



# TEST REPORT

FCC/ISED RFID Test for EVW011SK-SN  
Certification

**APPLICANT**  
LG Electronics Inc.

**REPORT NO.**  
HCT-RF-2310-FI001-R1

**DATE OF ISSUE**  
November 6, 2023

**Tested by**  
Kyung Jun Woo



**Technical Manager**  
Jong Seok Lee

Accredited by KOLAS, Republic of KOREA

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for EVW011SK-SN

## REPORT NO.

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## DATE OF ISSUE

November 06, 2023

## Additional model

-

## Applicant

**LG Electronics Inc.**

222, LG-ro, Jinwi-myeon, Pyeongtaek-si, Gyeonggi-do 17709, Republic of Korea

## Eut Type Model Name

Electric Vehicle Charger  
EVW011SK-SN

## FCC ID IC

BEJEVW011SK-SN  
2703H-EVW011SKSN

## RF Output Field Strength

42.89 dBμV/m @30 m

## Frequency of Operation

13.56 MHz

## Modulation type

ASK

## FCC Classification

Low Power Communication Device Transmitter (DXX)

## FCC Rule Part(s)

FCC Part 15.225 Subpart C

## ISED Rule Part(s)

RSS-210 Issue 10\_Amendment (April 2020)  
RSS-Gen Issue 5\_Amendment 2 (February 2021)

## Brand

LG

## Test Location

☒ Permanent Testing Lab

(Address: 74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si,  
Gyeonggi-do, Republic of Korea)

☐ On Site Testing

The result shown in this test report refer only to the sample(s) tested unless otherwise stated.

This test results were applied only to the test methods required by the standard.

This laboratory is not accredited for the test results marked \*.

## REVISION HISTORY

The revision history for this test report is shown in table.

| Revision No. | Date of Issue     | Description                                              |
|--------------|-------------------|----------------------------------------------------------|
| 0            | October 17, 2023  | Initial Release                                          |
| 1            | November 06, 2023 | Revised Model Name, FCC ID, IC, HVIN, EUT serial number. |

### Engineering Statement:

The measurements shown in this report were made in accordance with the procedures indicated, and the emissions from this equipment were found to be within the limits applicable. I assume full responsibility for the accuracy and completeness of these measurements, and for the qualifications of all persons taking them. It is further stated that upon the basis of the measurements made, the equipment tested is capable of operation in accordance with the requirements of the FCC Rules under normal use and maintenance. measurements, and for the qualifications of all persons taking them. It is further stated that upon the basis of the measurements made, the equipment tested is capable of operation in accordance with the requirements of the FCC Rules under normal use and maintenance.

### KOLAS Statement:

The above Test Report is the accredited test result by (KS Q) ISO/IEC 17025 and KOLAS(Korea Laboratory Accreditation Scheme), which signed the ILAC-MRA. (KOLAS Accreditation No. KT197)

If this report is required to confirmation of authenticity, please contact to [www.hct.co.kr](http://www.hct.co.kr)

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## 1. EUT DESCRIPTION

|                                                  |                                       |
|--------------------------------------------------|---------------------------------------|
| <b>Model</b>                                     | EVW011SK-SN                           |
| <b>Additional model</b>                          | -                                     |
| <b>EUT Type</b>                                  | Electric Vehicle Charger              |
| <b>Power Supply</b>                              | 240 V AC                              |
| <b>Frequency Range</b>                           | 13.56 MHz                             |
| <b>Transmit Power</b>                            | 42.89 dBμV/m @30 m                    |
| <b>Modulation Type</b>                           | ASK                                   |
| <b>Date(s) of Tests</b>                          | September 14, 2023 ~ October 17, 2023 |
| PMN<br>(Product Marketing Number)                | Electric Vehicle Charger              |
| HVIN<br>(Hardware Version Identification Number) | EVW011SK-SN                           |
| FVIN<br>(Firmware Version Identification Number) | 1.0                                   |
| HMN<br>(Host Marketing Name)                     | N/A                                   |
| <b>EUT serial numbers</b>                        | Radiated: EVW011SK-SN-01              |

## 2. TEST METHODOLOGY

The measurement procedure described in the American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices (ANSI C63.10-2013) is used in the measurement of the test device.

### EUT CONFIGURATION

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner that intends to maximize its emission characteristics in a continuous normal application.

### EUT EXERCISE

The EUT was operated in the engineering mode to fix the Tx frequency that was for the purpose of the measurements. According to its specifications, the EUT must comply with the requirements of the Section 15.207, 15.209 and 15.225 under the FCC Rules Part 15 Subpart C. / RSS-Gen issue 5, RSS-210 Issue 10.

### GENERAL TEST PROCEDURES

#### Conducted Emissions

The EUT is placed on the turntable, which is 0.8 m above ground plane. According to the requirements in Section 6.2 of ANSI C63.10. (Version :2013) Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30 MHz using CISPR Quasi-peak and average detector modes.

#### Radiated Emissions

The EUT is placed on a turn table, which is 0.8 m above ground plane. The turntable shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3 m away from the receiving antenna, which varied from 1 m to 4 m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the max. emission, the relative positions of this hand-held transmitter (EUT) was rotated through three orthogonal axes according to the requirements in Section 6.6.5 of ANSI C63.10. (Version: 2013).

## DESCRIPTION OF TEST MODES

The EUT has been tested under operating condition. Test program used to control the EUT for staying in continuous transmitting and receiving mode is programmed.

## 3. INSTRUMENT CALIBRATION

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipment, which is traceable to recognized national standards.

Especially, all antenna for measurement is calibrated in accordance with the requirements of C63.5 (Version : 2017).

## 4. FACILITIES AND ACCREDITATIONS

### FACILITIES

The SAC(Semi-Anechoic Chamber) and conducted measurement facility used to collect the radiated data are located at the 74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, 17383, Rep. of KOREA. The site is constructed in conformance with the requirements of ANSI C63.4. (Version :2014) and CISPR Publication 22.

Detailed description of test facility was submitted to the Commission and accepted dated March 31, 2022 (CAB identifier: KR0032).

For ISSED, test facility was accepted dated April 06, 2022 (CAB identifier: KR0032).

### EQUIPMENT

Radiated emissions are measured with one or more of the following types of Linearly polarized antennas: tuned dipole, bi-conical, log periodic, bi-log, and/or ridged waveguide, horn. Spectrum analyzers with pre-selectors and quasi-peak detectors are used to perform radiated measurements.

Conducted emissions are measured with Line Impedance Stabilization Networks and EMI Test Receivers. Calibrated wideband preamplifiers, coaxial cables, and coaxial attenuators are also used for making measurements.

All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."

## 5. ANTENNA REQUIREMENTS

### According to FCC 47 CFR § 15.203:

“An intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the responsible party can be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.”

- (1) The antennas of this E.U.T are permanently attached.
- (2) The E.U.T Complies with the requirement of § 15.203

### According to RSS-Gen(Issue 5) Section 6.8:

The applicant for equipment certification shall provide a list of all antenna types that may be used with the transmitter, where applicable (i.e. for transmitters with detachable antenna), indicating the maximum permissible antenna gain (in dBi) and the required impedance for each antenna. The test report shall demonstrate the compliance of the transmitter with the limit for maximum equivalent isotropically radiated power (e.i.r.p.) specified in the applicable RSS, when the transmitter is equipped with any antenna type, selected from this list.

For expediting the testing, measurements may be performed using only the antenna with highest gain of each combination of transmitter and antenna type, with the transmitter output power set at the maximum level. However, the transmitter shall comply with the applicable requirements under all operational conditions and when in combination with any type of antenna from the list provided in the test report (and in the notice to be included in the user manual, provided below).

When measurements at the antenna port are used to determine the RF output power, the effective gain of the device's antenna shall be stated, based on a measurement or on data from the antenna's manufacturer.

The test report shall state the RF power, output power setting and spurious emission measurements with each antenna type that is used with the transmitter being tested.

## 6. MEASUREMENT UNCERTAINTY

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI C63.10-2013.

All measurement uncertainty values are shown with a coverage factor of  $k=2$  to indicate a 95 % level of confidence.

