurious Emission    | FCC:<br>ANSI C63.10:2013<br>6 Standard test methods<br>ISED:<br>RSS-Gen 6.5, 6.6, 6.13 | FCC:<br>Section 15.209<br>ISED:<br>RSS-210 4.4<br>RSS-Gen 8.9 | Without magnetic sheet<br>QP<br>1.1 dB, 61.263 MHz, Vertical<br><br>With magnetic sheet<br>QP<br>2.2 dB, 31.179 MHz, Vertical                                                       | Complied#<br>b) | Radiated |
| -26 dB Bandwidth                                | FCC:<br>ANSI C63.10:2013<br>6 Standard test methods<br>ISED: -                         | FCC:<br>Reference data<br>ISED: -                             | N/A                                                                                                                                                                                 | Complied<br>c)  | Radiated |

Note: UL Japan, Inc.'s EMI Work Procedures: Work Instructions-ULID-003591 and Work Instructions-ULID-003593.

\* In case any questions arise about test procedure, ANSI C63.10: 2013 is also referred.

a) Refer to APPENDIX 1 (data of Conducted Emission)

b) Refer to APPENDIX 1 (data of Radiated Emission)

c) Refer to APPENDIX 1 (data of -26 dB Bandwidth / 99 % Occupied Bandwidth)

Symbols:

Complied The data of this test item has enough margin, more than the measurement uncertainty.

Complied# The data of this test item meets the limits unless the measurement uncertainty is taken into consideration

#### FCC Part 15.31 (e)

This EUT provides the stable volTage constantly to RF Part regardless of input volTage.  
Therefore, this EUT complies with the requirement.

#### FCC Part 15.203 Antenna requirement

The EUT has a unique coupling/antenna connector (RP-SMA).  
Therefore the equipment complies with the requirement of 15.203.

### 3.3 Addition to Standard

| Item                                                                        | Test Procedure    | Specification | Worst Margin | Results        | Remarks  |
|-----------------------------------------------------------------------------|-------------------|---------------|--------------|----------------|----------|
| 99 % Occupied Bandwidth                                                     | ISED: RSS-Gen 6.7 | ISED: -       | N/A          | Complied<br>a) | Radiated |
| a) Refer to APPENDIX 1 (data of -26 dB Bandwidth / 99 % Occupied Bandwidth) |                   |               |              |                |          |

Other than above, no addition, exclusion nor deviation has been made from the standard.

### 3.4 Uncertainty

There is no applicable rule of uncertainty in this applied standard. Therefore, the results are derived depending on whether or not laboratory uncertainty is applied.

The following uncertainties have been calculated to provide a confidence level of 95 % using a coverage factor  $k=2$ .

Shonan EMC Lab.

| Item                                             | Frequency range | Uncertainty (+/-) |                |                |                |
|--------------------------------------------------|-----------------|-------------------|----------------|----------------|----------------|
|                                                  |                 | No. 1 SAC / SR    | No. 2 SAC / SR | No. 3 SAC / SR | No. 4,5,6,8 SR |
| Conducted emission (AC Mains) LISN               | 150 kHz-30 MHz  | 2.9 dB            | 2.9 dB         | 3.0 dB         | 2.9 dB         |
| Radiated emission<br>(Measurement distance: 3 m) | 9 kHz-30 MHz    | 3.2 dB            | 3.1 dB         | 3.1 dB         | -              |
|                                                  | 30 MHz-200 MHz  | 4.6 dB            | 4.6 dB         | 4.6 dB         | -              |
|                                                  | 200 MHz-1 GHz   | 6.0 dB            | 6.1 dB         | 6.1 dB         | -              |
|                                                  | 1 GHz-6 GHz     | 4.7 dB            | 4.7 dB         | 4.7 dB         | -              |
|                                                  | 6 GHz-18 GHz    | 5.2 dB            | 5.3 dB         | 5.3 dB         | -              |
|                                                  | 18 GHz-40 GHz   | 5.4 dB            | 5.5 dB         | 5.5 dB         | -              |
| Radiated emission<br>(Measurement distance: 1 m) | 1 GHz-18 GHz    | 5.6 dB            | 5.6 dB         | 5.6 dB         | -              |
|                                                  | 18 GHz-40 GHz   | 5.8 dB            | 5.8 dB         | 5.8 dB         | -              |

SAC=Semi-Anechoic Chamber

SR= Shielded Room is applied besides radiated emission

| Other test            | Uncertainty (+/-) |
|-----------------------|-------------------|
| Bandwidth Measurement | 0.012 %           |

### 3.5 Test Location

UL Japan, Inc. Shonan EMC Lab.

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

Telephone: +81 463 50 6400, Facsimile: +81 463 50 6401

A2LA Certificate Number: 1266.03

(FCC test firm registration number: 626366, ISED lab company number: 2973D / CAB identifier: JP0001)

| Test site                  | IC Registration Number | Width x Depth x Height (m) | Size of reference ground plane (m) / horizontal conducting plane | Maximum measurement distance |
|----------------------------|------------------------|----------------------------|------------------------------------------------------------------|------------------------------|
| No.1 Semi-anechoic chamber | 2973D-1                | 20.6 x 11.3 x 7.65         | 20.6 x 11.3                                                      | 10 m                         |
| No.2 Semi-anechoic chamber | 2973D-2                | 20.6 x 11.3 x 7.65         | 20.6 x 11.3                                                      | 10 m                         |
| No.3 Semi-anechoic chamber | 2973D-3                | 12.7 x 7.7 x 5.35          | 12.7 x 7.7                                                       | 5 m                          |
| No.4 Semi-anechoic chamber | -                      | 8.1 x 5.1 x 3.55           | 8.1 x 5.1                                                        | -                            |
| No.1 Shielded room         | -                      | 6.8 x 4.1 x 2.7            | 6.8 x 4.1                                                        | -                            |
| No.2 Shielded room         | -                      | 6.8 x 4.1 x 2.7            | 6.8 x 4.1                                                        | -                            |
| No.3 Shielded room         | -                      | 6.3 x 4.7 x 2.7            | 6.3 x 4.7                                                        | -                            |
| No.4 Shielded room         | -                      | 4.4 x 4.7 x 2.7            | 4.4 x 4.7                                                        | -                            |
| No.5 Shielded room         | -                      | 7.8 x 6.4 x 2.7            | 7.8 x 6.4                                                        | -                            |
| No.6 Shielded room         | -                      | 7.8 x 6.4 x 2.7            | 7.8 x 6.4                                                        | -                            |
| No.8 Shielded room         | -                      | 3.45 x 5.5 x 2.4           | 3.45 x 5.5                                                       | -                            |
| No.1 Measurement room      | -                      | 2.55 x 4.1 x 2.5           | -                                                                | -                            |

### 3.6 Test Data, Test Instruments, and Test Set Up

Refer to APPENDIX.

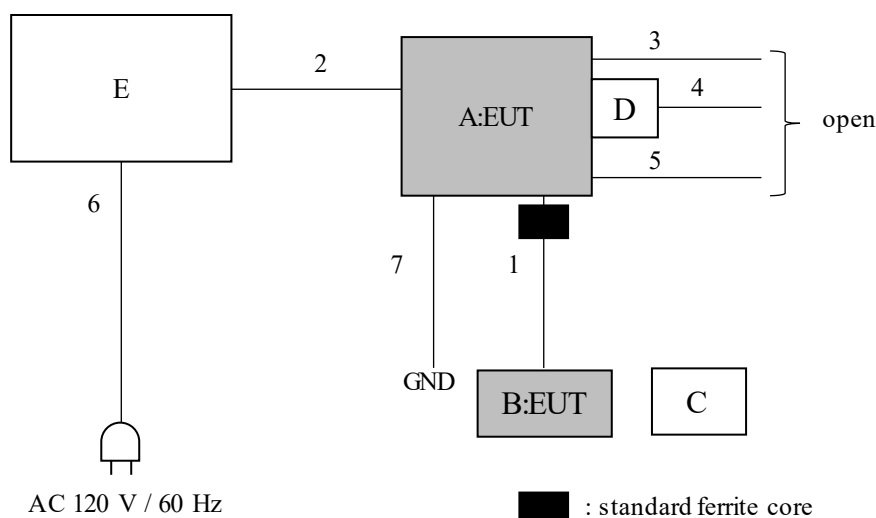
---

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

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

| <b>Mode</b>                                                                                                                                                                                                                                                                                                                                                                  | <b>Remarks*</b> |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|
| Tx 134.2 kHz mode                                                                                                                                                                                                                                                                                                                                                            | -               |
| *Power of the EUT was set by the software as follows;<br>Power Setting: Fixed<br>Software: V1.10<br>(Date: 2022.01 10, Storage location: EUT memory)<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. |                 |

## 4.2 Configuration and Peripherals



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

\*It was preliminary confirmed that there was no difference in emission level due to a standard ferrite core.

