



**FCC Part 1 Subpart I  
FCC Part 2 Subpart J**

**MPE EVALUATION REPORT**

**FOR**

**WPT (Wireless Power Transfer)**

**MODEL NUMBER: SM-G985F/DS, SM-G985F**

**FCC ID: A3LSMG985F**

**REPORT NUMBER: 4789247757-S4V1**

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**Testing Laboratory**

**TL-637**

**Revision History**

| Rev. | Date       | Revisions     | Revised By |
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| V1   | 12/10/2019 | Initial Issue | -          |
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## 1. Attestation of Test Results

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                      |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|
| Applicant Name                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | SAMSUNG ELECTRONICS CO.,LTD.                                                         |
| FCC ID                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | A3LSMG985F                                                                           |
| Model Number                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | SM-G985F/DS, SM-G985F                                                                |
| SERIAL Number                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | R38MA0KHL5Y                                                                          |
| Applicable Standards                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | FCC PART 1 SUBPART I<br>FCC PART 2 SUBPART J<br>KDB 680106 D01                       |
| Date Tested                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 12/9/2019                                                                            |
| Test Results                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Complies                                                                             |
| <p>UL Korea, Ltd. tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by UL Korea, Ltd. based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.</p> <p><b>Note:</b> The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by UL Korea, Ltd. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL Korea, Ltd. will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by IAS, any agency of the Federal Government, or any agency of any government.</p> |                                                                                      |
| Approved & Released By:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Prepared By:                                                                         |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |  |
| Justin Park<br>Operations Leader<br>UL Korea, Ltd. Suwon Laboratory                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Seonggon Lee<br>Laboratory Technician<br>UL Korea, Ltd. Suwon Laboratory             |

## 2. TEST METHODOLOGY

All calculations were made in accordance with FCC OET Bulletin 65 Edition 97-01.

## 3. Facilities and Accreditation

The test sites and measurement facilities used to collect data are located at

|             |
|-------------|
| Suwon       |
| Shield Room |

UL Korea, Ltd. is accredited by IAS, Laboratory Code TL-637.

The full scope of accreditation can be viewed at <http://www.iasonline.org/PDF/TL/TL-637.pdf>.

## 4. EQUIPMENT UNDER TEST

### 4.1. DESCRIPTION OF EUT

The EUT has WPT (Wireless Power Transfer) feature which has inductive charging coil to charge phone or watch. The charging frequency is between 110 kHz to 148 kHz, and the maximum power consumption is 9.0 W in charging status.

### 4.2. WORST-CASE CONFIGURATION

| Test configuration                | Description                                       |
|-----------------------------------|---------------------------------------------------|
| DUT to Phone test configuration 1 | Charging from Phone to DUT                        |
| DUT to Phone test configuration 2 | Charging from Phone to DUT (TA Charging from DUT) |
| DUT to Phone test configuration 3 | Charging from Phone to DUT                        |
| DUT to Phone test configuration 4 | Charging from Phone to DUT (TA Charging from DUT) |
| DUT to Watch test configuration 5 | Charging from Watch to DUT                        |
| DUT to Watch test configuration 6 | Charging from Watch to DUT (TA Charging from DUT) |

**Note:**

Configuration 2, 4 and 6 were tested with the worst case of configuration 1, 3 and 5.

#### 4.3. KDB 680106 D01 v03 SECTION 5.b) EQUIPMENT APPROVAL CONSIDERATIONS

| Requirement                                                                                                                                                                                                                                  | Device                                                                                 |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------|
| (1) Power transfer frequency is less than 1 MHz.                                                                                                                                                                                             | Yes. Operating Frequency is between 110kHz to 148 kHz.                                 |
| (2) Output power from each primary coil is less than or equal to 15 watts.                                                                                                                                                                   | Yes. Maximum power is 9.0 Watts.                                                       |
| (3) The transfer system includes only single primary and secondary coils. This includes charging systems that may have multiple primary coils and clients that are able to detect and allow coupling only between individual pairs of coils. | Yes.                                                                                   |
| (4) Client device is placed directly in contact with the transmitter.                                                                                                                                                                        | Yes.                                                                                   |
| (5) Mobile exposure conditions only (portable exposure conditions are not covered by this exclusion).                                                                                                                                        | Yes.                                                                                   |
| (6) The aggregate H-field strengths at 15 cm surrounding the device and 20 cm above the top surface from all simultaneous transmitting coils are demonstrated to be less than 50% of the MPE limit.                                          | Yes. The aggregate field at 15 cm from the device are 7.61 % of the FCC H field limit. |

