

## ***FCC EVALUATION REPORT FOR CERTIFICATION***

**Manufacturer:** Ohsung Electoronics Co., Ltd.  
**#181 Gongdan-dong, Gumi-si, Gyeongsangbuk-do**  
**Kyeongsangbuk-do, 712-837, Republic of Korea**  
**South Korea**  
**Attn: Mr. Hak Ki, Kim / General Manager**

**Date of Issue:** October 04, 2016  
**Order Number:** GETEC-C1-16-340  
**Test Report Number:** GETEC-E3-16-048  
**Test Site:** GUMI UNIVERSITY EMC CENTER  
**(FCC Test Firm Registration No.: 269701)**

**FCC ID. : OZ5URCTDC7100CG**

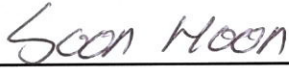
**Applicant : Ohsung Electronics Co., Ltd.**

**Rule Part(s) : FCC Part 18**  
**Test Method : FCC/OET MP-5**  
**EUT Type : Wireless Charger**  
**Equipment Class : Part 18 Consumer Device(8CC)**  
**Type of Authority : Certification**  
**Model Name : TDC-7100CG**  
**Trade Mark : URC**

**This equipment has been shown to be in compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in FCC/OET MP-5 (1986)**

**I attest to the accuracy of data. All measurements reported herein were performed by me or were made under my supervision and are correct to the vest of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.**

**Tested by,**

  
**Soon-Hoon Jeong, Senior Engineer**  
**GUMI UNIVERSITY EMC CENTER**

**Reviewed by,**

  
**Jae-Hoon Jeong, Technical Manager**  
**GUMI UNIVERSITY EMC CENTER**



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*Scope: Measurement and determination of electromagnetic emissions (EME) of radio frequency devices including intentional and / or unintentional radiators for compliance with technical rules and regulations of the Federal Communications Commission.*

## 1. General Information

**Applicant: Ohsung Electronics Co., Ltd.**

**Applicant Address: #141 Gongdan-dong, Gumi-si, Gyeongbuk, South Korea**

**Applicant: Ohsung Electronics Co., Ltd.**

**Applicant Address: #141 Gongdan-dong, Gumi-si, Gyeongbuk, South Korea**

**Contact Person: Mr.Hak Ki, Kim / General Manager**

**Tel. Number: +82-54-468-7281**

**Fax Number: +82-54-461-8368**

- **FCC ID.** OZ5URCTDC7100
- **EUT Type** Wireless Charger
- **Model Name** TDC-7100CG
- **Rule Part(s)** FCC Part 18
- **Test Method** FCC/OET MP-5
- **Type of Authority** Certification
- **Test Procedure(s)** FCC/OET MP-5
- **Dates of Test** August 18 ~ September 21, 2016
- **Place of Test** GUMI UNIVERSITY EMC CENTER (FCC Test Firm Registration Number: 269701) 37 Yaeun-ro, Gumi-si, Gyeongsangbuk-do, 730-711, Republic of Korea.
- **Test Report Number** GETEC-E3-16-048
- **Dates of Issue** October 04, 2016



## 2. Introduction

The measurement procedure described in American National Standard for Methods of Measurement of Radio-Nose Emissions From Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz (ANSI C63.4-2009) was used in determining radiated and conducted emissions emanating from **Ohsung Electronics Co., Ltd.. Wireless Charger. (Model name: TDC-7100CG)**

These measurement tests were conducted at **GUMI UNIVERSITY EMC CENTER**.

The site address is 37 Yaeun-ro, Gumi-si, Gyeongsangbuk-do, 730-711, Gyeongnam 641-713, Korea

This test site is one of the highest point of GUMI UNIVERSITY at about 200 kilometers away from Seoul city and 40 kilometers away from Daegu city. It is located in the valley surrounded by mountains in all directions where ambient radio signal conditions are quiet and a favorable area to measure the radio frequency interference on open field test site for the computing and ISM devices manufactures. The detailed description of the measurement facility was found to be in compliance with the requirements of §2.948 according to ANSI C63.4 (2009)

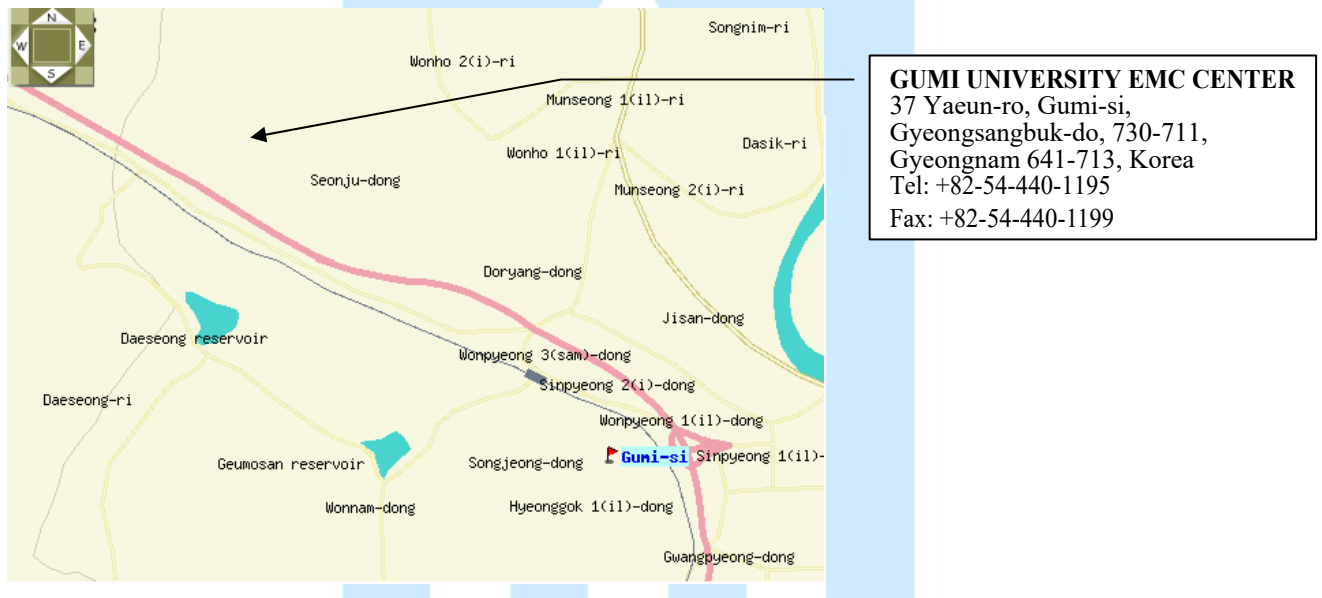


Fig 1. The map above shows the GUMI UNIVERSITY in vicinity area.



