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# **TEST REPORT**

| Report Number  | 210400124SEL-TEL1   |  |
|--|---|--|
| Applicant Name / Address   | LINE Friends Corporation  |  |
|  | 5F, 98, Hannam-daero, Yongsan-gu. Seoul, South Korea  |  |
| Test Sample Description  |   |  |
| - Product name   | BF×MINIONS-21 WIRELESS CAR CHARGER  |  |
| - Model and/or Brand name  | BM-RWC-MI-BR  |  |
| - FCC ID   | 2AQTSBFMINIONS21CAR   |  |
| - IC   | N/A   |  |
| - Manufacturer Name  | SUNTEK GROUP TECHNOLOGY LIMITED   |  |
| - Manufacturer Address   | Room 332, Shengji Times, No. 8206 Baoan Avenue, Shajing Street, Baoan District, Shenzhen City, China. |  |
| - Variant model Name   | BM-RWC-MI-SL  |  |
| Date of receipt of sample(s)   | 15 Apr. 2021  |  |
| Date of Test   | 22 Apr. 2021 - 01 Jun. 2021   |  |
| Test standard(s)   | CFR 47 Part 15 Subpart C 15.209   |  |
| Test Results & uncertainty   | See Summary   |  |
| Issue date   | 03 Jun. 2021  |  |
| Note 1. The results shown in this test report refer only to the sample(s) tested |   |  |

Note 1. The results shown in this test report refer only to the sample(s) tested.

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Tested by

Name : Criss.Lee RF Engineer

Inho

Approved by

Name : Bran.Ko **F /** RF Technical Manager

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# **SECTION 2** GENERAL DESCRIPTION

#### **1. Laboratory Information**

| Name      | Intertek ETL SEMKO Korea Ltd.   |
|-----------|---|
| Address   | Intertek building, 3, Gongdan-ro 160beon-gil, Gunpo-si, Gyeonggi-do, 15845, Korea |
| Phone No. | +82 2 567 7474  |
| Fax No.   | +82 2 567 8482  |

#### 2. Applicant Information

| Name           | LINE Friends Corporation                             |  |
|----------------|--|--|
| Address        | 5F, 98, Hannam-daero, Yongsan-gu. Seoul, South Korea |  |
| Contact Person | Jehyuk.Jang  |  |
| E-mail         | jehyuk.jang@linefriends.com                          |  |
| Phone No.      | +82-1544-5921  |  |

#### 3. Description of EUT

| Product name           | BF×MINIONS-21 WIRELESS CAR CHARGER |
|------------------------|------------------------------------|
| Model name             | BM-RWC-MI-BR                       |
| Variant model Name     | BM-RWC-MI-SL                       |
| Manufacturer           | SUNTEK GROUP TECHNOLOGY LIMITED    |
| Country of Manufacture | China                              |
| Rated Voltage          | DC 5 V, DC 9 V, DC 12 V            |
| Frequency Range        | 110 kHz ~ 205 kHz                  |
| Modulation Technique   | ASK                                |
| Antenna Type           | Inductive Loop Coil Antenna        |



Report No.: 210400124SEL-TEL1

#### 4. Test Instrument

| Control<br>No. | Equipment                           | Manufacturer    | Model    | Serial No.  | Cal. Due. |
|----------------|-------------------------------------|-----------------|----------|-------------|-----------|
| EMC001         | EMI Test Receiver                   | Rohde & Schwarz | ESU40    | 100478      | 2022/1/4  |
| EMC002         | EMI Test Receiver                   | Rohde & Schwarz | ESU26    | 100590      | 2022/1/4  |
| EMC003         | Open Switch and<br>Control Platform | Rohde & Schwarz | OSP130   | 101467      | N/A       |
| EMC007         | Two-Line V-<br>Network              | Rohde & Schwarz | ENV216   | 101982      | 2021/10/5 |
| EMC009         | Loop Antenna                        | Rohde & Schwarz | HFH2-Z2  | 100465      | 2023/1/5  |
| EMC025         | Biconilog (Type7)                   | ETS-Lindgren    | 3142E    | 00203547    | 2021/12/6 |
| EMC074         | AMP                                 | Rohde & Schwarz | SCU-01D  | 1904843     | 2021/6/22 |
| RF003          | VECTOR SIGNAL<br>GENERATOR          | Rohde & Schwarz | SMBV100A | 261569      | 2021/6/22 |
| RF004          | SIGNAL<br>GENERATOR                 | Rohde & Schwarz | SMB100A  | 178493      | 2021/6/30 |
| RF005          | SPECTRUM<br>ANALYZER                | Rohde & Schwarz | FSW43    | 103893      | 2021/6/23 |
| RF022          | System DC Power<br>Supply           | KEYSIGHT        | N5747A   | US16D4132P  | 2021/6/22 |
| 41             | Softwarer                           | Rohde & Schwarz | EMC32    | Ver10.30.00 | N/A       |

### 5. Support Equipment

| Description           | Manufacturer                                      | Model    | Note                   |
|-----------------------|---|----------|------------------------|
| Smart Phone           | Samsung Electronics Co., Ltd.                     | S9       | -                      |
| Adapter               | Shenzhen ZONSAN Innovation<br>Technology Co., Ltd | ZX-2U33T | 5V 3A, 9V 2A, 12V 1.5A |
| Wireless Charger Load | N/A   | -        | -                      |

## **SECTION 3 SUMMARY**

#### 1. Summary of test results

| Requirements                               | FCC Rule  | Compliance |  |
|--|-----------|------------|--|
| Antenna Requirement                        | 15.203    | Complied   |  |
| 20 dB Bandwidth                            | 2.1049    | Complied   |  |
| Radiated Emissions                         | 15.209(a) | Complied   |  |
| Conducted Emissions                        | 15.207(a) | Complied   |  |
| Test method: According to ANSI C63.10-2013 |           |            |  |

