

# EMI TEST REPORT

## FCC CERTIFICATION

**Applicant:****LG Electronics USA, Inc.****1000 Sylvan Avenue, Englewood Cliffs NJ 07632****United States****Date of Issue: February 22, 2019****Test Report No. HCT-EM-1902-FC010****Test Site: HCT CO., LTD.****FCC ID :****ZNFX220TB**

Rule Part(s) / Standard(s) : FCC CFR 47 PART 15 Subpart B Class B  
ANSI C63.4-2014

EUT Type : Multi-band GSM/EDGE/WCDMA/LTE Phone with WLAN and  
Bluetooth

Model Name : LM-X220TB

Series Model Name : LMX220TB, X220TB, LM-X220MB, LMX220MB, X220MB

Travel Adaptor Information : Model Name: MCS-V01WP / Manufacturer: PNTELECOM

Date of Test : February 11, 2019 to February 21, 2019

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 denied the FCC benefits pursuant to Section 5301 of the Anti-Drug Abuse Act of 1988, 21 U.S.C 862

**Tested By**

**Na-Eun Song**  
**Test Engineer**  
**EMC Team**  
**Certification Division**

**Reviewed**

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

This report only responds to the tested sample and may not be reproduced, except in full, without written approval of the HCT Co., Ltd.



## REVISION HISTORY

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

| Report No.        | Issue Date        | Information About Changes |
|-------------------|-------------------|---------------------------|
| HCT-EM-1902-FC010 | February 22, 2019 | Initial Release           |



## TABLE OF CONTENTS

|                                                         | PAGE |
|---------------------------------------------------------|------|
| 1. GENERAL INFORMATION .....                            | 4    |
| 1.1 Description of EUT .....                            | 4    |
| 1.2 Tested System Details .....                         | 5    |
| 1.3 Cable Description .....                             | 5    |
| 1.4 Noise Suppression Parts on Cable. (I/O Cable) ..... | 5    |
| 1.5 Test Facility .....                                 | 6    |
| 1.6 Calibration of Measuring Instrument .....           | 6    |
| 1.7 Measurement Uncertainty .....                       | 6    |
| 2. LIST OF TEST EQUIPMENT .....                         | 7    |
| 3. DESCRIPTION OF TEST .....                            | 8    |
| 3.1 Measurement of Conducted Emission .....             | 8    |
| 3.2 Measurement of Radiated Emission .....              | 9    |
| 4. OPERATING MODES .....                                | 11   |
| 4.1 Conducted Emission .....                            | 11   |
| 4.2 Radiated Emission .....                             | 11   |
| 5. CONDUCTED AND RADIATED EMISSION TEST SUMMARY .....   | 12   |
| 5.1 Conducted Emission .....                            | 12   |
| 5.2 Radiated Emission .....                             | 19   |
| 6. CONCLUSION .....                                     | 21   |
| 7. APPENDIX A. TEST SETUP PHOTOGRAPHS .....             | 22   |



## 1. GENERAL INFORMATION

### 1.1 Description of EUT

Its basic purpose is used for communications.

|                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|-------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| FCC ID            | ZNFX220TB                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Model             | LM-X220TB                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Series Model Name | LMX220TB, X220TB, LM-X220MB, LMX220MB, X220MB                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| EUT Type          | Multi-band GSM/EDGE/WCDMA/LTE Phone with WLAN and Bluetooth                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| TX Frequency      | 824.2 MHz to 848.8 MHz (GSM 850)<br>1 850.2 MHz to 1 909.8 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>826.4 MHz to 846.6 MHz (WCDMA B5)<br>1 850 MHz to 1 910 MHz (LTE B2)<br>1 710 MHz to 1 755 MHz (LTE B4)<br>824 MHz to 849 MHz (LTE B5)<br>699 MHz to 716 MHz (LTE B12)<br>1 850 MHz to 1 915 MHz (LTE B25)<br>814 MHz to 849 MHz (LTE B26)<br>1 710 MHz to 1 780 MHz (LTE B66)<br>663 MHz to 698 MHz (LTE B71)<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)   |
| RX Frequency      | 869.2 MHz to 893.8 MHz (GSM 850)<br>1 930.2 MHz to 1 989.8 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>871.4 MHz to 891.6 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>729 MHz to 746 MHz (LTE B12)<br>1 925 MHz to 1 990 MHz (LTE B25)<br>859 MHz to 894 MHz (LTE B26)<br>2 110 MHz to 2 200 MHz (LTE B66)<br>617 MHz to 652 MHz (LTE B71)<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) |



