

Dates of Tests: Nov 14 ~ Dec 20, 2019  
Test Report S/N: LR500111912N  
Test Site : LTA CO., LTD.

## CERTIFICATION OF COMPLIANCE

FCC ID.

**SS4DR900**

APPLICANT

**Bluebird Inc.**

|                           |   |                                               |
|---------------------------|---|-----------------------------------------------|
| Equipment Class           | : | Part 15 Spread Spectrum Transmitter           |
| Manufacturing Description | : | Desktop RFID Reader                           |
| Manufacturer              | : | Bluebird Inc.                                 |
| Model name                | : | DR900                                         |
| Test Device Serial No.:   | : | Identical prototype                           |
| Rule Part(s)              | : | FCC Part 15.247 Subpart C ; ANSI C-63.10-2013 |
| Frequency Range           | : | 917.10 MHz ~ 926.90 MHz(900 MHz RFID)         |
| Max. Output Power         | : | Max 24.28 dBm                                 |
| Data of issue             | : | Dec 20, 2019                                  |

This test report is issued under the authority of:



Ja-Beom Koo, Manager

The test was supervised by:



Eun-Hwan Jung, Test Engineer

This test result only responds to the tested sample. It is not allowed to copy this report even partly without the allowance of the test laboratory. The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.



NVLAP LAB Code.: 200723-0

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## 1. General information

### 1-1 Test Performed

Company name : LTA Co., Ltd.  
 Address : 243, Jubug-ri, Yangji-Myeon, Youngin-Si, Kyunggi-Do, Korea. 449-822  
 Web site : <http://www.ltalab.com>  
 E-mail : [chahn@ltalab.com](mailto:chahn@ltalab.com)  
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 Facsimile : +82-31-323-6010

Quality control in the testing laboratory is implemented as per ISO/IEC 17025 which is the “General requirements for the competents of calibration and testing laboratory”.

### 1-2 Accredited agencies

LTA Co., Ltd. is approved to perform EMC testing by the following agencies:

| Agency | Country | Accreditation No. | Validity   | Reference             |
|--------|---------|-------------------|------------|-----------------------|
| NVLAP  | U.S.A   | 200723-0          | 2020-09-30 | ECT accredited Lab.   |
| RRA    | KOREA   | KR0049            | -          | EMC accredited Lab.   |
| FCC    | U.S.A   | 649054            | 2021-04-11 | FCC CAB               |
| VCCI   | JAPAN   | C-4948,           | 2020-09-10 | VCCI registration     |
| VCCI   | JAPAN   | T-2416,           | 2020-09-10 | VCCI registration     |
| VCCI   | JAPAN   | R-4483(10 m),     | 2020-10-15 | VCCI registration     |
| VCCI   | JAPAN   | G-847             | 2022-06-13 | VCCI registration     |
| IC     | CANADA  | 5799A-1           | 2021-06-16 | IC filing             |
| KOLAS  | KOREA   | NO.551            | 2021-08-20 | KOLAS accredited Lab. |

## 2. Information about test item

### 2-1 Client & Manufacturer

Company name : Bluebird Inc.  
 Address : (Dogok-dong, SEI Tower 13,14) 39,Eonjuro30-gil, Gangnam-gu, Seoul, South Korea  
 Tel / Fax : TEL No : +82-010-4093-8861 / FAX No : +82-02-2258-9209  
 Model name : DR900

### 2-2 Equipment Under Test (EUT)

Date of receipt : Dec 20, 2019  
 EUT condition : Pre-production, not damaged  
 Antenna type : Patch Antenna  
 Frequency Range : 917.10 MHz ~ 926.90 MHz  
 RF output power : Max 24.28 dBm  
 Number of channels : 50  
 Type of Modulation : ASK  
 Power Source : DC 5.0 V  
 Firmware Version : V1.0.0

### 2-3 Tested frequency

| 900MHz RFID     | LOW    | MID    | HIGH   |
|-----------------|--------|--------|--------|
| Frequency (MHz) | 917.10 | 921.90 | 926.90 |