### 3. Product Information

#### 3.1 Description of EUT

The Equipment under Test (EUT) is the **OHSUNG Electronics Co., Ltd. Wireless Charger.(Model Name: TDC-7100CG) FCC ID.: OZ5URCTDC7100CG**

|                       |                                                                     |
|-----------------------|---------------------------------------------------------------------|
| Type of Equipment     | Wireless Charger                                                    |
| Model Name            | TDC-7100CG                                                          |
| Serial Number         | Prototype                                                           |
| RF Frequency          | 115 kHz ~ 205 kHz                                                   |
| External connector    | DC input 1 EA                                                       |
| Input Power           | DC 5.0 V, 2 A                                                       |
| Transmission Power    | DC 5W (Maximum 5 V, 1 A)                                            |
| AC/DC Adaptor         | Input : AC 100 ~ 230 V 50 Hz / 60 Hz, 0.4 A<br>Output : DC 5 V, 2 A |
| Antenna type          | A11 1-Layer Coil                                                    |
| Size(W x H x T)       | 200 (mm) x 125 (mm) x 17 (mm) (W x L x T) mm <sup>3</sup>           |
| Operating Temperature | : 0 °C ~ +55 °C                                                     |
| Hardware Version      | : PRC-110_V2.3                                                      |
| Software Version      | : Qi_Tx_A11_OS_KR_KT_1.0.90                                         |

#### 3.2 Definition of models

- None.



### 3.3 Support Equipment / Cables used

#### 3.3.1 Used Support Equipment

| Description                              | Manufacturer                 | Model Name | S/N & FCC ID.                |
|------------------------------------------|------------------------------|------------|------------------------------|
| Wireless charger RX module(5W, 2.5W, 1W) | Partron Co., Ltd.            | Proto type | S/N: None.<br>FCC ID.: None. |
| Wireless Remote Controller               | OHsung Electronics Co., Ltd. | TDC-7100   | S/N: None.<br>FCC ID.: None. |

See “Appendix E – Test Setup Photographs” for actual system test set-up

#### 3.3.2 System configuration

| Description      | Manufacturer                 | Model Name       | S/N & FCC ID.                    |
|------------------|------------------------------|------------------|----------------------------------|
| Wireless Charger | Ohsung Electronics Co., Ltd. | TDC-7100CG       | S/N: None.<br>FCC ID.: None.     |
| AC/DC Adaptor    | MEILE GROUP LTD              | MLF-B250502000UU | S/N: 160806001<br>FCC ID.: None. |

#### 3.3.3 Used Cable(s)

| Cable Name | Condition                              | Description                           |
|------------|----------------------------------------|---------------------------------------|
| USB cable  | Connected to the EUT and AC/DC Adaptor | 1.00 m Unshielded with a ferrite core |

### 3.4 Modification Item(s)

-. None



## 4. Description of tests

### 4.1 Test Condition

The EUT was installed, arranged and operated in a manner that is most representative of equipment as typically used. The measurements were carried out while varying operating modes and cable positions within typically arrangement to determine maximum emission level.

The representative and worst test mode(s) were noted in the test report.

- Test Voltage / Frequency: AC 120 V / 60 Hz

※ The supplying power of this device is DC 5.0 V from a AC/DC Adaptor.

- Operating condition during the test(s) :

This device has been tested in the configurations of charging mode

| Charging Current   | Support Equipment              | Comment              |
|--------------------|--------------------------------|----------------------|
| 1 000 mA           | Wireless charger RX load(5W)   | With Register load   |
| 500 mA             | Wireless charger RX load(2.5W) | With Register load   |
| 200 mA             | Wireless charger RX load(1.0W) | With Register load   |
| 0% < Battery state | TDC-7100                       | With charging device |
| 50% Battery state  | TDC-7100                       | With charging device |



## 4.2 General Test Procedures

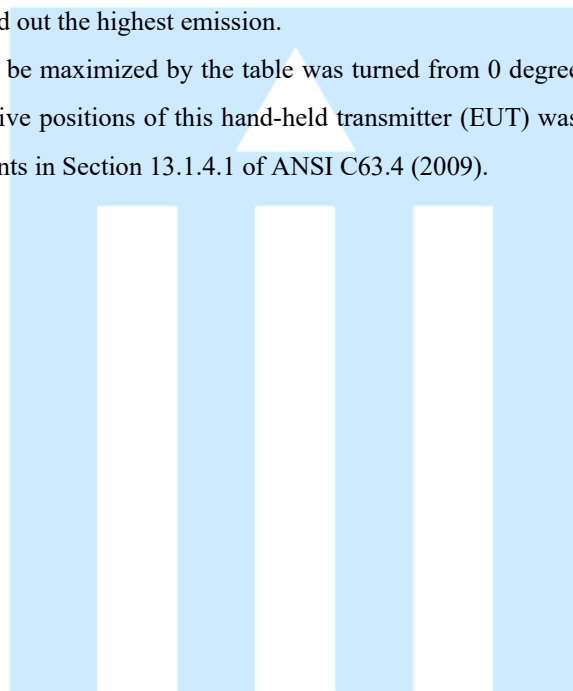
### Conducted Emissions

The EUT is placed on the turntable, which is 0.8 m above ground plane. According to the requirements in Section 13.1.4.1 of ANSI C63.4 (2009) Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz 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 Fixed at 2 m above the ground plane to find out the highest emission.

And also, each emission was to be maximized by the table was turned from 0 degrees to 360 degrees. 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 13.1.4.1 of ANSI C63.4 (2009).





## 5. Conducted Emission

### -Test Description

The Line conducted emission test facility is inside a 4 m × 8 m × 2.5 m shielded enclosure. (FCC Test Firm Registration No.: 269701)

The EUT was placed on a non-conducting 1.0 m by 1.5 m table, which is 0.8 m in height and 0.4 m away from the vertical wall of the shielded enclosure.

The EUT is powered from the Rohde & Schwarz LISN (ENV216) and the support equipment is powered from the Rohde & Schwarz LISN (ENV216). Powers to the LISN are filtered by high-current high insertion loss power line filter.

Sufficient time for EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition.

The RF output of the LISN was connected to the EMI test receiver (Rohde & Schwarz, ESCI).

Exploratory measurements were conducted to identify the highest emission by operating the EUT in a range of typical modes of operation, cable positions, system configuration and arrangement.

Based on exploratory measurements, the final measurements were conducted at the worst test conditions.

Exploratory measurements were scanned using Peak mode of EMI Test receiver from 150 kHz to 30 MHz with 20 ms sweep time. The final measurements were measured with Quasi-Peak and Average mode.

