

ELECTROMAGNETIC COMPATIBILITY TEST REPORT

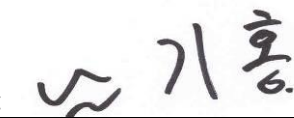
Test Report No. : W176R-D053
AGR No. : A175A-168
Applicant : Yasuda Co., Ltd.
Address : Nagahori YASUDA Bldg 7F, 1-11-9, Minamisenba, Chuo-ku, Osaka, 542-0081, Japan
Manufacturer : UNION COMMUNITY Co., Ltd.
Address : 1201-ho, Munjeong Daemyung Valleyon, 127 Beobwon-ro, Songpa-gu, Seoul, Korea
Type of Equipment : Smart-Ashley
Model Name : YDL100SF
Multiple Model Name : YDL100FP
Serial number : N/A
Total page of Report : 31 pages (including this page)
Date of Incoming : May 31, 2017
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SUMMARY

The equipment complies with the standard; EN 55032: 2012, EN 55024: 2010, EN 301 489-1 V2.1.1, EN 301 489-3 V2.1.1 and EN 301 489-17 V3.1.1

This test report contains only the results of a single test of the sample supplied for the examination. It is not a general valid assessment of the features of the respective products of the mass-production.

Reviewed by:



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REVISION HISTORY

| Issued Report No. | Issued Date | Revisions | Effect Section |
|-------------------|---------------|---------------|----------------|
| W176R-D053 | June 12, 2017 | Initial Issue | All |

1. APPLICANT AND MANUFACTURER INFORMATION

- Applicant : Yasuda Co., Ltd.
- Address : Nagahori YASUDA Bldg 7F, 1-11-9, Minamisenba, Chuo-ku, Osaka, 542-0081, Japan
- Manufacturer : UNION COMMUNITY Co., Ltd.
- Address : 1201-ho, Munjeong Daemyung Valleyon, 127 Beobwon-ro, Songpa-gu, Seoul, Korea

2. TEST SUMMARY

2.1 Test standards and results

| STANDARDS | | RESULTS |
|--|--|------------------|
| EN 55032: 2012 EN 301 489-1 V2.1.1 EN 301 489-3 V2.1.1 EN 301 489-17 V3.1.1 | Radiated Emission | PASS |
| | Conducted Emission on DC Power Input/Output Port | N/A (See Note 1) |
| | Conducted Emission on AC mains Input/Output Port | N/A (See Note 1) |
| | Conducted Emission on Telecommunication Port | N/A (See Note 2) |
| | Harmonic Current Emission on AC Mains Input Port | N/A (See Note 1) |
| | Voltage Fluctuations and Flicker on AC Mains Input Port | N/A (See Note 1) |
| EN 55024: 2010 EN 301 489-1 V2.1.1 EN 301 489-3 V2.1.1 EN 301 489-17 V3.1.1 | Electrostatic Discharge Immunity | Met criterion A |
| | RF Electromagnetic Field Immunity | Met criterion A |
| | Electrical Fast Transient/Burst Immunity | N/A (See Note 1) |
| | Surge Immunity | N/A (See Note 1) |
| | RF Common mode 0.15 MHz to 80 MHz Immunity | N/A (See Note 1) |
| | Transients and surges, vehicular environment | N/A (See Note 3) |
| | Voltage Dips, Short Interruptions and Voltage Variations | N/A (See Note 1) |

Note 1: This test is not applicable because the EUT is operated by DC battery.

Note 2: The test is not applicable because the EUT does not have a telecommunication port.

Note 3: The test is not applicable because the EUT does not operated in a vehicular environment.

2.2 Additions, deviations, exclusions from standards

No additions, deviations or exclusions have been made from standard.

2.3 Purpose of the test

To determine whether the equipment under test fulfills the EMC requirements of the standards stated in section 2.1.

2.4 Test Facility

The Onetech Corp. has been designated to perform equipment testing in compliance with ISO/IEC 17025.

The Electromagnetic compatibility measurement facilities are located at 43-14, Jinsaegol-gil, Chowol-eup, Gwangju-si, Gyeonggi-do, 12735, Korea

-. Site Filing:

VCCI (Voluntary Control Council for Interference) – Registration No. R-4112/ C-4617/ G-10666 / T-1842

IC (Industry Canada) – Registration No. Site# 3736A-3

-. Site Accreditation:

KOLAS (Korea Laboratory Accreditation Scheme) - Accreditation NO. KT085

FCC (Federal Communications Commission) - Accreditation No. KR0013

RRA (Radio Research Agency) – Designation No. KR0013

3. EUT (Equipment Under Test)

3.1 Identification of the EUT

- . Equipment : Smart-Ashley
- . Model Name : YDL100SF
- . Brand Name : -
- . Serial number : N/A
- . Manufacturer : UNION COMMUNITY Co., Ltd.

3.2 Additional information about the EUT

The Yasuda Co., Ltd., Model YDL100SF (referred to as the EUT in this report) is a Smart-Ashley. The product specification described herein was obtained from product data sheet or user’s manual.

| | |
|--|------------------------------------|
| DEVICE TYPE | Smart-Ashley |
| TRANSMITTING FREQUENCY | 13.561 MHz / 2 402 MHz ~ 2 480 MHz |
| MODULATION | ASK |
| ANTENNA TYPE | PCB pattern antenna |
| LIST OF EACH OSC. or CRY. FREQ.(FREQ. >= 1 MHz) | 32.768 kHz, 12 MHz |

3.3 Peripheral equipment

Defined as equipment needed for correct operation of the EUT, but not considered as tested:

| Model | Manufacturer | Description | Connected to |
|----------|------------------|--------------------|--------------|
| YDL100SF | Yasuda Co., Ltd. | Smart-Ashley (EUT) | - |
| IM-A850K | Pantech | Cellular Phone | EUT |

3.4 Cable Description

- . None

3.5 Mode of operation during the test

- . The EUT has Bluetooth, Reading Card and program was used for making continuous transmission mode during the test.