## 1.2 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-X220TB                                      | -             | LG           | ZNFX220TB    |
| Data Cable    | EAD62377927                                    | -             | Ningbo Broad | -            |
| Earphone      | EAB64269004                                    | -             | CRESYN       | -            |
| TA            | MCS-V01WP                                      | -             | PNTELECOM    | -            |
| Micro SD Card | Extreme MicroSDHC<br>UHS-I CLASS 10<br>(32 GB) | -             | SanDisk      | -            |

## 1.3 Cable Description

| Product Name | Port      | Power Cord<br>Shielded (Y/N) | I/O Cable Shielded<br>(Y/N) | Length (m) |
|--------------|-----------|------------------------------|-----------------------------|------------|
| EUT          | Micro USB | Y                            | N/A                         | (P)1.0     |
|              | Earphone  | N/A                          | N                           | (D)1.2     |

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

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

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



## 1.5 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 |                     |

## 1.6 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 (Version : 2006).

## 1.7 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  $U_{\text{CISPR}}$  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                   |
| Radiated Emissions (30 MHz to 1 GHz)    | 5.20 dB                   |
| Radiated Emissions (1 GHz to 18 GHz)    | 5.24 dB                   |
| Radiated Emissions (18 GHz to 40 GHz)   | 5.40 dB                   |