The measurement data shown herein meets or exceeds the  $U_{CISPR}$  measurement uncertainty values specified in CISPR 16-4-2 and, thus, can be compared directly to specified limits to determine compliance.

| Parameter                                | Expanded Uncertainty (dB)                   |
|------------------------------------------|---------------------------------------------|
| Conducted Disturbance (150 kHz ~ 30 MHz) | 1.90 ( Confidence level about 95 %, $k=2$ ) |
| Radiated Disturbance (9 kHz ~ 30 MHz)    | 4.14 ( Confidence level about 95 %, $k=2$ ) |
| Radiated Disturbance (30 MHz ~ 1 GHz)    | 5.82 ( Confidence level about 95 %, $k=2$ ) |
| Radiated Disturbance (1 GHz ~ 18 GHz)    | 5.74 ( Confidence level about 95 %, $k=2$ ) |
| Radiated Disturbance (18 GHz ~ 40 GHz)   | 5.76 ( Confidence level about 95 %, $k=2$ ) |
| Radiated Disturbance (Above 40 GHz)      | 5.52 ( Confidence level about 95 %, $k=2$ ) |

## 7. DESCRIPTION OF TESTS

### 7.1. Radiated Test

#### Limit (Operation within the band 13.110 MHz – 14.010 MHz)

| Frequency (MHz)                                            | Field Strength ( $\mu\text{V/m}$ ) | Measurement Distance (m) |
|------------------------------------------------------------|------------------------------------|--------------------------|
| 13.553 – 13.567                                            | 15,848                             | 30                       |
| $13.410 \leq f \leq 13.553$<br>$13.567 \leq f \leq 13.710$ | 334                                | 30                       |
| $13.110 \leq f \leq 13.410$<br>$13.710 \leq f \leq 14.010$ | 106                                | 30                       |

Note:

1.  $15,848 \mu\text{V/m} = 84.0 \text{ dB}\mu\text{V/m}$
2.  $334 \mu\text{V/m} = 50.47 \text{ dB}\mu\text{V/m}$
3.  $106 \mu\text{V/m} = 40.51 \text{ dB}\mu\text{V/m}$

#### Only FCC Limit

| Frequency (MHz) | Field Strength ( $\mu\text{V/m}$ ) | Measurement Distance (m) |
|-----------------|------------------------------------|--------------------------|
| 0.009 – 0.490   | $2400/F(\text{kHz})$               | 300                      |
| 0.490 – 1.705   | $24000/F(\text{kHz})$              | 30                       |
| 1.705 – 30      | 30                                 | 30                       |

#### Only ISED Limit

| Frequency (MHz) | Magnetic Field Strength ( $\mu\text{A/m}$ ) | Measurement Distance (m) |
|-----------------|---------------------------------------------|--------------------------|
| 0.009 – 0.490   | $6.37/F(\text{kHz})$                        | 300                      |
| 0.490 – 1.705   | $63.7/F(\text{kHz})$                        | 30                       |
| 1.705 – 30      | 0.08                                        | 30                       |

### FCC&ISED Limit

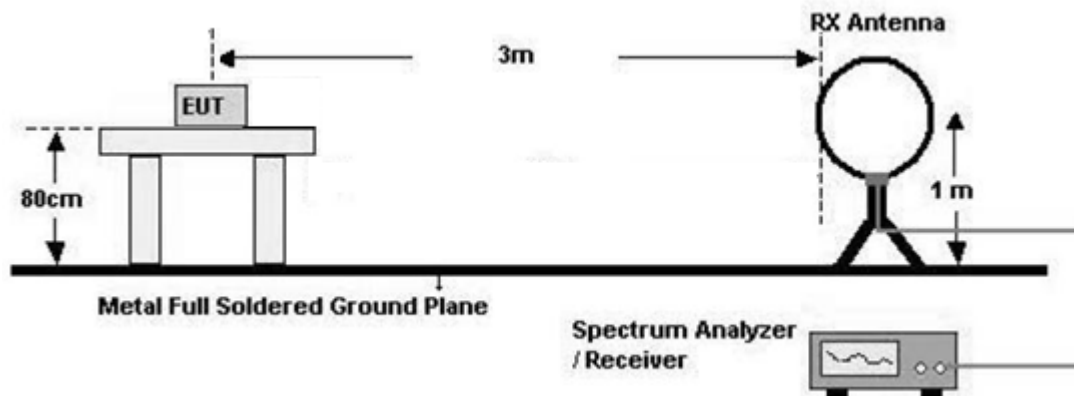
| Frequency (MHz) | Field Strength ( $\mu\text{V/m}$ ) | Measurement Distance (m) |
|-----------------|------------------------------------|--------------------------|
| 30-88           | *100                               | 3                        |
| 88-216          | *150                               | 3                        |
| 216-960         | *200                               | 3                        |
| Above 960       | 500                                | 3                        |

※.

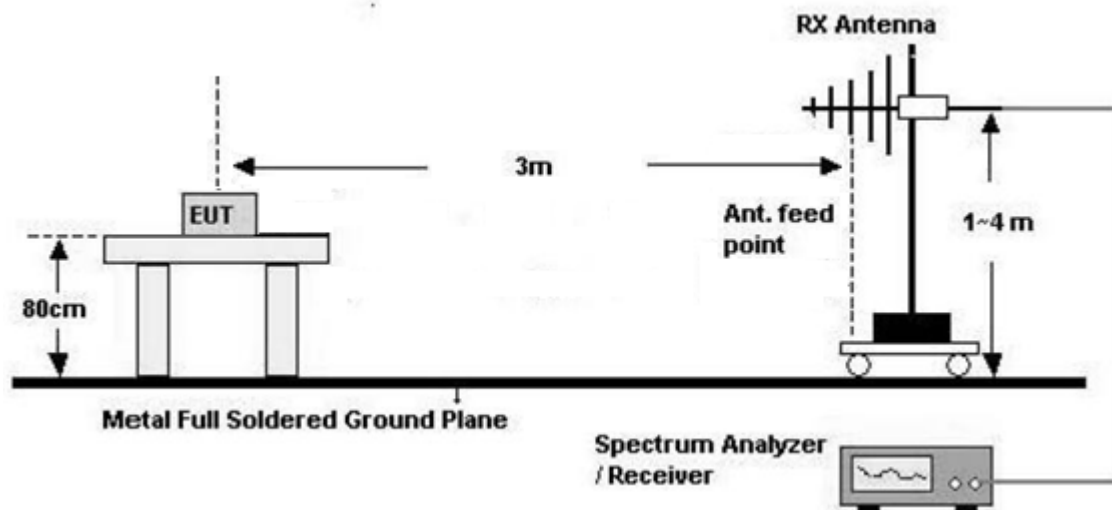
Except as provided in 15.209(g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g.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

### Test Configuration

Below 30 MHz



30 MHz - 1 GHz



### Test Procedure of in-band

1. The EUT was placed on a non-conductive table located on semi-anechoic chamber.
2. The loop antenna was placed at a location 3 m from the EUT
3. The EUT is placed on a turntable, which is 0.8m above ground plane.
4. We have done x, y, z planes in EUT and horizontal and vertical polarization and Parallel to the ground plane in detecting antenna.
5. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
6. Distance Correction Factor =  $40\log(3\text{ m}/30\text{ m}) = -40\text{ dB}$   
Measurement Distance : 3 m(Below 30 MHz)

### 7. Spectrum Setting

- 1) Frequency Range = 9 kHz ~ 150 kHz
  - Detector = Peak
  - Trace = Maxhold
  - RBW = 300 Hz
  - VBW  $\geq 3 \times$  RBW
- 2) Frequency Range = 150 kHz ~ 30 MHz
  - Detector = Peak
  - Trace = Maxhold
  - RBW = 10 kHz
  - VBW  $\geq 3 \times$  RBW

8. Total = Measured Value + Antenna Factor(A.F) + Cable Loss(C.L) + Distance Factor(D.F)

### **Test Procedure of Radiated spurious emissions(Below 30 MHz)**

1. The EUT was placed on a non-conductive table located on semi-anechoic chamber.
2. The loop antenna was placed at a location 3 m from the EUT
3. The EUT is placed on a turntable, which is 0.8m above ground plane.
4. We have done x, y, z planes in EUT and horizontal and vertical polarization and Parallel to the ground plane in detecting antenna.
5. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
6. Distance Correction Factor(0.009 MHz – 0.490 MHz) =  $40\log(3\text{ m}/300\text{ m}) = -80\text{ dB}$   
Measurement Distance : 3 m
7. Distance Correction Factor(0.490 MHz – 30 MHz) =  $40\log(3\text{ m}/30\text{ m}) = -40\text{ dB}$   
Measurement Distance : 3 m
8. Spectrum Setting
  - 1) Frequency Range = 9 kHz ~ 150 kHz
    - Detector = Peak
    - Trace = Maxhold
    - RBW = 300 Hz
    - VBW  $\geq 3 \times$  RBW
  - 2) Frequency Range = 150 kHz ~ 30 MHz
    - Detector = Peak
    - Trace = Maxhold
    - RBW = 10 kHz
    - VBW  $\geq 3 \times$  RBW
9. Total = Measured Value + Antenna Factor(A.F) + Cable Loss(C.L) + Distance Factor(D.F)
10. Measurement value only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.

### **KDB 414788 OFS and Chamber Correlation Justification**

Base on FCC 15.31 (f) (2): measurements may be performed at a distance closer than that specified in the regulations; however, an attempt should be made to avoid making measurements in the near field.