### 2-4 Ancillary Equipment

| Equipment | Model No. | Serial No. | Manufacturer |
|-----------|-----------|------------|--------------|
| Notebook  | CR720     | MS-1736    | MSI          |

### 3. Test Report

#### 3.1 Summary of tests

| FCC Part Section(s) | Parameter                        | Limit                                           | Test Condition | Status (note 1) |
|---------------------|----------------------------------|-------------------------------------------------|----------------|-----------------|
| 15.247(a)           | Carrier Frequency Separation     | $\geq 2/3$ of 20dB BW                           | Conducted      | N/A             |
| 15.247(a)           | Number of Hopping Frequencies    | $\geq 15$ channels                              |                | N/A             |
| 15.247(a)           | 20 dB Bandwidth<br>99% Bandwidth | —                                               |                | N/A             |
| 15.247(a)           | Dwell Time                       | $\leq 0.4$ seconds                              |                | N/A             |
| 15.247(b)           | Transmitter Output Power         | $\leq 1W$ for 1Mbps<br>$\leq 125mW$ for 2,3Mbps |                | N/A             |
| 15.247(d)           | Conducted Spurious emission      | $> 20$ dBc                                      |                | N/A             |
| 15.247(d)           | Band Edge                        | $> 20$ dBc                                      |                | N/A             |
| 15.249 / 15.209     | Field Strength of Harmonics      | $< 54$ dBuV (at 3m)                             | Radiated       | C               |
| 15.109              | Field Strength                   | —                                               |                | C               |
| 15.207 /15.107      | AC Conducted Emissions           | EN 55022                                        | Conducted      | NA              |
| 15.203              | Antenna requirement              | —                                               | -              | C               |

Note 1: C=Complies NC=Not Complies NT=Not Tested NA=Not Applicable

Note 2: The data in this test report are traceable to the national or international standards.

Note 3: This product is for fixed use.

N/A: The product replaces this test with a certificate using an authenticated module.

#### → Antenna Requirement

Bluebird Inc. FCC ID : SS4DR900 unit complies with the requirement of §15.203.

The antenna type is Patch Antenna

The sample was tested according to the following specification:

\*FCC Parts 15.247; ANSI C-63.4-2014

\*FCC KDB Publication No. 558074 D01 v05r02

\*FCC TCB Workshop 2012, April

## 3.2 Frequency Hopping System Requirements

### 3.2.1 Standard Applicable

According to FCC Part 15.247(a)(1), The system shall hop to channel frequencies that are selected at the system hopping rate from a pseudo randomly ordered list of hopping frequencies. Each frequency must be used equally on the average by each transmitter. The system receivers shall have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals.

(g) Frequency hopping spread spectrum systems are not required to employ all available hopping channels during each transmission. However, the system, consisting of both the transmitter and the receiver, must be designed to comply with all of the regulations in this section should the transmitter be presented with a continuous data (or information) stream. In addition, a system employing short transmission bursts must comply with the definition of a frequency hopping system and must distribute its transmissions over the minimum number of hopping channels specified in this section.

(h) The incorporation of intelligence within a frequency hopping spread spectrum system that permits the system to recognize other users within the spectrum band so that it individually and independently chooses and adapts its hopsets to avoid hopping on occupied channels is permitted. The coordination of frequency hopping systems in any other manner for the express purpose of avoiding the simultaneous occupancy of individual hopping frequencies by multiple transmitters is not permitted.

### 3.3 TECHNICAL CHARACTERISTIC TEST

#### 3.3.1 Carrier Frequency Separation

**Procedure:**

The test follows DA00-705. The carrier frequency separation was measured with a spectrum analyzer connected to the antenna terminal, while EUT had its hopping function enabled.

After the trace being stable, the reading value between the peaks of the adjacent channels using the marker-delta function was recorded as the measurement results.