## 2. LIST OF TEST EQUIPMENT

| <u>Type</u>                                                   | <u>Manufacturer</u> | <u>Model Name</u> | <u>Serial Number</u>      | <u>Calibration Cycle</u> | <u>CAL Date</u> |
|---------------------------------------------------------------|---------------------|-------------------|---------------------------|--------------------------|-----------------|
| <u>Conducted Emission</u>                                     |                     |                   |                           |                          |                 |
| <input checked="" type="checkbox"/> EMI Test Receiver         | Rohde & Schwarz     | ESCI              | 100584                    | 1 year                   | 06.25.2018      |
| <input checked="" type="checkbox"/> LISN                      | Rohde & Schwarz     | ENV216            | 102245                    | 1 year                   | 12.12.2018      |
| <input checked="" type="checkbox"/> Software                  | Rohde & Schwarz     | EMC32 VER8.54.0   | -                         | -                        | -               |
| <u>Radiated Emission</u>                                      |                     |                   |                           |                          |                 |
| -For measurement below 1 GHz                                  |                     |                   |                           |                          |                 |
| <input checked="" type="checkbox"/> EMI Test Receiver         | Rohde & Schwarz     | ESU40             | 100524                    | 1 year                   | 07.27.2018      |
| <input checked="" type="checkbox"/> Trilog Antenna            | Schwarzbeck         | VULB 9168         | 00847                     | 2 year                   | 04.13.2018      |
| <input checked="" type="checkbox"/> Antenna master            | INNCO Systems       | MA4640-XP-ET      | -                         | N/A                      | -               |
| <input checked="" type="checkbox"/> Antenna master controller | INNCO Systems       | CO 3000           | CO3000/870/<br>35990515/L | N/A                      | -               |
| <input checked="" type="checkbox"/> Turn Table                | INNCO Systems       | 1060              | -                         | N/A                      | -               |
| <input checked="" type="checkbox"/> Turn Table controller     | INNCO Systems       | CO2000            | CO2000/095/<br>7590304/L  | N/A                      | -               |
| <input type="checkbox"/> EMI Test Receiver                    | Rohde & Schwarz     | ESU26             | 100241                    | 1 year                   | 08.14.2018      |
| <input type="checkbox"/> Antenna master                       | INNCO Systems       | MA4000-EP         | MA4000/283                | N/A                      | -               |
| <input type="checkbox"/> Turn Table                           | INNCO Systems       | DT3000-3T         | DT3000/69                 | N/A                      | -               |
| <input checked="" type="checkbox"/> Software                  | Rohde & Schwarz     | EMC32 VER8.40.0   | -                         | -                        | -               |
| -For measurement above 1 GHz                                  |                     |                   |                           |                          |                 |
| <input checked="" type="checkbox"/> EMI Test Receiver         | Rohde & Schwarz     | ESU40             | 100524                    | 1 year                   | 07.27.2018      |
| <input checked="" type="checkbox"/> Antenna master            | INNCO Systems       | MA4640-XP-ET      | -                         | N/A                      | -               |
| <input checked="" type="checkbox"/> Antenna master controller | INNCO Systems       | CO3000            | CO3000/870/<br>35990515/L | N/A                      | -               |
| <input checked="" type="checkbox"/> Turn Table                | INNCO Systems       | 1060              | -                         | N/A                      | -               |
| <input checked="" type="checkbox"/> Turn Table controller     | INNCO Systems       | CO2000            | CO2000/095/<br>7590304/L  | N/A                      | -               |
| <input checked="" type="checkbox"/> Horn Antenna              | Schwarzbeck         | BBHA 9120D        | 01836                     | 2 year                   | 05.14.2018      |
| <input checked="" type="checkbox"/> Low Noise Amplifier       | TESTEK              | TK-PA18H          | 170034-L                  | 1 year                   | 03.06.2018      |
| <input checked="" type="checkbox"/> Horn Antenna              | Schwarzbeck         | BBHA 9170         | BBHA9170#786              | 2 year                   | 12.05.2017      |
| <input checked="" type="checkbox"/> Power Amplifier           | TESTEK              | TK-PA1840H        | 170030-L                  | 1 year                   | 12.17.2018      |
| <input type="checkbox"/> Antenna master controller            | HD GmbH             | HD 100            | 100/637                   | N/A                      | -               |
| <input type="checkbox"/> Power Amplifier                      | CERNEX              | CBLU1183540       | 21691                     | 1 year                   | 06.25.2018      |
| <input type="checkbox"/> Antenna master                       | HD GmbH             | MA240             | 240/520                   | N/A                      | -               |
| <input type="checkbox"/> EMI Test Receiver                    | Rohde & Schwarz     | ESU26             | 100241                    | 1 year                   | 08.14.2018      |
| <input type="checkbox"/> Turn Table                           | INNCO Systems       | DT3000-3T         | DT3000/69                 | N/A                      | -               |
| <input checked="" type="checkbox"/> Software                  | Rohde & Schwarz     | EMC32 VER8.40.0   | -                         | -                        | -               |



### 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<br>(MHz) | Resolution Bandwidth<br>(kHz) | Quasi-Peak<br>(dB(μV)) | Average<br>(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 ( $\mu\text{V}/\text{m}$ )  | Quasi-Peak ( $\text{dB}(\mu\text{V})/\text{m}$ ) |
|-----------------|----------------------|--------------------------------------------|--------------------------------------------------|
| 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 ( $\text{dB}(\mu\text{V})/\text{m}$ ) | Average ( $\text{dB}(\mu\text{V})/\text{m}$ )    |
| 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                                                                                      | 5 <sup>th</sup> harmonic of the highest frequency or 40 GHz, 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

It was tested the following operating mode, after connecting all peripheral devices.

**Operating Modes:**

- ☒ FRONT CAMERA & MP3 mode
- ☒ REAR CAMERA & FM RADIO mode
- ☒ IDLE mode

*NOTE. The worst-case emissions are reported.*

### 4.2 Radiated Emission

It was tested the following operating mode, after connecting all peripheral devices.