#### 2. Measurement Uncertainty

| Parameters                     | Uncertainty $(k = 2)$ |        |
|--------------------------------|-----------------------|--------|
| Spurious Emissions (Conducted) | 1.32                  | dB     |
|                                | 9 kHz to 30 MHz       | 4.5 dB |
| Spurious Emissions (Radiated)  | 30 MHz to 1 GHz       | 4.6 dB |

#### 3. Test Configurations

In order to check all kinds of possible configurations, EUT was evaluated with appropriate client and under each charging condition as below table.

| EUT Mode                           | Description                   |
|------------------------------------|-------------------------------|
|                                    | Battery less than 1% charged  |
| 5 V Charging Mode                  | Battery less than 50% charged |
|                                    | Battery 100% fully charged    |
|                                    | Battery less than 1% charged  |
| 9 V Charging Mode                  | Battery less than 50% charged |
|                                    | Battery 100% fully charged    |
| 12 V Charging Mode with dummy load | The worst status of full load |



### **SECTION 4** TEST RESULT

#### 1. Antenna Requirement

#### 1.1 Rule

According to §15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall 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. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

#### 1.2 Test Results – Complied

The antenna of this EUT is Inductive Loop Coil Antenna Type. Therefore the antenna is permanently attached. Please refer to the internal photo. Therefore this EUT Complies with the requirement of §15.203



#### 2. 20 dB Bandwidth

#### 2.1 Rule

None: for reporting purposed only.

#### 2.2 Measurement Procedure

a. Span = approximately 2 to 3 times the 20 dB bandwidth, RBW = greater than 1 % of the 20 dB bandwidth, VBW = RBW, Sweep = auto, Detector = peak, Trace = max hold.

b. The marker-to-peak function to set the mark to the emission. Use the marker-delta function to measure 20 dB down one side of the emission. Reset the 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 20 dB bandwidth of the emission.

#### 2.3 Test Results – Complied

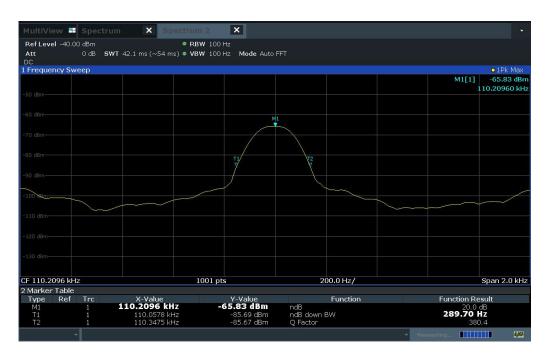
| Test Mode          | Test Results(kHz) |
|--------------------|-------------------|
| 5 V Charging Mode  | 0.287 7           |
| 9 V Charging Mode  | 0.289 7           |
| 12 V Charging Mode | 0.287 7           |

#### Test Mode - 5 V Charging Mode

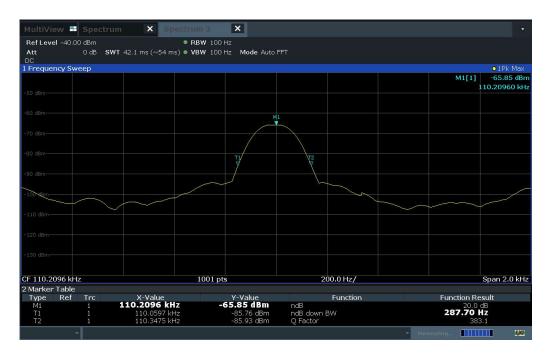




#### Test Mode - 9 V Charging Mode



Test Mode - 12 V Charging Mode





#### 3. Radiated Emission

#### 3.1 Rule

According to §15.209(a), Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

| Frequency (MHz) | Field strength (μV/m) | Measurement distance (m) |
|-----------------|-----------------------|--------------------------|
| 0.009 - 0.490   | 2 400/F(kHz)          | 300                      |
| 0.490 - 1.705   | 24 000/F(kHz)         | 30                       |
| 1.705 - 30      | 30                    | 30                       |
| 30 - 88         | 100**                 | 3                        |
| 88 - 216        | 150**                 | 3                        |
| 216 - 960       | 200**                 | 3                        |
| Above 960       | 500                   | 3                        |

\*\*Except as provided in paragraph (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.

#### **3.2 Measurement Procedure**

#### 3.2.1. Test Procedures for emission below 30 MHz

- 1. The EUT was placed on the top of a rotating table 0.8 meters above the ground at anechoic chamber test site. The table was rotated 360 degrees to determine the position of the highest radiation.
- 2. Then antenna is a loop antenna is fixed at one meter above the ground to determine the maximum value of the field strength. Both parallel and perpendicular of the antenna are set to make the measurement.
- 3. For each suspected emission, the EUT was arranged to its worst case and then the table was turned from 0 degrees to 360 degrees to find the maximum reading.
- 4. The test-receiver system was set to quasi peak detect function and Specified Bandwidth with Maximum Hold Mode.

#### 3.2.2. Test Procedures for emission below 1 000 MHz & above 1 000 MHz

- 1. The EUT was placed on the top of a rotating table 0.8 meters above the ground at anechoic chamber test site (below 1 GHz) and 1.5 meters above the ground at anechoic chamber test site (above 1 GHz). The table was rotated 360 degrees to determine the position of the highest radiation.
- 2. During performing radiated emission below 1 GHz, the EUT was set 3 meters away from the interference receiving antenna, which was mounted on the top of a variable-height antenna tower. During performing radiated emission above 1 GHz, the EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.