The spectrum analyzer is set to:

Span = 2~ 3 MHz (wide enough to capture the peaks of two adjacent channels)

RBW = 100 kHz (1% of the span or more)

Sweep = auto

VBW = 100 kHz

Detector function = peak

Trace = max hold

**Measurement Data:** N/A

**Minimum Standard:**

The EUT shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or two-thirds of 20 dB bandwidth of the hopping channel, whichever is greater.

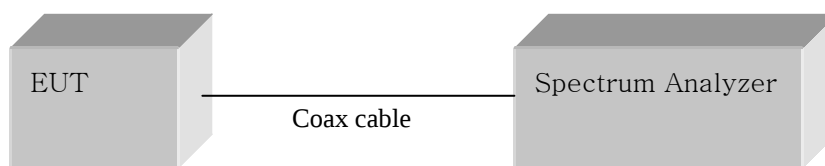
**Measurement Setup**

Figure 1: Measurement setup for the carrier frequency separation

### 3.3.2 Number of Hopping Frequencies

**Procedure:**

For frequency hopping systems operating in the 902–928 MHz band: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies

The spectrum analyzer is set to (Bluetooth):

Frequency range    Start = 802 MHz,    Stop = 928 MHz

RBW = 100 kHz (1% of the span or more)    Sweep = auto

e)

VBW = 100 kHz ( $VBW \geq RBW$ )

Detector function = peak

Trace = max hold

Span > 40 MHz

**Measurement Data :**    **N/A**

**Minimum Standard:**

---

Have at least 50 channels below 250 kHz bandwidth

---

**Measurement Setup**

Same as the Chapter 3.3.1 (Figure 1)

### 3.3.3 20 dB Bandwidth

**Procedure:**

The bandwidth at 20 dB below the highest inband spectral density was measured with a spectrum analyzer connected to the antenna terminal, while EUT had its hopping function disabled at the highest, middle and the lowest available channels..

After the trace being stable, Use the marker-to-peak function to set the marker to the peak of the emission. Use the marker-delta function to measure 20 dB down one side of the emission. Reset the marker-delta function, and move the marker to the other side of the emission, until it is ( as close as possible to ) even with the reference marker level. The marker-delta reading at this point is the 20 dB bandwidth of the emission.

The spectrum analyzer is set to RFID :

Center frequency = the highest, middle and the lowest channels

Span = 3 MHz (approximately 2 or 3 times of the 20 dB bandwidth)

RBW = 30 kHz

Sweep = auto

VBW = 30 kHz (VBW  $\geq$  RBW)

Detector function = peak

Trace = max hold

**Measurement Data:** N/A

**Minimum Standard:**

---

---

N/A

---

---

**Measurement Setup**

Same as the Chapter 3.3.1 (Figure 1)

---

### 3.3.4 Time of Occupancy (Dwell Time)

**Procedure:**

The test follows DA00-705. The dwell time was measured with a spectrum analyzer connected to the antenna terminal, while EUT had its hopping function enabled.

The spectrum analyzer is set to :

Center frequency = 915 MHz

Span = zero

RBW = 1 MHz

VBW = 1 MHz (VBW  $\geq$  RBW)

Trace = max hold

Detector function = peak

**Measurement Data (RFID):** N/A

**Minimum Standard:**

---

the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period

---

**Measurement Setup**

Same as the Chapter 3.3.1 (Figure 1)

### 3.3.5 Transmitter Output Power

**Procedure:**

The test follows DA00-705. The peak output power was measured with a spectrum analyzer connected to the antenna terminal, while EUT had its hopping function disabled at the highest, middle and the lowest available channels..

After the trace being stable, Use the marker-to-peak function to set the marker to the peak of the emission. The indicated level is the peak output power.

The spectrum analyzer is set to :

Center frequency = the highest, middle and the lowest channels

Span = 10 MHz (approximately 5 times of the 20 dB bandwidth)

RBW = 3 MHz (greater than the 20 dB bandwidth of the emission being measured)

VBW = 3 MHz (VBW  $\geq$  RBW)

Detector function = peak

Trace = max hold

Sweep = auto

**Measurement Data : N/A**

|                          |               |
|--------------------------|---------------|
| <b>Minimum Standard:</b> | at least 1 W. |
|--------------------------|---------------|

**Measurement Setup**

Same as the Chapter 3.3.1 (Figure 1)

### 3.3.6 Band Edge

#### Procedure:

The bandwidth at 20 dB down from the highest inband spectral density is measured with a spectrum analyzer connected to the antenna terminal, while EUT had its hopping function disabled at the highest, middle and the lowest available channels.