**Operating Modes:**

- ☒ FRONT CAMERA & MP3 mode
- ☒ REAR CAMERA & FM RADIO mode
- ☒ IDLE mode

*NOTE. The worst-case emissions are reported.*



## 5. CONDUCTED AND RADIATED EMISSION TEST SUMMARY

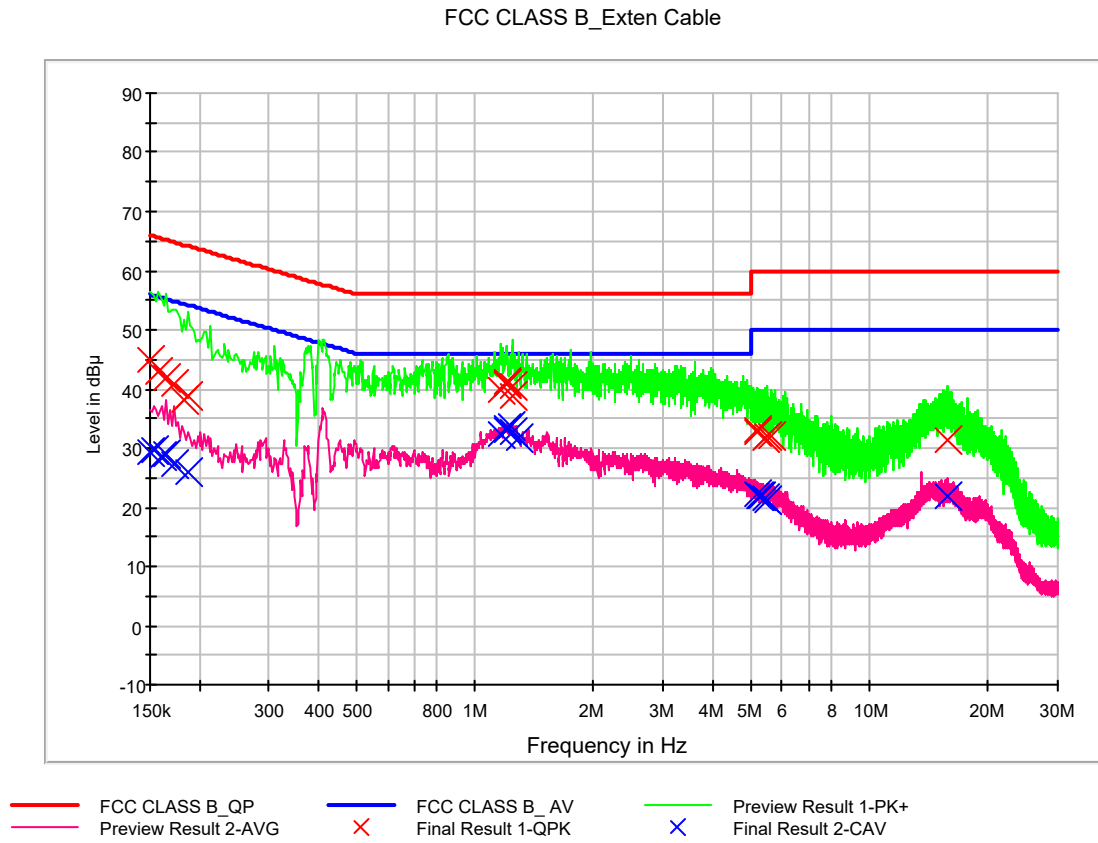
### 5.1 Conducted Emission

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)                  |
| Operating Mode       | REAR CAMERA & FM RADIO mode   |
| Kind of Test Site    | Shielded Room                 |
| Temperature          | 23.2 °C                       |
| Relative Humidity    | 40.9 %                        |
| Test Date            | February 11, 2019             |

#### **- Calculation Formula:**

1. Conductor L1 = Hot, Conductor N = Neutral
2. Corr. = LISN Factor + Cable Loss
3. QuasiPeak or CAverage= Receiver Reading + Corr.
4. Margin = Limit – QuasiPeak or CAverage