3.6 Criterion description - EN 55032 / EN 55024

3.6.1 Performance criteria

| Criterion | Description |
|-----------|--|
| A | <p>During and after the test the EUT shall continue to operate as intended without operator intervention. No degradation of performance or loss of function is allowed below a minimum performance level specified by the manufacturer when the EUT is used as intended. The performance level may be replaced by a permissible loss of performance. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and by what the user may reasonably expect from the EUT if used as intended.</p> |
| B | <p>After the test, the EUT shall continue to operate as intended without operator intervention. No degradation of performance or loss of function is allowed, after the application of the phenomena below a performance level specified by the manufacturer, when the EUT is used as intended. The performance level may be replaced by a permissible loss of performance.</p> <p>During the test, degradation of performance is allowed. However, no change of operating state or stored data is allowed to persist after the test.</p> <p>If the minimum performance level (or the permissible performance loss) is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and by what the user may reasonably expect from the EUT if used as intended.</p> |
| C | <p>During and after testing, a temporary loss of function is allowed, provided the function is self recoverable, or can be restored by the operation of the controls or cycling of the power to the EUT by the user in accordance with the manufacturer’s instructions.</p> <p>Functions, and/or information stored in non-volatile memory, or protected by a battery backup, shall not be lost.</p> |

3.7 Criterion description - EN 301 489-1

The performance criteria for SRD equipment with different receiver categories in combination with the different equipment types during and after immunity test are specified in this clause:

- performance criteria A for immunity tests with phenomena of a continuous nature;
- performance criteria B for immunity tests with phenomena of a transient nature;
- performance criteria for immunity tests with power interruptions exceeding a certain time are specified in EN 301 489-3, clause 7.2.2, table 6.

3.7.1 Performance criteria

| Criterion | Description |
|-----------|---|
| A | During and after the test the EUT shall continue to operate as intended without operator intervention. No degradation of performance or loss of function is allowed below a minimum performance level specified by the manufacturer when the EUT is used as intended. The performance level may be replaced by a permissible loss of performance. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and by what the user may reasonably expect from the EUT if used as intended. |
| B | After the test, the EUT shall continue to operate as intended without operator intervention. No degradation of performance or loss of function is allowed, after the application of the phenomena below a performance level specified by the manufacturer, when the EUT is used as intended. The performance level may be replaced by a permissible loss of performance. During the test, degradation of performance is allowed. However, no change of operating state or stored data is allowed to persist after the test. If the minimum performance level (or the permissible performance loss) is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and by what the user may reasonably expect from the EUT if used as intended. |
| C | During and after testing, a temporary loss of function is allowed, provided the function is self recoverable, or can be restored by the operation of the controls or cycling of the power to the EUT by the user in accordance with the manufacturer’s instructions. Functions, and/or information stored in non-volatile memory, or protected by a battery backup, shall not be lost. |

3.8 Criterion description of EN 301 489-3

3.8.1 Performance criteria

| Class 1 SRD equipment | | |
|-----------------------|--|--|
| Criteria | During test | After test |
| A | Operate as intended No loss of function For equipment type II the minimum performance shall be 12 dB SINAD No unintentional responses | Operate as intended For equipment type II the communication link shall be maintained No loss of function No degradation of performance No loss of stored data or user programmable functions |
| B | May be loss of function (one or more) No unintentional responses | Operate as intended Lost function(s) shall be self-recoverable No degradation of performance No loss of stored data or user programmable functions |
| Class 2 SRD equipment | | |
| Criteria | During test | After test |
| A | Operate as intended No loss of function For equipment type II the minimum performance shall be 6 dB SINAD No unintentional responses | Operate as intended For equipment type II the communication link shall be maintained No loss of function No degradation of performance No loss of stored data or user programmable functions |
| B | May be loss of function (one or more) No unintentional responses | Operate as intended Lost function(s) shall be self-recoverable No degradation of performance No loss of stored data or user programmable functions |
| Class 3 SRD equipment | | |
| Criteria | During test | After test |
| A and B | May be loss of function (one or more) No unintentional responses | Operate as intended, for equipment type II the communication link may be lost, but shall be recoverable by user No degradation of performance Lost functions shall be self-recoverable |

3.8.2 Performance criteria for Continuous phenomena applied to Transmitters (CT)

For equipment of type I or II including ancillary equipment tested on a stand alone basis, the performance criteria A of the applicable class as given in clause 6.3 shall apply.

For equipment of type II or type III that requires a communication link that is maintained during the test, it shall be verified by appropriate means supplied by the manufacturer that the communication link is maintained during each individual exposure in the test sequence.

Where the EUT is a transmitter, tests shall be repeated with the EUT in standby mode to ensure that any unintentional transmission does not occur.

3.8.3 Performance criteria for Transient phenomena applied to Transmitters (TT)

For equipment of type I or II, including ancillary equipment tested on a stand alone basis, the performance criteria B of the applicable class as given in clause 6.3 shall apply, except for power interruptions exceeding a certain time the performance criteria deviations are specified in clause 7.2.2.

For equipment of type II or type III that requires a communication link that is maintained during the test, this shall be verified by appropriate means supplied by the manufacturer during each individual exposure in the test sequence.

Where the EUT is a transmitter, tests shall be repeated with the EUT in standby mode to ensure that any unintentional transmission does not occur.

3.8.4 Performance criteria for Continuous phenomena applied to Receivers (CR)

For equipment of type I or II, including ancillary equipment tested on a stand alone basis, the performance criteria A of the applicable class as given in clause 6.3 shall apply.

For equipment of type II or III that requires a communication link that is maintained during the test, it shall be verified by appropriate means supplied by the manufacturer that the communication link is maintained during each individual exposure in the test sequence.

Where the EUT is a transceiver, under no circumstances shall the transmitter operate unintentionally during the test.

3.8.5 Performance criteria for Transient phenomena applied to Receivers (TR)

For equipment of type I or II, including ancillary equipment tested on a stand alone basis, the performance criteria B of the applicable class as given in clause 6.3 shall apply, except for power interruptions exceeding a certain time the performance criteria deviations are specified in clause 7.2.2.

For equipment of type II or type III that requires a communication link that is maintained during the test, this shall be verified by appropriate means supplied by the manufacturer during each individual exposure in the test sequence.

Where the EUT is a transceiver, under no circumstances shall the transmitter operate unintentionally during the test.