#### 4.4. DESCRIPTION OF TEST SETUP

##### SUPPORT EQUIPMENT & PERIPHERALS

| SUPPROT EQUIPMENT & PERIPHERALS LIST |                               |          |                |            |
|--------------------------------------|-------------------------------|----------|----------------|------------|
| Description                          | Manufacturer                  | Model    | Serial Numver  | FCC ID     |
| Phone                                | Samsung Electronics Co., Ltd. | SM-N975F | R38M504W9JN    | A3LSMN975F |
| Watch                                | Samsung Electronics Co., Ltd. | SM-R820N | RFAM90G1V0H    | A3LSMR820N |
| Charger                              | Samsung Electronics Co., Ltd. | EP-TA800 | R37M55W0ZE1SE3 | N/A        |
| Data Cable                           | Samsung Electronics Co., Ltd. | EP-DG977 | N/A            | N/A        |

##### TEST SETUP

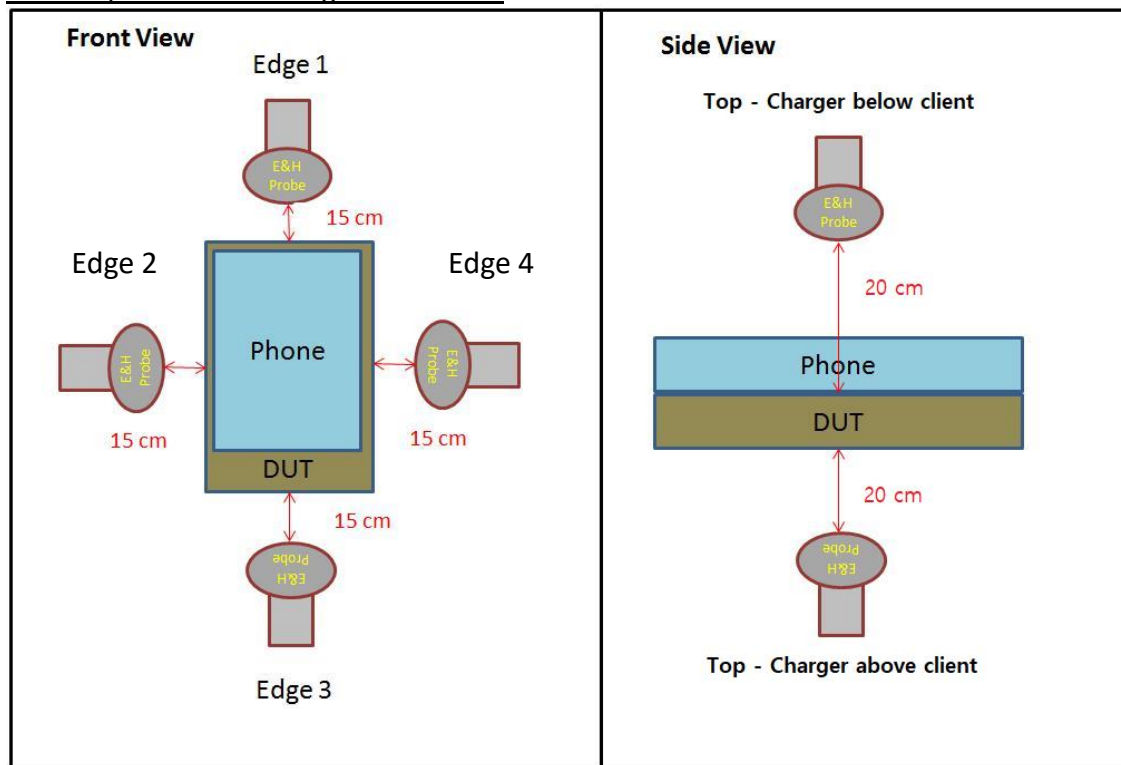
The following three modes are tested in test configurations;

| Mode                                                    |
|---------------------------------------------------------|
| Operating<br>(SUPPORT Equipment, <10% Power Charging)   |
| Operating<br>(SUPPORT Equipment, 50~55% Power Charging) |
| Operating<br>(SUPPORT Equipment, 90~95% Power Charging) |