**Figure 1: Conducted Emission, AC Main Port, Line (L1)**



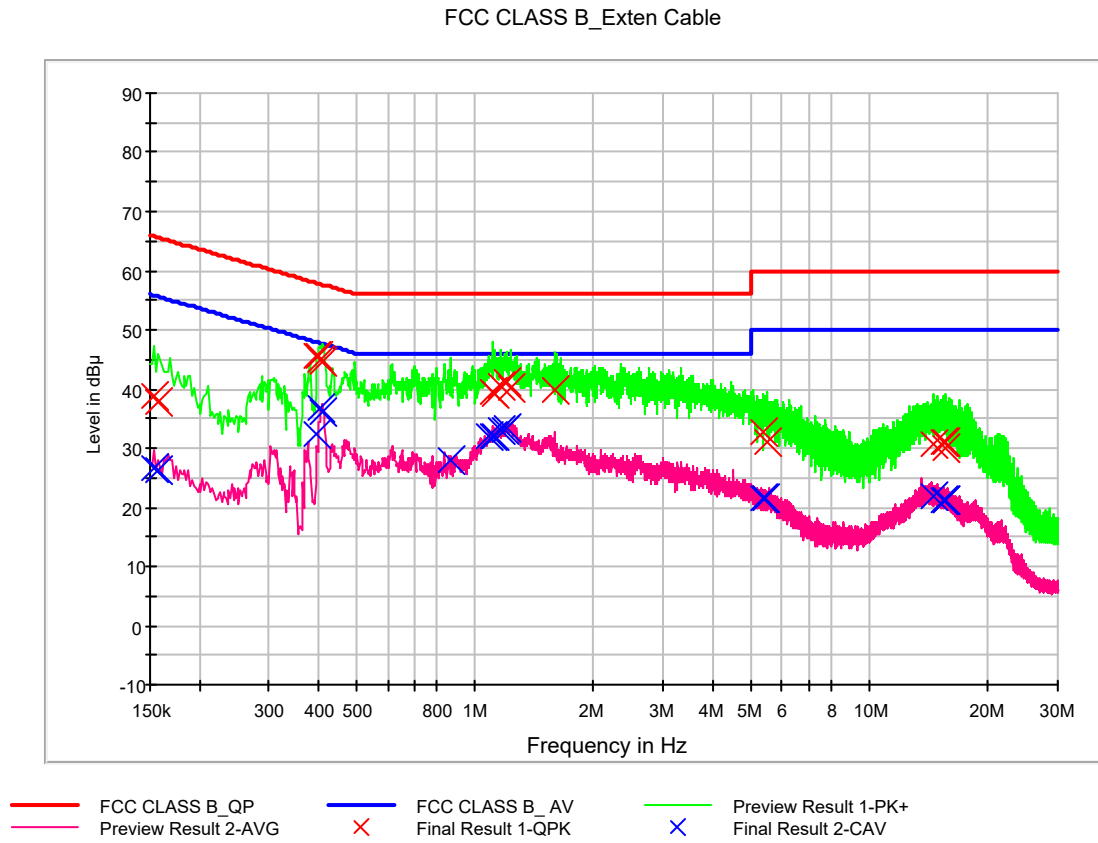
### QuasiPeak Final Result, Line (L1)

