74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, Korea
TEL: +82-31-645-6300 FAX: +82-31-645-6401

# EMI TEST REPORT
## FCC CERTIFICATION

| | |
|---|---|
| **Applicant:**<br>**LG Electronics MobileComm U.S.A., Inc.**<br>**1000 Sylvan Avenue, Englewood Cliffs NJ 07632**<br>**United States** | **Date of Receipt: April 05, 2018**<br>**Date of Issue: April 09, 2018**<br>**Test Report No. HCT-EM-1804-FC017** |

**FCC ID :** **ZNFG710VM**

| | |
|---|---|
| Rule Part(s) / Standard(s) | : FCC CFR 47 PART 15 Subpart B Class B |
| FCC Classification | : JAB (Part 15B – Class B Digital Device) |
| EUT Type | : Multi-band CDMA/GSM/EDGE/WCDMA/LTE phone with WLAN, Bluetooth and RFID |
| Model Name | : LM-G710VM |
| Additional Model Name | : LMG710VM, G710VM, LG-G710PM, LGG710PM, G710PM, LM-G710ULM, LMG710ULM, G710ULM |
| Date of Test | : April 05, 2018 – April 06, 2018 |

The device bearing the trade name and model specified above, has been shown to comply with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in ANSI C63.4-2014. (See Test Report if any modifications were made for compliance)
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 best 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.
HCT certifies that no party to application has been denial the FCC benefits pursuant to Section 5301 of the Anti-Drug Abuse Act of 1988, 21 U.S.C 862

***Tested By***

**Dong-Hwan Seo**
**Test Engineer**
**EMC Team**
**Certification Division**

***Reviewed By***

**Jin-Pyo Hong**
**Technical Manager**
**EMC Team**
**Certification Division**

# REVISION HISTORY

*The revision history for this document is shown in table.*

| Report No. | Issue Date | Information About Changes |
|---|---|---|
| HCT-EM-1804-FC017 | April 09, 2018 | Initial Release |

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# 1. GENERAL INFORMATION

## 1.1 Description of EUT

Its basic purpose is used for communications.

| | |
|---|---|
| FCC ID | ZNFG710VM |
| Model | LM-G710VM |
| Additional Model | LMG710VM, G710VM, LG-G710PM, LGG710PM, G710PM, LM-G710ULM, LMG710ULM, G710ULM |
| EUT Type | Multi-band CDMA/GSM/EDGE/WCDMA/LTE phone with WLAN, Bluetooth and RFID |
| TX Frequency | 824.70 MHz to 848.31 MHz (CDMA BC0)<br>1 851.25 MHz to 1 908.75 MHz (CDMA BC1)<br>817.90 MHz to 823.10 MHz (CDMA BC10)<br>824.20 MHz to 848.80 MHz (GSM 850)<br>1 850.20 MHz to 1 909.80 MHz (GSM 1 900)<br>1 852.4 MHz to 1 907.6 MHz (WCDMA B2)<br>1712.4 MHz to 1752.6 MHz (WCDMA B4)<br>826.40 MHz to 846.60 MHz (WCDMA B5)<br>1 850.7 MHz to 1 909.3 MHz (LTE B2)<br>1 710 MHz to 1 755 MHz (LTE B4)<br>824 MHz to 849 MHz (LTE B5)<br>2 496 MHz to 2 570 MHz (LTE B7)<br>699 MHz to 716 MHz (LTE B12)<br>777 MHz to 787 MHz (LTE B13)<br>704 MHz to 716 MHz (LTE B17)<br>1 850 MHz to 1 915 MHz (LTE B25)<br>814 MHz to 849 MHz (LTE B26)<br>2 496 MHz to 2 690 MHz (LTE B41)<br>3 550 MHz to 3 700 MHz (LTE B48)<br>2 402 MHz to 2 480 MHz (Bluetooth)<br>2 412 MHz to 2 462 MHz (WiFi 2.4 GHz)<br>5 180 MHz to 5 240 MHz (WiFi 5 GHz_UNII 1)<br>5 260 MHz to 5 320 MHz (WiFi 5 GHz_UNII 2A)<br>5 500 MHz to 5 720 MHz (WiFi 5 GHz_UNII 2C)<br>5 745 MHz to 5 825 MHz (WiFi 5 GHz_UNII 3)<br>13.56 MHz (NFC) |
| RX Frequency | 869.70 MHz to 893.31 MHz (CDMA BC0)<br>1 931.25 MHz to 1 988.75 MHz (CDMA BC1)<br>862.00 MHz to 894.00 MHz (CDMA BC10)<br>869.20 MHz to 893.80 MHz (GSM 850)<br>1 930.20 MHz to 1 989.80 MHz (GSM 1 900)<br>1 932.4 MHz to 1 987.6 MHz (WCDMA B2)<br>2 112.4 MHz to 2 152.6 MHz (WCDMA B4)<br>871.40 MHz to 891.60 MHz (WCDMA B5)<br>1 930 MHz to 1 990 MHz (LTE B2)<br>2 110 MHz to 2 155 MHz (LTE B4)<br>869 MHz to 894 MHz (LTE B5)<br>2 516 MHz to 2 690 MHz (LTE B7) |