The bandwidth of EMI Test Receiver was set to 9 kHz. Interface cables were connected to the available interface ports of the test unit. Excess cable lengths were bundled at center with 30 cm ~ 40 cm.

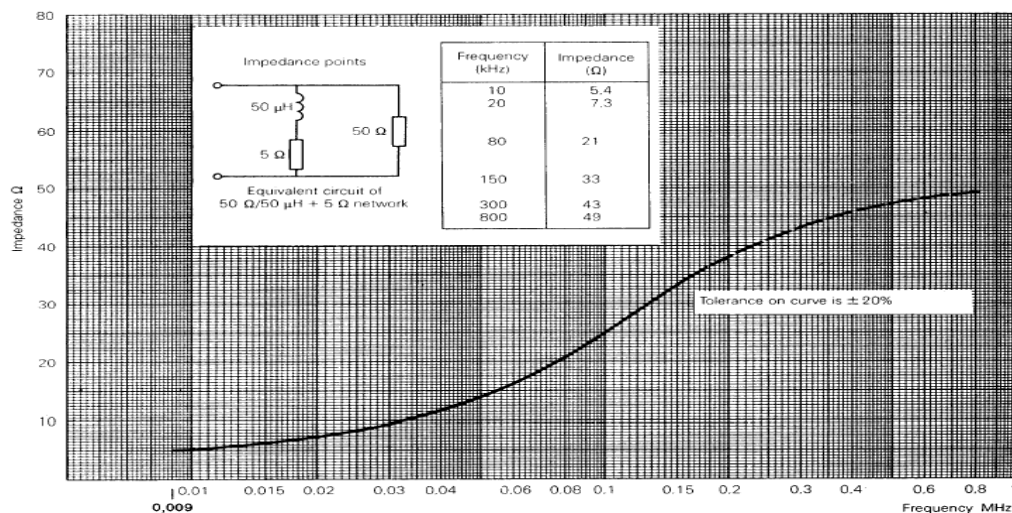


Fig 2. Impedance of LISN



### 5.1 Operating Environment

Temperature : 26.6 °C  
Relative Humidity : 47.6 % R.H.

### 5.2 Test Set-up

The conducted emission measurements were performed in the shielded room.

The EUT was placed on wooden table, 0.8 m heights above the floor, 0.4 m from the reference ground plane (GRP) wall and 0.8 m from AMN & ISN.

AMN is bonded on horizontal reference ground plane.

The ground plane, which was electrically bonded to the shield room, ground system and all power lines entering the shield room, were filtered.

### 5.3 Measurement Uncertainty

The measurement uncertainty was calculated in accordance with ISO “Guide to the expression of uncertainty in measurement.”

The measurement uncertainty was given with a confidence of 95 %.

| Test Items                            | Uncertainty | Remark                                             |
|---------------------------------------|-------------|----------------------------------------------------|
| Conducted emission (9 kHz ~ 150 kHz)  | 3.85 dB     | Confidence level of approximately 95 % ( $k = 2$ ) |
| Conducted emission (150 kHz ~ 30 MHz) | 3.32 dB     | Confidence level of approximately 95 % ( $k = 2$ ) |



#### 5.4 Limit

| RFI Conducted                                               | FCC Limit(dBμV/m) |          |
|-------------------------------------------------------------|-------------------|----------|
| Freq. Range                                                 | Quasi-Peak        | Average  |
| 150 kHz ~ 0.5 MHz                                           | 66 ~ 56*          | 56 ~ 46* |
| 0.5 MHz ~ 5 MHz                                             | 56                | 46       |
| 5 MHz ~ 30 MHz                                              | 60                | 50       |
| *Limits decreases linearly with the logarithm of frequency. |                   |          |

#### 5.5 Test Equipment used

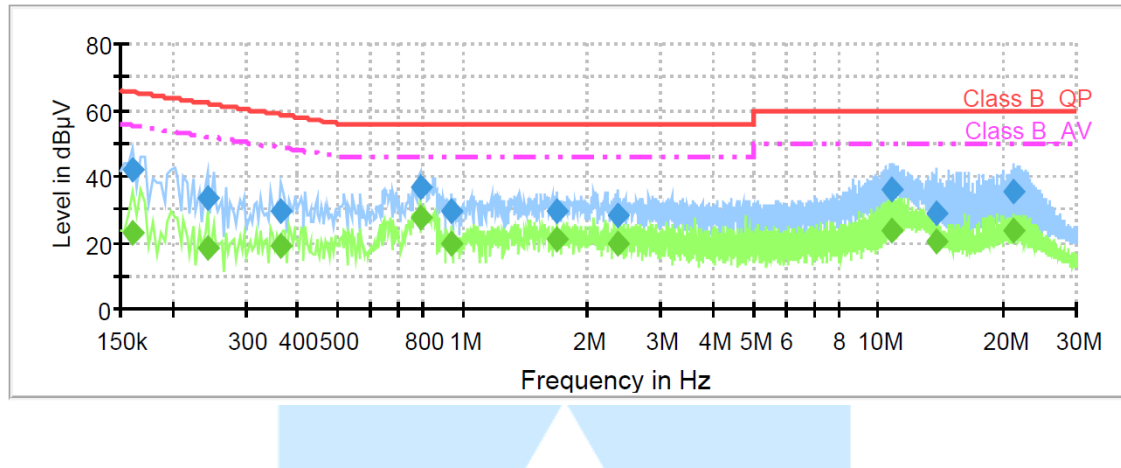
| Model Name | Manufacturer    | Description       | Serial Number | Due to Calibration |
|------------|-----------------|-------------------|---------------|--------------------|
| ■ - ESCI   | Rohde & Schwarz | EMI test receiver | 100237        | Apr 18, 2017       |
| ■ - ENV216 | Rohde & Schwarz | LISN              | 100173        | Apr 19, 2017       |
| □ - ENV216 | Rohde & Schwarz | LISN              | 100172        | Apr 19, 2017       |
| □ - ISN T8 | TESEQ. GmbH     | ISN               | 24568         | Apr 22, 2017       |

#### 5.6 Test data for Conducted Emission

- Test Date : August 17, 2016  
- Test Procedure(s) : FCC/OET MP-5  
- Operating Condition : Register load & Changing device charging mode  
- Frequency range : 150 kHz ~ 30 MHz  
- Comment : -



- Operating condition: it test EUT with Register load(5W)