\*Pre-check has been performed all antenna and with/without Tag, and measurement was conducted with the worst combination of two types of antennas and with/without Tag.

### Description of EUT and Support Equipment

| No. | Item                       | Model number         | Serial Number      | Manufacturer                | Remarks |
|-----|----------------------------|----------------------|--------------------|-----------------------------|---------|
| A   | LF-Band RFID READER/WRITER | ITS-LRW210           | 11000001           | NITTOKU CO., LTD.           | EUT     |
| B   | Antenna                    | ITS-LANT30S-1        | 2220001            | NITTOKU CO., LTD.           | EUT *1) |
|     |                            | ITS-LANT30S-3        | 2226001            | NITTOKU CO., LTD.           | EUT *1) |
|     |                            | ITS-LANT30S-2U       | 2229001            | NITTOKU CO., LTD.           | EUT *2) |
|     |                            | ITS-LANT30S-3U       | 2223001            | NITTOKU CO., LTD.           | EUT *2) |
| C   | Tag                        | RI-TRP-DR2B          | 00000999           | NITTOKU CO., LTD.           | -       |
| D   | RS232C-USB Converter       | CBL-USB(NR)232       | -                  | Yukioka Manufactory Co.Ltd. | -       |
| E   | DC Power Supply            | STEP-PS/1AC/24DC/2.5 | 2868651032037P5959 | Phoenix Contact             | -       |

\*1) With magnetic sheet

\*2) Without magnetic sheet

### List of Cables Used

| No. | Name  | Length (m) | Shield     |            | Remarks                          |
|-----|-------|------------|------------|------------|----------------------------------|
|     |       |            | Cable      | Connector  |                                  |
| 1   | RF    | 1.0        | Shielded   | Shielded   | ITS-LANT30S-1                    |
|     |       | 2.0        | Shielded   | Shielded   | ITS-LANT30S-2U                   |
|     |       | 3.0        | Shielded   | Shielded   | ITS-LANT30S-3/<br>ITS-LANT30S-3U |
| 2   | DC    | 1.2        | Unshielded | Unshielded | -                                |
| 3   | LAN   | 1.1        | Shielded   | Shielded   | -                                |
| 4   | USB   | 0.8        | Shielded   | Shielded   | -                                |
| 5   | RS485 | 1.2        | Unshielded | Unshielded | -                                |
| 6   | AC    | 1.8        | Unshielded | Unshielded | -                                |
| 7   | GND   | 1.2        | Unshielded | Unshielded | -                                |

## SECTION 5: Conducted emission

### Test conditions

|                 |                    |
|-----------------|--------------------|
| Frequency range | 0.15 MHz to 30 MHz |
| EUT position    | Table top          |

### Test configuration

The EUT was placed on a 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 was aligned and was flushed with rear of tabletop. All other surfaces of tabletop were at least 0.8 m from any other grounded conducting surface. The EUT was located 0.8 m from Line Impedance Stabilization Network (LISN) and excess AC Cable was bundled in center. 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.

Each EUT current-carrying power lead, except the ground (safety) lead, was individually connected through a LISN to the input power source.

Photographs of the set up are shown in Appendix 3.

### Test procedure

The emission had been measured with the EUT in the shielded room. An overview sweep with peak detection has been performed. The measurements had been performed with a quasi-peak detector and if required, with a CISPR average detector (CAV).

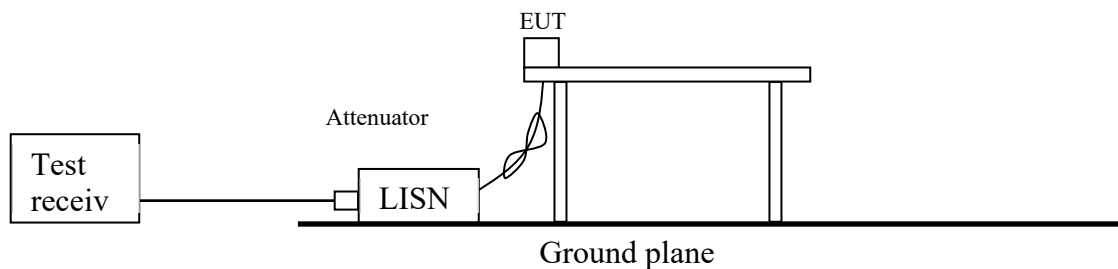
The conducted emission measurements were made with the following detector function of the test receiver.

|               |               |
|---------------|---------------|
| Detector Type | QP / CAV      |
| IF Bandwidth  | 9 kHz / 9 kHz |

### Results

Summary of the test results : Pass

Figure 1. Test Setup



## **SECTION 6: Radiated emission (Fundamental and Spurious Emission)**

### **Test Procedure**

EUT was placed on a urethane platform of nominal size, 1.0 m by 1.5 m, raised 0.8 m above the conducting ground plane. The Radiated Electric Field Strength has been measured in a Semi Anechoic Chamber with a ground plane.

Frequency: From 9 kHz to 30 MHz (Refer to Figure 2)

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

The measurements were performed for vertical polarization (antenna angle: 0 deg., 45 deg., 90 deg., and 135 deg.) and horizontal polarization.

\*Refer to Figure 1 about Direction of the Loop Antenna.

Frequency: From 30 MHz to 1 GHz (Refer to Figure 3)

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

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

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

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

|                        | 9 kHz to 90 kHz &<br>110 kHz to 150 kHz | 90 kHz to<br>110 kHz | 150 kHz<br>to 490 kHz | 490 kHz to<br>30 MHz | 30 MHz to 1 GHz                                                        |
|------------------------|-----------------------------------------|----------------------|-----------------------|----------------------|------------------------------------------------------------------------|
| Detector Type          | PK/AV                                   | QP                   | PK/AV                 | QP                   | QP                                                                     |
| IF Bandwidth           | 200 Hz                                  | 200 Hz               | 10 kHz                | 9 kHz                | 120 kHz                                                                |
| Distance factor<br>*1) | -80 dB                                  | -80 dB               | -80 dB                | -40 dB               | -                                                                      |
| Measuring<br>antenna   | Loop antenna                            |                      |                       |                      | Biconical<br>(30 MHz - 199.99 MHz)<br>Logperiodic<br>(200 MHz - 1 GHz) |

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

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

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

Although these tests were performed other than open field test site, adequate comparison measurements were confirmed against 30 m open field test site. Therefore, sufficient tests were made to demonstrate that the alternative site produces results that correlate with the ones of tests made in an open field based on KDB 414788.

These tests were performed in semi anechoic chamber. Therefore, the measured level of emissions may be higher than if measurements were made without ground plane.

However, test results were confirmed to pass against standard limit.

The limits in CFR 47, Part 15, Subpart C, paragraph 15.209(a), are identical to those in RSS-Gen section 8.9, Table 6, since the measurements are performed in terms of magnetic field strength and converted to electric field strength levels (as reported in the table) using the free space impedance of 377 Ohms. For example, the measurement at frequency 9 kHz resulted in a level of 45.5 dBuV/m, which is equivalent to  $45.5 - 51.5 = -6.0 \text{ dBuA/m}$ , which has the same margin, 3 dB, to the corresponding RSS-Gen Table 6 limit as it has to 15.209(a) limit.

The test was made on EUT at the normal use position.