| | |
|---|---|
| RX Frequency | 729 MHz to 746 MHz (LTE B12)<br>746 MHz to 756 MHz (LTE B13)<br>734 MHz to 746 MHz (LTE B17)<br>1 925 MHz to 1 990 MHz (LTE B25)<br>859 MHz to 894 MHz (LTE B26)<br>2 496 MHz to 2 690 MHz (LTE B41)<br>5150 MHz to 5925 MHz (LTE B46)<br>3 550 MHz to 3 700 MHz (LTE B48)<br>2 402 MHz to 2 480 MHz (Bluetooth)<br>2 412 MHz to 2 462 MHz (WiFi 2.4 GHz)<br>5 180 MHz to 5 240 MHz (WiFi 5 GHz_UNII 1)<br>5 260 MHz to 5 320 MHz (WiFi 5 GHz_UNII 2A)<br>5 500 MHz to 5 720 MHz (WiFi 5 GHz_UNII 2C)<br>5 745 MHz to 5 825 MHz (WiFi 5 GHz_UNII 3)<br>13.56 MHz (NFC) |

## 1.2 Related Submittal(s) / Grant(s)

Original submittal only.

## 1.3 Test Facility

Test site is located at 74, SEOICHEON-RO, 578BEON-GIL, MAJANG-MYEON, ICHEON-SI, GYEONGGI-DO, SOUTH KOREA. Those measurement facilities are constructed in conformance with the requirements of ANSI C63.4-2014. The Normalized site attenuations (30 MHz to 1 GHz) and Site validation (1 GHz to 18 GHz) were performed in accordance with the standard in ANSI C63.4-2014

| Measurement Facilities | Registration Number |
|---|---|
| Radiated Field strength measurement facility<br>3 m Semi Anechoic chamber | 90661 |
| Radiated Field strength measurement facility<br>10 m Semi Anechoic chamber | |

## 1.4 Calibration of Measuring Instrument

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturers recommendations for utilizing calibration equipments, which is traceable to recognized national standards.
Especially, all antenna for measurement is calibrated in accordance with the requirements of C63.5 (Versi on : 2006).

## 1.5 Tested System Details

All equipment descriptions used in the tested system (including inserted cards) are:

| Device Type | Model Name | Serial Number | Manufacturer | FCC ID / DoC |
|---|---|---|---|---|
| EUT | LM-G710VM | - | LG | ZNFG710VM |
| Earphone | EAB64168751 | - | I-SOUND | - |
| Wireless charger | EP-PN920 | - | SAMSUNG | A3LEPPN920 |
| Travel adaptor | EP-TA20JWE | - | SAMSUNG | - |
| USB cable | ECB-DU4EWE | - | SAMSUNG | - |
| Micro SD card | 256GB EVO+UHS-I microSDXC U1 | - | SAMSUNG | - |

## 1.6 Cable Description

| Product Name | Port | Power Cord Shielded (Y/N) | I/O Cable Shielded (Y/N) | Length (m) |
|---|---|---|---|---|
| EUT | Earphone | Y | Y | (P)1.2 |
| Wireless charger | Micro USB | N/A | Y | (D)1.5 |

* The marked “(D)” means the data cable and “(P)” means the power cable.