- 3. The antenna is a bi-log antenna, a horn antenna and its height is varied from one meter to four meters above the ground to determine the maximum value of the field strength (Keeping antenna aimed at EUT). Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- 4. The test-receiver system was set to quasi peak detect function (below 1 GHz), peak detect function and average detect function (above 1 GHz).

#### 3.3 Test result – Complied

- 1. Measured value of the Field strength of spurious emissions (Radiated)
- 2. The following table shows the highest levels of radiated emissions on both polarizations of horizontal and vertical.
- 3. All radiated testing was measured in one orthogonal EUT position (X-axis)

#### Field Strength of Fundamental and Spurious Emission Test data

#### 9 kHz ~ 30 MHz

#### Test Mode – 5 V Charging Mode (Battery less than 1 % charged)

| - Fundamenta       | l.                      |                     |                |                    |           |                  |                 |
|--------------------|-------------------------|---------------------|----------------|--------------------|-----------|------------------|-----------------|
| Frequency<br>[MHz] | QuasiPeak<br>[dB(µV)/m] | Limit<br>[dB(µV/m)] | Margin<br>[dB] | Bandwidth<br>[kHz] | Pol.      | Azimuth<br>[deg] | Corr.<br>[dB/m] |
| 0.11               | 93.92                   | 106.78              | 12.86          | 0.20               | Н         | 315.00           | 19.58           |
| - Spurious         |                         |                     |                |                    |           |                  |                 |
| Frequency          | OversiDest              |                     |                |                    |           |                  |                 |
| [MHz]              | QuasiPeak<br>[dB(µV)/m] | Limit<br>[dB(µV/m)] | Margin<br>[dB] | Bandwidth<br>[kHz] | Pol.      | Azimuth<br>[deg] | Corr.<br>[dB/m] |
| [MHz]<br>0.55      |                         |                     | U              |                    | Pol.<br>H |                  |                 |
|                    | [dB(µV)/m]              | [dB(µV/m)]          | [dB]           | [kHz]              |           | [deg]            | [dB/m]          |

Note 1 : QuasiPeak[dB( $\mu$ V)/m] = Reading value[dB( $\mu$ V)] + Corr.[dB/m]

Note 2 : According to §15.31 (f)(2); Result at 30m (dB $\mu$ V/m) = Result at 3m(dB $\mu$ V/m)-40log(30/3) (dB $\mu$ V/m) Result at 300m (dB $\mu$ V/m) = Result at 3m(dB $\mu$ V/m)-40log(300/3) (dB $\mu$ V/m)

Note 3 : The radiation measurements are performed in X, Y, Z axis positioning. And worst case mode is recorded in the report.

Note 4 : According to § 15.31(o), Emission levels are not reported much lower than the limits by over 20 dB.



- Fundamental

#### Test Mode – 5 V Charging Mode (Battery less than 50 % charged)

| Frequency | QuasiPeak  | Limit      | Margin | Bandwidth | Pol. | Azimuth | Corr.  |
|-----------|------------|------------|--------|-----------|------|---------|--------|
| [MHz]     | [dB(µV)/m] | [dB(µV/m)] | [dB]   | [kHz]     |      | [deg]   | [dB/m] |
| 0.11      | 94.14      | 106.78     | 12.64  | 0.20      | Н    | 0.00    | 19.58  |

- Spurious

| Frequency<br>[MHz] | QuasiPeak<br>[dB(µV)/m] | Limit<br>[dB(µV/m)] | Margin<br>[dB] | Bandwidth<br>[kHz] | Pol. | Azimuth<br>[deg] | Corr.<br>[dB/m] |
|--------------------|-------------------------|---------------------|----------------|--------------------|------|------------------|-----------------|
| 0.55               | 58.12                   | 72.85               | 14.73          | 9.00               | Н    | 182.00           | 19.64           |
| 0.77               | 52.75                   | 69.91               | 17.16          | 9.00               | Н    | 182.00           | 19.65           |
| 0.99               | 47.84                   | 67.72               | 19.88          | 9.00               | Н    | 182.00           | 19.67           |

Note 1 : QuasiPeak[dB( $\mu$ V)/m] = Reading value[dB( $\mu$ V)] + Corr.[dB/m]

Note 2 : According to §15.31 (f)(2);

Result at 30m (dB $\mu$ V/m) = Result at 3m(dB $\mu$ V/m)-40log(30/3) (dB $\mu$ V/m) Result at 300m (dB $\mu$ V/m) = Result at 3m(dB $\mu$ V/m)-40log(300/3) (dB $\mu$ V/m)

Note 3 : The radiation measurements are performed in X, Y, Z axis positioning. And worst case mode is recorded in the report.

Note 4 : According to § 15.31(o), Emission levels are not reported much lower than the limits by over 20 dB.

#### Test Mode – 5 V Charging Mode (Battery 100 % fully charged)

| - Fundamenta       | al                      |                     |                |                    |      |                  |                 |
|--------------------|-------------------------|---------------------|----------------|--------------------|------|------------------|-----------------|
| Frequency<br>[MHz] | QuasiPeak<br>[dB(µV)/m] | Limit<br>[dB(µV/m)] | Margin<br>[dB] | Bandwidth<br>[kHz] | Pol. | Azimuth<br>[deg] | Corr.<br>[dB/m] |
| 0.11               | 93.88                   | 106.78              | 12.90          | 0.20               | Н    | 48.00            | 19.58           |

- Spurious

| Frequency<br>[MHz] | QuasiPeak<br>[dB(µV)/m] | Limit<br>[dB(µV/m)] | Margin<br>[dB] | Bandwidth<br>[kHz] | Pol. | Azimuth<br>[deg] | Corr.<br>[dB/m] |
|--------------------|-------------------------|---------------------|----------------|--------------------|------|------------------|-----------------|
| 0.55               | 58.00                   | 72.85               | 14.85          | 9.00               | Н    | 185.00           | 19.64           |
| 0.77               | 52.71                   | 69.91               | 17.20          | 9.00               | Н    | 185.00           | 19.65           |
| 0.99               | 47.89                   | 67.72               | 19.83          | 9.00               | Н    | 185.00           | 19.67           |