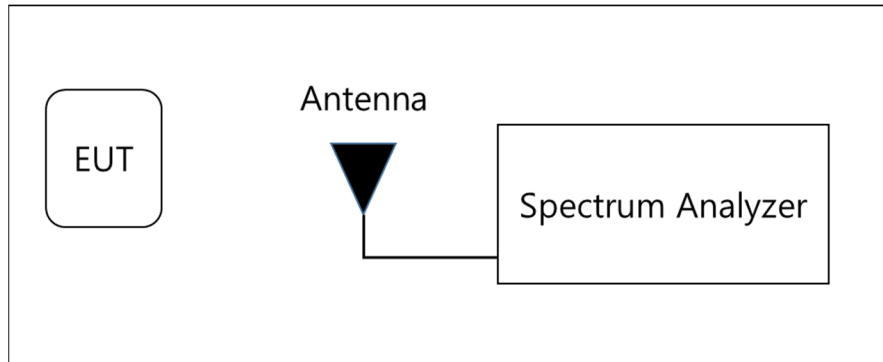
OFS and chamber correlation testing had been performed and chamber measured test result is the worst case test result.

### Test Procedure of Radiated spurious emissions(Above 30 MHz)

1. The EUT was placed on a non-conductive table located on semi-anechoic chamber.
2. The EUT is placed on a turntable, which is 0.8m above ground plane.
3. The Hybrid antenna was placed at a location 3 m from the EUT, which is varied from 1m to 4m to find out the highest emissions.
4. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
5. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
6. Spectrum Setting
  - Frequency Range = 30 MHz ~ 1 GHz
  - Detector = Peak
  - Trace = Maxhold
  - RBW = 100 kHz
  - VBW  $\geq$  3 x RBW
7. Total = Measured Value + Antenna Factor(A.F) + Cable Loss(C.L)
8. Measurement value only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.

## 7.2. 20 dB Bandwidth

### Test Configuration



### Test Procedure

The 20 dB bandwidth was measured by using a spectrum analyzer.

(Procedure 6.9.2 in ANSI 63.10-2013)

- 1) RBW = 1 %~5 % of the OBW
- 2) VBW = approximately three times RBW
- 3) Span = between two times and five times the OBW
- 4) Detector = Peak
- 5) Trace mode = Max hold
- 6) Allow the trace to stabilize

### Note:

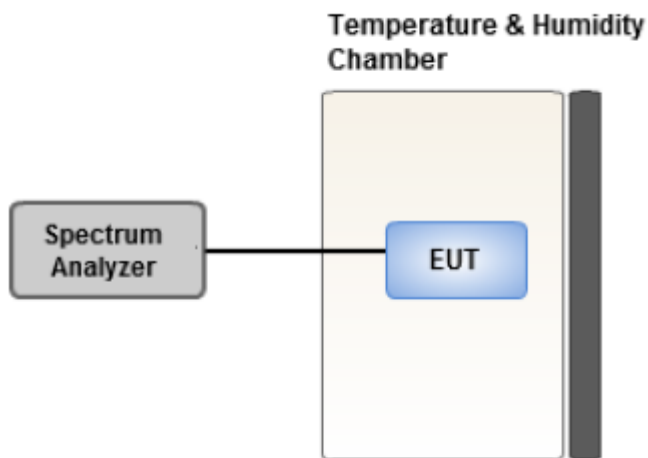
We tested Occupied Bandwidth using the automatic bandwidth measurement capability of a spectrum analyzer.

### 7.3. Frequency Stability

#### Limit

The frequency tolerance of the carrier signal shall be maintained within  $\pm 0.01\%$  of the operating frequency.

#### Test Configuration



#### Test Procedure.

For battery operated equipment, the equipment tests shall be performed using a new battery.

- 1) Turn the EUT OFF and place it inside the environmental temperature chamber.  
For devices that have oscillator heaters, energize only the heater circuit.
- 2) Set the temperature control on the chamber to the highest specified in the regulatory requirements  
for the type of device and allow the oscillator heater and the chamber temperature to stabilize.
- 3) While maintaining a constant temperature inside the environmental chamber, turn the EUT ON and record the operating frequency at startup, and at 2 minutes, 5 minutes, and 10 minutes after the EUT is energized. Four measurements in total are made.
- 4) The frequency tolerance of the carrier signal shall be maintained within  $\pm 0.01\%$  of the operating frequency.

**Note:**

## 1) Temperature:

The temperature is varied from -20 °C to + 50 °C using an environmental chamber.

## 2) Primary Supply Voltage :

The primary supply voltage is varied from 85 % to 115 % of the nominal value for non hand-carried battery and AC powered equipment.

For hand-carried, battery-powered equipment, primary supply voltage is reduced to the battery operating end point which shall be specified by the manufacturer.

#### 7.4. AC Power line Conducted Emissions

##### Limit

For an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50  $\mu$ H/50 ohms line impedance stabilization network (LISN).

| Frequency Range (MHz) | Limits (dB $\mu$ V)     |                         |
|-----------------------|-------------------------|-------------------------|
|                       | Quasi-peak              | Average                 |
| 0.15 to 0.50          | 66 to 56 <sup>(a)</sup> | 56 to 46 <sup>(a)</sup> |
| 0.50 to 5             | 56                      | 46                      |
| 5 to 30               | 60                      | 50                      |

<sup>(a)</sup>Decreases with the logarithm of the frequency.

Compliance with this provision shall be based on the measurement of the radio frequency voltage between each power line (LINE and NEUTRAL) and ground at the power terminals.

##### Test Configuration

See test photographs attached in Annex A for the actual connections between EUT and support equipment.

##### Test Procedure

1. The EUT is placed on a wooden table 80 cm above the reference ground plane.
2. The EUT is connected via LISN to a test power supply.
3. The measurement results are obtained as described below:
4. Detectors : Quasi Peak and Average Detector.
5. The EUT is the device operating below 30 MHz.
  - For unterminated the Antenna, the AC line conducted tests are performed with the antenna connected
  - For terminated the Antenna, the AC line conducted tests are performed with a dummy load connected to the EUT antenna output terminal.

##### Sample Calculation

Quasi-peak(Final Result) = Measured Value + Correction Factor

## 7.5. Receiver Spurious Emissions

### Limit

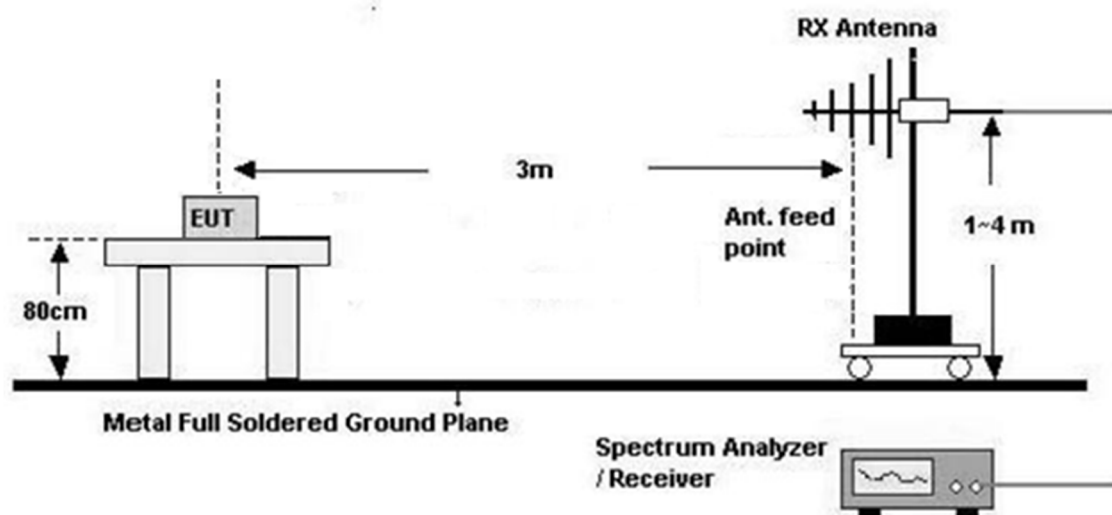
| Frequency (MHz) | Field Strength ( $\mu\text{V/m}$ ) | Measurement Distance (m) |
|-----------------|------------------------------------|--------------------------|
| 30-88           | 100                                | 3                        |
| 88-216          | 150                                | 3                        |
| 216-960         | 200                                | 3                        |
| Above 960       | 500                                | 3                        |

Note:

Measurements for compliance with the limits in table may be performed at distances other than 3 metres.