## 1.7 Noise Suppression Parts on Cable. (I/O Cable)

| Product Name | Port | Ferrite Bead (Y/N) | Location | Metal Hood (Y/N) | Location |
|---|---|---|---|---|---|
| EUT | Earphone | N | N/A | Y | EUT End |
| Wireless charger | Micro USB | N | N/A | Y | Both End |

## 2. MEASUREMENT UNCERTAINTY

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI C63.4-2014.
All measurement uncertainty values are shown with a coverage factor of $k = 2$ to indicate a 95 % level of confidence. The measurement data shown herein meets or exceeds the $U_{CISPR}$ measurement uncertainty values specified in CISPR 16-4-2 and, thus, can be compared directly to specified limits to determine compliance.

| Parameter | Expanded Uncertainty (dB) |
|---|---|
| Conducted Emission (0.15 MHz to 30 MHz) | 1.82 dB ($k = 2$) |
| Radiated Emissions (30 MHz to 1 GHz) | 5.20 dB ($k = 2$) |
| Radiated Emissions (1 GHz to 18 GHz) | 5.24 dB ($k = 2$) |
| Radiated Emissions (18 GHz to 40 GHz) | 5.40 dB ($k = 2$) |

# 3. DESCRIPTION OF TEST

## 3.1 Measurement of Conducted Emission

The test procedure was in accordance with ANSI C63.4-2014, Clause 7.3

a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN).
If the EUT is connected to the PC through USB, the AC power-line adapter of the PC is directly connected to a line impedance stabilization network (LISN).
Other support units were connected to the power mains through another LISN. The two LISNs provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
b. Both conducted lines are measured in Quasi-Peak and Average mode, including the worst-case data points for each tested configuration.
c. The frequency range from 150 kHz to 30 MHz was searched.

**[ Conducted Emission Limits ]**

| Frequency (MHz) | Resolution Bandwidth (kHz) | Quasi-Peak (dB(μV)) | Average (dB(μV)) |
|---|---|---|---|
| 0.15 to 0.5 | 9 | 66 to 56* | 56 to 46* |
| 0.5 to 5 | 9 | 56 | 46 |
| 5 to 30 | 9 | 60 | 50 |

**Decreases with the logarithm of the frequency.*

## 3.2 Measurement of Radiated Emission

The test procedure was in accordance with ANSI C63.4-2014, Clause 8.3

a. The EUT was placed on the top of a turn table 0.8 meters above the ground at a semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
b. The EUT was set 3 m away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
c. The antenna height is varied from 1 m to 4 m above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 m to 4 m and the turn table was turned from 0 degrees to 360 degrees to find the maximum reading.
e. The test-receiver system was set to Quasi-Peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.
f. The test-receiver system was set to Peak and Average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz.
g. Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response.(1 GHz to 40 GHz)