#### Final Result 1

| Frequency (MHz) | QuasiPeak (dBµV) | Meas. Time (ms) | Bandwidth (kHz) | Filter | Line | Corr. (dB) | Margin (dB) | Limit (dBµV) | Comment |
|-----------------|------------------|-----------------|-----------------|--------|------|------------|-------------|--------------|---------|
| 0.161194        | 42.1             | 100.0           | 9.000           | Off    | N    | 9.6        | 23.3        | 65.4         |         |
| 0.243281        | 33.7             | 100.0           | 9.000           | Off    | N    | 9.7        | 28.2        | 62.0         |         |
| 0.366412        | 29.7             | 100.0           | 9.000           | Off    | N    | 9.7        | 28.9        | 58.6         |         |
| 0.791775        | 36.8             | 100.0           | 9.000           | Off    | L1   | 9.7        | 19.2        | 56.0         |         |
| 0.937294        | 29.3             | 100.0           | 9.000           | Off    | N    | 9.7        | 26.7        | 56.0         |         |
| 1.683544        | 29.2             | 100.0           | 9.000           | Off    | L1   | 9.7        | 26.8        | 56.0         |         |
| 2.347706        | 28.0             | 100.0           | 9.000           | Off    | N    | 9.7        | 28.0        | 56.0         |         |
| 10.836300       | 35.8             | 100.0           | 9.000           | Off    | N    | 9.9        | 24.2        | 60.0         |         |
| 13.817569       | 28.7             | 100.0           | 9.000           | Off    | L1   | 9.9        | 31.3        | 60.0         |         |
| 21.138281       | 35.6             | 100.0           | 9.000           | Off    | N    | 10.0       | 24.4        | 60.0         |         |

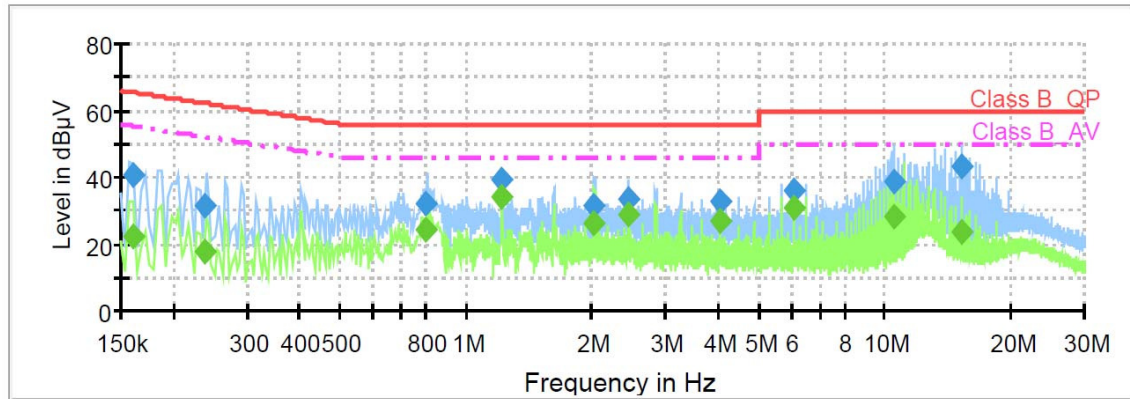
#### Final Result 2

| Frequency (MHz) | CAverage (dBµV) | Meas. Time (ms) | Bandwidth (kHz) | Filter | Line | Corr. (dB) | Margin (dB) | Limit (dBµV) | Comment |
|-----------------|-----------------|-----------------|-----------------|--------|------|------------|-------------|--------------|---------|
| 0.161194        | 23.0            | 100.0           | 9.000           | Off    | N    | 9.6        | 32.4        | 55.4         |         |
| 0.243281        | 18.0            | 100.0           | 9.000           | Off    | N    | 9.7        | 33.9        | 52.0         |         |
| 0.366412        | 18.8            | 100.0           | 9.000           | Off    | N    | 9.7        | 29.8        | 48.6         |         |
| 0.791775        | 27.9            | 100.0           | 9.000           | Off    | L1   | 9.7        | 18.1        | 46.0         |         |
| 0.937294        | 19.5            | 100.0           | 9.000           | Off    | N    | 9.7        | 26.5        | 46.0         |         |
| 1.683544        | 20.7            | 100.0           | 9.000           | Off    | L1   | 9.7        | 25.3        | 46.0         |         |
| 2.347706        | 19.8            | 100.0           | 9.000           | Off    | N    | 9.7        | 26.2        | 46.0         |         |
| 10.836300       | 23.5            | 100.0           | 9.000           | Off    | N    | 9.9        | 26.5        | 50.0         |         |
| 13.817569       | 20.5            | 100.0           | 9.000           | Off    | L1   | 9.9        | 29.5        | 50.0         |         |
| 21.138281       | 23.5            | 100.0           | 9.000           | Off    | N    | 10.0       | 26.5        | 50.0         |         |

< Fig 5. Graph of continuous disturbance >



- Operating condition: it test EUT with Register load(2.5W)



#### Final Result 1

| Frequency (MHz) | QuasiPeak (dBµV) | Meas. Time (ms) | Bandwidth (kHz) | Filter | Line | Corr. (dB) | Margin (dB) | Limit (dBµV) | Comment |
|-----------------|------------------|-----------------|-----------------|--------|------|------------|-------------|--------------|---------|
| 0.160071        | 40.9             | 100.0           | 9.000           | Off    | L1   | 9.6        | 24.5        | 65.5         |         |
| 0.237926        | 31.4             | 100.0           | 9.000           | Off    | N    | 9.6        | 30.7        | 62.2         |         |
| 0.800081        | 32.0             | 100.0           | 9.000           | Off    | N    | 9.7        | 24.0        | 56.0         |         |
| 1.218203        | 39.2             | 100.0           | 9.000           | Off    | L1   | 9.7        | 16.8        | 56.0         |         |
| 2.027213        | 31.5             | 100.0           | 9.000           | Off    | N    | 9.7        | 24.5        | 56.0         |         |
| 2.442518        | 33.4             | 100.0           | 9.000           | Off    | N    | 9.7        | 22.6        | 56.0         |         |
| 4.064415        | 32.7             | 100.0           | 9.000           | Off    | L1   | 9.8        | 23.3        | 56.0         |         |
| 6.098137        | 36.1             | 100.0           | 9.000           | Off    | L1   | 9.8        | 23.9        | 60.0         |         |
| 10.570740       | 38.4             | 100.0           | 9.000           | Off    | N    | 9.9        | 21.6        | 60.0         |         |
| 15.239718       | 43.2             | 100.0           | 9.000           | Off    | N    | 9.9        | 16.8        | 60.0         |         |