| Frequency (MHz) | QuasiPeak (dBuV) | Bandwidth (kHz) | Line | Corr. (dB) | Margin (dB) | Limit (dBuV) |
|-----------------|------------------|-----------------|------|------------|-------------|--------------|
| 0.150000        | 44.8             | 9.000           | L1   | 9.7        | 21.2        | 66.0         |
| 0.158000        | 42.9             | 9.000           | L1   | 9.7        | 22.7        | 65.6         |
| 0.164000        | 41.9             | 9.000           | L1   | 9.7        | 23.4        | 65.3         |
| 0.172000        | 40.9             | 9.000           | L1   | 9.7        | 24.0        | 64.9         |
| 0.182000        | 38.0             | 9.000           | L1   | 9.7        | 26.4        | 64.4         |
| 0.188000        | 38.8             | 9.000           | L1   | 9.7        | 25.4        | 64.1         |
| 1.158000        | 39.8             | 9.000           | L1   | 9.8        | 16.2        | 56.0         |
| 1.198000        | 40.7             | 9.000           | L1   | 9.8        | 15.3        | 56.0         |
| 1.204000        | 40.8             | 9.000           | L1   | 9.8        | 15.2        | 56.0         |
| 1.210000        | 41.2             | 9.000           | L1   | 9.8        | 14.8        | 56.0         |
| 1.246000        | 40.6             | 9.000           | L1   | 9.9        | 15.4        | 56.0         |
| 1.250000        | 38.7             | 9.000           | L1   | 9.9        | 17.3        | 56.0         |
| 5.182000        | 32.6             | 9.000           | L1   | 10.0       | 27.4        | 60.0         |
| 5.196000        | 33.0             | 9.000           | L1   | 10.0       | 27.0        | 60.0         |
| 5.436000        | 31.8             | 9.000           | L1   | 10.0       | 28.2        | 60.0         |
| 5.474000        | 32.1             | 9.000           | L1   | 10.0       | 27.9        | 60.0         |
| 5.632000        | 32.2             | 9.000           | L1   | 10.1       | 27.8        | 60.0         |
| 15.826000       | 31.3             | 9.000           | L1   | 10.4       | 28.7        | 60.0         |



## CAverage Final Result, Line (L1)

| Frequency (MHz) | CAverage (dBuV) | Bandwidth (kHz) | Line | Corr. (dB) | Margin (dB) | Limit (dBuV) |
|-----------------|-----------------|-----------------|------|------------|-------------|--------------|
| 0.150000        | 29.4            | 9.000           | L1   | 9.7        | 26.6        | 56.0         |
| 0.154000        | 29.7            | 9.000           | L1   | 9.7        | 26.1        | 55.8         |
| 0.160000        | 28.7            | 9.000           | L1   | 9.7        | 26.7        | 55.5         |
| 0.164000        | 29.1            | 9.000           | L1   | 9.7        | 26.2        | 55.3         |
| 0.172000        | 27.3            | 9.000           | L1   | 9.7        | 27.6        | 54.9         |
| 0.188000        | 25.8            | 9.000           | L1   | 9.7        | 28.3        | 54.1         |
| 1.158000        | 32.5            | 9.000           | L1   | 9.8        | 13.5        | 46.0         |
| 1.198000        | 33.3            | 9.000           | L1   | 9.8        | 12.7        | 46.0         |
| 1.210000        | 33.2            | 9.000           | L1   | 9.8        | 12.8        | 46.0         |
| 1.236000        | 33.6            | 9.000           | L1   | 9.9        | 12.4        | 46.0         |
| 1.246000        | 32.9            | 9.000           | L1   | 9.9        | 13.1        | 46.0         |
| 1.290000        | 31.6            | 9.000           | L1   | 9.9        | 14.4        | 46.0         |
| 5.196000        | 22.1            | 9.000           | L1   | 10.0       | 27.9        | 50.0         |
| 5.262000        | 21.9            | 9.000           | L1   | 10.0       | 28.1        | 50.0         |
| 5.338000        | 22.0            | 9.000           | L1   | 10.0       | 28.0        | 50.0         |
| 5.436000        | 21.6            | 9.000           | L1   | 10.0       | 28.4        | 50.0         |
| 5.474000        | 21.4            | 9.000           | L1   | 10.0       | 28.6        | 50.0         |
| 15.826000       | 21.9            | 9.000           | L1   | 10.4       | 28.1        | 50.0         |