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

Figure 2: Direction of the Loop Antenna

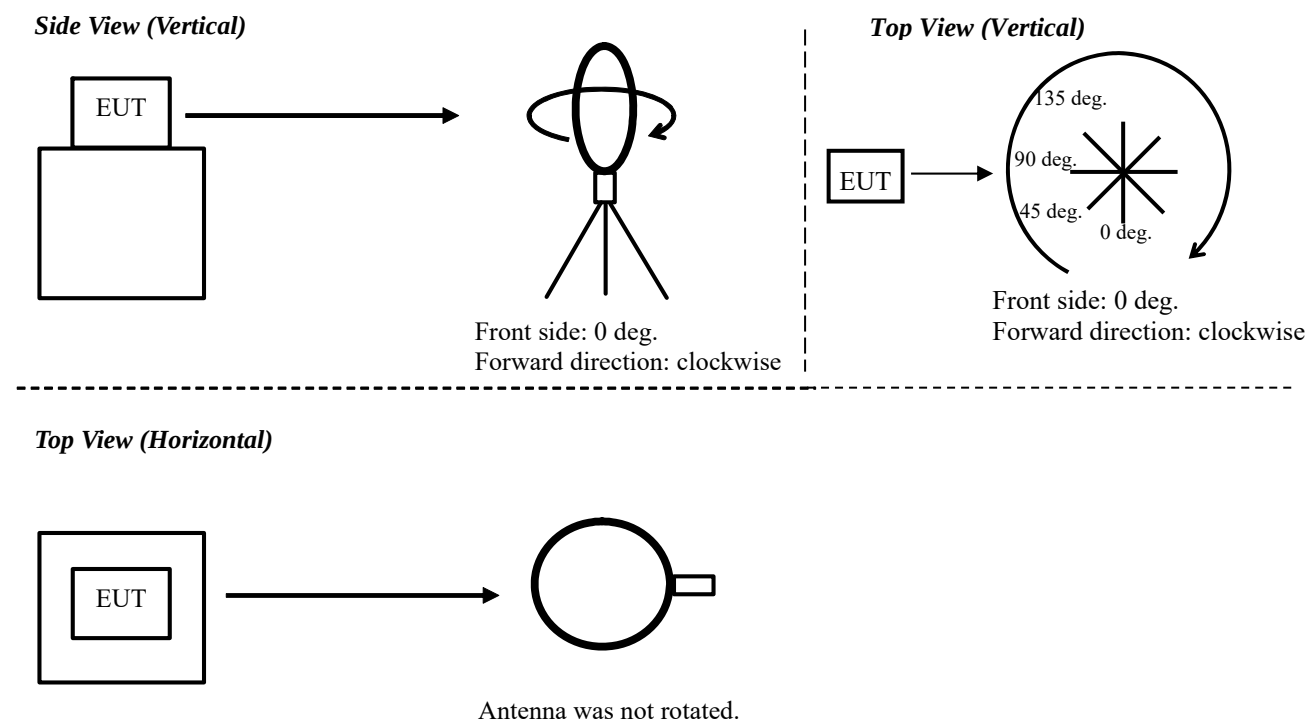
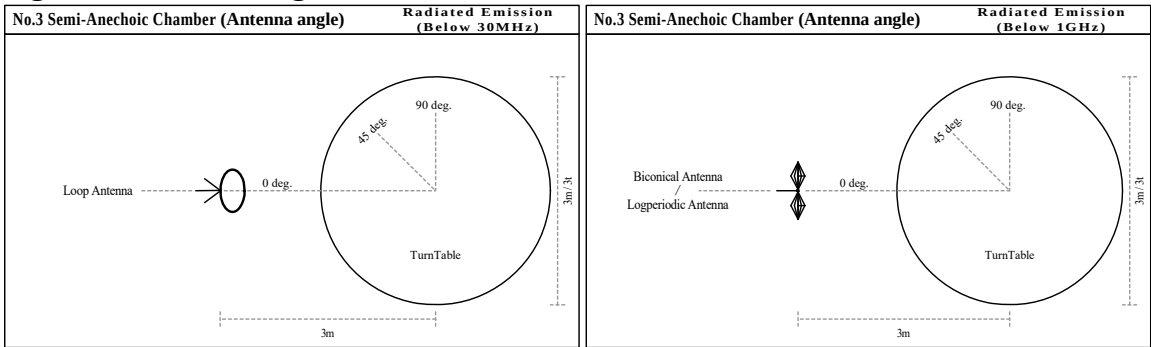
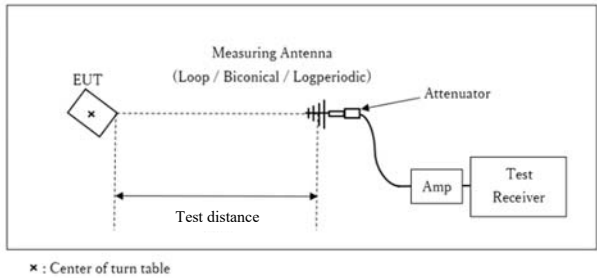


Figure 3. Antenna angle



[Test Setup]  
Below 1 GHz



Test Distance: 3 m

|                   |                 |
|-------------------|-----------------|
| Measurement range | : 9 kHz - 1 GHz |
| Test data         | : APPENDIX 1    |
| Test result       | : Pass          |

## **SECTION 7: -26 dB Bandwidth**

### **Test Procedure**

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

| Test             | Span   | RBW    | VBW    | Sweep | Detector | Trace    | Instrument used   |
|------------------|--------|--------|--------|-------|----------|----------|-------------------|
| -26 dB Bandwidth | 15 kHz | 200 Hz | 620 Hz | Auto  | Peak     | Max Hold | Spectrum Analyzer |

**Test data** : APPENDIX 1

**Test result** : Pass

## **SECTION 8: 99 % Bandwidth**

### **Test Procedure**

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

| Test                    | Span                                    | RBW             | VBW                | Sweep | Detector | Trace        | Instrument used   |
|-------------------------|-----------------------------------------|-----------------|--------------------|-------|----------|--------------|-------------------|
| 99 % Occupied Bandwidth | Enough width to display emission skirts | 1 to 5 % of OBW | Three times of RBW | Auto  | Peak *1) | Max Hold *1) | Spectrum Analyzer |

\*1) The measurement was performed with Peak detector, Max Hold since the duty cycle was not 100 %.  
Peak hold was applied as Worst-case measurement.

**Test data** : APPENDIX 1

**Test result** : Pass

## APPENDIX 1: Test Data

### Conducted Emission

#### DATA OF CONDUCTED EMISSION TEST

UL Japan, Inc. Shonan EMC Lab. No.2 Shielded Room  
Date : 2022/03/01

Mode : Tx 134.2 kHz

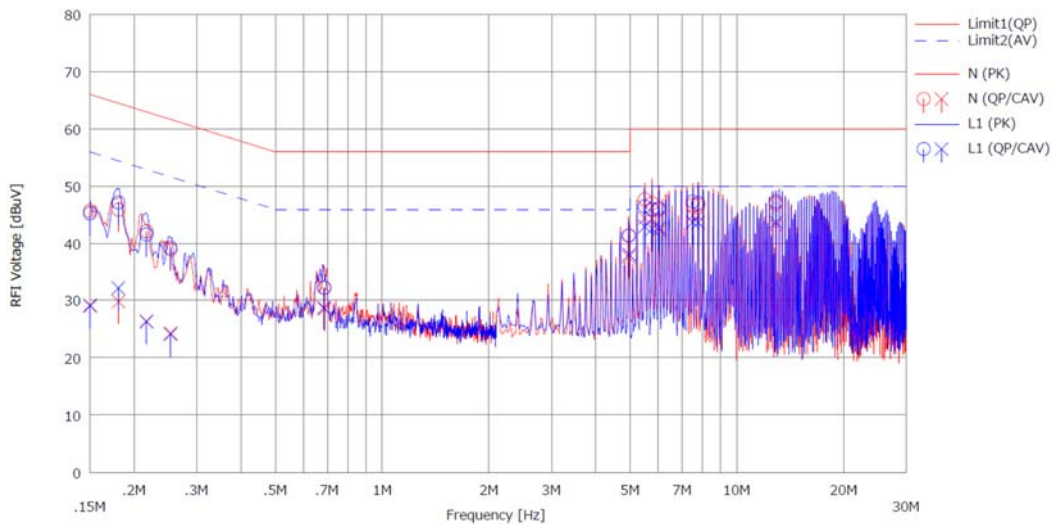
Power : DC 24 V

Temp./Humi. : 23 deg.C / 32 %RH

Remarks : Antenna : ITS-LANT30S-2U, with TAG

Limit : FCC\_Part 15 Subpart C(15.207)