After the trace being stable, Use the marker-to-peak function to measure 20 dB down both sides of the intentional emission.

The spectrum analyzer is set to:

Center frequency = the highest, middle and the lowest channels

RBW = 100 kHz

VBW = 300 kHz

Span = 10~30 MHz

Detector function = peak

Trace = max hold

Sweep = auto

**Measurement Data:** N/A

|                          |               |
|--------------------------|---------------|
| <b>Minimum Standard:</b> | $\leq 20$ dBc |
|--------------------------|---------------|

#### Measurement Setup

Same as the Chapter 3.3.1 (Figure 1)

### 3.3.7 Conducted Spurious Emissions

**Procedure:**

The test follows DA00-705. The conducted spurious emissions were measured with a spectrum analyzer connected to the antenna terminal, while EUT had its hopping function disabled at the highest, middle and the lowest available channels..

After the trace being stable, set the marker on the peak of any spurious emission recorded.

The spectrum analyzer is set to:

Span = wide enough to capture the peak level of the in-band emission and all spurious emissions

RBW = 100 kHz

Sweep = auto

VBW = 100 kHz

Detector function = peak

Trace = max hold

**Measurement Data:** N/A

|                          |               |
|--------------------------|---------------|
| <b>Minimum Standard:</b> | $\leq 20$ dBc |
|--------------------------|---------------|

**Measurement Setup**

Same as the Chapter 3.3.1 (Figure 1)

### 3.3.8 Radiated Spurious Emissions

#### Procedure:

The EUT was placed on a 0.8 m high wooden table inside a shielded enclosure. An antenna was placed near the EUT and measurements of frequencies and amplitudes of field strengths were recorded for reference during final measurements. For final radiated testing, measurements were performed in OATS. Measurements were performed with the EUT oriented in 3 orthogonal axis and rotated 360 degrees to determine worst-case orientation for maximum emissions.

The spectrum analyzer is set to:

Center frequency = the worst channel

Frequency Range = 9 kHz ~ 10<sup>th</sup> harmonic.

RBW = 100 kHz ( 30 MHz ~ 1 GHz)

VBW  $\geq$  RBW

= 1 MHz (1 GHz ~ 10<sup>th</sup> harmonic )