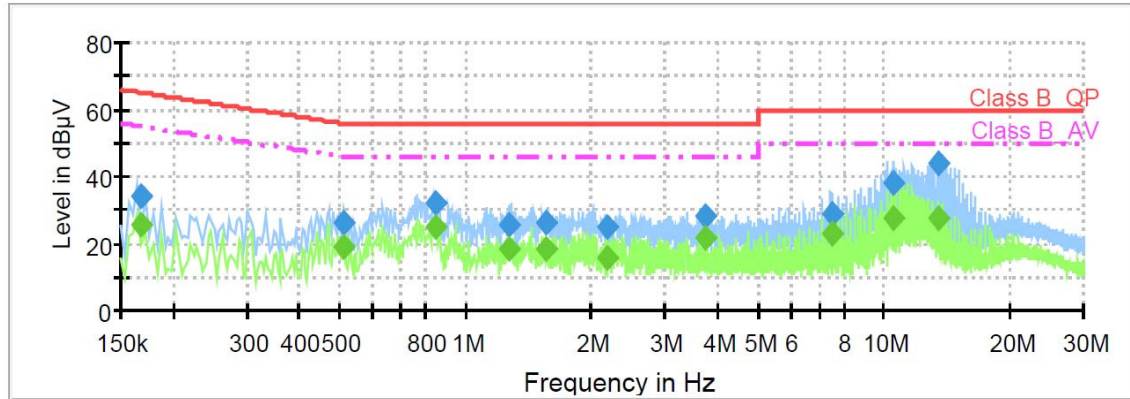
#### Final Result 2

| Frequency (MHz) | CAverage (dBµV) | Meas. Time (ms) | Bandwidth (kHz) | Filter | Line | Corr. (dB) | Margin (dB) | Limit (dBµV) | Comment |
|-----------------|-----------------|-----------------|-----------------|--------|------|------------|-------------|--------------|---------|
| 0.160071        | 22.6            | 100.0           | 9.000           | Off    | L1   | 9.6        | 32.8        | 55.5         |         |
| 0.237926        | 17.9            | 100.0           | 9.000           | Off    | N    | 9.6        | 34.3        | 52.2         |         |
| 0.800081        | 24.1            | 100.0           | 9.000           | Off    | N    | 9.7        | 21.9        | 46.0         |         |
| 1.218203        | 33.8            | 100.0           | 9.000           | Off    | L1   | 9.7        | 12.2        | 46.0         |         |
| 2.027213        | 26.1            | 100.0           | 9.000           | Off    | N    | 9.7        | 19.9        | 46.0         |         |
| 2.442518        | 28.7            | 100.0           | 9.000           | Off    | N    | 9.7        | 17.3        | 46.0         |         |
| 4.064415        | 26.9            | 100.0           | 9.000           | Off    | L1   | 9.8        | 19.1        | 46.0         |         |
| 6.098137        | 30.8            | 100.0           | 9.000           | Off    | L1   | 9.8        | 19.2        | 50.0         |         |
| 10.570740       | 28.1            | 100.0           | 9.000           | Off    | N    | 9.9        | 21.9        | 50.0         |         |
| 15.239718       | 23.6            | 100.0           | 9.000           | Off    | N    | 9.9        | 26.4        | 50.0         |         |

< Fig 5. Graph of continuous disturbance >



- Operating condition: it test EUT with Register load(1 W)



#### Final Result 1

| Frequency (MHz) | QuasiPeak (dBµV) | Meas. Time (ms) | Bandwidth (kHz) | Filter | Line | Corr. (dB) | Margin (dB) | Limit (dBµV) | Comment |
|-----------------|------------------|-----------------|-----------------|--------|------|------------|-------------|--------------|---------|
| 0.167521        | 34.1             | 100.0           | 9.000           | Off    | L1   | 9.6        | 30.9        | 65.1         |         |
| 0.512764        | 26.3             | 100.0           | 9.000           | Off    | L1   | 9.6        | 29.7        | 56.0         |         |
| 0.850882        | 32.0             | 100.0           | 9.000           | Off    | L1   | 9.7        | 24.0        | 56.0         |         |
| 1.278064        | 25.3             | 100.0           | 9.000           | Off    | N    | 9.7        | 30.7        | 56.0         |         |
| 1.561628        | 26.3             | 100.0           | 9.000           | Off    | L1   | 9.7        | 29.7        | 56.0         |         |
| 2.170687        | 24.8             | 100.0           | 9.000           | Off    | L1   | 9.7        | 31.2        | 56.0         |         |
| 3.738573        | 28.4             | 100.0           | 9.000           | Off    | L1   | 9.8        | 27.6        | 56.0         |         |
| 7.480512        | 29.1             | 100.0           | 9.000           | Off    | L1   | 9.8        | 30.9        | 60.0         |         |
| 10.530979       | 38.2             | 100.0           | 9.000           | Off    | L1   | 9.9        | 21.8        | 60.0         |         |
| 13.422394       | 44.1             | 100.0           | 9.000           | Off    | N    | 9.9        | 15.9        | 60.0         |         |

#### Final Result 2

| Frequency (MHz) | CAverage (dBµV) | Meas. Time (ms) | Bandwidth (kHz) | Filter | Line | Corr. (dB) | Margin (dB) | Limit (dBµV) | Comment |
|-----------------|-----------------|-----------------|-----------------|--------|------|------------|-------------|--------------|---------|
| 0.167521        | 25.5            | 100.0           | 9.000           | Off    | L1   | 9.6        | 29.6        | 55.1         |         |
| 0.512764        | 18.7            | 100.0           | 9.000           | Off    | L1   | 9.6        | 27.3        | 46.0         |         |
| 0.850882        | 24.8            | 100.0           | 9.000           | Off    | L1   | 9.7        | 21.2        | 46.0         |         |
| 1.278064        | 18.2            | 100.0           | 9.000           | Off    | N    | 9.7        | 27.8        | 46.0         |         |
| 1.561628        | 18.5            | 100.0           | 9.000           | Off    | L1   | 9.7        | 27.5        | 46.0         |         |
| 2.170687        | 15.4            | 100.0           | 9.000           | Off    | L1   | 9.7        | 30.6        | 46.0         |         |
| 3.738573        | 21.8            | 100.0           | 9.000           | Off    | L1   | 9.8        | 24.2        | 46.0         |         |
| 7.480512        | 23.3            | 100.0           | 9.000           | Off    | L1   | 9.8        | 26.7        | 50.0         |         |
| 10.530979       | 27.5            | 100.0           | 9.000           | Off    | L1   | 9.9        | 22.5        | 50.0         |         |
| 13.422394       | 27.8            | 100.0           | 9.000           | Off    | N    | 9.9        | 22.2        | 50.0         |         |

< Fig 5. Graph of continuous disturbance >



## 6. Radiated Emission

### 6.1 Operating Environment

Temperature : 21.8 °C  
Relative Humidity : 49.3 % R.H.

### 6.2 Test Set-up

The Radiated emission measurements were conducted at the worst test conditions.