Engineer : Shiro Kobayashi



| No. | Freq.<br>[MHz] | Reading        |                 | C.Fac<br>[dB] | Results        |                 | Limit          |                | Margin       |              | Phase | Comment |
|-----|----------------|----------------|-----------------|---------------|----------------|-----------------|----------------|----------------|--------------|--------------|-------|---------|
|     |                | <QP><br>[dBuV] | <CAV><br>[dBuV] |               | <QP><br>[dBuV] | <CAV><br>[dBuV] | <QP><br>[dBuV] | <AV><br>[dBuV] | <QP><br>[dB] | <AV><br>[dB] |       |         |
|     |                | [dB]           | [dB]            |               | [dB]           | [dB]            | [dB]           | [dB]           | [dB]         | [dB]         |       |         |
| 1   | 0.15000        | 33.25          | 16.65           | 12.45         | 45.70          | 29.10           | 66.00          | 56.00          | 20.3         | 26.9         | N     |         |
| 2   | 0.18069        | 33.47          | 17.28           | 12.46         | 45.93          | 29.74           | 64.45          | 54.45          | 18.5         | 24.7         | N     |         |
| 3   | 0.21658        | 29.71          | 13.84           | 12.46         | 42.17          | 26.30           | 62.95          | 52.95          | 20.7         | 26.6         | N     |         |
| 4   | 0.25348        | 26.54          | 11.78           | 12.47         | 39.01          | 24.25           | 61.64          | 51.64          | 22.6         | 27.3         | N     |         |
| 5   | 0.68799        | 19.62          | 15.94           | 12.52         | 32.14          | 28.46           | 56.00          | 46.00          | 23.8         | 17.5         | N     |         |
| 6   | 4.95884        | 28.58          | 24.82           | 12.84         | 41.42          | 37.66           | 56.00          | 46.00          | 14.5         | 8.3          | N     |         |
| 7   | 5.49610        | 34.88          | 31.59           | 12.86         | 47.74          | 44.45           | 60.00          | 50.00          | 12.2         | 5.5          | N     |         |
| 8   | 5.76374        | 34.14          | 31.49           | 12.88         | 47.02          | 44.37           | 60.00          | 50.00          | 12.9         | 5.6          | N     |         |
| 9   | 6.03214        | 33.03          | 29.41           | 12.89         | 45.92          | 42.30           | 60.00          | 50.00          | 14.0         | 7.7          | N     |         |
| 10  | 7.50599        | 33.80          | 32.01           | 12.97         | 46.77          | 44.98           | 60.00          | 50.00          | 13.2         | 5.0          | N     |         |
| 11  | 7.77525        | 33.77          | 31.90           | 12.98         | 46.75          | 44.88           | 60.00          | 50.00          | 13.2         | 5.1          | N     |         |
| 12  | 12.86808       | 33.70          | 30.05           | 13.19         | 46.89          | 43.24           | 60.00          | 50.00          | 13.1         | 6.7          | N     |         |
| 13  | 0.15000        | 32.81          | 16.52           | 12.47         | 45.28          | 28.99           | 66.00          | 56.00          | 20.7         | 27.0         | L1    |         |
| 14  | 0.18023        | 34.74          | 19.63           | 12.46         | 47.20          | 32.09           | 64.48          | 54.48          | 17.2         | 22.3         | L1    |         |
| 15  | 0.21665        | 29.16          | 13.78           | 12.48         | 41.64          | 26.26           | 62.95          | 52.95          | 21.3         | 26.6         | L1    |         |
| 16  | 0.25285        | 26.85          | 11.59           | 12.47         | 39.32          | 24.06           | 61.66          | 51.66          | 22.3         | 27.6         | L1    |         |
| 17  | 0.68586        | 19.63          | 16.19           | 12.51         | 32.14          | 28.70           | 56.00          | 46.00          | 23.8         | 17.3         | L1    |         |
| 18  | 4.96150        | 28.62          | 25.30           | 12.81         | 41.43          | 38.11           | 56.00          | 46.00          | 14.5         | 7.8          | L1    |         |
| 19  | 5.49775        | 33.68          | 30.17           | 12.82         | 46.50          | 42.99           | 60.00          | 50.00          | 13.5         | 7.0          | L1    |         |
| 20  | 5.76576        | 33.18          | 29.73           | 12.84         | 46.02          | 42.57           | 60.00          | 50.00          | 13.9         | 7.4          | L1    |         |
| 21  | 6.03333        | 33.33          | 29.86           | 12.85         | 46.18          | 42.71           | 60.00          | 50.00          | 13.8         | 7.2          | L1    |         |
| 22  | 7.50819        | 34.44          | 30.84           | 12.92         | 47.36          | 43.76           | 60.00          | 50.00          | 12.6         | 6.2          | L1    |         |
| 23  | 7.77461        | 34.17          | 30.75           | 12.92         | 47.09          | 43.67           | 60.00          | 50.00          | 12.9         | 6.3          | L1    |         |
| 24  | 12.86820       | 34.24          | 30.68           | 13.06         | 47.30          | 43.74           | 60.00          | 50.00          | 12.7         | 6.2          | L1    |         |

Calculation: Result[dBuV]=Reading[dBuV]+C.Fac[LISN(AMN)+Cable+ATT][dB]  
LISN(AMN): SLS-03

## Conducted Emission

### DATA OF CONDUCTED EMISSION TEST

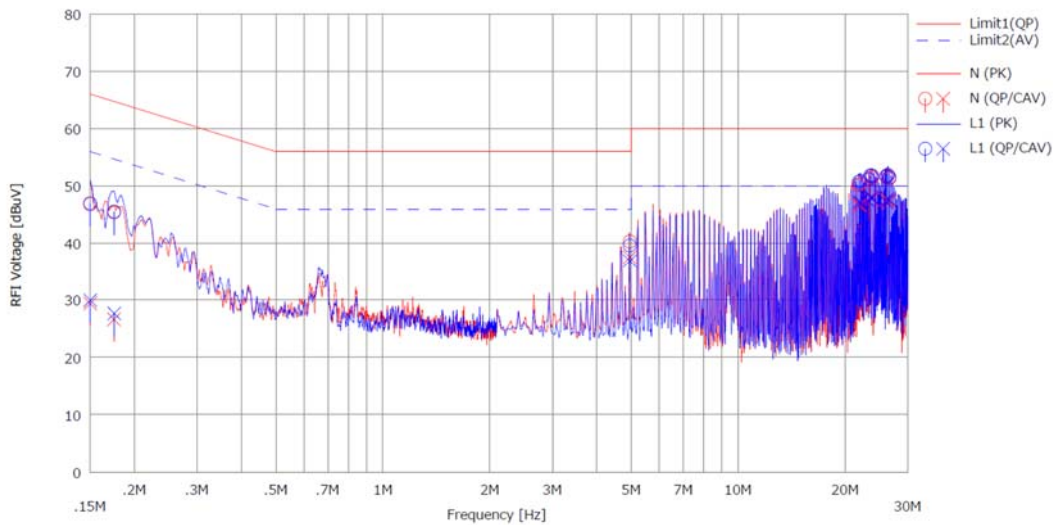
UL Japan, Inc. Shonan EMC Lab. No.2 Shielded Room  
Date : 2022/03/01

Mode : Tx 134.2 kHz  
Power : DC 24 V  
Temp./Humi. : 23 deg.C / 32 %RH

Remarks : Antenna : ITS-LANT30S-1, with TAG

Limit : FCC\_Part 15 Subpart C(15.207)