Span = 100 MHz

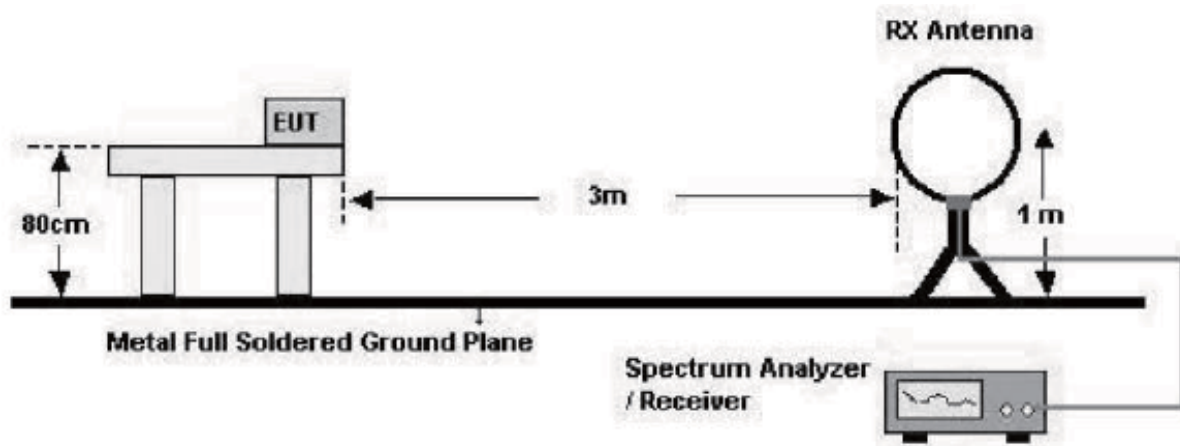
Detector function = peak

Trace = max hold

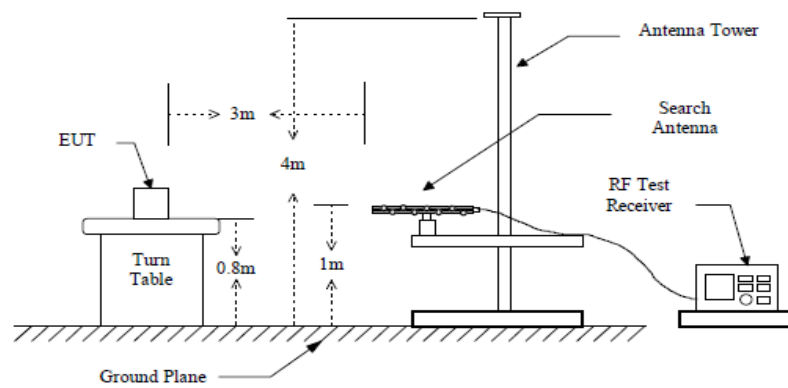
Sweep = auto

**Note : Attach worst-case data in accordance with ANSI C63.10-2013 6.3.4.**

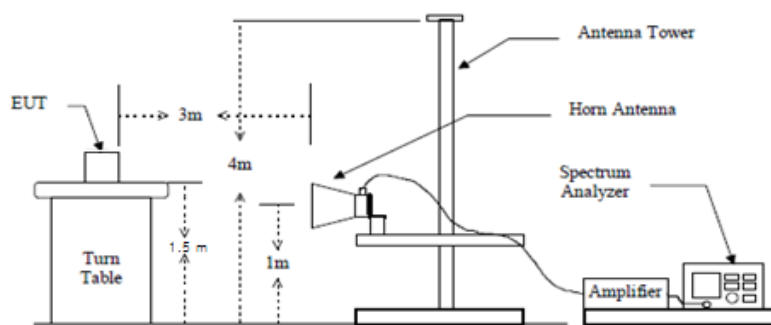
**below 30 MHz**



below 1 GHz (30 MHz to 1 GHz)



above 1 GHz



**Measurement Data: Complies**

- See next pages for actual measured data.
- No other emissions were detected at a level greater than 20 dB below limit include from 9 kHz to 30 MHz.

**Minimum Standard: FCC Part 15.209(a)**

| Frequency (MHz) | Limit (uV/m) @ 3 m    |
|-----------------|-----------------------|
| 0.009 ~ 0.490   | 2400/F(kHz) (@ 300 m) |
| 0.490 ~ 1.705   | 24000/F(kHz) (@ 30 m) |
| 1.705 ~ 30      | 30(@ 30 m)            |
| 30 ~ 88         | 100 **                |
| 88 ~ 216        | 150 **                |
| 216 ~ 960       | 200 **                |
| Above 960       | 500                   |

\*\* Except as provided in 15.209(g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g. 15.231 and 15.241.

**Measurement Data: (9 kHz – 30 MHz)**

| Frequency<br><br>[MHz]                                                 | Reading<br>[dBuV / m] |   | Pol. | Correction<br>Factor |                | Limits<br>[dBuV / m] |   | Result<br>[dBuV / m] |   | Margin<br>[dB] |   |
|------------------------------------------------------------------------|-----------------------|---|------|----------------------|----------------|----------------------|---|----------------------|---|----------------|---|
|                                                                        | AV / Peak             |   |      | Antenna              | Amp.Gain+Cable | AV / Peak            |   | AV / Peak            |   | AV / Peak      |   |
|                                                                        |                       |   |      |                      |                |                      |   |                      |   |                |   |
| -                                                                      | -                     | - | -    | -                    | -              | -                    | - | -                    | - | -              | - |
| -                                                                      | -                     | - | -    | -                    | -              | -                    | - | -                    | - | -              | - |
| *No emissions were detected at a level greater than 20 dB below limit. |                       |   |      |                      |                |                      |   |                      |   |                |   |
| -                                                                      | -                     | - | -    | -                    | -              | -                    | - | -                    | - | -              | - |

\*No emissions were detected at a level greater than 20 dB below limit.