**[ Radiated Emission Limits ]**

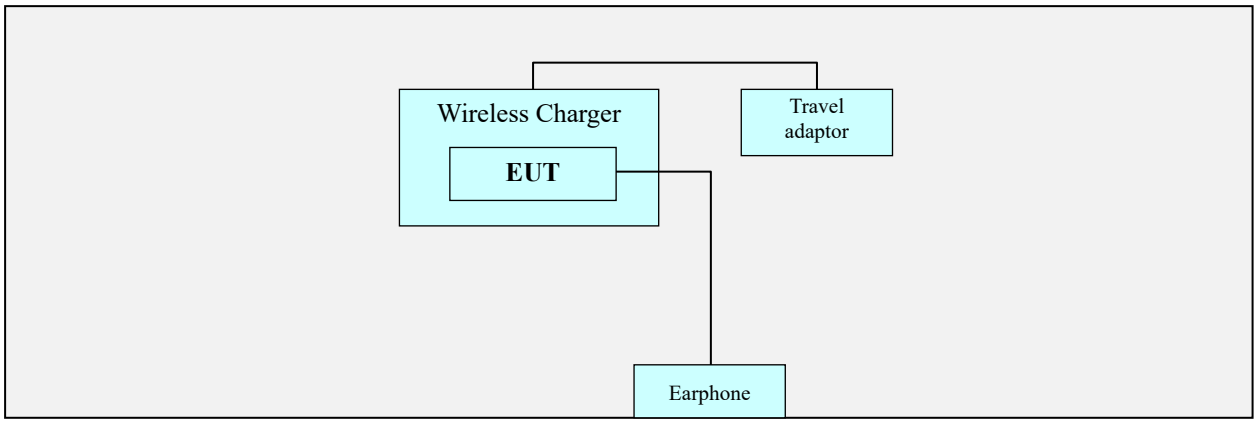
| Frequency (MHz) | Antenna Distance (m) | Field Strength (μV/m) | Quasi-Peak (dB(μV)/m) |
|---|---|---|---|
| 30 to 88 | 3 | 100 | 40.0 |
| 88 to 216 | 3 | 150 | 43.5 |
| 216 to 960 | 3 | 200 | 46.0 |
| Above 960 | 3 | 500 | 54.0 |
| Frequency (MHz) | Antenna Distance (m) | Peak (dB(μV)/m) | Average (dB(μV)/m) |
| Above 1 000 | 3 | 74 | 54 |

## 3.2.1 Frequency Range of Radiated Measurements

An unintentional radiator, including a digital device, the spectrum shall be investigated from the lowest radio frequency signal generated or used in the device, without going below the lowest frequency for which a Radiated Emission limit is specified, up to the frequency shown in the following table

| Highest frequency generated or used in the device or on which the device operates or tunes (MHz) | Upper frequency of measurement range (MHz) |
|---|---|
| Below 1.705 | 30 |
| 1.705 to 108 | 1 000 |
| 108 to 500 | 2 000 |
| 500 to 1 000 | 5 000 |
| Above 1 000 | 5th harmonic of the highest frequency or 40 ㎓, whichever is lower |

## 3.3 Configuration of Tested System




**Non-Conductive Table**
Power Line: 120 VAC, 60 Hz

# 4. PRELIMINARY TEST

## 4.1 Conducted Emission Test (Not Applicable)

It was tested Data Communication mode, after connecting all peripheral devices.

**Operation Mode:** ☒ Not applicable

## 4. 2 Radiated Emission Test

It was tested Data Communication mode, after connecting all peripheral devices.

**Operation Mode:** ☒ Wireless Charging mode

# 5. CONDUCTED AND RADIATED EMISSION TEST SUMMARY

## 5.1 Conducted Emission Test (Not Applicable)

The test results of conducted emission at mains ports provide the following information:

| | |
|---|---|
| Rule Part / Standard | FCC PART 15 Subpart B Class B |
| Detector | Quasi-Peak, CISPR-Average |
| Bandwidth | 9 kHz (6 dB) |
| Operation Mode | - |
| Kind of Test Site | Shielded Room |
| Temperature | - °C |
| Relative Humidity | - % |
| Test Date | - |

## 5.2 Radiated Emission Test

The test results of radiated emission provide the following information:

### -For Measurement Below 1 GHz

| | |
|---|---|
| Rule Part / Standard | FCC PART 15 Subpart B Class B |
| Detector | Quasi-Peak |
| Bandwidth | 120 kHz (6 dB) |
| Worst Case of Operation Mode | Wireless Charging mode |
| Kind of Test Site | 3 m semi anechoic chamber |
| Temperature | 21.8 °C |
| Relative Humidity | 45.7 % |
| Test Date | April 06, 2018 |

| Frequency (MHz) | Quasi Peak (dBµV/m) | Antenna Height (cm) | POL. (H/V) | Azimuth (deg) | Corr. (dB) | Margin (dB) | Limit (dBµV/m) |
|---|---|---|---|---|---|---|---|
| 39.148000 | 32.9 | 99.7 | V | 31.0 | 19.6 | 6.3 | 40.0 |
| 45.236800 | 30.6 | 99.9 | V | 118.0 | 20.0 | 9.4 | 40.0 |
| 80.293600 | 26.2 | 391.8 | H | 123.0 | 15.6 | 13.8 | 40.0 |
| 114.554400 | 21.8 | 225.1 | V | 246.0 | 17.2 | 21.7 | 43.5 |
| 137.541600 | 23.9 | 99.8 | V | 246.0 | 19.4 | 19.6 | 43.5 |
| 214.694400 | 24.0 | 174.7 | V | 131.0 | 17.4 | 19.5 | 43.5 |