Note 1 : QuasiPeak[dB( $\mu$ V)/m] = Reading value[dB( $\mu$ V)] + Corr.[dB/m]

Note 2 : According to §15.31 (f)(2);

Result at 30m (dB $\mu$ V/m) = Result at 3m(dB $\mu$ V/m)-40log(30/3) (dB $\mu$ V/m) Result at 300m (dB $\mu$ V/m) = Result at 3m(dB $\mu$ V/m)-40log(300/3) (dB $\mu$ V/m)

- Note 3 : The radiation measurements are performed in X, Y, Z axis positioning. And worst case mode is recorded in the report.
- Note 4 : According to § 15.31(o), Emission levels are not reported much lower than the limits by over 20 dB.



- Fundamental

#### Test Mode – 9 V Charging Mode (Battery less than 1 % charged)

| Tunuumentu         |                         |                     |                |                    |      |                  |                 |
|--------------------|-------------------------|---------------------|----------------|--------------------|------|------------------|-----------------|
| Frequency<br>[MHz] | QuasiPeak<br>[dB(µV)/m] | Limit<br>[dB(µV/m)] | Margin<br>[dB] | Bandwidth<br>[kHz] | Pol. | Azimuth<br>[deg] | Corr.<br>[dB/m] |
| 0.11               | 94.29                   | 106.78              | 12.49          | 0.20               | Н    | 0.00             | 19.58           |

- Spurious

| Frequency<br>[MHz] | QuasiPeak<br>[dB(µV)/m] | Limit<br>[dB(µV/m)] | Margin<br>[dB] | Bandwidth<br>[kHz] | Pol. | Azimuth<br>[deg] | Corr.<br>[dB/m] |
|--------------------|-------------------------|---------------------|----------------|--------------------|------|------------------|-----------------|
| 0.55               | 58.16                   | 72.85               | 14.68          | 9.00               | Н    | 183.00           | 19.64           |
| 0.77               | 52.05                   | 69.91               | 17.86          | 9.00               | Н    | 160.00           | 19.65           |
| 0.99               | 47.24                   | 67.72               | 20.48          | 9.00               | Н    | 160.00           | 19.67           |

Note 1 : QuasiPeak[dB( $\mu$ V)/m] = Reading value[dB( $\mu$ V)] + Corr.[dB/m]

Note 2 : According to §15.31 (f)(2);

Result at 30m (dB $\mu$ V/m) = Result at 3m(dB $\mu$ V/m)-40log(30/3) (dB $\mu$ V/m) Result at 300m (dB $\mu$ V/m) = Result at 3m(dB $\mu$ V/m)-40log(300/3) (dB $\mu$ V/m)

Note 3 : The radiation measurements are performed in X, Y, Z axis positioning. And worst case mode is recorded in the report.

Note 4 : According to § 15.31(o), Emission levels are not reported much lower than the limits by over 20 dB.

#### Test Mode – 9 V Charging Mode (Battery less than 50 % charged)

| - Fundamenta       | al                      |                     |                |                    |      |                  |                 |
|--------------------|-------------------------|---------------------|----------------|--------------------|------|------------------|-----------------|
| Frequency<br>[MHz] | QuasiPeak<br>[dB(µV)/m] | Limit<br>[dB(µV/m)] | Margin<br>[dB] | Bandwidth<br>[kHz] | Pol. | Azimuth<br>[deg] | Corr.<br>[dB/m] |
| 0.11               | 93.94                   | 106.78              | 12.83          | 0.20               | Н    | 48.00            | 19.58           |

- Spurious

| Frequency<br>[MHz] | QuasiPeak<br>[dB(µV)/m] | Limit<br>[dB(µV/m)] | Margin<br>[dB] | Bandwidth<br>[kHz] | Pol. | Azimuth<br>[deg] | Corr.<br>[dB/m] |
|--------------------|-------------------------|---------------------|----------------|--------------------|------|------------------|-----------------|
| 0.55               | 58.04                   | 72.85               | 14.80          | 9.00               | Н    | 165.00           | 19.64           |
| 0.77               | 52.21                   | 69.91               | 17.70          | 9.00               | Н    | 165.00           | 19.65           |
| 0.99               | 47.85                   | 67.72               | 19.87          | 9.00               | Н    | 188.00           | 19.67           |

Note 1 : QuasiPeak[dB( $\mu$ V)/m] = Reading value[dB( $\mu$ V)] + Corr.[dB/m]

Note 2 : According to §15.31 (f)(2);

Result at 30m (dBµV/m) = Result at 3m(dBµV/m)-40log(30/3) (dBµV/m) Result at 300m (dBµV/m) = Result at 3m(dBµV/m)-40log(300/3) (dBµV/m)

- Note 3 : The radiation measurements are performed in X, Y, Z axis positioning. And worst case mode is recorded in the report.
- Note 4 : According to § 15.31(o), Emission levels are not reported much lower than the limits by over 20 dB.