### Test Configuration

30 MHz - 1 GHz



### Test Procedure of Receiver Spurious Emissions (Below 1GHz)

1. The EUT was placed on a non-conductive table located on semi-anechoic chamber.
2. The EUT is placed on a turntable, which is 0.8 m above ground plane.
3. The Hybrid antenna was placed at a location 3 m from the EUT, which is varied from 1 m to 4 m to find out the highest emissions.
4. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
5. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
6. Spectrum Setting

#### (1) Measurement Type(Peak):

- Measured Frequency Range : 30 MHz – 1 GHz
- Detector = Peak
- Trace = Maxhold
- RBW = 100 kHz
- VBW  $\geq 3 \times$  RBW

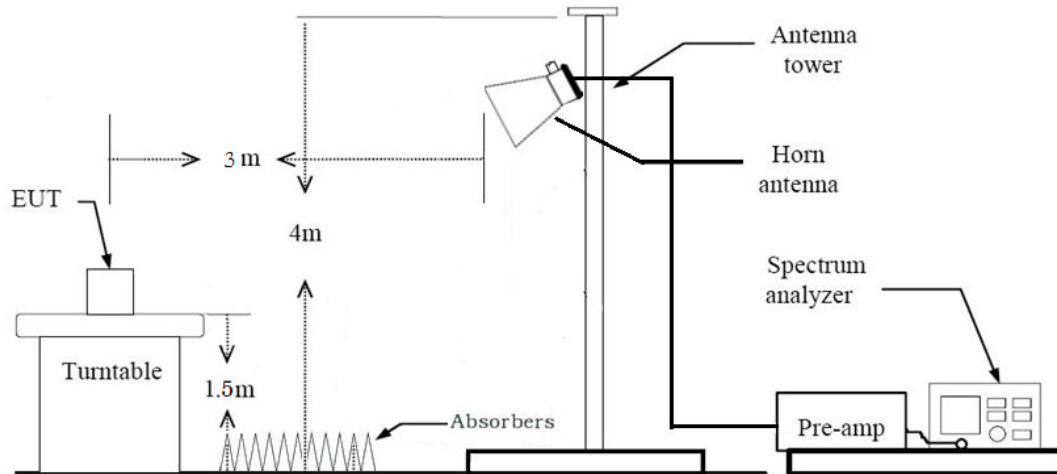
#### (2) Measurement Type(Quasi-peak):

- Measured Frequency Range : 30 MHz – 1 GHz
- Detector = Quasi-Peak
- RBW = 120 kHz

#### 7. Total = Measured Value

- We apply to the offset in the range 30 MHz - 1 GHz.
- The offset is Antenna Factor(A.F) + Cable Loss(C.L) – Amp Gain(A.G)

Above 1 GHz



#### Test Procedure of Radiated spurious emissions (Above 1 GHz)

1. The EUT is placed on a turntable, which is 1.5 m above ground plane.
2. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
3. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
4. EUT is set 3 m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
5. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
6. Each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
7. Spectrum Setting

##### (1) Measurement Type(Peak):

- Measured Frequency Range : 1 GHz – 25 GHz
- Detector = Peak
- Trace = Maxhold
- RBW = 1 MHz
- VBW  $\geq 3 \times$  RBW

##### (2) Measurement Type(Average):

- Duty cycle < 98%, duty cycle variations are less than  $\pm 2\%$
- Measured Frequency Range : 1 GHz – 25 GHz
- Detector = RMS
- Averaging type = power (*i.e.*, RMS)
- RBW = 1 MHz



-  $VBW \geq 3 \times RBW$

- Sweep time = auto.

8. Measurement value only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.

9. Total = Measured Level + Antenna Factor(A.F) + Cable Loss(C.L) - Amp Gain(A.G) + Distance Factor(D.F)

## 7.6. Worst case configuration and mode

### Radiated test

1. All modes of operation were investigated and the worst case configuration results are reported.
  - Mode : Stand alone
  - Worstcase : Stand alone
2. All EUT Axis of operation were investigated and the worst case configuration results are reported.
  - Worst case EUT Axis: Z
3. All type and bitrate were investigated and the worst case results are reported.
  - Worst case : Type A, 106 kbps
4. All position of loop antenna were investigated and the worst case configuration results are reported.
  - Position : Horizontal, Vertical, Parallel to the ground plane
  - Worstcase : Horizontal

### AC Power line Conducted Emissions

1. All modes of operation were investigated and the worst case configuration results are reported.
  - Mode : Stand alone
  - Worstcase : Stand alone

### 20 dB Bandwidth & Frequency Stability

1. All type and bitrate were investigated and the worst case results are reported.
  - Worst case : Type A, 106 kbps

## 8. TEST SUMMARY

### FCC Part

| Regulation      | Requirement                                                                                           | Result |
|-----------------|-------------------------------------------------------------------------------------------------------|--------|
| Part 15.225 (a) | Radiated Electric Field Emissions<br>(13.553 MHz to 13.567 MHz)                                       | Pass   |
| Part 15.225 (b) | Radiated Electric Field Emissions<br>( $13.410 \leq f \leq 13.553$ ,<br>$13.567 \leq f \leq 13.710$ ) | Pass   |
| Part 15.225 (c) | Radiated Electric Field Emissions<br>( $13.110 \leq f \leq 13.410$ ,<br>$13.710 \leq f \leq 14.010$ ) | Pass   |
| Part 15.209     | Radiated Electric Field Emissions<br>(9 kHz to 30 MHz)                                                | Pass   |
| Part 15.209     | Radiated Electric Field Emissions<br>(30 MHz to 1 GHz)                                                | Pass   |
| Part 15.225 (e) | Frequency Stability                                                                                   | Pass   |
| Part 15.207     | AC power conducted emissions<br>(150 kHz to 30 MHz)                                                   | Pass   |
| Part 15.215 (c) | 20 dB Bandwidth                                                                                       | Pass   |

**ISED Part**

| Test Description                                                                                      | ISED Part Section(s)       | Test Result |
|-------------------------------------------------------------------------------------------------------|----------------------------|-------------|
| Radiated Electric Field Emissions<br>(13.553 MHz to 13.567 MHz)                                       | RSS-210, annex B.6(a)(i)   | Pass        |
| Radiated Electric Field Emissions<br>( $13.410 \leq f \leq 13.553$ ,<br>$13.567 \leq f \leq 13.710$ ) | RSS-210, annex B.6(a)(ii)  | Pass        |
| Radiated Electric Field Emissions<br>( $13.110 \leq f \leq 13.410$ ,<br>$13.710 \leq f \leq 14.010$ ) | RSS-210, annex B.6(a)(iii) | Pass        |
| Radiated Electric Field Emissions<br>(9 kHz to 30 MHz)                                                | RSS-GEN, 8.9               | Pass        |
| Radiated Electric Field Emissions<br>(30 MHz to 1 GHz)                                                | RSS-GEN, 8.9               | Pass        |
| Frequency Stability                                                                                   | RSS-210, annex B.6(a)(iv)  | Pass        |
| AC power conducted emissions<br>(150kHz to 30MHz)                                                     | RSS-GEN, 8.8               | Pass        |
| 20 dB Bandwidth                                                                                       | RSS-GEN, 6.7               | Pass        |
| Receiver Spurious Emissions                                                                           | RSS-GEN, 7                 | Pass        |

## 9. TEST RESULT

### 9.1. Operation within the band 13.110 MHz – 14.010 MHz

| Measured Frequency Range :<br>13.553 MHz-13.567 MHz |                                          |                   |                                |                      |                                  |                                  |                |
|-----------------------------------------------------|------------------------------------------|-------------------|--------------------------------|----------------------|----------------------------------|----------------------------------|----------------|
| Frequency<br>(MHz)                                  | Measured Value<br>(dB $\mu$ V/m)<br>@3 m | A.F+C.L<br>[dB/m] | Distance<br>Correction<br>(dB) | Ant.<br>POL<br>(H/V) | Total<br>(dB $\mu$ V/m)<br>@30 m | Limit<br>(dB $\mu$ V/m)<br>@30 m | Margin<br>(dB) |
| 13.5605                                             | 62.34                                    | 20.55             | -40.00                         | H                    | 42.89                            | 84.00                            | 41.11          |
| 13.5605                                             | 61.85                                    | 20.55             | -40.00                         | V                    | 42.40                            | 84.00                            | 41.60          |

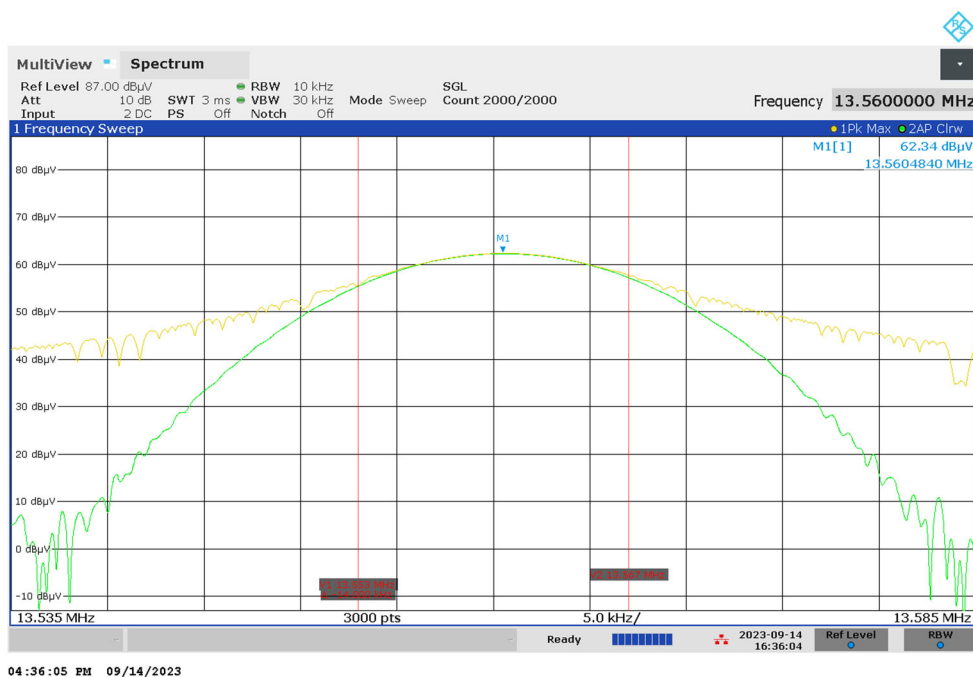
| Measured Frequency Range :<br>13.410 MHz-13.553 MHz and 13.567 MHz-13.710 MHz |                                          |                   |                                |                      |                                  |                                  |                |
|-------------------------------------------------------------------------------|------------------------------------------|-------------------|--------------------------------|----------------------|----------------------------------|----------------------------------|----------------|
| Frequency<br>(MHz)                                                            | Measured Value<br>(dB $\mu$ V/m)<br>@3 m | A.F+C.L<br>[dB/m] | Distance<br>Correction<br>(dB) | Ant.<br>POL<br>(H/V) | Total<br>(dB $\mu$ V/m)<br>@30 m | Limit<br>(dB $\mu$ V/m)<br>@30 m | Margin<br>(dB) |
| 13.5529                                                                       | 56.56                                    | 20.55             | -40.00                         | H                    | 37.11                            | 50.47                            | 13.36          |
| 13.5671                                                                       | 57.42                                    | 20.55             | -40.00                         | H                    | 37.97                            | 50.47                            | 12.50          |