The measurements of below 1 GHz were made at 3 m Semi Anechoic Chamber or 10 m Semi Anechoic Chamber (FCC Test Firm Registration No.: 269701) that complies with CISPR 16/ANSI C63.4.

The frequency range of 9 kHz to 30 MHz, The EUT was placed on a non-conductive turntable approximately 0.8 m above the ground plane. The turntable with EUT was rotated 360° and the receive antenna was fixed 2.0 m on the ground plane.

The frequency range of 30 MHz to 1 000 MHz, The EUT was placed on a non-conductive turntable approximately 0.8 m above the ground plane. The turntable with EUT was rotated 360° and adjusting the receive antenna height from 1.0 m to 4.0 m. All frequencies were investigated in both horizontal and vertical antenna polarity.

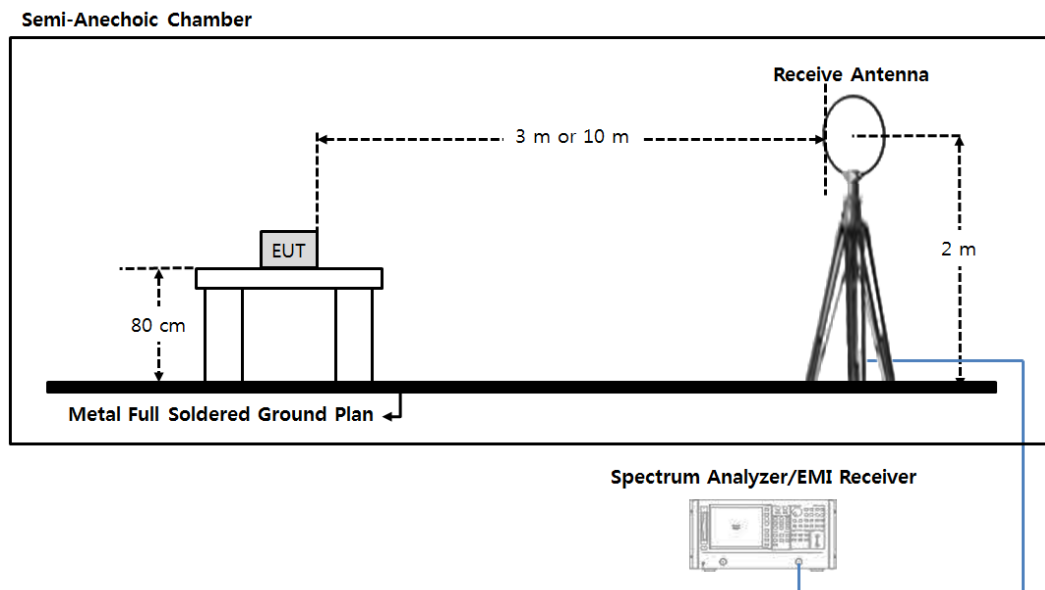


Fig 3. Configurations of Radiated emission test (9 kHz to 30 MHz)

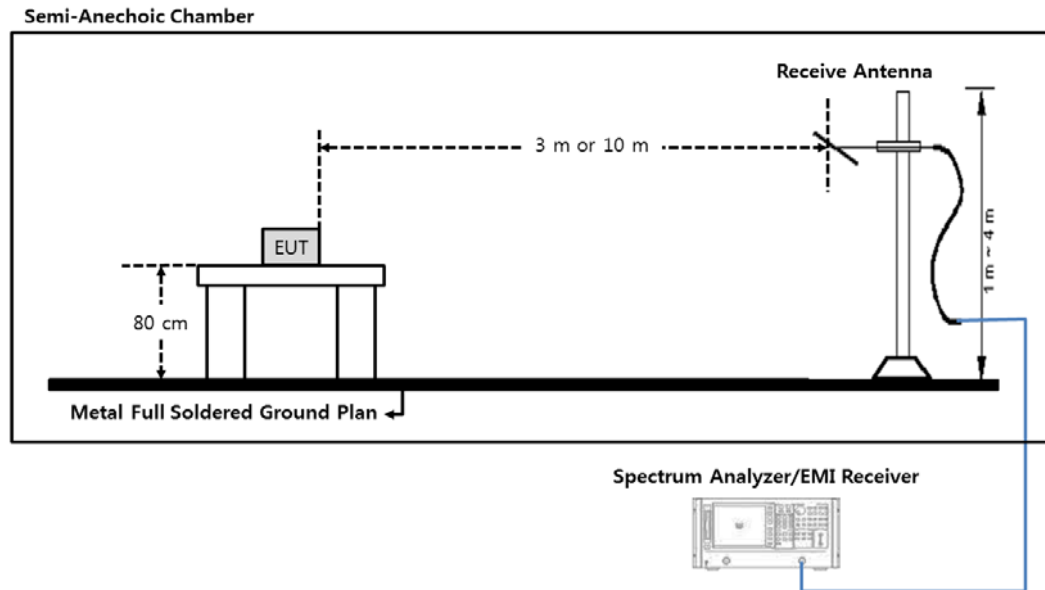


Fig 4. Configurations of Radiated emission test (30 MHz to 1 000 MHz)

### 6.3 Measurement Uncertainty

The measurement uncertainty was calculated in accordance with ISO “Guide to the expression of uncertainty in measurement”.

The measurement uncertainty was given with a confidence of 95 %.

| Test Items(Anechoic Chamber)                             | Uncertainty | Remark                                             |
|----------------------------------------------------------|-------------|----------------------------------------------------|
| Radiated emission (30 MHz ~ 300 MHz, 3 m, Vertical)      | 4.66 dB     | Confidence level of approximately 95 % ( $k = 2$ ) |
| Radiated emission (30 MHz ~ 300 MHz, 3 m, Horizontal)    | 4.65 dB     | Confidence level of approximately 95 % ( $k = 2$ ) |
| Radiated emission (300 MHz ~ 1 000 MHz, 3 m, Vertical)   | 4.91 dB     | Confidence level of approximately 95 % ( $k = 2$ ) |
| Radiated emission (300 MHz ~ 1 000 MHz, 3 m, Horizontal) | 4.88 dB     | Confidence level of approximately 95 % ( $k = 2$ ) |
| Radiated emission (1 000 MHz ~ 6 000 MHz, 3 m)           | 5.32 dB     | Confidence level of approximately 95 % ( $k = 2$ ) |
| Radiated emission (1 000 MHz ~ 18 000 MHz, 3 m)          | 5.45 dB     | Confidence level of approximately 95 % ( $k = 2$ ) |