3.8.6 Technical nature of the primary function

| Primary Function Type | Technical nature of the primary function |
|-----------------------|--|
| I | Transfer of messages (digital or analogue signals) |
| II | Transfer of audio(speech or music) |
| III | <u>Others</u> |

3.8.7 Risk assessment of communication link performance per device type

| Device Type | Risk assesment of communication link performance |
|-------------|---|
| 1 | Highly reliable SRD communication media; e.g. serving human life inherent systems (may result in a physical risk to a person) |
| 2 | <u>Medium reliable SRD communication media; e.g. causing inconvenience to persons, which cannot simply be overcome by other means</u> |
| 3 | Standard reliable SRD communication media; e.g. inconvenience to persons, which can simply be overcome by other means (e.g. manual) |

3.9 Criterion description of EN 301 489-17

3.9.1 Performance criteria

| Criteria | During test | After test |
|----------|---|---|
| A | <p>Shall operate as intended.</p> <p>May show degradation of performance (see note 1).</p> <p>Shall be no loss of function.</p> <p>Shall be no unintentional transmissions.</p> | <p>Shall operate as intended.</p> <p>Shall be no degradation of performance (see note 2).</p> <p>Shall be no loss of function.</p> <p>Shall be no loss of stored data or user programmable functions.</p> |
| B | <p>May show loss of function (one or more).</p> <p>May show degradation of performance (see note 1).</p> <p>No unintentional transmissions.</p> | <p>Functions shall be self-recoverable.</p> <p>Shall operate as intended after recovering.</p> <p>Shall be no degradation of performance (see note 2).</p> <p>Shall be no loss of stored data or user programmable functions.</p> |
| C | <p>May be loss of function (one or more).</p> | <p>Functions shall be recoverable by the operator.</p> <p>Shall operate as intended after recovering.</p> <p>Shall be no degradation of performance (see note 2).</p> |

NOTE 1: Degradation of performance during the test is understood as a degradation to a level not below a minimum performance level specified by the manufacturer for the use of the apparatus as intended. In some cases the specified minimum performance level may be replaced by a permissible degradation of performance.

If the minimum performance level or the permissible performance degradation is not specified by the manufacturer then either of these may be derived from the product description and documentation (including leaflets and advertising) and what the user may reasonably expect from the apparatus if used as intended.

NOTE 2: No degradation of performance after the test is understood as no degradation below a minimum performance level specified by the manufacturer for the use of the apparatus as intended. In some cases the specified minimum performance level may be replaced by a permissible degradation of performance. After the test no change of actual operating data or user retrievable data is allowed.

If the minimum performance level or the permissible performance degradation is not specified by the manufacturer then either of these may be derived from the product description and documentation (including leaflets and advertising) and what the user may reasonably expect from the apparatus if used as intended.

3.9.2 Performance criteria for Continuous phenomena applied to Transmitters (CT)

The performance criteria A shall apply.

Tests shall be repeated with the EUT in standby mode (if applicable) to ensure that unintentional transmission does not occur. In systems using acknowledgement signals, it is recognized that an ACKnowledgement (ACK) or Not ACKnowledgement (NACK) transmission may occur, and steps should be taken to ensure that any transmission resulting from the application of the test is correctly interpreted.

3.9.3 Performance criteria for Transient phenomena applied to Transmitters (TT)

The performance criteria B shall apply, except for voltage dips of 100 ms and voltage interruptions of 5 000 ms duration, for which performance criteria C shall apply.

Tests shall be repeated with the EUT in standby mode (if applicable) to ensure that unintentional transmission does not occur. In systems using acknowledgement signals, it is recognized that an acknowledgement (ACK) or not-acknowledgement (NACK) transmission may occur, and steps should be taken to ensure that any transmission resulting from the application of the test is correctly interpreted.

3.9.4 Performance criteria for Continuous phenomena applied to Receivers (CR)

The performance criteria A shall apply.

Where the EUT is a transceiver, under no circumstances, shall the transmitter operate unintentionally during the test. In systems using acknowledgement signals, it is recognized that an ACK or NACK transmission may occur, and steps should be taken to ensure that any transmission resulting from the application of the test is correctly interpreted.

3.9.5 Performance criteria for Transient phenomena applied to Receivers (TR)

The performance criteria B shall apply, except for voltage dips of 100 ms and voltage interruptions of 5 000 ms duration for which performance criteria C shall apply.

Where the EUT is a transceiver, under no circumstances, shall the transmitter operate unintentionally during the test. In systems using acknowledgement signals, it is recognized that an ACK or NACK transmission may occur, and steps should be taken to ensure that any transmission resulting from the application of the test is correctly interpreted.

3.10 Alternative type(s)/model(s); also covered by this test report

-. The following lists consist of the added model and their differences.

| Model Name | Differences | Tested |
|------------|---|-------------------------------------|
| YDL100SF | Basic Model | <input checked="" type="checkbox"/> |
| YDL100FP | The model is identical to basic model except for the model name only. | <input type="checkbox"/> |

Note: 1. Applicant consigns only basic model to test. Therefore this test report just guarantees the units, which have been tested.

2. The Applicant/manufacturer is responsible for the compliance of all variants.

4. EUT MODIFICATIONS

-. None

5. EMISSION TESTS

5.1 RADIATED ELECTROMAGNETIC FIELD

5.1.1 Operating environment

Temperature : (24 ~ 25) °C
 Relative humidity : (46 ~ 47) % R.H.

5.1.2 Test set-up

The radiated emissions measurements were on the 10 m, semi anechoic chamber. The EUT was placed on a non-conductive table, 0.8 m height above the ground plane.

The frequency spectrum from 30 MHz to 1 000 MHz was scanned and emission levels maximized at each frequency recorded. The system was rotated 360°, and the antenna was varied in height between 1.0 m and 4.0 m in order to determine the maximum emission levels. This procedure was performed for both horizontal and vertical polarization of the receiving antenna.

The test set-up photos are included in appendix I

5.1.3 Measurement uncertainty

Radiated emission electric field intensity, 30 MHz ~ 300 MHz : ± 4.43 dB

Radiated emission electric field intensity, 300 MHz ~ 1 000 MHz : ± 3.80 dB

Measurement uncertainty is calculated in accordance with CISPR 16-4-2. The measurement uncertainty is given with a confidence of 95 % with the coverage factor, k = 2.