Engineer : Shiro Kobayashi



| No. | Freq.<br>[MHz] | Reading        |                 | C.Fac | Results        |                 | Limit          |                | Margin       |              | Phase | Comment |
|-----|----------------|----------------|-----------------|-------|----------------|-----------------|----------------|----------------|--------------|--------------|-------|---------|
|     |                | (QP)<br>[dBuV] | (CAV)<br>[dBuV] |       | (QP)<br>[dBuV] | (CAV)<br>[dBuV] | (QP)<br>[dBuV] | (AV)<br>[dBuV] | (QP)<br>[dB] | (AV)<br>[dB] |       |         |
| 1   | 0.15000        | 34.42          | 16.89           | 12.45 | 46.87          | 29.34           | 66.00          | 56.00          | 19.1         | 26.6         | N     |         |
| 2   | 0.17508        | 32.91          | 14.16           | 12.46 | 45.37          | 26.62           | 64.72          | 54.72          | 19.3         | 28.1         | N     |         |
| 3   | 4.95416        | 27.45          | 24.69           | 12.84 | 40.29          | 37.53           | 56.00          | 46.00          | 15.7         | 8.4          | N     |         |
| 4   | 21.82340       | 36.65          | 33.17           | 13.55 | 50.20          | 46.72           | 60.00          | 50.00          | 9.8          | 3.2          | N     |         |
| 5   | 22.09277       | 36.83          | 33.15           | 13.55 | 50.38          | 46.70           | 60.00          | 50.00          | 9.6          | 3.3          | N     |         |
| 6   | 23.29320       | 37.57          | 33.81           | 13.62 | 51.19          | 47.43           | 60.00          | 50.00          | 8.8          | 2.5          | N     |         |
| 7   | 23.56520       | 38.05          | 34.39           | 13.62 | 51.67          | 48.01           | 60.00          | 50.00          | 8.3          | 1.9          | N     |         |
| 8   | 23.83315       | 37.84          | 34.12           | 13.64 | 51.48          | 47.76           | 60.00          | 50.00          | 8.5          | 2.2          | N     |         |
| 9   | 26.10807       | 37.92          | 33.86           | 13.76 | 51.68          | 47.62           | 60.00          | 50.00          | 8.3          | 2.3          | N     |         |
| 10  | 26.37729       | 37.97          | 33.98           | 13.78 | 51.75          | 47.76           | 60.00          | 50.00          | 8.2          | 2.2          | N     |         |
| 11  | 26.64673       | 37.52          | 33.41           | 13.79 | 51.31          | 47.20           | 60.00          | 50.00          | 8.6          | 2.8          | N     |         |
| 12  | 0.15000        | 34.47          | 17.44           | 12.47 | 46.94          | 29.91           | 66.00          | 56.00          | 19.0         | 26.0         | L1    |         |
| 13  | 0.17532        | 33.07          | 15.16           | 12.46 | 45.53          | 27.62           | 64.70          | 54.70          | 19.1         | 27.0         | L1    |         |
| 14  | 4.95465        | 26.82          | 24.08           | 12.81 | 39.63          | 36.89           | 56.00          | 46.00          | 16.3         | 9.1          | L1    |         |
| 15  | 21.83744       | 37.48          | 34.03           | 13.21 | 50.69          | 47.24           | 60.00          | 50.00          | 9.3          | 2.7          | L1    |         |
| 16  | 22.10683       | 37.67          | 33.91           | 13.21 | 50.88          | 47.12           | 60.00          | 50.00          | 9.1          | 2.8          | L1    |         |
| 17  | 23.30531       | 37.92          | 34.13           | 13.25 | 51.17          | 47.38           | 60.00          | 50.00          | 8.8          | 2.6          | L1    |         |
| 18  | 23.57603       | 38.62          | 34.79           | 13.25 | 51.87          | 48.04           | 60.00          | 50.00          | 8.1          | 1.9          | L1    |         |
| 19  | 23.84177       | 38.51          | 34.64           | 13.26 | 51.77          | 47.90           | 60.00          | 50.00          | 8.2          | 2.1          | L1    |         |
| 20  | 26.12068       | 38.27          | 33.87           | 13.35 | 51.62          | 47.22           | 60.00          | 50.00          | 8.3          | 2.7          | L1    |         |
| 21  | 26.38174       | 38.58          | 34.48           | 13.36 | 51.94          | 47.84           | 60.00          | 50.00          | 8.0          | 2.1          | L1    |         |
| 22  | 26.64952       | 38.17          | 34.18           | 13.37 | 51.54          | 47.55           | 60.00          | 50.00          | 8.4          | 2.4          | L1    |         |

Calculation: Result[dBuV]=Reading[dBuV]+C.Fac(LISN(AMN)+Cable+ATT)[dB]  
LISN(AMN):SLS-03

**Radiated Emission (Fundamental and Spurious Emission)**

Report No. 13806752S-A-R2  
 Test place Shonan EMC Lab.  
 Semi Anechoic Chamber No.3 No.3  
 Date February 24, 2022 February 25, 2022  
 Temperature / Humidity 24 deg. C / 32 % RH 24 deg. C / 33 % RH  
 Engineer Yosuke Murakami Yosuke Murakami  
 (Below 30 MHz) (Above 30 MHz)

Antenna type without magnetic sheet antenna  
 EUT and Antenna axis Below 30 MHz (EUT X-axis, Antenna Y-axis), with Tag  
 Above 30 MHz (EUT Y-axis, Antenna Y-axis), without Tag  
 Antenna Below 30 MHz (ITS-LANT30S-3U)  
 Above 30 MHz (ITS-LANT30S-2U)  
 Remarks Below 30 MHz Vertical polarization (Antenna Angle) of the worst case: 0 deg.

| Polarity | Frequency [MHz] | Detector | Reading [dBuV] | Ant.Fac. [dB/m] | Loss [dB] | Gain [dB] | Distance Factor [dB] | Result [dBuV/m] | Limit [dBuV/m] | Margin [dB] | Height [cm] | Angle [deg.] | Remark      |
|----------|-----------------|----------|----------------|-----------------|-----------|-----------|----------------------|-----------------|----------------|-------------|-------------|--------------|-------------|
| Hori.    | 0.1342          | PK       | 100.46         | 20.06           | 5.89      | 32.00     | -80.0                | 14.41           | 45.04          | 30.6        | -           | 184          | Fundamental |
| Hori.    | 0.6710          | QP       | 51.60          | 20.06           | 5.94      | 32.19     | -40.0                | 5.41            | 31.06          | 25.6        | -           | 184          | -           |
| Hori.    | 0.9349          | QP       | 45.40          | 20.07           | 5.96      | 32.19     | -40.0                | -0.76           | 28.18          | 28.9        | -           | 188          | -           |
| Hori.    | 1.0736          | QP       | 42.50          | 20.06           | 5.96      | 32.19     | -40.0                | -3.67           | 26.98          | 30.6        | -           | 188          | -           |
| Hori.    | 321.4880        | QP       | 43.60          | 14.31           | 8.70      | 31.95     | 0.0                  | 34.66           | 46.02          | 11.3        | 100         | 122          | -           |
| Hori.    | 537.3150        | QP       | 41.10          | 17.63           | 9.66      | 31.95     | 0.0                  | 36.44           | 46.02          | 9.5         | 100         | 129          | -           |
| Hori.    | 549.9510        | QP       | 42.60          | 17.91           | 9.72      | 31.96     | 0.0                  | 38.27           | 46.02          | 7.7         | 100         | 121          | -           |
| Hori.    | 849.9240        | QP       | 35.40          | 21.48           | 10.79     | 31.33     | 0.0                  | 36.34           | 46.02          | 9.6         | 100         | 163          | -           |
| Hori.    | 949.9140        | QP       | 34.20          | 22.07           | 11.11     | 30.59     | 0.0                  | 36.79           | 46.02          | 9.2         | 164         | 173          | -           |
| Vert.    | 0.1342          | PK       | 108.89         | 20.06           | 5.89      | 32.00     | -80.0                | 22.84           | 45.04          | 22.2        | -           | 183          | Fundamental |
| Vert.    | 0.6710          | QP       | 59.00          | 20.06           | 5.94      | 32.19     | -40.0                | 12.81           | 31.06          | 18.2        | -           | 183          | -           |
| Vert.    | 0.9394          | QP       | 52.40          | 20.07           | 5.96      | 32.19     | -40.0                | 6.24            | 28.14          | 21.9        | -           | 184          | -           |
| Vert.    | 1.2078          | QP       | 47.70          | 20.07           | 5.97      | 32.19     | -40.0                | 1.55            | 25.96          | 24.4        | -           | 178          | -           |
| Vert.    | 30.8970         | QP       | 38.70          | 18.53           | 6.47      | 32.18     | 0.0                  | 31.52           | 40.00          | 8.4         | 100         | 38           | -           |
| Vert.    | 47.2100         | QP       | 44.10          | 12.26           | 6.77      | 32.17     | 0.0                  | 30.96           | 40.00          | 9.0         | 100         | 74           | -           |
| Vert.    | 58.7230         | QP       | 55.40          | 8.51            | 6.59      | 32.16     | 0.0                  | 38.34           | 40.00          | 1.6         | 100         | 21           | -           |
| Vert.    | 61.2630         | QP       | 56.50          | 7.96            | 6.52      | 32.16     | 0.0                  | 38.82           | 40.00          | 1.1         | 100         | 30           | -           |
| Vert.    | 197.5370        | QP       | 41.50          | 16.47           | 7.84      | 32.05     | 0.0                  | 33.76           | 43.52          | 9.7         | 100         | 296          | -           |
| Vert.    | 549.9440        | QP       | 40.80          | 17.91           | 9.72      | 31.96     | 0.0                  | 36.47           | 46.02          | 9.5         | 116         | 171          | -           |
| Vert.    | 649.9420        | QP       | 39.20          | 19.15           | 10.08     | 31.92     | 0.0                  | 36.51           | 46.02          | 9.5         | 100         | 271          | -           |
| Vert.    | 799.9280        | QP       | 38.20          | 20.74           | 10.61     | 31.55     | 0.0                  | 38.00           | 46.02          | 8.0         | 141         | 182          | -           |

Result = Reading + Ant Factor + Loss (Cable+ATT+ΔAF(above 30MHz)) - Gain(Amplifier) + Distance factor(below 30MHz)

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

**Peak measurement value with Duty cycle correction factor (DCCF)**

| Polarity | Frequency [MHz] | Detector | Reading [dBuV] | Ant.Fac. [dB/m] | Loss [dB] | Gain [dB] | Distance Factor [dB] | DCCF [dB] | Result [dBuV/m] | Limit [dBuV/m] | Margin [dB] | Remark      |
|----------|-----------------|----------|----------------|-----------------|-----------|-----------|----------------------|-----------|-----------------|----------------|-------------|-------------|
| Hori.    | 0.1342          | PK       | 100.46         | 20.06           | 5.89      | 32.00     | -80.0                | 0.00      | 14.41           | 25.04          | 10.6        | Fundamental |
| Vert.    | 0.1342          | PK       | 108.89         | 20.06           | 5.89      | 32.00     | -80.0                | 0.00      | 22.84           | 25.04          | 2.2         | Fundamental |

Result = Reading + Ant.Fac. + Loss (Cable+Attenuator) - Gain(Amplifier) + Distance factor + DCCF

\* Since the peak emission result satisfied the average limit, DCCF was omitted.