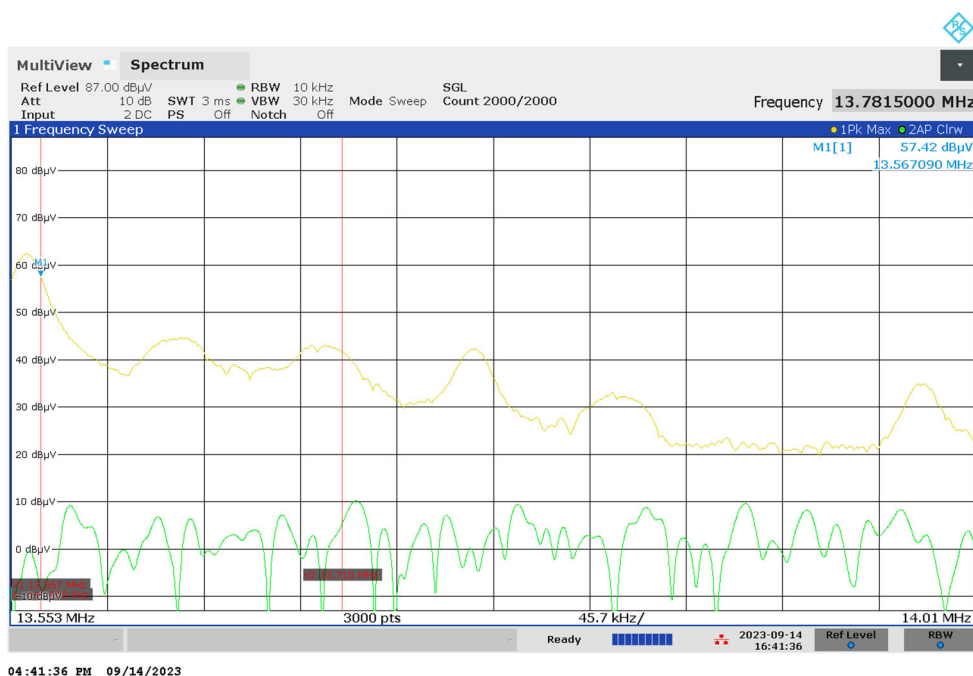
| Measured Frequency Range :<br>13.110 MHz – 13.410 MHz and 13.710 MHz-14.010 MHz |                                          |                   |                                |                      |                                  |                                  |                |
|---------------------------------------------------------------------------------|------------------------------------------|-------------------|--------------------------------|----------------------|----------------------------------|----------------------------------|----------------|
| Frequency<br>(MHz)                                                              | Measured Value<br>(dB $\mu$ V/m)<br>@3 m | A.F+C.L<br>[dB/m] | Distance<br>Correction<br>(dB) | Ant.<br>POL<br>(H/V) | Total<br>(dB $\mu$ V/m)<br>@30 m | Limit<br>(dB $\mu$ V/m)<br>@30 m | Margin<br>(dB) |
| 13.3487                                                                         | 40.60                                    | 20.55             | -40.00                         | H                    | 21.15                            | 40.51                            | 19.36          |
| 13.7725                                                                         | 42.28                                    | 20.55             | -40.00                         | H                    | 22.83                            | 40.51                            | 17.68          |

## Test Plots

13.553 MHz ~ 13.567 MHz



13.567 MHz-13.710 MHz



## Note:

In order to simplify the report, Plots of worst case are only reported.

## 9.2. Radiated Emission 9 kHz – 30 MHz

-FCC

Measured Frequency Range :

9 kHz - 490 kHz

| Frequency<br>(MHz) | Measured Value<br>(dB $\mu$ V/m)<br>@3 m | A.F+C.L<br>[dB/m] | Distance<br>Correction<br>(dB) | Ant. POL<br>(H/V) | Total<br>(dB $\mu$ V/m)<br>@300 m | Limit<br>(dB $\mu$ V/m)<br>@300 m | Margin<br>(dB) |
|--------------------|------------------------------------------|-------------------|--------------------------------|-------------------|-----------------------------------|-----------------------------------|----------------|
| 0.0096             | 32.84                                    | 19.27             | -80.00                         | H                 | -27.89                            | 47.92                             | 75.81          |
| 0.2456             | 29.86                                    | 19.67             | -80.00                         | H                 | -30.47                            | 19.80                             | 50.27          |

Measured Frequency Range :

490 kHz - 30 MHz

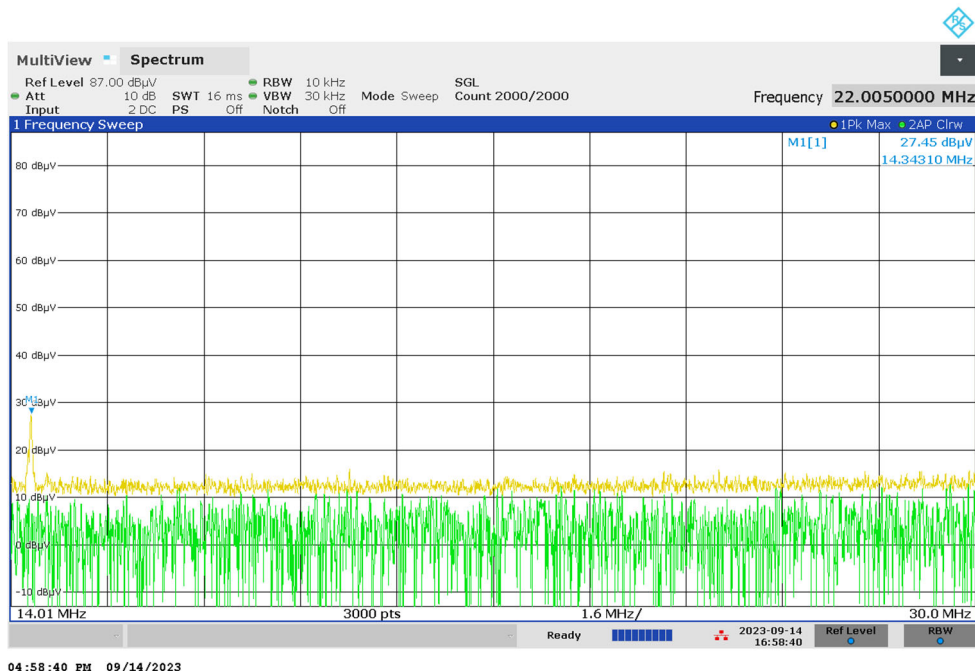
| Frequency<br>(MHz) | Measured Value<br>(dB $\mu$ V/m)<br>@3 m | A.F+C.L<br>[dB/m] | Distance<br>Correction<br>(dB) | Ant. POL<br>(H/V) | Total<br>(dB $\mu$ V/m)<br>@30 m | Limit<br>(dB $\mu$ V/m)<br>@30 m | Margin<br>(dB) |
|--------------------|------------------------------------------|-------------------|--------------------------------|-------------------|----------------------------------|----------------------------------|----------------|
| 0.4906             | 29.83                                    | 19.63             | -40.00                         | H                 | 9.46                             | 33.79                            | 24.33          |
| 12.4998            | 21.72                                    | 20.46             | -40.00                         | H                 | 2.18                             | 29.54                            | 27.36          |
| 14.3400            | 27.45                                    | 20.46             | -40.00                         | H                 | 7.91                             | 29.54                            | 21.63          |