#### 6.4 Limit

| Equipment                                           | Operating frequency                        | RF Power generated by equipment (watts) | Field strength limit (μV/m)                                                         | Distance (meters)                     |
|-----------------------------------------------------|--------------------------------------------|-----------------------------------------|-------------------------------------------------------------------------------------|---------------------------------------|
| Any type unless otherwise specified (miscellaneous) | Any ISM frequency                          | Below 500<br>500 or more                | 25<br>$25 \times \text{SQRT}(\text{power}/500)$                                     | 300<br><sup>1</sup> 300               |
|                                                     | <b><u>Any non-ISM frequency</u></b>        | <b><u>Below 500</u></b><br>500 or more  | <b><u>15</u></b><br>$15 \times \text{SQRT}(\text{power}/500)$                       | <b><u>300</u></b><br><sup>1</sup> 300 |
| Industrial heaters and RF stabilized arc welders    | On or below 5,725 MHz<br>Above 5,725 MHz   | Any<br>Any                              | 10<br>(2)                                                                           | 1,600<br>(2)                          |
| Medical diathermy                                   | Any ISM frequency<br>Any non-ISM frequency | Any<br>Any                              | 25<br>15                                                                            | 300<br>300                            |
| Ultrasonic                                          | Below 490 kHz                              | Below 500<br>500 or more                | $2,400/F(\text{kHz})$<br>$2,400/F(\text{kHz}) \times \text{SQRT}(\text{power}/500)$ | 300<br><sup>3</sup> 300               |
|                                                     | 490 to 1,600 kHz<br>Above 1,600 kHz        | Any<br>Any                              | $24,000/F(\text{kHz})$<br>15                                                        | 30<br>30                              |
| Induction cooking ranges                            | Below 90 kHz<br>On or above 90 kHz         | Any<br>Any                              | 1,500<br>300                                                                        | <sup>4</sup> 30<br><sup>4</sup> 30    |

Note.

- 1) Field strength may not exceed 10 μV/m at 1600 meters. Consumer equipment operating below 1000 MHz is not permitted the increase in field strength otherwise permitted here for power over 500 watts.
- 2) Reduced to the greatest extent possible.
- 3) Field strength may not exceed 10 μV/m at 1600 meters. Consumer equipment is not permitted the increase in field strength otherwise permitted here for over 500 watts.
- 4) Induction cooking ranges manufactured prior to February 1, 1980, shall be subject to the field strength limits for miscellaneous ISM equipment.

#### 6.5 Test Equipment used

| Model Name  | Manufacturer    | Description         | Serial Number | Due to Calibration |
|-------------|-----------------|---------------------|---------------|--------------------|
| ■ - ESIB26  | Rohde & Schwarz | EMI Test Receiver   | 830482/010    | Apr. 18, 2017      |
| ■ - ESU40   | Rohde & Schwarz | EMI Test Receiver   | 100266        | Jun. 20, 2017      |
| ■ - HFH2-Z2 | Rohde & Schwarz | Loop ANT            | 100041        | Dec.21, 2017       |
| ■ - MCU066  | maturo GmbH     | Position Controller | 1390306       | N/A                |
| ■ - TT2.5SI | maturo GmbH     | Turntable           | 1390307       | N/A                |
| □ - AM 4.0  | maturo GmbH     | Antenna Mast        | 1390308       | N/A                |

All test equipment used is calibrated on a regular basis.



## 6.6 Test data for Radiated Emission

- Test Date : Sep. 27, 2016
- Measurement Distance : 3 m
- Note : frequency range to be scanned up to 30 MHz, because the frequency band in which the EUT operates less than 1.705 MHz

### -. Measurement setting

|                      |                 |                   |
|----------------------|-----------------|-------------------|
| Frequency range      | 9 kHz ~ 150 kHz | 0.15 MHz ~ 30 MHz |
| Detector mode        | Peak            | Peak              |
| Resolution bandwidth | 200 Hz          | 9 kHz             |

### -. Measurement Data: Wireless charging with register load (5 W)

| Note.2 | Frequency [MHz] | Detector mode | ANT Pol. | Reading [dBuV] | T.F [dB/m] | D.C.F | Field Strength [dBuV/m] | Limits [dBuV/m] | Margin [dB] |
|--------|-----------------|---------------|----------|----------------|------------|-------|-------------------------|-----------------|-------------|
| S      | 0.049           | PK            | V2       | 31.99          | 19.33      | 80    | -28.68                  | 23.52           | -52.20      |
| S      | 0.051           | PK            | V2       | 27.43          | 19.33      | 80    | -33.24                  | 23.52           | -56.76      |
| S      | 0.059           | PK            | V2       | 31.68          | 19.32      | 80    | -29.00                  | 23.52           | -52.52      |
| F      | 0.170           | PK            | V2       | 50.53          | 19.22      | 80    | -10.25                  | 23.52           | -33.77      |
| S      | 0.450           | PK            | V1       | 30.94          | 19.10      | 80    | -29.96                  | 23.52           | -53.48      |
| S      | 1.731           | PK            | V1       | 25.77          | 19.23      | 80    | -35.00                  | 23.52           | -58.52      |

### -. Measurement Data: Wireless charging with register load (2.5 W)

| Note.2 | Frequency [MHz] | Detector mode | ANT Pol. | Reading [dBuV] | T.F [dB/m] | D.C.F | Field Strength [dBuV/m] | Limits [dBuV/m] | Margin [dB] |
|--------|-----------------|---------------|----------|----------------|------------|-------|-------------------------|-----------------|-------------|
| S      | 0.030           | PK            | V2       | 28.80          | 19.34      | 80    | -31.86                  | 23.52           | 55.38       |
| S      | 0.330           | PK            | V2       | 26.74          | 19.10      | 80    | -34.16                  | 23.52           | 57.68       |
| S      | 0.060           | PK            | V2       | 25.15          | 19.32      | 80    | -35.53                  | 23.52           | 59.05       |
| S      | 0.090           | PK            | V2       | 24.41          | 19.27      | 80    | -36.32                  | 23.52           | 59.84       |
| F      | 0.198           | PK            | V2       | 46.60          | 19.19      | 80    | -14.21                  | 23.52           | 37.73       |
| S      | 0.470           | PK            | V1       | 31.32          | 19.10      | 80    | -29.58                  | 23.52           | 53.10       |



**-. Measurement Data: Wireless charging with register load (1 W)**

| Note.2 | Frequency [MHz] | Detector mode | ANT Pol. | Reading [dBuV] | T.F [dB/m] | D.C.F | Field Strength [dBuV/m] | Limits [dBuV/m] | Margin [dB] |
|--------|-----------------|---------------|----------|----------------|------------|-------|-------------------------|-----------------|-------------|
| S      | 0.013           | PK            | V2       | 26.47          | 19.76      | 80    | -33.77                  | 23.52           | 57.29       |
| S      | 0.022           | PK            | V2       | 24.81          | 19.54      | 80    | -35.65                  | 23.52           | 59.17       |
| S      | 0.045           | PK            | V2       | 22.53          | 19.33      | 80    | -38.14                  | 23.52           | 61.66       |
| S      | 0.067           | PK            | V2       | 22.04          | 19.31      | 80    | -38.65                  | 23.52           | 62.17       |
| F      | 0.205           | PK            | V2       | 45.32          | 19.19      | 80    | -15.49                  | 23.52           | 39.01       |
| S      | 3.601           | PK            | V2       | 29.47          | 19.36      | 80    | -31.17                  | 23.52           | 54.69       |

Note.1 The worst case data were reported

And no other spurious and harmonic emissions were reported greater than listed emission above table

Note.2 “F”=Fundamental / “S”=Spurious / “\*” = Noise Floor

Note.3 All measurements were recorded using a spectrum analyzer employing a peak detector for below 30 MHz

Note.4 Distance Correction Factor (D.C.F.)