**Figure 2: Conducted Emission, AC Main Port, Line (N)**



### QuasiPeak Final Result, Line (N)

| Frequency (MHz) | QuasiPeak (dBuV) | Bandwidth (kHz) | Line | Corr. (dB) | Margin (dB) | Limit (dBuV) |
|-----------------|------------------|-----------------|------|------------|-------------|--------------|
| 0.154000        | 38.6             | 9.000           | N    | 9.8        | 27.1        | 65.8         |
| 0.158000        | 37.9             | 9.000           | N    | 9.8        | 27.6        | 65.6         |
| 0.398000        | 45.4             | 9.000           | N    | 9.9        | 12.5        | 57.9         |
| 0.402000        | 45.7             | 9.000           | N    | 9.9        | 12.1        | 57.8         |
| 0.406000        | 45.0             | 9.000           | N    | 9.9        | 12.8        | 57.7         |
| 0.412000        | 44.4             | 9.000           | N    | 9.9        | 13.2        | 57.6         |
| 1.112000        | 39.6             | 9.000           | N    | 10.0       | 16.4        | 56.0         |
| 1.120000        | 39.3             | 9.000           | N    | 10.0       | 16.7        | 56.0         |
| 1.162000        | 40.6             | 9.000           | N    | 10.0       | 15.4        | 56.0         |
| 1.198000        | 41.2             | 9.000           | N    | 10.0       | 14.8        | 56.0         |
| 1.236000        | 40.0             | 9.000           | N    | 10.0       | 16.0        | 56.0         |
| 1.602000        | 39.9             | 9.000           | N    | 10.1       | 16.1        | 56.0         |
| 5.378000        | 32.7             | 9.000           | N    | 10.2       | 27.3        | 60.0         |
| 5.478000        | 31.2             | 9.000           | N    | 10.2       | 28.8        | 60.0         |
| 14.512000       | 30.8             | 9.000           | N    | 10.6       | 29.2        | 60.0         |
| 15.370000       | 30.9             | 9.000           | N    | 10.7       | 29.1        | 60.0         |
| 15.638000       | 31.0             | 9.000           | N    | 10.7       | 29.0        | 60.0         |
| 15.652000       | 30.1             | 9.000           | N    | 10.7       | 29.9        | 60.0         |



## CAverage Final Result, Line (N)

| Frequency (MHz) | CAverage (dBuV) | Bandwidth (kHz) | Line | Corr. (dB) | Margin (dB) | Limit (dBuV) |
|-----------------|-----------------|-----------------|------|------------|-------------|--------------|
| 0.154000        | 26.6            | 9.000           | N    | 9.8        | 29.2        | 55.8         |
| 0.158000        | 26.4            | 9.000           | N    | 9.8        | 29.1        | 55.6         |
| 0.398000        | 32.3            | 9.000           | N    | 9.9        | 15.6        | 47.9         |
| 0.406000        | 36.8            | 9.000           | N    | 9.9        | 10.9        | 47.7         |
| 0.410000        | 36.0            | 9.000           | N    | 9.9        | 11.6        | 47.6         |
| 0.868000        | 27.9            | 9.000           | N    | 10.0       | 18.1        | 46.0         |
| 1.084000        | 32.0            | 9.000           | N    | 10.0       | 14.0        | 46.0         |
| 1.112000        | 32.0            | 9.000           | N    | 10.0       | 14.0        | 46.0         |
| 1.120000        | 32.1            | 9.000           | N    | 10.0       | 13.9        | 46.0         |
| 1.162000        | 32.9            | 9.000           | N    | 10.0       | 13.1        | 46.0         |
| 1.190000        | 33.1            | 9.000           | N    | 10.0       | 12.9        | 46.0         |
| 1.198000        | 33.5            | 9.000           | N    | 10.0       | 12.5        | 46.0         |
| 5.378000        | 21.4            | 9.000           | N    | 10.2       | 28.6        | 50.0         |
| 5.470000        | 21.4            | 9.000           | N    | 10.2       | 28.6        | 50.0         |
| 14.512000       | 21.9            | 9.000           | N    | 10.6       | 28.1        | 50.0         |
| 15.370000       | 21.2            | 9.000           | N    | 10.7       | 28.8        | 50.0         |
| 15.638000       | 21.1            | 9.000           | N    | 10.7       | 28.9        | 50.0         |
| 15.652000       | 21.1            | 9.000           | N    | 10.7       | 28.9        | 50.0         |