#### Test Mode – 9 V Charging Mode (Battery 100 % fully charged)

| - Fundamenta       | il                      |                     |                |                    |      |                  |                 |
|--------------------|-------------------------|---------------------|----------------|--------------------|------|------------------|-----------------|
| Frequency<br>[MHz] | QuasiPeak<br>[dB(µV)/m] | Limit<br>[dB(µV/m)] | Margin<br>[dB] | Bandwidth<br>[kHz] | Pol. | Azimuth<br>[deg] | Corr.<br>[dB/m] |
| 0.11               | 94.29                   | 106.78              | 12.49          | 0.20               | Н    | 0.00             | 19.58           |

- Spurious

| Frequency<br>[MHz] | QuasiPeak<br>[dB(µV)/m] | Limit<br>[dB(µV/m)] | Margin<br>[dB] | Bandwidth<br>[kHz] | Pol. | Azimuth<br>[deg] | Corr.<br>[dB/m] |
|--------------------|-------------------------|---------------------|----------------|--------------------|------|------------------|-----------------|
| 0.55               | 58.08                   | 72.85               | 14.77          | 9.00               | Н    | 181.00           | 19.64           |
| 0.77               | 52.68                   | 69.91               | 17.23          | 9.00               | Н    | 181.00           | 19.65           |
| 0.99               | 47.87                   | 67.72               | 19.85          | 9.00               | Н    | 181.00           | 19.67           |

Note 1 : QuasiPeak[dB( $\mu$ V)/m] = Reading value[dB( $\mu$ V)] + Corr.[dB/m]

Note 2 : According to §15.31 (f)(2);

Result at 30m (dB $\mu$ V/m) = Result at 3m(dB $\mu$ V/m)-40log(30/3) (dB $\mu$ V/m) Result at 300m (dB $\mu$ V/m) = Result at 3m(dB $\mu$ V/m)-40log(300/3) (dB $\mu$ V/m)

Note 3 : The radiation measurements are performed in X, Y, Z axis positioning. And worst case mode is recorded in the report.

Note 4 : According to § 15.31(o), Emission levels are not reported much lower than the limits by over 20 dB.

#### Test Mode – 12 V Charging Mode (With Wireless Charger load)

| - | Fundamenta         | I                       |                     |                |                    |      |                  |                 |
|---|--------------------|-------------------------|---------------------|----------------|--------------------|------|------------------|-----------------|
|   | Frequency<br>[MHz] | QuasiPeak<br>[dB(µV)/m] | Limit<br>[dB(µV/m)] | Margin<br>[dB] | Bandwidth<br>[kHz] | Pol. | Azimuth<br>[deg] | Corr.<br>[dB/m] |
| _ | 0.11               | 94.43                   | 106.78              | 12.35          | 0.20               | Н    | 0.00             | 19.58           |

- Spurious

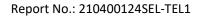
| Frequency<br>[MHz] | QuasiPeak<br>[dB(µV)/m] | Limit<br>[dB(µV/m)] | Margin<br>[dB] | Bandwidth<br>[kHz] | Pol. | Azimuth<br>[deg] | Corr.<br>[dB/m] |
|--------------------|-------------------------|---------------------|----------------|--------------------|------|------------------|-----------------|
| 0.55               | 58.00                   | 72.85               | 14.85          | 9.00               | Н    | 182.00           | 19.64           |
| 0.77               | 52.70                   | 69.91               | 17.21          | 9.00               | Н    | 182.00           | 19.65           |
| 0.99               | 47.90                   | 67.72               | 19.82          | 9.00               | Н    | 182.00           | 19.67           |

Note 1 : QuasiPeak[dB( $\mu$ V)/m] = Reading value[dB( $\mu$ V)] + Corr.[dB/m]

Note 2 : According to §15.31 (f)(2);

Result at 30m (dB $\mu$ V/m) = Result at 3m(dB $\mu$ V/m)-40log(30/3) (dB $\mu$ V/m) Result at 300m (dB $\mu$ V/m) = Result at 3m(dB $\mu$ V/m)-40log(300/3) (dB $\mu$ V/m)

- Note 3 : The radiation measurements are performed in X, Y, Z axis positioning. And worst case mode is recorded in the report.
- Note 4 : According to § 15.31(o), Emission levels are not reported much lower than the limits by over 20 dB.





#### 30 MHz ~ 1 GHz

| Frequency<br>[MHz]QuasiPeak<br>[dB(μV)/m]Limit<br>[dB(μV/m)]Margin<br>[dB]Bandwidth<br>[kHz]Height<br>[cm]Pol.Azimuth<br>[deg]Corr.<br>[dB/m]43.1919.7140.0020.29120.00100.0V90.00-13.8755.6525.7540.0014.25120.00100.0V67.00-16.2068.3424.9040.0015.10120.00100.0V136.00-15.23100.8024.2043.5019.30120.00100.0V0.00-14.04145.3924.9943.5018.51120.00100.0V0.00-12.52 | - Spurious |       |       |       |        |       |      |        |        |
|---|------------|-------|-------|-------|--------|-------|------|--------|--------|
| 55.65 25.75 40.00 14.25 120.00 100.0 V 67.00 -16.20   68.34 24.90 40.00 15.10 120.00 100.0 V 136.00 -15.23   100.80 24.20 43.50 19.30 120.00 100.0 V 102.00 -14.04  |            |       |       | U     |        | -     | Pol. |        |        |
| 68.34 24.90 40.00 15.10 120.00 100.0 V 136.00 -15.23   100.80 24.20 43.50 19.30 120.00 100.0 V 102.00 -14.04  | 43.19      | 19.71 | 40.00 | 20.29 | 120.00 | 100.0 | V    | 90.00  | -13.87 |
| 100.80 24.20 43.50 19.30 120.00 100.0 V 102.00 -14.04   | 55.65      | 25.75 | 40.00 | 14.25 | 120.00 | 100.0 | V    | 67.00  | -16.20 |
|   | 68.34      | 24.90 | 40.00 | 15.10 | 120.00 | 100.0 | V    | 136.00 | -15.23 |
| 145.39 24.99 43.50 18.51 120.00 100.0 V 0.00 -12.52   | 100.80     | 24.20 | 43.50 | 19.30 | 120.00 | 100.0 | V    | 102.00 | -14.04 |
|   | 145.39     | 24.99 | 43.50 | 18.51 | 120.00 | 100.0 | V    | 0.00   | -12.52 |
| 941.12 28.36 46.00 17.64 120.00 100.0 H 0.00 7.67   | 941.12     | 28.36 | 46.00 | 17.64 | 120.00 | 100.0 | Н    | 0.00   | 7.67   |

Note 1 : QuasiPeak[dB( $\mu$ V)/m] = Reading value[dB( $\mu$ V)] + Corr.[dB/m]

Note 2 : According to §15.31 (f)(2);

Result at 30m (dB $\mu$ V/m) = Result at 3m(dB $\mu$ V/m)-40log(30/3) (dB $\mu$ V/m) Result at 300m (dB $\mu$ V/m) = Result at 3m(dB $\mu$ V/m)-40log(300/3) (dB $\mu$ V/m)

Note 3 : The radiation measurements are performed in X, Y, Z axis positioning. And worst case mode is recorded in the report.