**Result of the fundamental emission at 3 m without Distance factor**

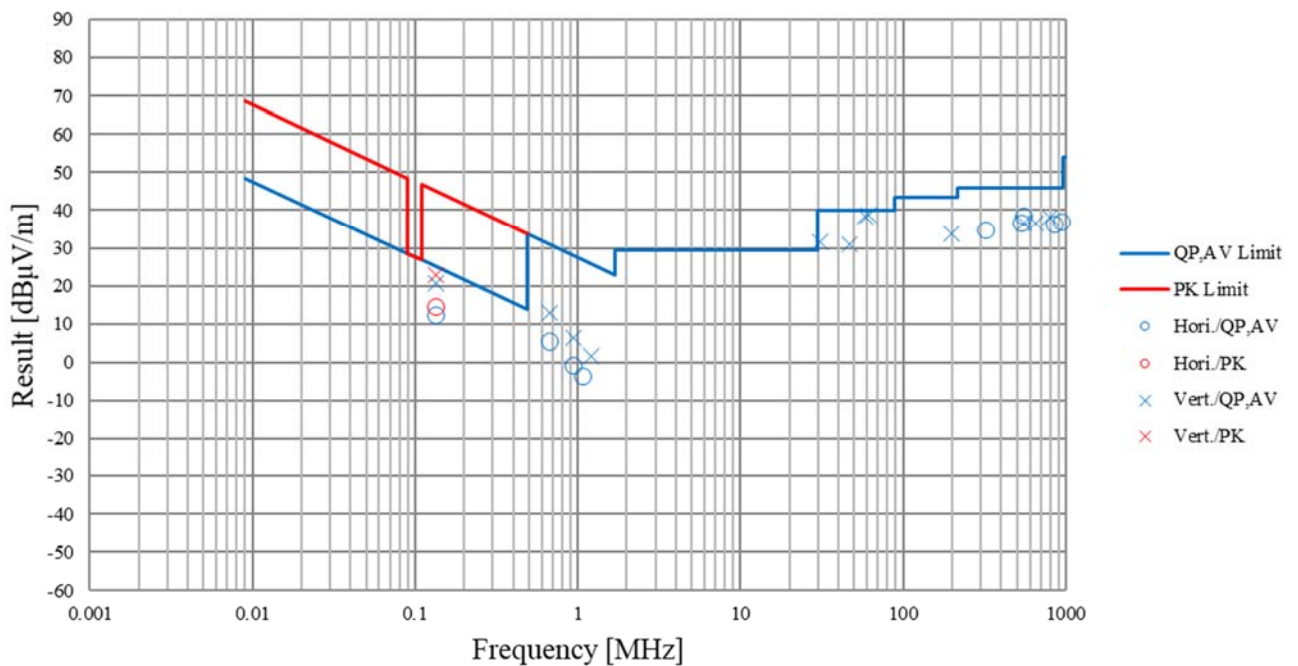
| Polarity | Frequency [MHz] | Detector | Reading [dBuV] | Ant.Fac. [dB/m] | Loss [dB] | Gain [dB] | Distance Factor [dB] | - | Result [dBuV/m] | Limit [dBuV/m] | Margin [dB] | Remark      |
|----------|-----------------|----------|----------------|-----------------|-----------|-----------|----------------------|---|-----------------|----------------|-------------|-------------|
| Hori.    | 0.1342          | PK       | 100.46         | 20.06           | 5.89      | 32.00     | 0.0                  | - | 94.41           | -              | -           | Fundamental |
| Vert.    | 0.1342          | PK       | 108.89         | 20.06           | 5.89      | 32.00     | 0.0                  | - | 102.84          | -              | -           | Fundamental |

Result = Reading + Ant.Fac. + Loss (Cable+Attenuator) - Gain(Amplifier)

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

## Radiated Spurious Emission (Plot data)

|                        |                                                                                                               |                                   |
|------------------------|---------------------------------------------------------------------------------------------------------------|-----------------------------------|
| Report No.             | 13806752S-A-R2                                                                                                |                                   |
| Test place             | Shonan EMC Lab.                                                                                               |                                   |
| Semi Anechoic Chamber  | No.3                                                                                                          | No.3                              |
| Date                   | February 24, 2022                                                                                             | February 25, 2022                 |
| Temperature / Humidity | 24 deg. C / 32 % RH                                                                                           | 24 deg. C / 33 % RH               |
| Engineer               | Yosuke Murakami<br>(Below 30 MHz)                                                                             | Yosuke Murakami<br>(Above 30 MHz) |
| Antenna type           | without magnetic sheet antenna                                                                                |                                   |
| EUT and Antenna axis   | Below 30 MHz (EUT X-axis, Antenna Y-axis), with Tag<br>Above 30 MHz (EUT Y-axis, Antenna Y-axis), without Tag |                                   |
| Antenna                | Below 30 MHz (ITS-LANT30S-3U)<br>Above 30 MHz (ITS-LANT30S-2U)                                                |                                   |
| Remarks                | Below 30 MHz Vertical polarization (Antenna Angle) of the worst case: 0 deg.                                  |                                   |



**Radiated Emission (Fundamental and Spurious Emission)**

Report No. 13806752S-A-R2  
 Test place Shonan EMC Lab.  
 Semi Anechoic Chamber No.3 No.3  
 Date February 21, 2022 February 25, 2022  
 Temperature / Humidity 21 deg. C / 30 % RH 24 deg. C / 33 % RH  
 Engineer Yosuke Murakami Yosuke Murakami  
 (Below 30 MHz) (Above 30 MHz)

Antenna type with Magnetic sheet antenna  
 EUT and Antenna axis Below 30 MHz (EUT X-axis, Antenna Y-axis), with Tag  
 Above 30 MHz (EUT Y-axis, Antenna Y-axis), without Tag  
 Antenna Below 30 MHz (ITS-LANT30S-3)  
 Above 30 MHz (ITS-LANT30S-1)  
 Remarks Below 30 MHz Vertical polarization (Antenna Angle) of the worst case: 0 deg.