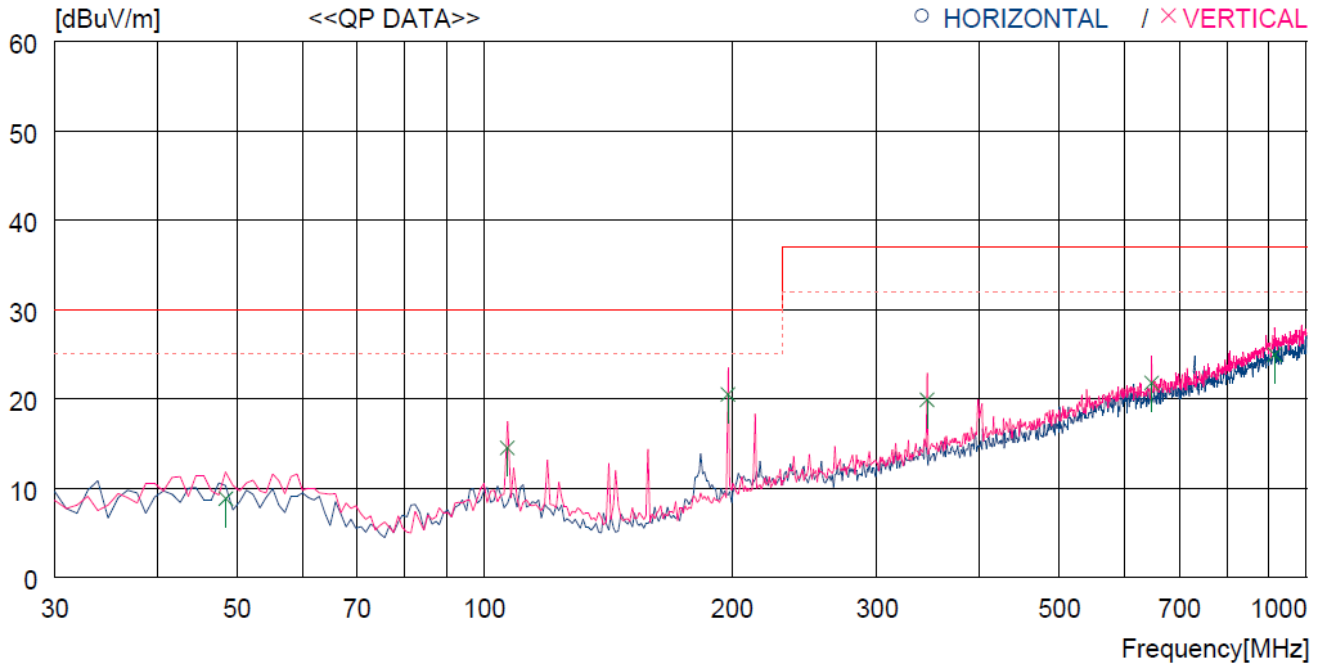
5.1.4 Test equipment used

| Model Number | Manufacturer | Description | Serial Number | Last Cal. (Interval) |
|-----------------|-------------------|--------------------------|---------------------------|----------------------|
| ■ - ESCI | Rohde & Schwarz | EMI Test Receiver | 101013 | Apr. 05, 2017 (1Y) |
| ■ - ESU | Rohde & Schwarz | EMI Test Receiver | 100261 | Apr. 06, 2017 (1Y) |
| ■ - 310N | Sonoma Instrument | Amplifier | 312544 | Apr. 05, 2017 (1Y) |
| ■ - 310N | Sonoma Instrument | Amplifier | 312545 | Apr. 05, 2017 (1Y) |
| ■ - SCU 18 | Rohde & Schwarz | Signal Conditioning Unit | 102209 | May 31, 2017 (1Y) |
| ■ - VULB9163 | Schwarzbeck | TRILOG Broadband Antenna | 9163-419 | Aug. 05, 2016 (2Y) |
| ■ - VULB9163 | Schwarzbeck | TRILOG Broadband Antenna | 9163-255 | May 20, 2016 (2Y) |
| ■ - BBHA9120D | Schwarzbeck | Horn Antenna | BBHA9120D295 | Aug. 31, 2015 (2Y) |
| ■ - CO3000 | Innco System | Controller | CO3000/904/ 37211215/L | N/A |
| ■ - DT3000 | Innco System | Turn Table | 930611 | N/A |
| ■ - MA-4000XPET | Innco System | Antenna Master | MA4000/509/ 37211215/L | N/A |
| ■ - MA4000-EP | Innco System | Antenna Master | MA4000/332/ 27030611/L | N/A |

All test equipment used is calibrated on a regular basis.

5.1.5 Test data

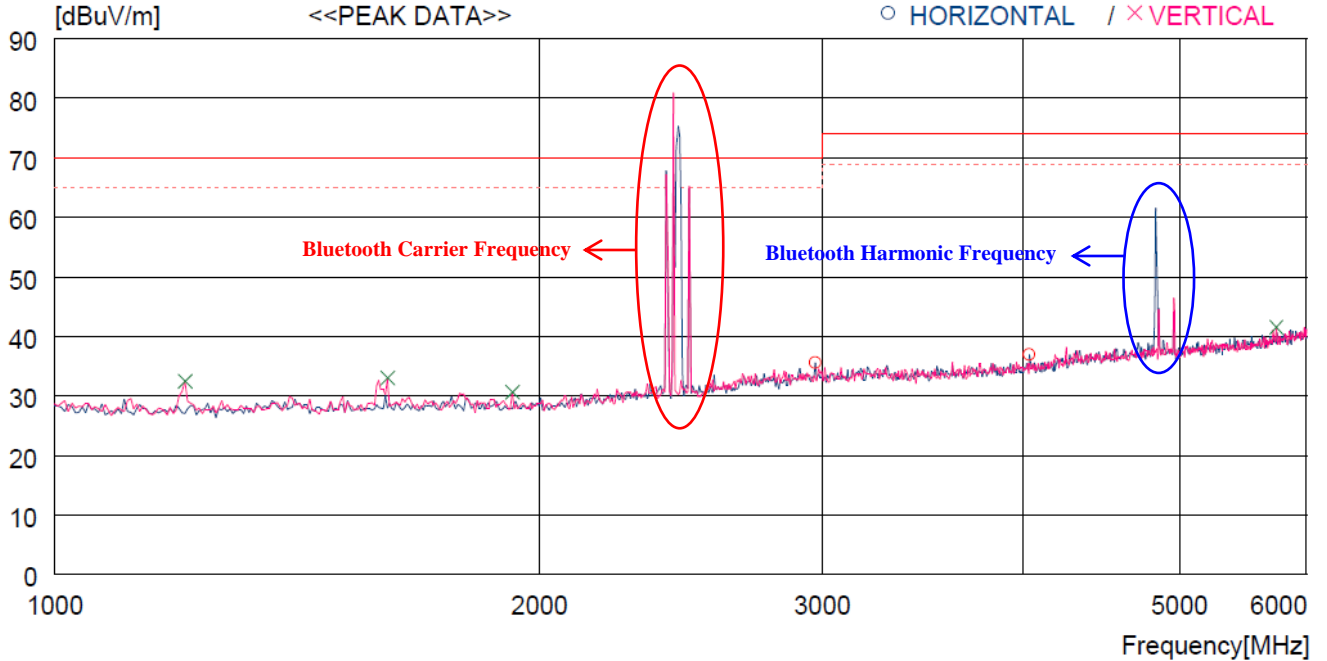
- . Test Date : June 08, 2017
- . Resolution bandwidth : 120 kHz
- . Frequency range : 30 MHz ~ 1 000 MHz
- . Measurement distance : 10 m
- . Detector Mode : Q.P