## 5.2 Radiated Emission

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)                |
| Operating Mode       | REAR CAMERA & FM RADIO mode   |
| Kind of Test Site    | 3 m semi anechoic chamber     |
| Temperature          | 22.0 °C                       |
| Relative Humidity    | 42.1 %                        |
| Test Date            | February 20, 2019             |

| Frequency (MHz) | Quasi Peak (dBμV/m) | Antenna Height (cm) | POL. (H/V) | Azimuth (deg) | Corr. (dB) | Margin (dB) | Limit (dBμV/m) |
|-----------------|---------------------|---------------------|------------|---------------|------------|-------------|----------------|
| 48.511200       | 23.6                | 100.0               | V          | 18.0          | 20.3       | 16.4        | 40.0           |
| 59.744800       | 17.4                | 100.0               | V          | 146.0         | 19.6       | 22.6        | 40.0           |
| 64.879200       | 16.7                | 207.9               | H          | 256.0         | 18.9       | 23.3        | 40.0           |
| 67.179200       | 16.4                | 100.0               | V          | 100.0         | 18.6       | 23.6        | 40.0           |
| 98.606400       | 22.3                | 206.9               | H          | 97.0          | 15.3       | 21.2        | 43.5           |
| 699.772800      | 28.6                | 100.0               | H          | 228.0         | 28.8       | 17.4        | 46.0           |

### - 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 Frequency      | 5 825 MHz                                                                                     |
| Tested Frequency Range | 1 GHz to 30 GHz                                                                               |
| Operating Mode         | REAR CAMERA & FM RADIO mode                                                                   |
| Kind of Test Site      | 3 m semi anechoic chamber                                                                     |
| Temperature            | 23.1 °C                                                                                       |
| Relative Humidity      | 43.5 %                                                                                        |
| Test Date              | February 21, 2019                                                                             |

| Frequency (MHz) | Peak (dBμV/m) | Antenna Height (cm) | POL. (H/V) | Azimuth (deg) | Corr. (dB) | Margin (dB) | Limit (dBμV/m) |
|-----------------|---------------|---------------------|------------|---------------|------------|-------------|----------------|
| 3050.820000     | 33.5          | 149.5               | H          | 0.0           | -22.7      | 40.5        | 74.0           |
| 5597.600000     | 36.5          | 113.6               | H          | 269.0         | -17.7      | 37.5        | 74.0           |
| 7389.275000     | 41.0          | 100.0               | V          | 64.0          | -13.1      | 33.0        | 74.0           |
| 9870.335000     | 44.1          | 150.0               | V          | 56.0          | -9.5       | 29.9        | 74.0           |
| 11360.030000    | 45.0          | 230.6               | H          | 0.0           | -5.0       | 29.0        | 74.0           |
| 14798.495000    | 46.1          | 140.5               | H          | 54.0          | -1.4       | 27.9        | 74.0           |

| Frequency (MHz) | CAverage (dBμV/m) | Antenna Height (cm) | POL. (H/V) | Azimuth (deg) | Corr. (dB) | Margin (dB) | Limit (dBμV/m) |
|-----------------|-------------------|---------------------|------------|---------------|------------|-------------|----------------|
| 3050.820000     | 20.8              | 149.5               | H          | 0.0           | -22.7      | 33.2        | 54.0           |
| 5597.600000     | 23.8              | 113.6               | H          | 269.0         | -17.7      | 30.2        | 54.0           |
| 7389.275000     | 28.2              | 100.0               | V          | 64.0          | -13.1      | 25.8        | 54.0           |
| 9870.335000     | 30.6              | 150.0               | V          | 56.0          | -9.5       | 23.4        | 54.0           |
| 11360.030000    | 31.9              | 230.6               | H          | 0.0           | -5.0       | 22.1        | 54.0           |
| 14798.495000    | 33.4              | 140.5               | H          | 54.0          | -1.4       | 20.6        | 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. CONCLUSION

The data collected shows that the **EUT Type: Multi-band GSM/EDGE/WCDMA/LTE Phone with WLAN and Bluetooth, FCC ID: ZNFX220TB, Model: LM-X220TB** complies with §15.107 and §15.109 of the FCC rules.



## 7. APPENDIX A. TEST SETUP PHOTOGRAPHS

Please refer to Appendix A