-ISED

| Measured Frequency Range : |                                    |                   |                                |                   |                             |                             |                |
|----------------------------|------------------------------------|-------------------|--------------------------------|-------------------|-----------------------------|-----------------------------|----------------|
| 9 kHz - 490 kHz            |                                    |                   |                                |                   |                             |                             |                |
| Frequency<br>(MHz)         | Measured Value<br>(dBμV/m)<br>@3 m | A.F+C.L<br>[dB/m] | Distance<br>Correction<br>(dB) | Ant. POL<br>(H/V) | Total<br>(dBμA/m)<br>@300 m | Limit<br>(dBμA/m)<br>@300 m | Margin<br>(dB) |
| 0.0096                     | 32.84                              | 19.27             | -80.00                         | H                 | -79.42                      | 0.66                        | 80.08          |
| 0.2456                     | 29.86                              | 19.67             | -80.00                         | H                 | -82.00                      | 0.03                        | 82.02          |

| Measured Frequency Range : |                                    |                   |                                |                   |                            |                            |                |
|----------------------------|------------------------------------|-------------------|--------------------------------|-------------------|----------------------------|----------------------------|----------------|
| 490 kHz - 30 MHz           |                                    |                   |                                |                   |                            |                            |                |
| Frequency<br>(MHz)         | Measured Value<br>(dBμV/m)<br>@3 m | A.F+C.L<br>[dB/m] | Distance<br>Correction<br>(dB) | Ant. POL<br>(H/V) | Total<br>(dBμA/m)<br>@30 m | Limit<br>(dBμA/m)<br>@30 m | Margin<br>(dB) |
| 0.4906                     | 29.83                              | 19.63             | -40.00                         | H                 | -42.07                     | 0.13                       | 42.20          |
| 12.4998                    | 21.72                              | 20.46             | -40.00                         | H                 | -49.21                     | 0.08                       | 49.29          |
| 14.3400                    | 27.45                              | 20.46             | -40.00                         | H                 | -43.48                     | 0.08                       | 43.56          |

## Test Plot



### Note:

In order to simplify the report, Plot of worst case is only reported

### 9.3. Radiated Emission 30 MHz – 1000 MHz

Measured Frequency Range :

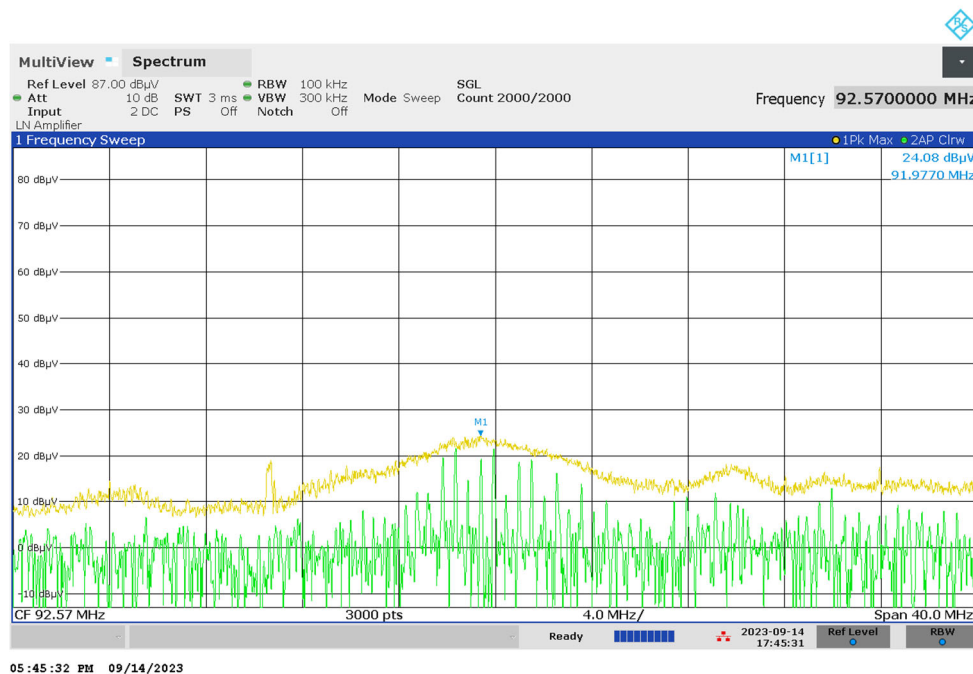
30 MHz - 1000 MHz

| Frequency (MHz) | Measured Value (dB $\mu$ V/m)@3 m | Ant. Factor (dB/m) | Cable Loss (dB) | Ant. POL [H/V] | Total (dB $\mu$ V/m) | Limit (dB $\mu$ V/m) | Margin (dB) |
|-----------------|-----------------------------------|--------------------|-----------------|----------------|----------------------|----------------------|-------------|
| 91.9770         | 24.08                             | 13.90              | 1.68            | H              | 39.66                | 43.52                | 3.86        |
| 214.5853        | 10.03                             | 16.30              | 2.59            | H              | 28.92                | 43.52                | 14.60       |
| #258.2513       | 9.89                              | 17.70              | 2.85            | V              | 30.44                | 46.02                | 15.58       |
| 312.2542        | 10.19                             | 19.50              | 3.12            | H              | 32.81                | 46.02                | 13.21       |
| #325.1575       | 10.12                             | 19.80              | 3.19            | H              | 33.11                | 46.02                | 12.91       |
| #401.5270       | 10.24                             | 21.00              | 3.55            | V              | 34.79                | 46.02                | 11.23       |

Note:

1. # is the result for restricted band.

#### Test Plot



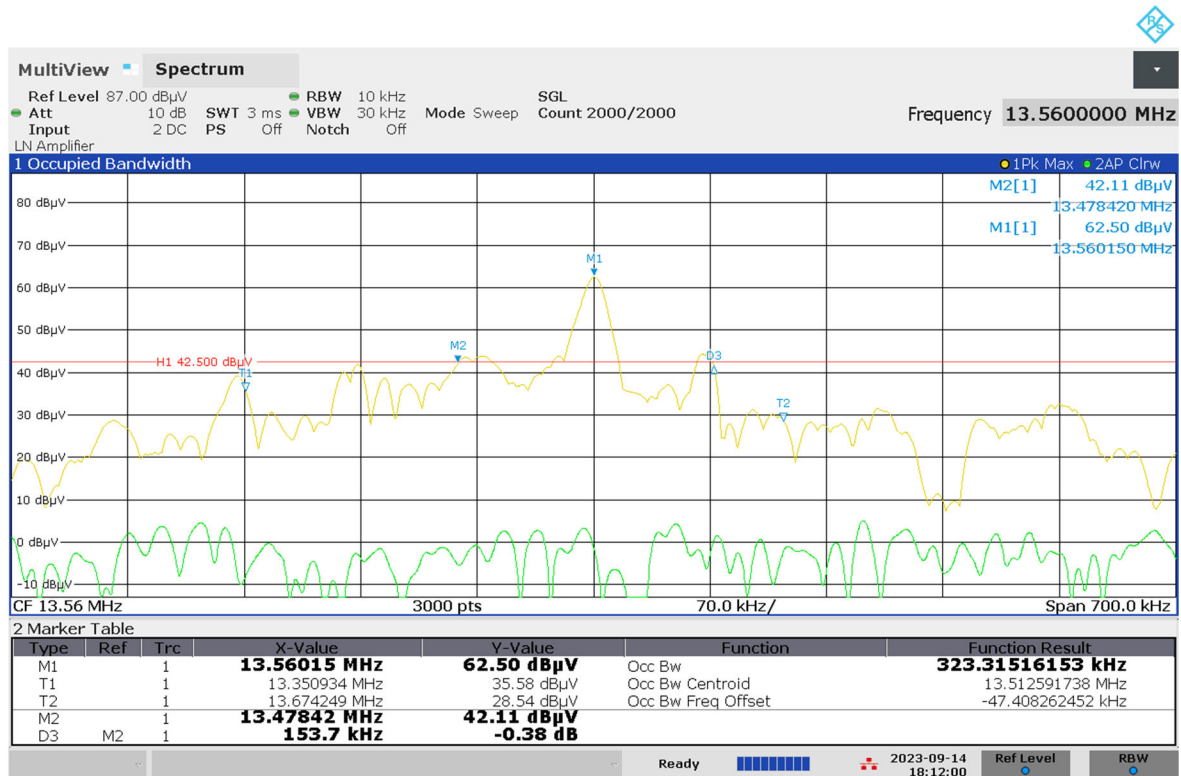
Note:

In order to simplify the report, Plot of worst case is only reported.