| No. | FREQ [MHz] | READING QP [dBuV] | ANT FACTOR [dB] | LOSS [dB] | GAIN [dB] | RESULT [dBuV/m] | LIMIT [dBuV/m] | MARGIN [dB] | ANTENNA [cm] | TABLE [DEG] |
|----------------------|---------------|-------------------------|-----------------------|--------------|--------------|--------------------|-------------------|----------------|-----------------|----------------|
| ----- Vertical ----- | | | | | | | | | | |
| 1 | 48.430 | 25.4 | 13.8 | 2.1 | 32.5 | 8.8 | 30.0 | 21.2 | 100 | 0 |
| 2 | 106.630 | 32.8 | 11.2 | 3.1 | 32.6 | 14.5 | 30.0 | 15.5 | 200 | 359 |
| 3 | 197.810 | 38.4 | 10.4 | 4.2 | 32.5 | 20.5 | 30.0 | 9.5 | 400 | 359 |
| 4 | 345.250 | 32.4 | 14.6 | 5.4 | 32.5 | 19.9 | 37.0 | 17.1 | 400 | 186 |
| 5 | 647.887 | 27.8 | 19.2 | 7.5 | 32.7 | 21.8 | 37.0 | 15.2 | 200 | 359 |
| 6 | 913.658 | 25.9 | 22.0 | 8.9 | 31.8 | 25.0 | 37.0 | 12.0 | 100 | 0 |

Remark: Margin (dB) = Limit – Result and Result = Reading Q.P + Antenna Factor + Loss – Gain
 Loss and Gain in above table means Cable Loss and Pre-amplifier gain.

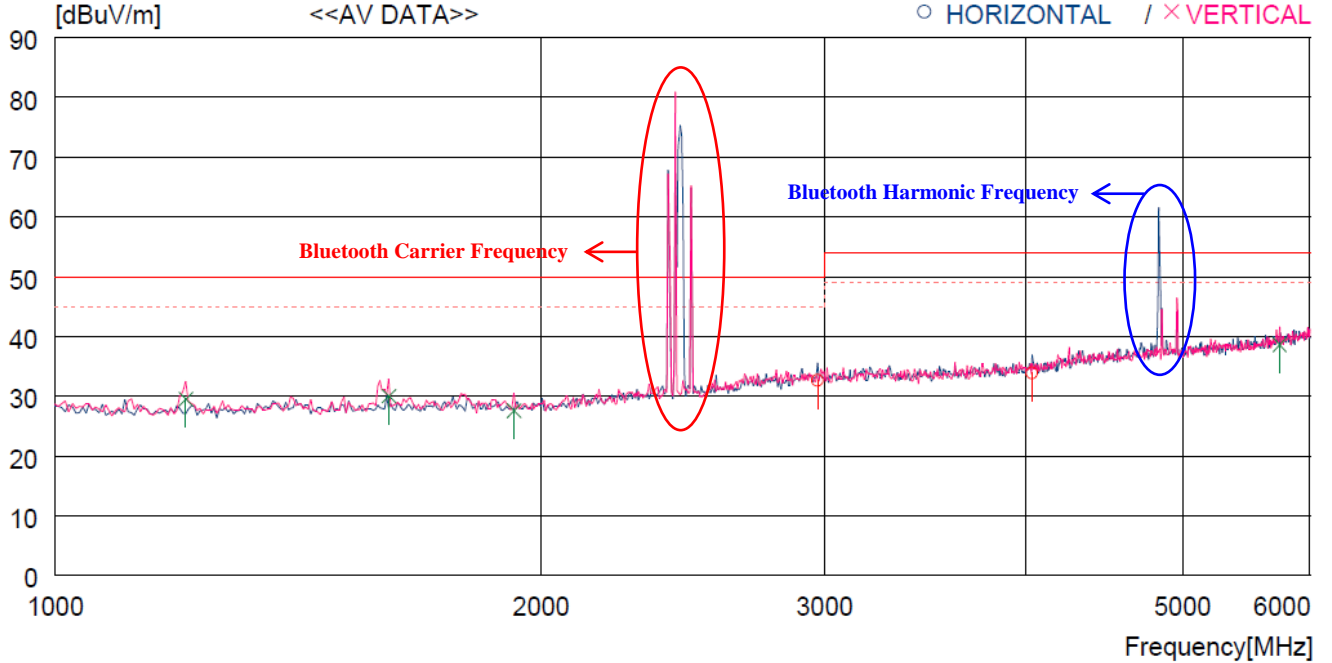
- Test Date : June 08, 2017
- Resolution bandwidth : 1 MHz
- Frequency range : 1 000 MHz ~ 6 000 MHz
- Measurement distance : 3 m
- Detector Mode : Peak



| No. | FREQ [MHz] | READING PEAK [dBuV] | ANT FACTOR [dB] | LOSS [dB] | GAIN [dB] | RESULT [dBuV/m] | LIMIT [dBuV/m] | MARGIN [dB] | ANTENNA [cm] | TABLE [DEG] |
|------------------------|------------|---------------------|-----------------|-----------|-----------|-----------------|----------------|-------------|--------------|-------------|
| ----- Horizontal ----- | | | | | | | | | | |
| 1 | 2970.000 | 34.4 | 28.3 | 12.4 | 39.5 | 35.6 | 70.0 | 34.4 | 100 | 0 |
| 2 | 4035.000 | 33.4 | 29.7 | 14.5 | 40.7 | 36.9 | 74.0 | 37.1 | 100 | 153 |
| ----- Vertical ----- | | | | | | | | | | |
| 3 | 1205.000 | 39.9 | 25.0 | 7.6 | 40.0 | 32.5 | 70.0 | 37.5 | 100 | 359 |
| 4 | 1610.000 | 38.9 | 25.3 | 8.9 | 40.1 | 33.0 | 70.0 | 37 | 100 | 359 |
| 5 | 1925.000 | 35.5 | 25.5 | 9.8 | 40.2 | 30.6 | 70.0 | 39.4 | 100 | 149 |
| 6 | 5745.000 | 32.8 | 32.0 | 17.8 | 41.0 | 41.6 | 74.0 | 32.4 | 100 | 359 |

Remark: Margin (dB) = Limit – Result and Result = Reading Peak + Antenna Factor + Loss – Gain
 Loss and Gain in above table means Cable Loss and Pre-amplifier gain.