| Polarity | Frequency<br>[MHz] | Detector | Reading<br>[dBuV] | Ant.Fac.<br>[dB/m] | Loss<br>[dB] | Gain<br>[dB] | Distance Factor<br>[dB] | Result<br>[dBuV/m] | Limit<br>[dBuV/m] | Margin<br>[dB] | Height<br>[cm] | Angle<br>[deg.] | Remark      |
|----------|--------------------|----------|-------------------|--------------------|--------------|--------------|-------------------------|--------------------|-------------------|----------------|----------------|-----------------|-------------|
| Hori.    | 0.1342             | PK       | 100.95            | 20.06              | 5.89         | 32.00        | -80.00                  | 14.90              | 45.04             | 30.1           | -              | 188             | Fundamental |
| Hori.    | 0.6710             | QP       | 60.90             | 20.06              | 5.94         | 32.19        | -40.00                  | 14.71              | 31.06             | 16.3           | -              | 188             | -           |
| Hori.    | 0.9394             | QP       | 53.20             | 20.07              | 5.96         | 32.19        | -40.00                  | 7.04               | 28.14             | 21.1           | -              | 186             | -           |
| Hori.    | 1.2078             | QP       | 45.90             | 20.07              | 5.97         | 32.19        | -40.00                  | -0.25              | 25.96             | 26.2           | -              | 180             | -           |
| Hori.    | 243.6340           | QP       | 53.10             | 12.06              | 8.26         | 31.99        | 0.00                    | 41.43              | 46.02             | 4.5            | 124            | 77              | -           |
| Hori.    | 312.9100           | QP       | 48.90             | 13.99              | 8.65         | 31.96        | 0.00                    | 39.58              | 46.02             | 6.4            | 106            | 68              | -           |
| Hori.    | 537.2980           | QP       | 40.20             | 17.63              | 9.66         | 31.95        | 0.00                    | 35.54              | 46.02             | 10.4           | 100            | 149             | -           |
| Hori.    | 549.9510           | QP       | 42.00             | 17.91              | 9.72         | 31.96        | 0.00                    | 37.67              | 46.02             | 8.3            | 100            | 141             | -           |
| Hori.    | 649.9420           | QP       | 39.50             | 19.15              | 10.08        | 31.92        | 0.00                    | 36.81              | 46.02             | 9.2            | 116            | 329             | -           |
| Hori.    | 849.9240           | QP       | 37.00             | 21.48              | 10.79        | 31.33        | 0.00                    | 37.94              | 46.02             | 8.0            | 100            | 93              | -           |
| Hori.    | 949.9150           | QP       | 34.90             | 22.07              | 11.11        | 30.59        | 0.00                    | 37.49              | 46.02             | 8.5            | 166            | 66              | -           |
| Vert.    | 0.1342             | PK       | 109.71            | 20.06              | 5.89         | 32.00        | -80.00                  | 23.66              | 45.04             | 21.3           | -              | 186             | Fundamental |
| Vert.    | 0.6710             | QP       | 68.70             | 20.06              | 5.94         | 32.19        | -40.00                  | 22.51              | 31.06             | 8.5            | -              | 188             | -           |
| Vert.    | 0.9394             | QP       | 61.20             | 20.07              | 5.96         | 32.19        | -40.00                  | 15.04              | 28.14             | 13.1           | -              | 188             | -           |
| Vert.    | 1.2078             | QP       | 54.20             | 20.07              | 5.97         | 32.19        | -40.00                  | 8.05               | 25.96             | 17.9           | -              | 191             | -           |
| Vert.    | 31.1790            | QP       | 45.00             | 18.45              | 6.47         | 32.18        | 0.00                    | 37.74              | 40.00             | 2.2            | 100            | 52              | -           |
| Vert.    | 32.8200            | QP       | 44.00             | 17.82              | 6.50         | 32.18        | 0.00                    | 36.14              | 40.00             | 3.8            | 100            | 41              | -           |
| Vert.    | 61.3130            | QP       | 51.50             | 7.95               | 6.52         | 32.16        | 0.00                    | 33.81              | 40.00             | 6.1            | 100            | 339             | -           |
| Vert.    | 103.8390           | QP       | 47.40             | 10.91              | 7.30         | 32.13        | 0.00                    | 33.48              | 43.52             | 10.0           | 100            | 129             | -           |
| Vert.    | 312.7090           | QP       | 44.60             | 13.98              | 8.65         | 31.96        | 0.00                    | 35.27              | 46.02             | 10.7           | 147            | 129             | -           |
| Vert.    | 549.9510           | QP       | 40.70             | 17.91              | 9.72         | 31.96        | 0.00                    | 36.37              | 46.02             | 9.6            | 100            | 19              | -           |
| Vert.    | 649.9410           | QP       | 41.10             | 19.15              | 10.08        | 31.92        | 0.00                    | 38.41              | 46.02             | 7.6            | 100            | 246             | -           |
| Vert.    | 749.9330           | QP       | 38.20             | 20.16              | 10.45        | 31.75        | 0.00                    | 37.06              | 46.02             | 8.9            | 100            | 338             | -           |

Result = Reading + Ant Factor + Loss (Cable+ATT+ΔAF(above 30 MHz)) - Gain(Amplifier) + Distance factor(below 30 MHz)

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

**Peak measurement value with Duty cycle correction factor (DCCF)**

| Polarity | Frequency<br>[MHz] | Detector | Reading<br>[dBuV] | Ant.Fac.<br>[dB/m] | Loss<br>[dB] | Gain<br>[dB] | Distance Factor<br>[dB] | DCCF<br>[dB] | Result<br>[dBuV/m] | Limit<br>[dBuV/m] | Margin<br>[dB] | Remark      |
|----------|--------------------|----------|-------------------|--------------------|--------------|--------------|-------------------------|--------------|--------------------|-------------------|----------------|-------------|
| Hori.    | 0.1342             | PK       | 100.95            | 20.06              | 5.89         | 32.00        | -80.0                   | 0.00         | 14.90              | 25.04             | 10.1           | Fundamental |
| Vert.    | 0.1342             | PK       | 109.71            | 20.06              | 5.89         | 32.00        | -80.0                   | 0.00         | 23.66              | 25.04             | 1.3            | Fundamental |

Result = Reading + Ant.Fac. + Loss (Cable+Attenuator) - Gain(Amplifier) + Distance factor + DCCF

\* Since the peak emission result satisfied the average limit, DCCF was omitted.

**Result of the fundamental emission at 3 m without Distance factor**

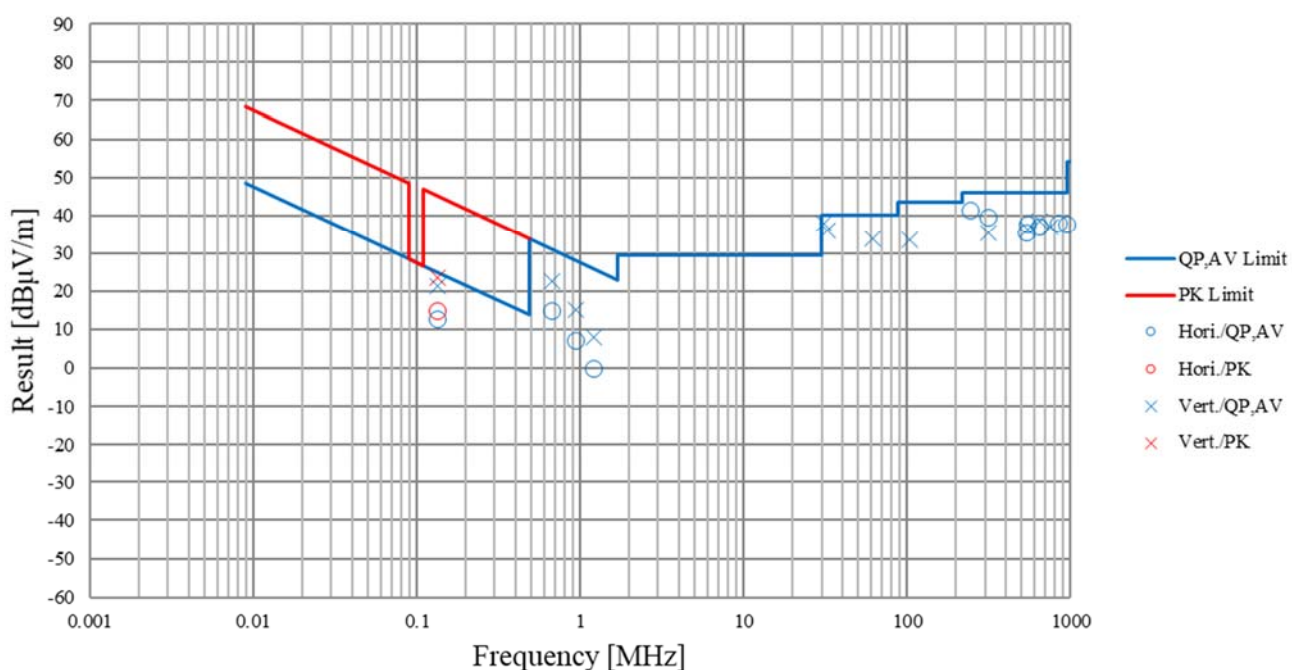
| Polarity | Frequency<br>[MHz] | Detector | Reading<br>[dBuV] | Ant.Fac.<br>[dB/m] | Loss<br>[dB] | Gain<br>[dB] | Distance Factor<br>[dB] | - | Result<br>[dBuV/m] | Limit<br>[dBuV/m] | Margin<br>[dB] | Remark      |
|----------|--------------------|----------|-------------------|--------------------|--------------|--------------|-------------------------|---|--------------------|-------------------|----------------|-------------|
| Hori.    | 0.1342             | PK       | 100.95            | 20.06              | 5.89         | 32.00        | 0.0                     | - | 94.90              | -                 | -              | Fundamental |
| Vert.    | 0.1342             | PK       | 109.71            | 20.06              | 5.89         | 32.00        | 0.0                     | - | 103.66             | -                 | -              | Fundamental |

Result = Reading + Ant.Fac. + Loss (Cable+Attenuator) - Gain(Amplifier)