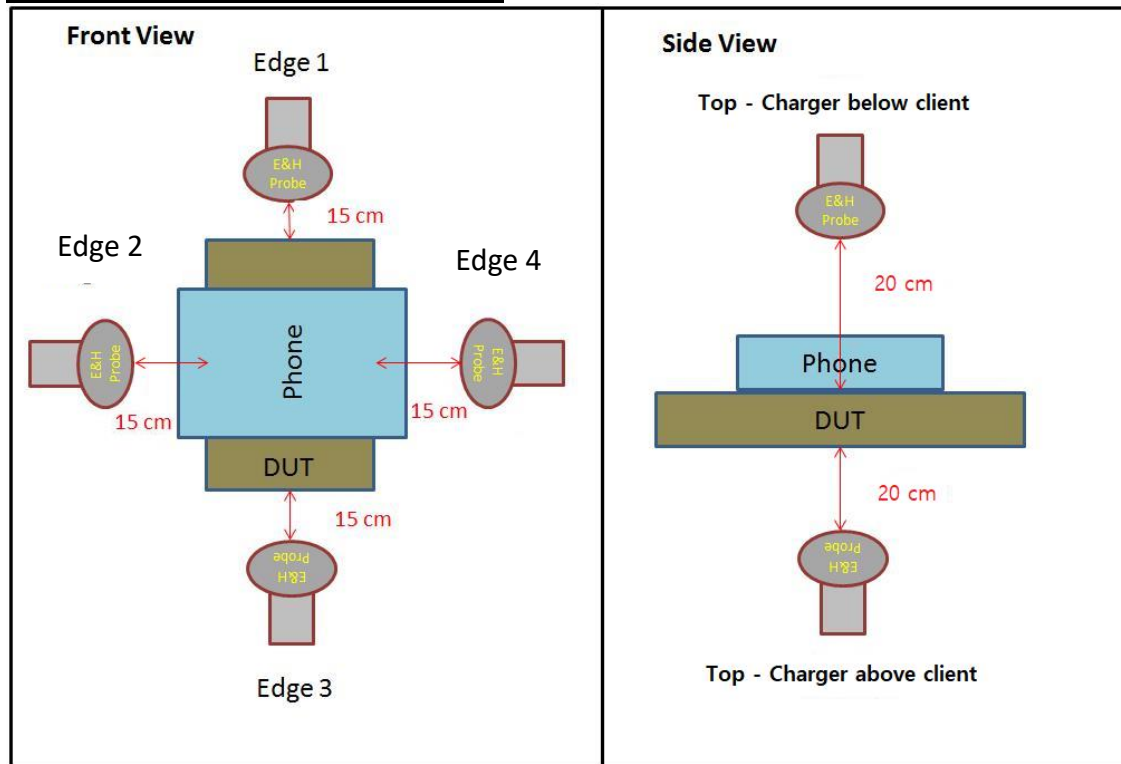
## MEASUREMENT TEST SETUP

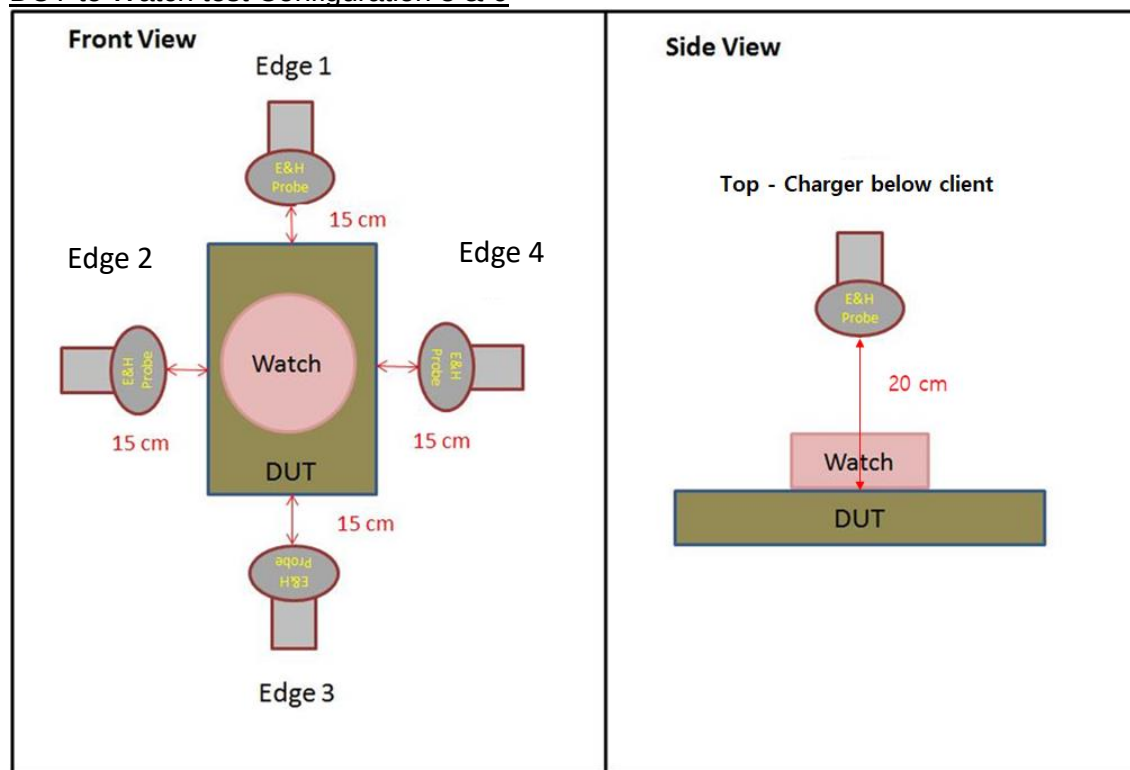
The measurement was taken using a probe placed 15 cm surrounding the device and 20 cm above the top surface of the EUT. Measurements were taken the top (charger below/client) and all sides of the EUT per KDB680106 D01 v03 and RF Exposure Procedures (Wireless Power Transfer) in TCB Workshop October, 2018.