- Test Date : June 08, 2017
- Resolution bandwidth : 1 MHz
- Frequency range : 1 000 MHz ~ 6 000 MHz
- Measurement distance : 3 m
- Detector Mode : CISPR-Average



| No. | FREQ [MHz] | READING AV [dBuV] | ANT FACTOR [dB] | LOSS [dB] | GAIN [dB] | RESULT [dBuV/m] | LIMIT [dBuV/m] | MARGIN [dB] | ANTENNA [cm] | TABLE [DEG] |
|------------------------|------------|-------------------|-----------------|-----------|-----------|-----------------|----------------|-------------|--------------|-------------|
| ----- Horizontal ----- | | | | | | | | | | |
| 1 | 2970.000 | 31.4 | 28.3 | 12.4 | 39.5 | 32.6 | 50.0 | 17.4 | 100 | 0 |
| 2 | 4035.000 | 30.4 | 29.7 | 14.5 | 40.7 | 33.9 | 54.0 | 20.1 | 100 | 153 |
| ----- Vertical ----- | | | | | | | | | | |
| 3 | 1205.000 | 36.9 | 25.0 | 7.6 | 40.0 | 29.5 | 50.0 | 20.5 | 100 | 359 |
| 4 | 1610.000 | 35.9 | 25.3 | 8.9 | 40.1 | 30.0 | 50.0 | 20.0 | 100 | 359 |
| 5 | 1925.000 | 32.5 | 25.5 | 9.8 | 40.2 | 27.6 | 50.0 | 22.4 | 100 | 149 |
| 6 | 5745.000 | 29.8 | 32.0 | 17.8 | 41.0 | 38.6 | 54.0 | 15.4 | 100 | 359 |

Remark: Margin (dB) = Limit – Result and Result = Reading Average + Antenna Factor + Loss – Gain

Loss and Gain in above table means Cable Loss and Pre-amplifier gain.

Tested by: Hyung-Kwon, Oh / Assistant Manager

6. IMMUNITY TESTS

6.1 ELECTROSTATIC DISCHARGE IMMUNITY

The measurement of the Immunity Against Electrostatic Discharge was performed in a shield room.

Date: June 07, 2017

6.1.1 Operating environment

Ambient temperature (24 ~ 25) °C
 Relative humidity (46 ~ 47) % R.H.
 Atmospheric pressure (101.2 ~ 101.3) kPa

6.1.2 Test set-up

The EUT and all local support equipment were placed on non-conductive support 0.8 m above a reference ground plane (RGP) and were put into operation according to the specified operating mode.

The test set-up photo is included in appendix II.

6.1.3 Measurement uncertainty

It has been demonstrated that the ESD generator meets the specified requirements in the standard with at least a 95 % confidence.

6.1.4 Test equipment used

| Model Number | Manufacturer | Description | Serial Number | Last Cal.(Interval) |
|----------------|--------------|-----------------------------------|---------------|---------------------|
| ■ - ESS-2002EX | NOISEKEN | Electrostatic Discharge Simulator | ESS0898812 | Apr. 06, 2017 (1Y) |

All test equipment used is calibrated on a regular basis.

6.1.5 Test data

Test levels : Contact discharge 2 / 4 kV, Air discharge 2 / 4 / 8 kV

Number of contact/air discharges : 25 each pol. at each point for contact discharge
 10 each pol. at each point for air discharge

Polarity : Positive / Negative

EUT-position : Table top

Required performance criterion : B

Test result : Met criterion A

Monitoring of the EUT : Observed the state of Bluetooth and Reading card mode.

The test points of the EUT are each location on the surface touchable by hand (see test point in next page) and HCP / VCP - 0.1 m from the four sides of the EUT.

The results of selected test points of the EUT are listed in below table.

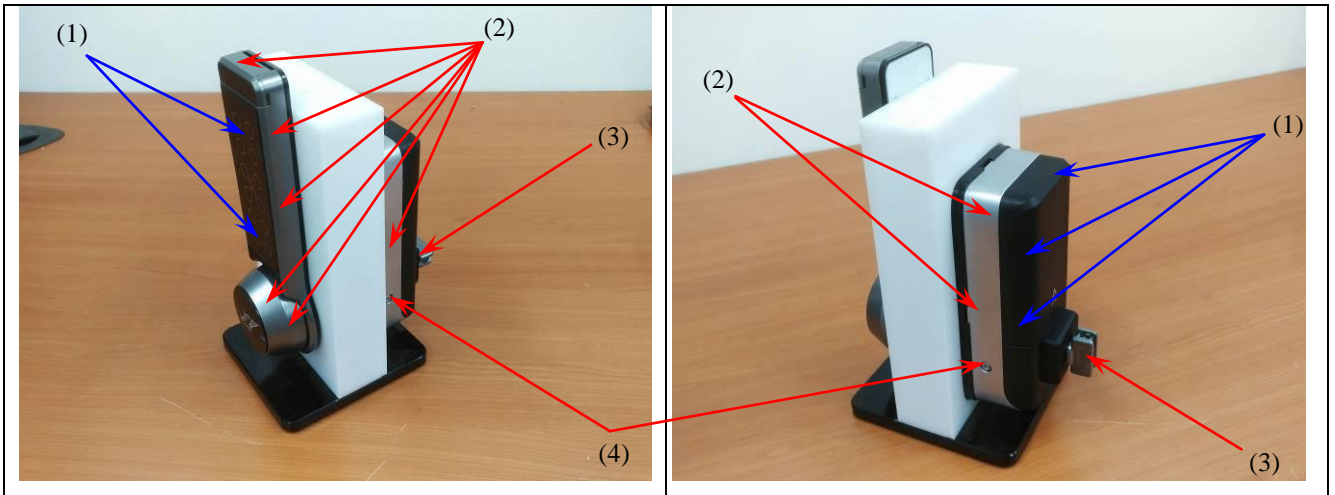
| Point | Test level [\pm kV] | Pass / Fail | Description |
|--------------------|------------------------|-------------|---|
| Enclosure(Plastic) | 2 / 4 / 8 (Air) | Pass | There was no deviation from normal operating condition during and after test. The EUT was not observed any unintentional transmission in standby mode. |
| Enclosure(Metal) | 2 / 4 (Contact) | Pass | |
| Switch | 2 / 4 (Contact) | Pass | |
| Screw | 2 / 4 (Contact) | Pass | |
| HCP / VCP | 2 / 4 (Indirect) | Pass | |