Note 4 : According to § 15.31(o), Emission levels are not reported much lower than the limits by over 20 dB.

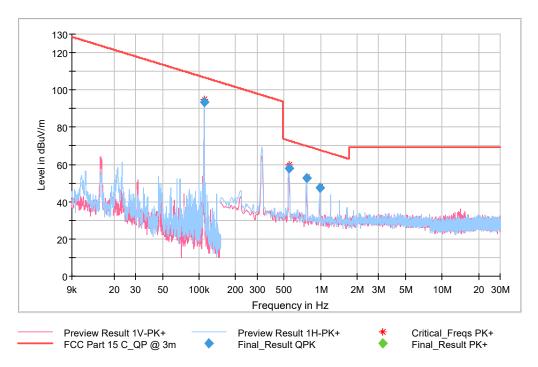


#### 3.4 Test Plot

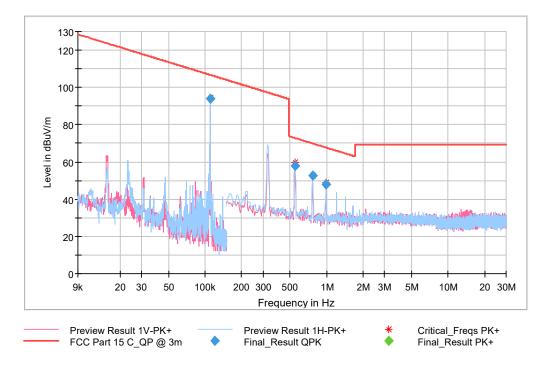
Plot of Field Strength of Fundamental and Spurious Emission (Radiated)

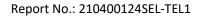
#### 9 kHz ~ 30 MHz

#### Test Mode - 5 V Charging Mode (Battery less than 1 % charged)

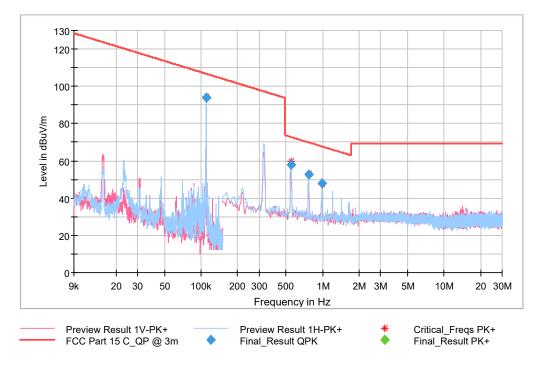


Test Mode - 5 V Charging Mode (Battery less than 50 % charged)



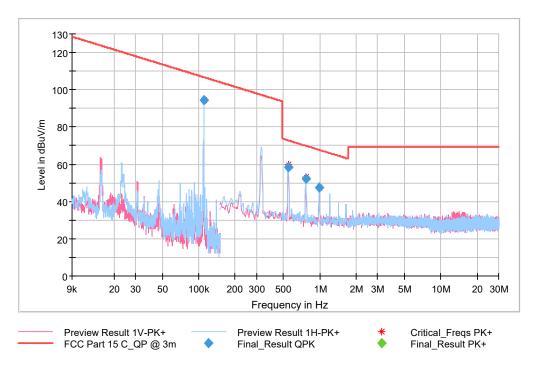


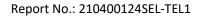




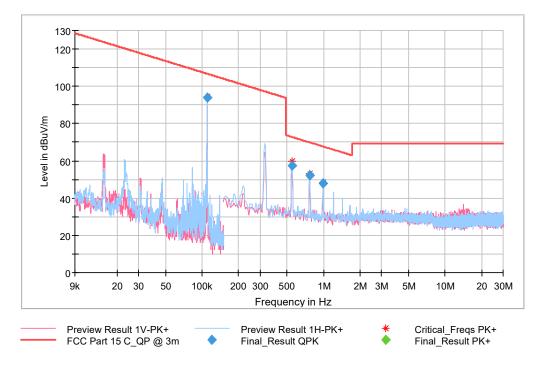
Test Mode - 5 V Charging Mode (Battery less than 100 % charged)

Test Mode - 9 V Charging Mode (Battery less than 1 % charged)



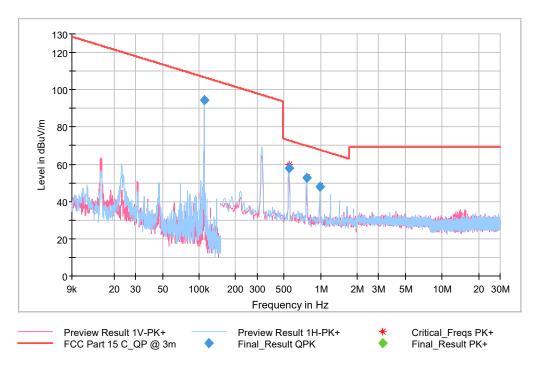


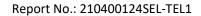




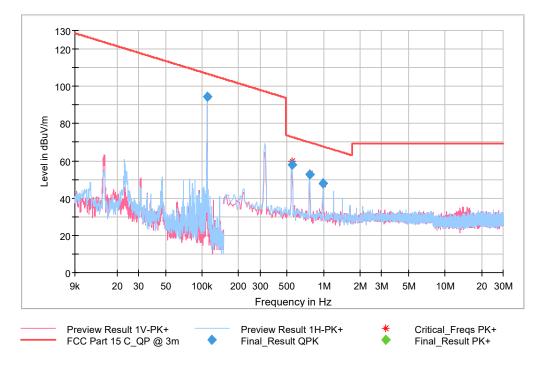
Test Mode - 9 V Charging Mode (Battery less than 50 % charged)