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

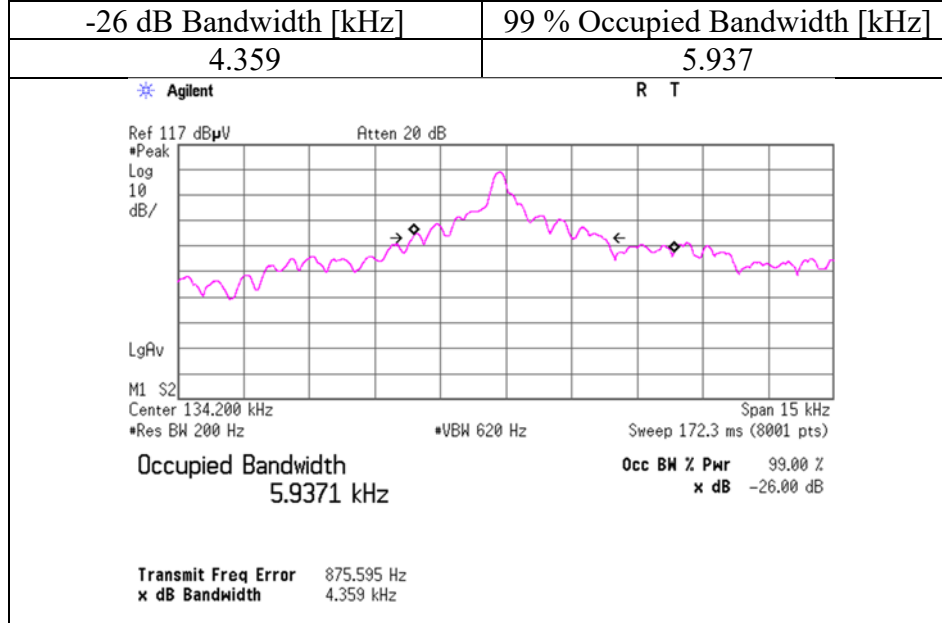
## Radiated Spurious Emission (Plot data)

|                        |                                                                              |
|------------------------|------------------------------------------------------------------------------|
| Report No.             | 13806752S-A-R2                                                               |
| Test place             | Shonan EMC Lab.                                                              |
| Semi Anechoic Chamber  | No.3                                                                         |
| Date                   | February 21, 2022                                                            |
| Temperature / Humidity | 21 deg. C / 30 % RH                                                          |
| Engineer               | Yosuke Murakami                                                              |
| Antenna type           | with Magnetic sheet antenna                                                  |
| EUT and Antenna axis   | Below 30 MHz (EUT X-axis, Antenna Y-axis), with Tag                          |
| Antenna                | Above 30 MHz (EUT Y-axis, Antenna Y-axis), without Tag                       |
| Remarks                | Below 30 MHz Vertical polarization (Antenna Angle) of the worst case: 0 deg. |



### -26 dB Bandwidth / 99 % Occupied Bandwidth

Report No. 13806752S-A-R2  
Test place Shonan EMC Lab. No.2 Shielded room  
Date March 4, 2022  
Temperature / Humidity 22 deg. C / 23 % RH  
Engineer Yosuke Murakami



\*Since the transmitter signal is CW-like it is impractical to use a RBW setting of 1 – 5% of the emission bandwidth.

**APPENDIX 2: Test Instruments****Test Equipment**

| Test Item   | Local ID                       | LIMS ID | Description               | Manufacturer                                | Model                                      | Serial                  | Last Calibration Date | Cal Int |
|-------------|--------------------------------|---------|---------------------------|---------------------------------------------|--------------------------------------------|-------------------------|-----------------------|---------|
| CE          | KAT3-12                        | 144896  | Attenuator                | JFW IND. INC.                               | 50HF-003N                                  | -                       | 2021/07/12            | 12      |
| CE          | SCC-B12/B13/SRSE-02            | 144969  | Coaxial Cable&RF Selector | Suhner/Suhner/TOYO                          | RG223U/141PE/NS4906                        | -/0901-270(RF Selector) | 2021/04/12            | 12      |
| CE          | SJM-20                         | 207277  | Measuring                 | ASKUL                                       | -                                          | -                       | -                     | -       |
| CE          | SLS-03                         | 145540  | LISN                      | Rohde & Schwarz                             | ENV216                                     | 100513                  | 2022/02/23            | 12      |
| CE          | STR-07                         | 146209  | Test Receiver             | Rohde & Schwarz                             | ESU26                                      | 100484                  | 2021/09/17            | 12      |
| CE          | SOS-22                         | 191839  | Humidity Indicator        | CUSTOM. Inc                                 | CTH-201                                    | -                       | 2021/10/14            | 12      |
| CE          | STS-02                         | 145793  | Digital Hitester          | HIOKI E.E. CORPORATION                      | 3805-50                                    | 80997819                | 2021/04/28            | 12      |
| CE,RE       | COTS-SEMI-5                    | 170932  | EMI Software              | TSJ (Techno Science Japan)                  | TEPTO-DV3(RE,CE,ME,P E)                    | -                       | -                     | -       |
| DCCF,BW     | SSA-02                         | 145800  | Spectrum Analyzer         | Keysight Technologies Inc                   | E4448A                                     | MY48250106              | 2021/04/13            | 12      |
| DCCF,BW     | SSCA-01                        | 146178  | Search coil               | Langer                                      | RF-R 400-1                                 | 02-0634                 | -                     | -       |
| DCCF,BW     | SOS-24                         | 191841  | Humidity Indicator        | CUSTOM. Inc                                 | CTH-201                                    | -                       | 2021/10/14            | 12      |
| RE          | KJM-02                         | 146432  | Measure                   | TAJIMA                                      | GL19-55                                    | -                       | -                     | -       |
| RE          | SAEC-03(NSA)                   | 145565  | Semi-Anechoic Chamber     | TDK                                         | SAEC-03(NSA)                               | 3                       | 2021/04/27            | 12      |
| RE          | SAEC-ALL                       | 145568  | Semi-Anechoic Chamber(ME) | TDK                                         | Semi-Anechoic Chamber 3m/10m               | 1, 2, 3                 | 2021/12/25            | 12      |
| RE          | SAF-03                         | 145126  | Pre Amplifier             | SONOMA                                      | 310N                                       | 290213                  | 2022/02/24            | 12      |
| RE          | SAT6-13                        | 167094  | Attenuator                | JFW                                         | 50HF-006N                                  | -                       | 2022/02/21            | 12      |
| RE          | SAT6-15                        | 167096  | Attenuator                | JFW                                         | 50HF-006N                                  | -                       | 2022/02/21            | 12      |
| RE          | SBA-03                         | 145023  | Biconical Antenna         | Schwarzbeck Mess-Elektronik OHG             | BBA9106                                    | 91032666                | 2021/05/15            | 12      |
| RE          | SCC-C1/C2/C3/C4/C5/C10/SRSE-03 | 145171  | Coaxial Cable&RF Selector | Fujikura/Fujikura/Suhner/Suhner/Suhner/TOYO | 8D2W/12DSFA/141PE/141PE/141PE/141PE/NS4906 | -/0901-271(RF Selector) | 2021/04/12            | 12      |
| RE          | SCC-M1                         | 194601  | Coaxial Cable             | Fujikura                                    | 5D-2W                                      | -                       | 2021/12/10            | 12      |
| RE          | SLA-07                         | 145529  | Logperiodic Antenna       | Schwarzbeck Mess-Elektronik OHG             | VUSLP9111B                                 | 196                     | 2021/05/15            | 12      |
| RE          | SLP-02                         | 145536  | Loop Antenna              | Rohde & Schwarz                             | HFH2-Z2                                    | 100218                  | 2021/04/06            | 12      |
| RE          | SOS-23                         | 191840  | Humidity Indicator        | CUSTOM. Inc                                 | CTH-201                                    | -                       | 2021/08/02            | 12      |
| RE          | STR-09                         | 213530  | Test Receiver             | Rohde & Schwarz                             | ESW44                                      | 103068                  | 2022/01/17            | 12      |
| RE,DCCF, BW | STS-03                         | 146210  | Digital Hitester          | HIOKI E.E. CORPORATION                      | 3805-50                                    | 80997823                | 2021/09/14            | 12      |

\*Hyphens for Last Calibration Date and Cal Int (month) are instruments that Calibration is not required (e.g. software), or instruments checked in advance before use.

The expiration date of the calibration is the end of the expired month.

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

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

Test item: CE: Conducted Emission  
RE: Radiated Emission  
DCCF: Duty Cycle Correction Factor  
BW: -26 dB Bandwidth / 99 % Occupied Bandwidth