Tested by: Hyung-Kwon, Oh / Assistant Manager

6.1.6 ESD Test Point Table

| ESD Point | Discharge voltage [± kV] | Test Result |
|------------------------|--------------------------|-----------------|
| (1) Enclosure(Plastic) | 2 / 4 / 8 (Air) | Met Criterion A |
| (2) Enclosure(Metal) | 2 / 4 (Contact) | Met Criterion A |
| (3) Switch | 2 / 4 (Contact) | Met Criterion A |
| (4) Screw | 2 / 4 (Contact) | Met Criterion A |
| HCP / VCP | 2 / 4 (Indirect) | Met Criterion A |



6.2 RADIATED RF-ELECTROMAGNETIC FIELD IMMUNITY

The measurement of the Immunity Against Radiated RF-Electromagnetic Field was performed in an anechoic chamber.

Date: June 08, 2017

6.2.1 Operating environment

| | |
|----------------------|---------------------|
| Ambient temperature | (24 ~ 25) °C |
| Relative humidity | (44 ~ 45) % R.H. |
| Atmospheric pressure | (101.3 ~ 101.4) kPa |

6.2.2 Test set-up

The EUT and all local support equipment were placed on a non-conductive support 0.8 m above a reference ground plane (RGP) and were put into operation according to the specified operating mode.

The test set-up photo is included in appendix III.

6.2.3 Measurement uncertainty

The measurement uncertainty is ± 0.23 V/m for 1 V/m, ± 0.70 V/m for 3 V/m and ± 2.30 V/m for 10 V/m.

Measurement uncertainty is calculated in accordance with UKAS Lab34. The measurement uncertainty is given with a confidence of 95 %. The measurement uncertainty is calculated as the uncertainty of the electric field intensity detected by the probe(s). The uncertainty calculations exclude influence of phenomena like inhomogeneity of the electric field intensity.

6.2.4 Test equipment used

| | Model Number | Manufacturer | Description | Serial Number | Last Cal.(Interval) |
|---|--------------|--------------------|-------------------------------------|---------------|---------------------|
| ■ | SMT 06 | Rohde & Schwarz | Signal Generator | 100267 | Nov. 02, 2016 (1Y) |
| □ | SML 03 | Rohde & Schwarz | Signal Generator | 102602 | Apr. 03, 2017 (1Y) |
| ■ | NRVD | Rohde & Schwarz | Power Meter | 101448 | Apr. 05, 2017 (1Y) |
| ■ | AT1080 | Amplifier Research | Log Periodic Antenna | 17611 | N/A |
| ■ | AT4002A | Amplifier Research | Microwave Horn Antenna | N/A | N/A |
| ■ | ATH2G10 | Amplifier Research | Microwave Horn Antenna | N/A | N/A |
| ■ | 500W1000A | Amplifier Research | Power Amplifier | 332911 | N/A |
| ■ | 30S1G6 | Amplifier Research | Power Amplifier | 345914 | N/A |
| ■ | DC6180A | Amplifier Research | Directional Coupler | 332598 | Apr. 05, 2017 (1Y) |
| ■ | DC7420 | Amplifier Research | Directional Coupler | 347907 | Aug. 02, 2016 (1Y) |
| ■ | CMW500 | Rohde & Schwarz | WIDEBAND RADIO COMMUNICATION TESTER | 145762 | May 31, 2016 (1Y) |

All test equipment used is calibrated on a regular basis.

6.2.5 Test data

Test level : 3 V/m (AM 80 %, 1 kHz, sine wave)
 Frequency range : 80 MHz ~ 6 000 MHz
 Frequency step : 1 %
 Dwell time at each frequency : 3 s
 Exposed side : Front / Back / Left / Right
 Polarization of antenna : Horizontal / Vertical
 Distance of antenna – EUT : 3 m
 EUT-position : Table top
 Required performance criterion : A
 Test result : Met criterion A
 Monitoring of the EUT : Observed the state of Bluetooth and Reading card mode.

The results of test are listed in below table.