### DUT to phone test Configuration 1 & 2



### DUT to phone test Configuration 3 & 4



DUT to Watch test Configuration 5 & 6

## 5. TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was used for the tests documented in this report;

| Test Equipment List               |              |          |               |           |           |
|-----------------------------------|--------------|----------|---------------|-----------|-----------|
| Description                       | Manufacturer | Model    | Serial Numver | Cal Date  | Cal Due   |
| Electric and Magnetic Field Probe | Narda        | EHP-200A | 170WX80301    | 8-26-2019 | 8-26-2020 |

## 6. Maximum PERMISSIBLE RF EXPOSURE

### 6.1. FCC LIMITS AND SUMMARY

#### 6.1.1. FCC LIMITS

§ 1.1310 The criteria listed in Table 1 shall be used to evaluate the environmental impact of human exposure to radio-frequency (RF) radiation as specified in § 1.1307(b), except in the case of portable devices which shall be evaluated according to the provisions of § 2.1093 of this chapter.

TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

| Frequency range<br>(MHz)                                       | Electric field<br>strength<br>(V/m) | Magnetic field<br>strength<br>(A/m) | Power density<br>(mW/cm <sup>2</sup> ) | Averaging time<br>(minutes) |
|----------------------------------------------------------------|-------------------------------------|-------------------------------------|----------------------------------------|-----------------------------|
| <b>(A) Limits for Occupational/Controlled Exposures</b>        |                                     |                                     |                                        |                             |
| 0.3–3.0 .....                                                  | 614                                 | 1.63                                | *(100)                                 | 6                           |
| 3.0–30 .....                                                   | 1842/f                              | 4.89/f                              | *(900/f <sup>2</sup> )                 | 6                           |
| 30–300 .....                                                   | 61.4                                | 0.163                               | 1.0                                    | 6                           |
| 300–1500 .....                                                 | .....                               | .....                               | f/300                                  | 6                           |
| 1500–100,000 .....                                             | .....                               | .....                               | 5                                      | 6                           |
| <b>(B) Limits for General Population/Uncontrolled Exposure</b> |                                     |                                     |                                        |                             |
| 0.3–1.34 .....                                                 | 614                                 | 1.63                                | *(100)                                 | 30                          |
| 1.34–30 .....                                                  | 824/f                               | 2.19/f                              | *(180/f <sup>2</sup> )                 | 30                          |

TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)—Continued

| Frequency range<br>(MHz) | Electric field<br>strength<br>(V/m) | Magnetic field<br>strength<br>(A/m) | Power density<br>(mW/cm <sup>2</sup> ) | Averaging time<br>(minutes) |
|--------------------------|-------------------------------------|-------------------------------------|----------------------------------------|-----------------------------|
| 30–300 .....             | 27.5                                | 0.073                               | 0.2                                    | 30                          |
| 300–1500 .....           | .....                               | .....                               | f/1500                                 | 30                          |
| 1500–100,000 .....       | .....                               | .....                               | 1.0                                    | 30                          |

f = frequency in MHz

\* = Plane-wave equivalent power density

NOTE 1 TO TABLE 1: Occupational/controlled limits apply in situations in which persons are exposed as a consequence of their employment provided those persons are fully aware of the potential for exposure and can exercise control over their exposure. Limits for occupational/controlled exposure also apply in situations when an individual is transient through a location where occupational/controlled limits apply provided he or she is made aware of the potential for exposure.