**Measurement Data : Low (Above 1 GHz)**

| Frequency<br><br>[MHz] | Reading<br>[dBuV / m] |       | Pol. | Correction             | Limits     |    | Result     |       | Margin    |       |
|------------------------|-----------------------|-------|------|------------------------|------------|----|------------|-------|-----------|-------|
|                        |                       |       |      | Factor                 | [dBuV / m] |    | [dBuV / m] |       | [dB]      |       |
|                        | AV / Peak             |       |      | Antenna-Amp.Gain+Cable | AV/Peak    |    | AV/Peak    |       | AV / Peak |       |
| 1562.50                | 28.20                 | 62.40 | V    | -8.69                  | 54         | 74 | 19.51      | 53.71 | 30.49     | 16.29 |
| 7905.25                | 19.50                 | 48.46 | V    | 8.55                   | 54         | 74 | 28.05      | 57.01 | 25.95     | 16.99 |
| 7982.88                | 19.11                 | 42.56 | V    | 8.56                   | 54         | 74 | 27.67      | 51.21 | 26.33     | 22.79 |

- No other emissions were detected at a level greater than 20 dB below limit.

**Measurement Data : Mid (Above 1 GHz)**

| Frequency<br><br>[MHz] | Reading<br>[dBuV / m] |       | Pol. | Correction<br><br>Factor | Limits<br>[dBuV / m] |    | Result<br>[dBuV / m] |       | Margin<br>[dB] |       |
|------------------------|-----------------------|-------|------|--------------------------|----------------------|----|----------------------|-------|----------------|-------|
|                        | AV / Peak             |       |      | Antenna-Amp.Gain+Cable   | AV /Peak             |    | AV /Peak             |       | AV / Peak      |       |
| 6081.63                | 19.79                 | 47.67 | V    | 6.02                     | 54                   | 74 | 53.69                | 25.81 | 28.19          | 20.31 |
| 1559.13                | 27.00                 | 55.37 | V    | -8.72                    | 54                   | 74 | 18.28                | 46.65 | 31.72          | 23.35 |
| 6713.88                | 19.70                 | 42.61 | V    | 7.15                     | 54                   | 74 | 26.85                | 49.76 | 27.15          | 24.24 |

- No other emissions were detected at a level greater than 20 dB below limit.

**Measurement Data : High (Above 1 GHz)**

| Frequency<br><br>[MHz] | Reading<br>[dBuV / m] |       | Pol. | Correction             | Limits<br>[dBuV / m] |    | Result<br>[dBuV / m] |       | Margin<br>[dB] |       |
|------------------------|-----------------------|-------|------|------------------------|----------------------|----|----------------------|-------|----------------|-------|
|                        |                       |       |      | Factor                 |                      |    |                      |       |                |       |
|                        | AV / Peak             |       |      | Antenna-Amp.Gain+Cable | AV /Peak             |    | AV /Peak             |       | AV / Peak      |       |
| 6081.63                | 20.99                 | 51.10 | H    | 6.02                   | 54                   | 74 | 27.01                | 57.13 | 26.99          | 16.88 |
| 7077.25                | 20.99                 | 48.51 | H    | 7.88                   | 54                   | 74 | 27.88                | 56.39 | 26.12          | 17.61 |
| 8924.50                | 19.40                 | 44.55 | H    | 9.60                   | 54                   | 74 | 29.00                | 54.15 | 25.00          | 19.85 |

- No other emissions were detected at a level greater than 20 dB below limit.