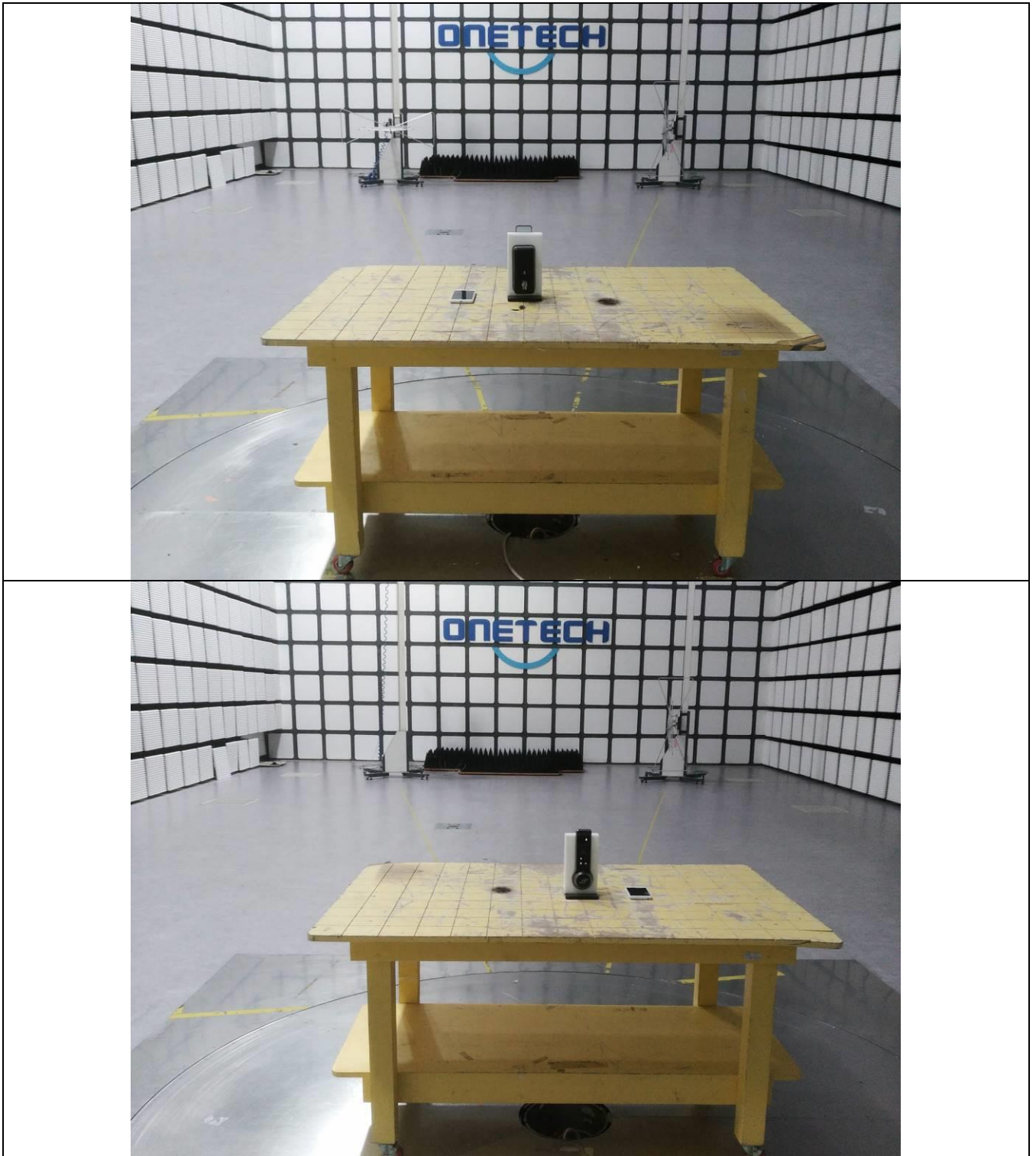
| Freq. Range [MHz] | Pol. V/H | Exposed side | Pass/ Fail | Description |
|-------------------|----------|-----------------------------|------------|---|
| 80 ~ 6 000 | H/V | Front / Back / Left / Right | Pass | There was no deviation from normal operating condition during and after test. The EUT was not observed any unintentional transmission in standby mode. |

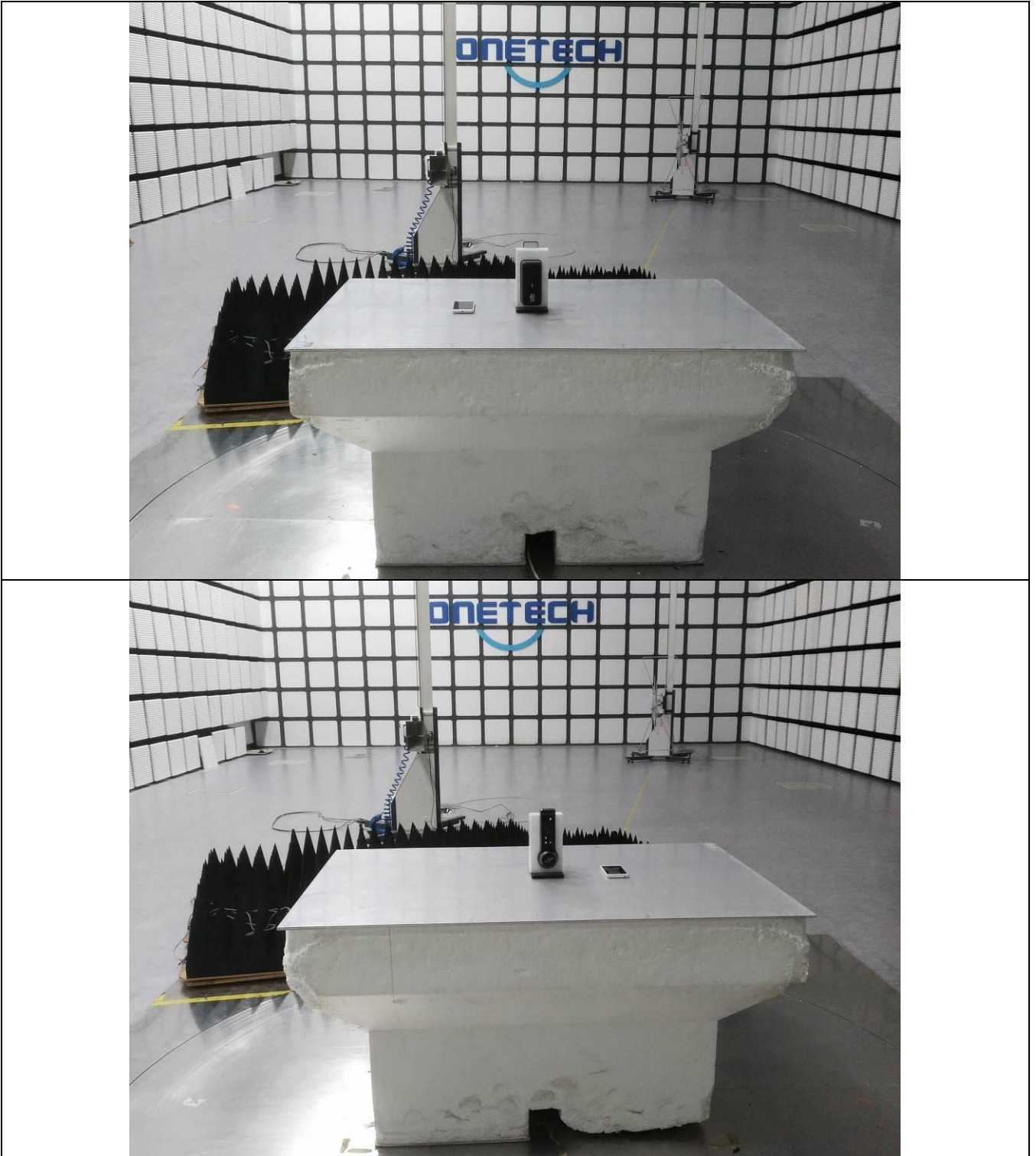
Remark: “H”: Horizontal, “V”: Vertical



Tested by: Hyung-Kwon, Oh / Assistant Manager

APPENDIX I - TEST SET-UP PHOTO: (Radiated Emission)





APPENDIX II - TEST SET-UP PHOTO: (ESD)



APPENDIX III - TEST SET-UP PHOTO: (RF E-FIELD)



APPENDIX VI - PHOTOGRAPHS OF THE PRODUCT



-. External



-. Internal