#### 9.4. 20 dB Bandwidth

| Frequency<br>(MHz) | 20 dB Bandwidth<br>(kHz) | Occupied Bandwidth<br>99% BW(kHz) |
|--------------------|--------------------------|-----------------------------------|
| 13.56              | 153.7                    | 323.315                           |

#### Test Plot



06:12:01 PM 09/14/2023

## 9.5. Frequency Stability

### Startup

PERATING FREQUENCY: 13.56 MHz  
REFERENCE VOLTAGE: 240 VDC  
DEVIATION LIMIT:  $\pm 0.01 \% = \pm 1356 \text{ Hz}$

| Voltage | Power | Temp.     | Frequency | Frequency<br>Dev. | Frequency |
|---------|-------|-----------|-----------|-------------------|-----------|
| (%)     | (VDC) | (°C)      | (MHz)     | (Hz)              | Dev (%)   |
| 100 %   | 240   | -20       | 13.560061 | 61                | 0.0004499 |
| 100 %   |       | -10       | 13.560044 | 44                | 0.0003245 |
| 100 %   |       | 0         | 13.560071 | 71                | 0.0005236 |
| 100 %   |       | +10       | 13.560034 | 34                | 0.0002507 |
| 100 %   |       | +20(Ref.) | 13.560086 | 86                | 0.0006342 |
| 100 %   |       | +30       | 13.560020 | 20                | 0.0001475 |
| 100 %   |       | +40       | 13.560035 | 35                | 0.0002581 |
| 100 %   |       | +50       | 13.560028 | 28                | 0.0002065 |
| LOW     | 208   | +20       | 13.560003 | 3                 | 0.0000221 |
| HIGH    | 240   | +20       | 13.560086 | 86                | 0.0006342 |



2 minutes

PERATING FREQUENCY: 13.56 MHz

REFERENCE VOLTAGE: 240 VDC

DEVIATION LIMIT: ±0.01 % = ±1356 Hz

| Voltage | Power | Temp.     | Frequency | Frequency<br>Dev. | Frequency |
|---------|-------|-----------|-----------|-------------------|-----------|
| (%)     | (VDC) | (°C)      | (MHz)     | (Hz)              | Dev (%)   |
| 100 %   | 240   | -20       | 13.560055 | 55                | 0.0004056 |
| 100 %   |       | -10       | 13.560088 | 88                | 0.0006490 |
| 100 %   |       | 0         | 13.560084 | 84                | 0.0006195 |
| 100 %   |       | +10       | 13.560032 | 32                | 0.0002360 |
| 100 %   |       | +20(Ref.) | 13.560083 | 83                | 0.0006121 |
| 100 %   |       | +30       | 13.560019 | 19                | 0.0001401 |
| 100 %   |       | +40       | 13.560006 | 6                 | 0.0000442 |
| 100 %   |       | +50       | 13.560052 | 52                | 0.0003835 |
| LOW     | 208   | +20       | 13.560086 | 86                | 0.0006342 |
| HIGH    | 240   | +20       | 13.560083 | 83                | 0.0006121 |



**5 minutes**

PERATING FREQUENCY: 13.56 MHz  
 REFERENCE VOLTAGE: 240 VDC  
 DEVIATION LIMIT:  $\pm 0.01\% = \pm 1356 \text{ Hz}$

| Voltage | Power | Temp.     | Frequency | Frequency<br>Dev. | Frequency |
|---------|-------|-----------|-----------|-------------------|-----------|
| (%)     | (VDC) | (°C)      | (MHz)     | (Hz)              | Dev (%)   |
| 100 %   | 240   | -20       | 13.560006 | 6                 | 0.0000442 |
| 100 %   |       | -10       | 13.560012 | 12                | 0.0000885 |
| 100 %   |       | 0         | 13.560033 | 33                | 0.0002434 |
| 100 %   |       | +10       | 13.560027 | 27                | 0.0001991 |
| 100 %   |       | +20(Ref.) | 13.560094 | 94                | 0.0006932 |
| 100 %   |       | +30       | 13.560086 | 86                | 0.0006342 |
| 100 %   |       | +40       | 13.560053 | 53                | 0.0003909 |
| 100 %   |       | +50       | 13.560061 | 61                | 0.0004499 |
| LOW     | 208   | +20       | 13.560068 | 68                | 0.0005015 |
| HIGH    | 240   | +20       | 13.560094 | 94                | 0.0006932 |



10 minutes

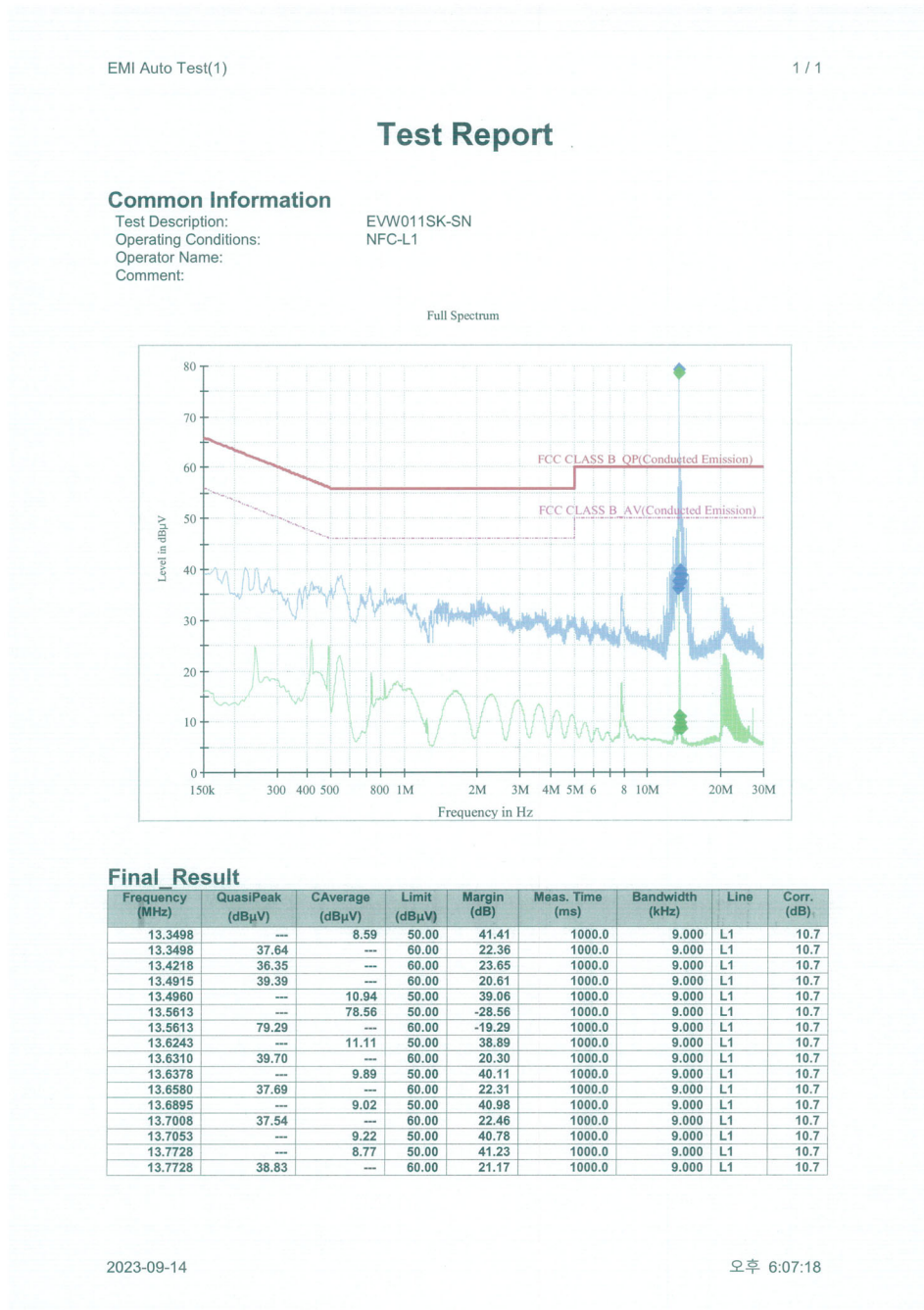
PERATING FREQUENCY: 13.56 MHz

REFERENCE VOLTAGE: 240 VDC

DEVIATION LIMIT: ±0.01 % = ±1356 Hz

| Voltage | Power | Temp.     | Frequency | Frequency<br>Dev. | Frequency |
|---------|-------|-----------|-----------|-------------------|-----------|
| (%)     | (VDC) | (°C)      | (MHz)     | (Hz)              | Dev (%)   |
| 100 %   | 240   | -20       | 13.560061 | 61                | 0.0004499 |
| 100 %   |       | -10       | 13.560061 | 61                | 0.0004499 |
| 100 %   |       | 0         | 13.560060 | 60                | 0.0004425 |
| 100 %   |       | +10       | 13.560098 | 98                | 0.0007227 |
| 100 %   |       | +20(Ref.) | 13.560052 | 52                | 0.0003835 |
| 100 %   |       | +30       | 13.560054 | 54                | 0.0003982 |
| 100 %   |       | +40       | 13.560063 | 63                | 0.0004646 |
| 100 %   |       | +50       | 13.560022 | 22                | 0.0001622 |
| LOW     | 208   | +20       | 13.560030 | 30                | 0.0002212 |
| HIGH    | 240   | +20       | 13.560052 | 52                | 0.0003835 |