NOTE 2 TO TABLE 1: General population/uncontrolled exposures apply in situations in which the general public may be exposed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or can not exercise control over their exposure.

## 6.2. TEST RESULTS

### 6.2.1. FCC RF EXPOSURE

#### H-FIELD MEASUREMENTS

Note: Peak measurement were performed. RMS values were calculated from the peak measurement. Please refer to the formula for calculating the RMS values: [Field Strength x  $\sqrt{\text{Duty Cycle}}$ ].

Additional test was performed in each Test mode by moving the probe surrounding the device to find the maximum exposure.

#### TEST results of DUT to phone test Configuration 1 & 2

| FCC RF Exposure Result |                                                |                                                                          |                            |                     |                         |
|------------------------|------------------------------------------------|--------------------------------------------------------------------------|----------------------------|---------------------|-------------------------|
| Test Configuration     | Test mode                                      | Test distance                                                            | Test Position              | H-Field Limit (A/m) | H-Field meas data (A/m) |
| Configuration 1        | Operating Real Product (Power <10% charging)   | 15 cm probe to edges of EUT and<br>20 cm probe to top surface of the EUT | Top - charger above client | 1.63                | 0.051                   |
|                        |                                                |                                                                          | Top - charger below client |                     | 0.051                   |
|                        |                                                |                                                                          | Edge 1                     |                     | 0.051                   |
|                        |                                                |                                                                          | Edge 2                     |                     | 0.051                   |
|                        |                                                |                                                                          | Edge 3                     |                     | 0.051                   |
|                        |                                                |                                                                          | Edge 4                     |                     | 0.051                   |
|                        |                                                |                                                                          | max                        |                     | 0.052                   |
|                        | Operating Real Product (Power 50~55% charging) |                                                                          | Top - charger above client |                     | 0.051                   |
|                        |                                                |                                                                          | Top - charger below client |                     | 0.051                   |
|                        |                                                |                                                                          | Edge 1                     |                     | 0.051                   |
|                        |                                                |                                                                          | Edge 2                     |                     | 0.051                   |
|                        |                                                |                                                                          | Edge 3                     |                     | 0.051                   |
|                        |                                                |                                                                          | Edge 4                     |                     | 0.052                   |
|                        |                                                |                                                                          | max                        |                     | 0.052                   |
|                        | Operating Real Product (Power 90~95% charging) |                                                                          | Top - charger above client |                     | 0.051                   |
|                        |                                                |                                                                          | Top - charger below client |                     | 0.051                   |
|                        |                                                |                                                                          | Edge 1                     |                     | 0.051                   |
|                        |                                                |                                                                          | Edge 2                     |                     | 0.051                   |
|                        |                                                |                                                                          | Edge 3                     |                     | 0.051                   |
|                        |                                                |                                                                          | Edge 4                     |                     | 0.052                   |
|                        |                                                |                                                                          | max                        |                     | 0.053                   |
| Configuration 2        | Operating Real Product (Power 90~95% charging) | Edge 4                                                                   |                            | 0.051               |                         |
|                        |                                                | max                                                                      |                            | 0.053               |                         |