Test Mode - 5 V Charging Mode (Battery less than 100 % charged)









Test Mode - 12 V Charging Mode (With Wireless Charger load)

#### 30 MHz ~ 1 GHz

Test Mode - 12 V Charging Mode (With Wireless Charger load)





#### 4. Conducted Emissions

#### 4.1 Rule

According to §15.207(a), 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  $\Omega$  line impedance stabilization network (LISN).

Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

| Frequency range | Limits dB(μV) |          |  |
|-----------------|---------------|----------|--|
| (MHz)           | Quasi-peak    | Average  |  |
| 0.15 to 0.5     | 66 to 56      | 56 to 46 |  |
| 0.5 to 5        | 56            | 46       |  |
| 5 to 30         | 60            | 50       |  |

Note 1 The lower limit shall apply at the transition frequencies.

Note 2 The limit decreases linearly with the logarithm of the frequency in the range (0.15  $\sim$  0.5) MHz. Note 3 Result (dB $\mu$ V) = Reading (dB $\mu$ V) + Corr. (Insertion Loss (dB) + Cable Loss (dB))

Result: Final value, Reading: Receiver reading value, Corr.: Correction Factor

Margin = Limit – Result

#### 4.2 Measurement Procedure

All data rates and modes were investigated for this test. The full data for the worst case data rate are reported in this section.

AC line conducted emissions from the EUT were measured according to the dictates of ANSI C63.10-2013

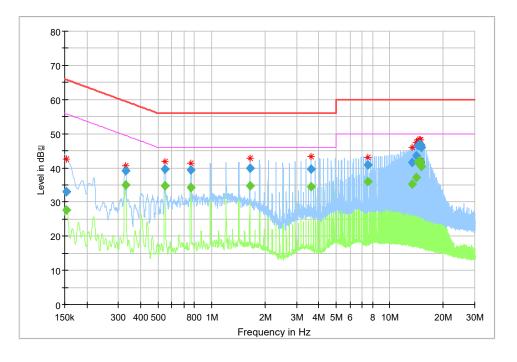
1. The test procedure is performed in a 6.5 m  $\times$  3.6 m  $\times$  3.6 m (L  $\times$  W  $\times$  H) shielded room. The EUT along with its peripherals were placed on a 1.0 m (W)  $\times$  1.5 m (L) and 0.8 m in height wooden table and the EUT was adjusted to maintain a 0.4 meter space from a vertical reference plane.

2. The EUT was connected to power mains through a line impedance stabilization network (LISN) which provides 50 ohm coupling impedance for measuring instrument and the chassis ground was bounded to the horizontal ground plane of shielded room.

3. The excess power cable between the EUT and the LISN was bundled. All connecting cables of EUT were moved to find the maximum emission.



### 4.3 Test result – Complied Test Mode - 5 V Charging Mode\_Neutral / Live



| Frequency<br>[MHz] | QuasiPeak  | CAverage<br>[dB(µV)/m] | Limit     | Margin<br>[dB] | Corr.<br>[dB/m] |
|--------------------|------------|------------------------|-----------|----------------|-----------------|
|                    | [dB(µV)/m] |                        | L (1 / /3 |                |                 |
| 0.153 980          |            | 27.53                  | 55.78     | 28.25          | 9.9             |
| 0.153 980          | 33.06      |                        | 65.78     | 32.72          | 9.9             |
| 0.329 100          | 39.12      |                        | 59.47     | 20.36          | 10.0            |
| 0.329 100          |            | 34.89                  | 49.47     | 14.58          | 10.0            |
| 0.547 005          |            | 34.78                  | 46.00     | 11.22          | 10.0            |
| 0.547 005          | 39.71      |                        | 56.00     | 16.29          | 10.0            |
| 0.765 905          |            | 34.36                  | 46.00     | 11.64          | 10.0            |
| 0.765 905          | 39.31      |                        | 56.00     | 16.69          | 10.0            |
| 1.642 500          |            | 34.81                  | 46.00     | 11.19          | 10.0            |
| 1.642 500          | 39.91      |                        | 56.00     | 16.09          | 10.0            |
| 3.614 590          |            | 34.48                  | 46.00     | 11.52          | 10.0            |
| 3.614 590          | 39.57      |                        | 56.00     | 16.43          | 10.0            |
| 7.560 760          |            | 35.92                  | 50.00     | 14.08          | 10.3            |
| 7.560 760          | 40.91      |                        | 60.00     | 19.09          | 10.3            |
| 14.460 090         |            | 41.57                  | 50.00     | 8.43           | 10.6            |
| 14.460 090         | 46.57      |                        | 60.00     | 13.43          | 10.6            |
| 14.680 980         |            | 42.13                  | 50.00     | 7.87           | 10.6            |
| 14.680 980         | 46.90      |                        | 60.00     | 13.10          | 10.6            |
| 14.898 885         |            | 41.41                  | 50.00     | 8.59           | 10.6            |
| 14.899 880         |            | 41.87                  | 50.00     | 8.13           | 10.6            |
| 15.118 780         | 45.93      |                        | 60.00     | 14.07          | 10.6            |
| 15.118 780         |            | 40.44                  | 50.00     | 9.56           | 10.6            |
|                    |            |                        |           |                |                 |