**Measurement Data : Low(Below 1 GHz)**

| Frequency<br>[MHz] | Reading<br>[dBuV / m] | Pol. | Correction<br>Factor   | Limits<br>[dBuV / m] | Result<br>[dBuV / m] | Margin<br>[dB] |
|--------------------|-----------------------|------|------------------------|----------------------|----------------------|----------------|
|                    |                       |      | Antenna-Amp.Gain+Cable |                      |                      |                |
| 402.72             | 43.03                 | H    | -8.71                  | 46                   | 34.32                | 11.68          |
| 47.82              | 35.18                 | H    | -14.54                 | 46                   | 20.64                | 25.36          |
| 479.96             | 31.35                 | H    | -7.45                  | 46                   | 23.90                | 22.10          |

- No other emissions were detected at a level greater than 20 dB below limit.

**Measurement Data : Mid (Below 1 GHz)**

| Frequency<br>[MHz] | Reading<br>[dBuV / m] | Pol. | Correction<br>Factor   | Limits<br>[dBuV / m] | Result<br>[dBuV / m] | Margin<br>[dB] |
|--------------------|-----------------------|------|------------------------|----------------------|----------------------|----------------|
|                    |                       |      | Antenna-Amp.Gain+Cable |                      |                      |                |
| 406.72             | 44.42                 | H    | -8.66                  | 46                   | 35.76                | 10.24          |
| 79.96              | 36.87                 | H    | -18.76                 | 46                   | 18.11                | 27.89          |
| 47.70              | 35.14                 | H    | -14.55                 | 46                   | 20.59                | 25.41          |

- No other emissions were detected at a level greater than 20 dB below limit.

**Measurement Data : High (Below 1 GHz)**

| Frequency<br>[MHz] | Reading<br>[dBuV / m] | Pol. | Correction<br>Factor   | Limits<br>[dBuV / m] | Result<br>[dBuV / m] | Margin<br>[dB] |
|--------------------|-----------------------|------|------------------------|----------------------|----------------------|----------------|
|                    |                       |      | Antenna-Amp.Gain+Cable |                      |                      |                |
| 408.54             | 45.60                 | H    | -8.62                  | 46                   | 36.98                | 9.02           |
| 47.95              | 38.29                 | H    | -14.53                 | 46                   | 23.76                | 22.24          |
| 79.96              | 36.83                 | H    | -18.76                 | 46                   | 18.07                | 27.93          |

- No other emissions were detected at a level greater than 20 dB below limit.

### 3.3.9 AC Conducted Emissions

**Procedure:**

The conducted emissions are measured in the shielded room with a spectrum analyzer in peak hold. While the measurement, EUT had its hopping function disabled at the middle channels in line with Section 15.31(m). Emissions closest to the limit are measured in the quasi-peak mode (QP) with the tuned receiver using a bandwidth of 9 kHz. The emissions are maximized further by cable manipulation and Exerciser operation. The highest emissions relative to the limit are listed.

**Measurement Data:** NA

**Minimum Standard:** FCC Part 15.207(a) / EN 55022

Class B

| Frequency Range | quasi-peak | Average    |
|-----------------|------------|------------|
| 0.15 ~ 0.5      | 66 to 56 * | 56 to 46 * |
| 0.5 ~ 5         | 56         | 46         |
| 5 ~ 30          | 60         | 50         |