## 9.6 POWERLINE CONDUCTED EMISSIONS

Conducted Emissions

EMI Auto Test(1)

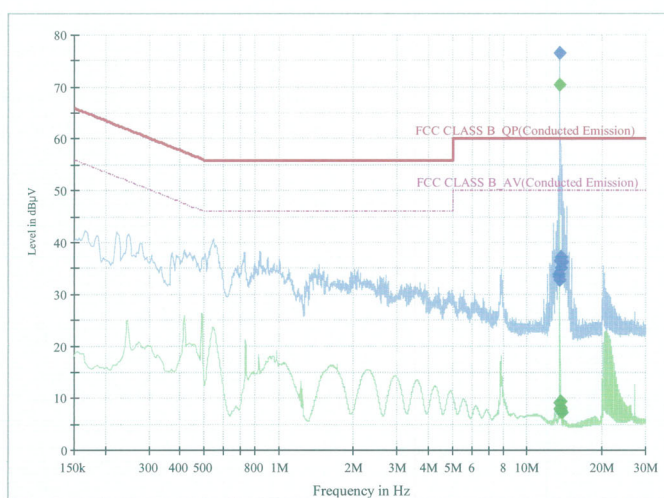
1 / 1

## Test Report

## Common Information

Test Description: EVW011SK-SN  
Operating Conditions: NFC-L2  
Operator Name:  
Comment:

Full Spectrum



## Final Result

| Frequency (MHz) | QuasiPeak (dBμV) | CAverage (dBμV) | Limit (dBμV) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Line | Corr. (dB) |
|-----------------|------------------|-----------------|--------------|-------------|-----------------|-----------------|------|------------|
| 13.3498         | 33.96            | ---             | 60.00        | 26.04       | 1000.0          | 9.000           | L2   | 10.7       |
| 13.4218         | 33.43            | ---             | 60.00        | 26.57       | 1000.0          | 9.000           | L2   | 10.7       |
| 13.4263         | 32.85            | ---             | 60.00        | 27.15       | 1000.0          | 9.000           | L2   | 10.7       |
| 13.4825         | ---              | 7.85            | 50.00        | 42.15       | 1000.0          | 9.000           | L2   | 10.7       |
| 13.4938         | 36.40            | ---             | 60.00        | 23.60       | 1000.0          | 9.000           | L2   | 10.7       |
| 13.4960         | ---              | 9.21            | 50.00        | 40.79       | 1000.0          | 9.000           | L2   | 10.7       |
| 13.5613         | 76.59            | ---             | 60.00        | -16.59      | 1000.0          | 9.000           | L2   | 10.7       |
| 13.5613         | ---              | 70.32           | 50.00        | -20.32      | 1000.0          | 9.000           | L2   | 10.7       |
| 13.6243         | ---              | 9.42            | 50.00        | 40.58       | 1000.0          | 9.000           | L2   | 10.7       |
| 13.6288         | 37.26            | ---             | 60.00        | 22.74       | 1000.0          | 9.000           | L2   | 10.7       |
| 13.6378         | ---              | 8.23            | 50.00        | 41.77       | 1000.0          | 9.000           | L2   | 10.7       |
| 13.6985         | 34.98            | ---             | 60.00        | 25.02       | 1000.0          | 9.000           | L2   | 10.7       |
| 13.7008         | ---              | 7.54            | 50.00        | 42.46       | 1000.0          | 9.000           | L2   | 10.7       |
| 13.7053         | ---              | 7.64            | 50.00        | 42.36       | 1000.0          | 9.000           | L2   | 10.7       |
| 13.7728         | ---              | 7.33            | 50.00        | 42.67       | 1000.0          | 9.000           | L2   | 10.7       |
| 13.7728         | 36.28            | ---             | 60.00        | 23.72       | 1000.0          | 9.000           | L2   | 10.7       |

2023-09-14

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## 10. LIST OF TEST EQUIPMENT

### Conducted Test

| Equipment                                    | Model     | Manufacturer    | Serial No. | Due to Calibration | Calibration Interval |
|----------------------------------------------|-----------|-----------------|------------|--------------------|----------------------|
| LISN                                         | ENV216    | Rohde & Schwarz | 102245     | 08/02/2024         | Annual               |
| EMI Test Receiver                            | ESR       | Rohde & Schwarz | 101910     | 05/26/2024         | Annual               |
| Temperature Chamber                          | SU-642    | ESPEC           | 93008124   | 02/22/2024         | Annual               |
| Signal Analyzer                              | N9030A    | Keysight        | MY55410508 | 09/04/2024         | Annual               |
| Power Meter                                  | N1911A    | Agilent         | MY45100523 | 03/06/2024         | Annual               |
| Power Sensor                                 | N1921A    | Agilent         | MY57820067 | 03/06/2024         | Annual               |
| Directional Coupler                          | 87300B    | Agilent         | 3116A03621 | 11/02/2023         | Annual               |
| Power Splitter                               | 11667B    | Hewlett Packard | 10545      | 02/06/2024         | Annual               |
| DC Power Supply                              | E3632A    | Agilent         | KR75305528 | 01/03/2024         | Annual               |
| Attenuator(10 dB)(DC-26.5 GHz)               | 8493C-010 | Agilent         | 08285      | 06/02/2024         | Annual               |
| Attenuator(20 dB)                            | 18N-20dB  | Rohde & Schwarz | 8          | 03/08/2024         | Annual               |
| Software                                     | EMC32     | Rohde & Schwarz | N/A        | N/A                | N/A                  |
| FCC WLAN&BT&BLE Conducted Test Software v3.0 | N/A       | HCT CO., LTD.   | N/A        | N/A                | N/A                  |
| Bluetooth Tester                             | CBT       | Rohde & Schwarz | 100808     | 02/16/2024         | Annual               |

### Note:

1. Equipment listed above that calibrated during the testing period was set for test after the calibration.
2. Equipment listed above that has a calibration due date during the testing period, the testing is completed before equipment expiration date.

**Radiated Test**

| Equipment                           | Model                      | Manufacturer         | Serial No.  | Due to Calibration | Calibration Interval |
|-------------------------------------|----------------------------|----------------------|-------------|--------------------|----------------------|
| Controller(Antenna mast)            | CO3000                     | Innco system         | CO3000-4p   | N/A                | N/A                  |
| Antenna Position Tower              | MA4640/800-XP-EP           | Innco system         | N/A         | N/A                | N/A                  |
| Controller                          | EM2090                     | Emco                 | 060520      | N/A                | N/A                  |
| Turn Table                          | N/A                        | Ets                  | N/A         | N/A                | N/A                  |
| Loop Antenna                        | FMZB 1513                  | Rohde & Schwarz      | 1513-333    | 03/17/2024         | Biennial             |
| Hybrid Antenna                      | VULB 9168                  | Schwarzbeck          | 9168-0895   | 08/16/2024         | Biennial             |
| Horn Antenna                        | BBHA 9120D                 | Schwarzbeck          | 9120D-1191  | 11/18/2023         | Biennial             |
| Horn Antenna(15 GHz ~ 40 GHz)       | BBHA9170                   | Schwarzbeck          | BBHA9170124 | 03/28/2025         | Biennial             |
| Amp & Filter Bank Switch Controller | FBSM-01A                   | TNM system           | 0           | N/A                | N/A                  |
| RF Switching System                 | FBSR-03A<br>(3G HPF+LNA)   | T&M SYSTEM           | S3L1        | 12/05/2023         | Annual               |
| RF Switching System                 | FBSR-03A<br>(10dB ATT+LNA) | T&M SYSTEM           | S3L2        | 12/05/2023         | Annual               |
| RF Switching System                 | FBSR-03A<br>(7G HPF+LNA)   | T&M SYSTEM           | S3L3        | 12/05/2023         | Annual               |
| RF Switching System                 | FBSR-03A<br>(3dB ATT+LNA)  | T&M SYSTEM           | S3L4        | 12/05/2023         | Annual               |
| Power Amplifier                     | CBL18265035                | CERNEX               | 22966       | 12/01/2023         | Annual               |
| Power Amplifier                     | CBL26405040                | CERNEX               | 25956       | 03/02/2024         | Annual               |
| Power Amplifier                     | 310N                       | SONOMA<br>INSTRUMENT | 186169      | 02/15/2024         | Annual               |
| Bluetooth Tester                    | TC-3000C                   | TESCOM               | 3000C000175 | 03/28/2024         | Annual               |
| Spectrum Analyzer                   | FSVA40<br>(10 Hz ~ 40 GHz) | Rohde & Schwarz      | 101502      | 03/17/2024         | Annual               |

**Note:**

1. Equipment listed above that calibrated during the testing period was set for test after the calibration.
2. Equipment listed above that has a calibration due date during the testing period, the testing is completed before equipment expiration date.
3. Especially, all antenna for measurement is calibrated in accordance with the requirements of C63.5(Version : 2017).



## 11. ANNEX A\_ TEST SETUP PHOTO

Please refer to test setup photo file no. as follows;

| No. | Description         |
|-----|---------------------|
| 1   | HCT-RF-2310-FI001-P |