### *- Calculation Formula:*

1. POL. H = Horizontal, POL. V = Vertical
2. QuasiPeak = Reading (Receiver Reading) + Corr.
3. Corr. (Correction Factor) = Antenna Factor + Cable Loss
4. Margin = Limit - QuasiPeak

## -For Measurement Above 1 GHz

| | |
|---|---|
| Rule Part / Standard | FCC PART 15 Subpart B Class B |
| Detector | Peak mode: Peak (RBW: 1 MHz, VBW: 3 MHz)<br>CISPR-Average mode: Peak (RBW: 1 MHz, VBW: 10 Hz) |
| Highest Operating Frequency | 5 825 MHz |
| Upper Frequency | 1 GHz to 29.125 GHz |
| Worst Case of Operation Mode | Wireless Charging mode |
| Kind of Test Site | 3 m semi anechoic chamber |
| Temperature | 22.1 °C |
| Relative Humidity | 46.1 % |
| Test Date | April 05, 2018 |

| Frequency (MHz) | Peak (dBµV/m) | Antenna Height (cm) | POL. (H/V) | Azimuth (deg) | Corr. (dB) | Margin (dB) | Limit (dBµV/m) |
|---|---|---|---|---|---|---|---|
| 2702.065000 | 33.4 | 160.5 | V | 0.0 | -23.7 | 40.6 | 74.0 |
| 3557.105000 | 34.1 | 150.0 | V | 34.0 | -22.1 | 39.9 | 74.0 |
| 4923.885000 | 36.3 | 248.5 | H | 282.0 | -18.5 | 37.7 | 74.0 |
| 7343.685000 | 40.8 | 150.0 | V | 20.0 | -12.6 | 33.2 | 74.0 |
| 8441.660000 | 41.6 | 138.8 | V | 248.0 | -12.0 | 32.4 | 74.0 |
| 9197.940000 | 42.8 | 149.9 | H | 0.0 | -11.1 | 31.2 | 74.0 |

| Frequency (MHz) | CAverage (dBµV/m) | Antenna Height (cm) | POL. (H/V) | Azimuth (deg) | Corr. (dB) | Margin (dB) | Limit (dBµV/m) |
|---|---|---|---|---|---|---|---|
| 2702.065000 | 20.4 | 160.5 | V | 0.0 | -23.7 | 33.6 | 54.0 |
| 3557.105000 | 20.8 | 150.0 | V | 34.0 | -22.1 | 33.2 | 54.0 |
| 4923.885000 | 23.5 | 248.5 | H | 282.0 | -18.5 | 30.5 | 54.0 |
| 7343.685000 | 28.2 | 150.0 | V | 20.0 | -12.6 | 25.8 | 54.0 |
| 8441.660000 | 29.2 | 138.8 | V | 248.0 | -12.0 | 24.8 | 54.0 |
| 9197.940000 | 30.1 | 149.9 | H | 0.0 | -11.1 | 23.9 | 54.0 |

### *- Calculation Formula:*

1. POL. H = Horizontal, POL. V = Vertical
2. Peak or CAverage = Reading (Receiver Reading) + Corr.
3. Corr. (Correction Factor) = Antenna Factor+ Cable Loss –Amplifier Gain
4. Margin = Limit - Peak or CAverage