\* Decreases with the logarithm of the frequency

## APPENDIX

### TEST EQUIPMENT USED FOR TESTS

|    | Use | Description                          | Model No.        | Serial No.  | Manufacturer           | Interval | Last Cal. Date |
|----|-----|--------------------------------------|------------------|-------------|------------------------|----------|----------------|
| 1  |     | Signal Analyzer (9 kHz ~ 30 GHz)     | FSV30            | 100757      | R&S                    | 1 year   | 2019-09-07     |
| 2  |     | Signal Generator (~3.2 GHz)          | 8648C            | 3623A02597  | HP                     | 1 year   | 2019-03-21     |
| 3  |     | SYNTHESIZED CW GENERATOR             | 83711B           | US34490456  | HP                     | 1 year   | 2019-09-06     |
| 4  |     | Attenuator (3 dB)                    | 8491A            | 37822       | HP                     | 1 year   | 2019-09-07     |
| 5  |     | Attenuator (10 dB)                   | 8491A            | 63196       | HP                     | 1 year   | 2019-09-07     |
| 6  | ■   | EMI Test Receiver (~7 GHz)           | ESCI7            | 100722      | R&S                    | 1 year   | 2019-09-07     |
| 7  | ■   | RF Amplifier (~1.3 GHz)              | 8447D OPT 010    | 2944A07684  | HP                     | 1 year   | 2019-09-07     |
| 8  | ■   | RF Amplifier (1~26.5 GHz)            | 8449B            | 3008A02126  | HP                     | 1 year   | 2019-03-21     |
| 9  | ■   | Horn Antenna (1~18 GHz)              | 3115             | 00114105    | ETS                    | 2 year   | 2018-08-04     |
| 10 | ■   | DRG Horn (Small)                     | 3116B            | 81109       | ETS-Lindgren           | 2 year   | 2018-03-21     |
| 11 |     | DRG Horn (Small)                     | 3116B            | 133350      | ETS-Lindgren           | 2 year   | 2018-03-21     |
| 12 | ■   | TRILOG Antenna                       | VULB 9160        | 9160-3237   | SCHWARZBECK            | 2 year   | 2019-04-17     |
| 13 |     | Temp.Humidity Data Logger            | SK-L200TH II A   | 00801       | SATO                   | 1 year   | 2019-03-21     |
| 14 |     | Splitter (SMA)                       | ZFSC-2-2500      | SF617800326 | Mini-Circuits          | -        | -              |
| 15 |     | DC Power Supply                      | 6674A            | 3637A01657  | Agilent                | -        | -              |
| 17 | ■   | Power Meter                          | EPM-441A         | GB32481702  | HP                     | 1 year   | 2019-03-21     |
| 18 | ■   | Power Sensor                         | 8481A            | 3318A94972  | HP                     | 1 year   | 2019-09-07     |
| 19 |     | Audio Analyzer                       | 8903B            | 3729A18901  | HP                     | 1 year   | 2019-09-07     |
| 20 |     | Modulation Analyzer                  | 8901B            | 3749A05878  | HP                     | 1 year   | 2019-09-07     |
| 21 |     | TEMP & HUMIDITY Chamber              | YJ-500           | LTAS06041   | JinYoung Tech          | 1 year   | 2019-09-07     |
| 22 |     | Stop Watch                           | HS-3             | 812Q08R     | CASIO                  | 2 year   | 2019-03-21     |
| 23 |     | LISN                                 | KNW-407          | 8-1430-1    | Kyoritsu               | 1 year   | 2019-09-07     |
| 24 |     | Two-Lime V-Network                   | ESH3-Z5          | 893045/017  | R&S                    | 1 year   | 2019-03-21     |
| 25 |     | UNIVERSAL RADIO COMMUNICATION TESTER | CMU200           | 106243      | R&S                    | 1 year   | 2019-03-21     |
| 26 |     | Highpass Filter                      | WHKX1.5/15G-10SS | 74          | Wainwright Instruments | 1 year   | 2019-03-21     |
| 27 |     | Highpass Filter                      | WHKX3.0/18G-10SS | 118         | Wainwright Instruments | 1 year   | 2019-03-21     |
| 28 |     | OSP120 BASE UNIT                     | OSP120           | 101230      | R&S                    | 1 year   | 2019-03-21     |
| 29 |     | Signal Generator(100 kHz ~ 40 GHz)   | SMB100A03        | 177621      | R&S                    | 1 year   | 2019-03-21     |
| 30 | ■   | Signal Analyzer (10 Hz ~ 40 GHz)     | FSV40            | 101367      | R&S                    | 1 year   | 2019-03-21     |
| 31 | ■   | Active Loop Antenna                  | FMZB 1519        | 1519-031    | SCHWARZBECK            | 2 year   | 2019-02-26     |