For 300 m:  $40 \log(300/3) = 80 \text{ dB}$

Note.5 Sample calculation

$T.F = AF + CL - AG$

$\text{Field Strength} = \text{Reading} + T.F - D.C.F$

$\text{Margin} = \text{Limit} - \text{Field Strength}$

Where, T.F = Total Factor, AF = Antenna Factor, CL = Cable Loss, AG = Amplifier Gain

D.C.F = Distance Correction Factor

Note. 6 “V1” = Vertical and perpendicular to the centerline / “V2”=Vertical and parallel to the centerline

“H”= horizontal(parallel to the ground)



**-. Measurement Data: Wireless charging with charging device(TDC-7100) (0 % battery state)**

| Note.2 | Frequency [MHz] | Detector mode | ANT Pol. | Reading [dBuV] | T.F [dB/m] | D.C.F | Field Strength [dBuV/m] | Limits [dBuV/m] | Margin [dB] |
|--------|-----------------|---------------|----------|----------------|------------|-------|-------------------------|-----------------|-------------|
| S      | 0.010           | PK            | V2       | 32.14          | 19.84      | 80    | -28.02                  | 23.52           | -51.54      |
| S      | 0.071           | PK            | V2       | 27.42          | 19.30      | 80    | -33.28                  | 23.52           | -56.80      |
| S      | 0.106           | PK            | V2       | 24.09          | 19.26      | 80    | -36.65                  | 23.52           | -60.17      |
| S      | 0.142           | PK            | V2       | 20.03          | 19.24      | 80    | -40.73                  | 23.52           | -64.25      |
| F      | 0.236           | PK            | V2       | 46.83          | 19.16      | 80    | -14.01                  | 23.52           | -37.53      |

**-. Measurement Data: Wireless charging with charging device(TDC-7100) (50 % battery state)**

| Note.2 | Frequency [MHz] | Detector mode | ANT Pol. | Reading [dBuV] | T.F [dB/m] | D.C.F | Field Strength [dBuV/m] | Limits [dBuV/m] | Margin [dB] |
|--------|-----------------|---------------|----------|----------------|------------|-------|-------------------------|-----------------|-------------|
| S      | 0.010           | PK            | V1       | 37.10          | 19.84      | 80    | -23.06                  | 23.52           | -46.58      |
| S      | 0.037           | PK            | V1       | 29.38          | 19.34      | 80    | -31.28                  | 23.52           | -54.80      |
| S      | 0.075           | PK            | V1       | 25.97          | 19.30      | 80    | -34.73                  | 23.52           | -58.25      |
| S      | 0.112           | PK            | V2       | 23.66          | 19.26      | 80    | -37.08                  | 23.52           | -60.60      |
| F      | 0.179           | PK            | V2       | 46.46          | 19.21      | 80    | -14.33                  | 23.52           | -37.85      |
| S      | 0.463           | PK            | V1       | 30.72          | 19.10      | 80    | -30.18                  | 23.52           | -53.70      |

Note.1 The worst case data were reported

And no other spurious and harmonic emissions were reported greater than listed emission above table

Note.2 “F”=Fundamental / “S”=Spurious / “\*” = Noise Floor

Note.3 All measurements were recorded using a spectrum analyzer employing a peak detector for below 30 MHz

Note.4 Distance Correction Factor (D.C.F.)

For 300 m:  $40 \log(300/3) = 80 \text{ dB}$

Note.5 Sample calculation

$T.F = AF + CL - AG$

Field Strength = Reading + T.F – D.C.F

Margin = Limit – Field Strength

Where, T.F = Total Factor, AF = Antenna Factor, CL = Cable Loss, AG = Amplifier Gain

D.C.F = Distance Correction Factor

Note. 6 “V1” = Vertical and perpendicular to the centerline / “V2”=Vertical and parallel to the centerline

“H”= horizontal(parallel to the ground)

**EUT Type: Wireless Charger**

**FCC ID.: OZ5URCTDC7100CG**





## 7. Sample Calculations

$$\begin{aligned} \text{dB}\mu\text{V} &= 20 \text{ Log}_{10}(\mu\text{V}/\text{m}) \\ \text{dB}\mu\text{V} &= \text{dBm} + 107 \\ \mu\text{V} &= 10^{(\text{dB}\mu\text{V}/20)} \end{aligned}$$

### 7.1 Example 1 :

#### ■ 20.3 MHz

|                                      |                                                           |
|--------------------------------------|-----------------------------------------------------------|
| Class B Limit                        | = 250 $\mu\text{V}$ = 48 dB $\mu\text{V}$                 |
| Reading                              | = 39.2 dB $\mu\text{V}$                                   |
| $10^{(39.2\text{dB}\mu\text{V}/20)}$ | = 91.2 $\mu\text{V}$                                      |
| Margin                               | = 48 dB $\mu\text{V}$ - 39.2 dB $\mu\text{V}$<br>= 8.8 dB |

### 7.2 Example 2 :

#### ■ 66.7 MHz

|                             |                                                                               |
|-----------------------------|-------------------------------------------------------------------------------|
| Class B Limit               | = 100 $\mu\text{V}/\text{m}$ = 40.0 dB $\mu\text{V}/\text{m}$                 |
| Reading                     | = 31.0 dB $\mu\text{V}$                                                       |
| Antenna Factor + Cable Loss | = 5.8 dB                                                                      |
| Total                       | = 36.8 dB $\mu\text{V}/\text{m}$                                              |
| Margin                      | = 40.0 dB $\mu\text{V}/\text{m}$ - 36.8 dB $\mu\text{V}/\text{m}$<br>= 3.2 dB |

## 8. Recommendation & Conclusion

The data collected shows that the **Ohsung Electronics Co., Ltd. Wireless Charger(Model Name: TDC-7100CG)** was complies with §18.305 and 18.307 of the FCC Rules.

- The end -