# 6. LIST OF TEST EQUIPMENT

| Type | Manufacturer | Model Name | Serial Number | Calibration Cycle | CAL Date |
|---|---|---|---|---|---|
| Conducted Emission | | | | | |
| ☐ EMI Test Receiver | Rohde & Schwarz | ESCI | 100584 | 1 year | 06.20.2017 |
| ☐ EMI Test Receiver | Rohde & Schwarz | ESCI | 100033 | 1 year | 06.27.2017 |
| ☐ LISN | Rohde & Schwarz | ENV216 | 102245 | 1 year | 12.20.2017 |
| ☐ LISN | Rohde & Schwarz | ESH3-Z5 | 100282 | 1 year | 05.22.2017 |
| ☐ LISN | Rohde & Schwarz | ENV216 | 100073 | 1 year | 07.18.2017 |
| ☐ Software | Rohde & Schwarz | EMC32 VER8.54.0 | - | - | - |
| Radiated Emission | | | | | |
| -For measurement below 1 GHz | | | | | |
| ☒ EMI Test Receiver | Rohde & Schwarz | ESU40 | 100524 | 1 year | 08.16.2017 |
| ☒ Trilog Antenna | Schwarzbeck | VULB 9168 | 760 | 2 year | 04.06.2017 |
| ☒ Antenna master | INNCO Systems | MA4000-XP-ET | - | N/A | - |
| ☒ Antenna master controller | INNCO Systems | CO 3000 | CO 3000/870/ 35990515/L | N/A | - |
| ☒ Turn Table | INNCO Systems | - | - | N/A | - |
| ☒ Turn Table controller | INNCO Systems | CO2000 | - | N/A | - |
| ☐ EMI Test Receiver | Rohde & Schwarz | ESU26 | 100241 | 1 year | 08.16.2017 |
| ☐ Antenna master | INNCO Systems | MA4000-EP | MA4000/283 | N/A | - |
| ☐ Turn Table | INNCO Systems | DT3000-3T | DT3000/69 | N/A | - |
| ☒ Software | Rohde & Schwarz | EMC32 VER8.40.0 | - | - | - |
| -For measurement above 1 GHz | | | | | |
| ☒ EMI Test Receiver | Rohde & Schwarz | ESU40 | 100524 | 1 year | 08.16.2017 |
| ☒ Antenna master | INNCO Systems | MA4000-XP-ET | - | N/A | - |
| ☒ Antenna master controller | INNCO Systems | CO 3000 | CO 3000/870/ 35990515/L | N/A | - |
| ☒ Turn Table | INNCO Systems | - | - | N/A | - |
| ☒ Turn Table controller | INNCO Systems | CO2000 | - | N/A | - |
| ☒ Low Noise Amplifier | TESTEK | TK-PA18H | 170034-L | 1 year | 03.06.2018 |
| ☒ Horn Antenna | BBHA 9120D | Schwarzbeck | 296 | 2 year | 10.12.2016 |
| ☒ Horn Antenna | BBHA 9170 | Schwarzbeck | BBHA9170#786 | 2 year | 12.05.2017 |
| ☒ Power Amplifier | TK-PA1840H | TESTEK | 170030-L | 1 year | 12.20.2017 |
| ☐ Antenna master controller | HD GmbH | HD 100 | 100/637 | N/A | - |
| ☐ Power Amplifier | CERNEX | CBLU1183540 | 21691 | 1 year | 06.28.2017 |
| ☐ Antenna master | HD GmbH | MA240 | 240/520 | N/A | - |
| ☐ Horn Antenna | Schwarzbeck | BBHA 9120D | 1300 | 2 year | 06.30.2017 |
| ☐ EMI Test Receiver | Rohde & Schwarz | ESU26 | 100241 | 1 year | 08.16.2017 |
| ☐ Turn Table | INNCO Systems | DT3000-3T | DT3000/69 | N/A | - |
| ☒ Software | Rohde & Schwarz | EMC32 VER8.40.0 | - | - | - |

## 7. CONCLUSION

The data collected shows that the **EUT Type: Multi-band CDMA/GSM/EDGE/WCDMA/LTE phone with WLAN, Bluetooth and RFID, Model: LM-G710VM, FCC ID: ZNFG710VM** complies with §15.107 and §15.109 of the FCC rules.

# 8. APPENDIX A. TEST SETUP PHOTOGRAPHS

Please refer to Appendix A