80-70<sup>.</sup> 60 50 Level in dB a 40 \* 30 20. 10 0+ 150k 300 400 500 800 1M 2M 3M 4M 5M 6 8 10M 20M 30M Frequency in Hz

| Test Mode - 9 | V Charging Mode_ | Neutral / Live |
|---------------|------------------|----------------|
|---------------|------------------|----------------|

| Frequency  | QuasiPeak  | CAverage   | Limit      | Margin | Corr.  |
|------------|------------|------------|------------|--------|--------|
| [MHz]      | [dB(µV)/m] | [dB(µV)/m] | [dB(µV/m)] | [dB]   | [dB/m] |
| 0.153 980  |            | 26.27      | 55.78      | 29.51  | 9.9    |
| 0.153 980  | 32.04      |            | 65.78      | 33.74  | 9.9    |
| 0.387 805  |            | 29.18      | 48.11      | 18.93  | 10.0   |
| 0.387 805  | 36.43      |            | 58.11      | 21.68  | 10.0   |
| 0.649 490  | 33.40      |            | 56.00      | 22.60  | 10.0   |
| 0.649 490  |            | 25.90      | 46.00      | 20.10  | 10.0   |
| 3.248 430  | 36.51      |            | 56.00      | 19.49  | 9.9    |
| 3.248 430  |            | 27.81      | 46.00      | 18.19  | 9.9    |
| 4.025 525  | 32.15      |            | 56.00      | 23.85  | 10.0   |
| 4.025 525  |            | 23.23      | 46.00      | 22.77  | 10.0   |
| 6.339 895  |            | 28.18      | 50.00      | 21.82  | 10.1   |
| 6.339 895  | 35.30      |            | 60.00      | 24.70  | 10.1   |
| 9.707 970  |            | 39.78      | 50.00      | 10.22  | 10.3   |
| 9.707 970  | 46.39      |            | 60.00      | 13.61  | 10.3   |
| 13.588 470 |            | 40.48      | 50.00      | 9.52   | 10.5   |
| 13.588 470 | 49.87      |            | 60.00      | 10.13  | 10.5   |
| 14.884 955 | 42.06      |            | 60.00      | 17.94  | 10.5   |
| 14.884 955 |            | 32.32      | 50.00      | 17.68  | 10.5   |
| 15.144 650 |            | 36.91      | 50.00      | 13.09  | 10.6   |
| 15.144 650 | 44.96      |            | 60.00      | 15.04  | 10.6   |
| 15.919 755 | 44.49      |            | 60.00      | 15.51  | 10.6   |
| 15.919 755 |            | 33.44      | 50.00      | 16.56  | 10.6   |
|            |            |            |            |        |        |



80-70-60 50 Level in dB ً \* 40 \* 30 20 10 0 20M 30M 150k 300 400 500 800 1M 2M 3M 4M 5M 6 8 10M Frequency in Hz

Test Mode - 12 V Charging Mode\_Neutral / Live

| Frequency  | QuasiPeak  | CAverage   | Limit      | Margin | Corr.  |
|------------|------------|------------|------------|--------|--------|
| [MHz]      | [dB(µV)/m] | [dB(µV)/m] | [dB(µV/m)] | [dB]   | [dB/m] |
| 0.159 950  | 30.78      |            | 65.47      | 34.69  | 9.9    |
| 0.159 950  |            | 18.02      | 55.47      | 37.45  | 9.9    |
| 0.397 755  |            | 28.77      | 47.90      | 19.13  | 10.0   |
| 0.397 755  | 36.64      |            | 57.90      | 21.26  | 10.0   |
| 0.662 425  |            | 26.69      | 46.00      | 19.31  | 10.0   |
| 0.662 425  | 35.48      |            | 56.00      | 20.52  | 10.0   |
| 3.586 730  |            | 27.84      | 46.00      | 18.16  | 10.0   |
| 3.586 730  | 39.33      |            | 56.00      | 16.67  | 10.0   |
| 4.915 055  |            | 35.24      | 46.00      | 10.76  | 10.0   |
| 4.915 055  | 42.16      |            | 56.00      | 13.84  | 10.0   |
| 7.306 040  |            | 35.81      | 50.00      | 14.19  | 10.2   |
| 7.306 040  | 43.67      |            | 60.00      | 16.33  | 10.2   |
| 7.837 370  |            | 32.85      | 50.00      | 17.15  | 10.3   |
| 7.837 370  | 43.09      |            | 60.00      | 16.91  | 10.3   |
| 11.821 350 |            | 38.46      | 50.00      | 11.54  | 10.4   |
| 11.821 350 | 45.57      |            | 60.00      | 14.43  | 10.4   |
| 14.479 990 |            | 39.24      | 50.00      | 10.76  | 10.6   |
| 14.479 990 | 47.47      |            | 60.00      | 12.53  | 10.6   |
| 14.744 660 | 48.72      |            | 60.00      | 11.28  | 10.5   |
| 14.744 660 |            | 42.27      | 50.00      | 7.73   | 10.5   |
| 15.009 330 |            | 37.83      | 50.00      | 12.17  | 10.6   |
| 15.009 330 | 47.69      |            | 60.00      | 12.31  | 10.6   |
|            |            |            |            |        |        |



### **SECTION 5 REVISION HISTORY**

|          | REVISION HISTORY  |              |             |  |  |  |
|----------|-------------------|--------------|-------------|--|--|--|
| Revision | Report No.        | Issue Date   | Description |  |  |  |
| 0        | 210400124SEL-TEL1 | 03 Jun. 2021 | Initial     |  |  |  |

- End -