**TEST results of DUT to phone test Configuration 3 & 4**

| FCC RF Exposure Result |                                                |                                                                          |                            |                     |                         |
|------------------------|------------------------------------------------|--------------------------------------------------------------------------|----------------------------|---------------------|-------------------------|
| Test Configuration     | Test mode                                      | Test distance                                                            | Test Position              | H-Field Limit (A/m) | H-Field meas data (A/m) |
| Configuration 3        | Operating Real Product (Power <10% charging)   | 15 cm probe to edges of EUT and<br>20 cm probe to top surface of the EUT | Top - charger above client | 1.63                | 0.064                   |
|                        |                                                |                                                                          | Top - charger below client |                     | 0.053                   |
|                        |                                                |                                                                          | Edge 1                     |                     | 0.055                   |
|                        |                                                |                                                                          | Edge 2                     |                     | 0.117                   |
|                        |                                                |                                                                          | Edge 3                     |                     | 0.100                   |
|                        |                                                |                                                                          | Edge 4                     |                     | 0.051                   |
|                        |                                                |                                                                          | max                        |                     | 0.117                   |
|                        | Operating Real Product (Power 50~55% charging) |                                                                          | Top - charger above client |                     | 0.052                   |
|                        |                                                |                                                                          | Top - charger below client |                     | 0.051                   |
|                        |                                                |                                                                          | Edge 1                     |                     | 0.051                   |
|                        |                                                |                                                                          | Edge 2                     |                     | 0.090                   |
|                        |                                                |                                                                          | Edge 3                     |                     | 0.073                   |
|                        |                                                |                                                                          | Edge 4                     |                     | 0.051                   |
|                        |                                                |                                                                          | max                        |                     | 0.091                   |
|                        | Operating Real Product (Power 90~95% charging) |                                                                          | Top - charger above client |                     | 0.053                   |
|                        |                                                |                                                                          | Top - charger below client |                     | 0.051                   |
|                        |                                                |                                                                          | Edge 1                     |                     | 0.051                   |
|                        |                                                |                                                                          | Edge 2                     |                     | 0.099                   |
|                        |                                                |                                                                          | Edge 3                     |                     | 0.068                   |
|                        |                                                |                                                                          | Edge 4                     |                     | 0.051                   |
|                        |                                                |                                                                          | max                        |                     | 0.106                   |
| Configuration 4        | Operating Real Product (Power < 10% charging)  | Edge 2                                                                   |                            | 0.121               |                         |
|                        |                                                | max                                                                      |                            | 0.124               |                         |

**TEST results of DUT to phone test Configuration 5 & 6**

| FCC RF Exposure Result |                                                 |                                                                          |                            |                     |                         |
|------------------------|-------------------------------------------------|--------------------------------------------------------------------------|----------------------------|---------------------|-------------------------|
| Test Configuration     | Test mode                                       | Test distance                                                            | Test Position              | H-Field Limit (A/m) | H-Field meas data (A/m) |
| Configuration 5        | Operating Real Product (Pow er <10% charging)   | 15 cm probe to edges of EUT and<br>20 cm probe to top surface of the EUT | Top - charger below client | 1.63                | 0.079                   |
|                        |                                                 |                                                                          | Edge 1                     |                     | 0.058                   |
|                        |                                                 |                                                                          | Edge 2                     |                     | 0.051                   |
|                        |                                                 |                                                                          | Edge 3                     |                     | 0.102                   |
|                        |                                                 |                                                                          | Edge 4                     |                     | 0.057                   |
|                        |                                                 |                                                                          | max                        |                     | 0.103                   |
|                        | Operating Real Product (Pow er 50~55% charging) |                                                                          | Top - charger below client |                     | 0.082                   |
|                        |                                                 |                                                                          | Edge 1                     |                     | 0.066                   |
|                        |                                                 |                                                                          | Edge 2                     |                     | 0.051                   |
|                        |                                                 |                                                                          | Edge 3                     |                     | 0.075                   |
|                        |                                                 |                                                                          | Edge 4                     |                     | 0.051                   |
|                        |                                                 |                                                                          | max                        |                     | 0.102                   |
|                        | Operating Real Product (Pow er 90~95% charging) |                                                                          | Top - charger below client |                     | 0.083                   |
|                        |                                                 |                                                                          | Edge 1                     |                     | 0.051                   |
|                        |                                                 |                                                                          | Edge 2                     |                     | 0.051                   |
|                        |                                                 |                                                                          | Edge 3                     |                     | 0.074                   |
|                        |                                                 |                                                                          | Edge 4                     |                     | 0.051                   |
|                        |                                                 |                                                                          | max                        |                     | 0.095                   |
| Configuration 6        | Operating Real Product (Pow er < 10% charging)  | Edge 3                                                                   |                            | 0.090               |                         |
|                        |                                                 | max                                                                      |                            | 0.092               |                         |

**6.2.2. FCC SUMMARY OF RESULTS**

| H-Field Limit   |                         |                |
|-----------------|-------------------------|----------------|
| FCC RF Exposure | Maximum meas data (A/m) | Percentage (%) |
| 1.63            | 0.124                   | <b>7.61</b>    |

**Conclusion:**

H-Field result is less than 50% of the MPE limit.

## **Appendixes**

**Refer to separated files for the following appendixes.**

**4789247757-S4V1 FCC Report MPE\_App A\_Test Setup Photos**

**END OF REPORT**