



HCT CO., LTD.

CERTIFICATION DIVISION
105-1, JANGAM-RI, MAJANG-MYEON, ICHEON-SI, KYOUNGKI-DO, REPUBLIC OF KOREA
TEL: +82 31 645 6300 FAX: +82 31 645 6401

EMI CERTIFICATION REPORT

Applicant:

LG Electronics MobileComm U.S.A., Inc.
10101 Old Grove Road, San Diego, CA 92131

Date of Issue: September 10, 2012

Test Report No.: HCTE1209FE07

Test Site: HCT CO., LTD.

HCT FRN: 0005-8664-21

FCC ID:

ZNFE971

Rule Part(s) / Standard(s) : FCC PART 15 Subpart B Class B
Equipment Type : GSM/EDGE/WCDMA/LTE Phone with WLAN, Bluetooth and NFC
Model Name : E971
Additional Model Name : LG-E971, LGE971
Port / Connector(s) : USB Port / Headset Port

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 C63.4-2003. (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 subject to a denial of Federal benefits that includes FCC benefits pursuant to Section 5301 of the Anti-Drug Abuse Act of 1988, 21 U.S.C 862

Report prepared by
: Jeong-Hyeon Choi
Test Engineer of EMC Team

Approved by
: Sang-Jun Lee
Manager of EMC Team

TABLE OF CONTENTS

| | PAGE |
|---|-------------|
| 1. GENERAL INFORMATION | 3 |
| 1.1 Product Description..... | 3 |
| 1.2 Related Submittal(s) / Grant(s)..... | 3 |
| 1.3 Tested System Details..... | 4 |
| 1.4 Cable Description | 5 |
| 1.5 Noise Suppression Parts on Cable. (I/O cable) | 5 |
| 1.6 Test Methodology | 6 |
| 1.7 Test Facility | 6 |
| 1.8 Frequency Range of Radiated Measurements | 6 |
| 2. SYSTEM TEST CONFIGURATION..... | 7 |
| 2.1 Configuration of Test System..... | 7 |
| 3. PRELIMINARY TEST | 8 |
| 3.1 Conducted Emission Test | 8 |
| 3.2 Radiated Emission Test | 8 |
| 4. CONDUCTED AND RADIATED EMISSION TEST SUMMARY | 9 |
| 4.1 Conducted Emission Test | 9 |
| 4.2 Radiated Emission Test | 14 |
| 5. FIELD STRENGTH CALCULATION | 15 |
| 6. TEST EQUIPMENT | 17 |
| 7. CONCLUSION | 17 |

ATTACHMENT: TEST SETUP PHOTOGRAPHS

1. GENERAL INFORMATION

1.1 Product Description

Equipment Under Test is **EUT type: GSM/EDGE/WCDMA/LTE Phone with WLAN, Bluetooth and NFC, model: E971** manufactured by **LG Electronics MobileComm U.S.A., Inc.** Its basic purpose is used for communications.

| | |
|-------------------------|---|
| Model | E971 |
| Additional Model | LG-E971, LGE971 |
| FCC ID | ZNFE971 |
| E.U.T Type | GSM/EDGE/WCDMA/LTE Phone with WLAN, Bluetooth and NFC |
| TX Frequency | 824.20 MHz to 848.80 MHz (GSM 850) 1 850.20 MHz to 1 909.80 MHz (GSM 1 900) 826.40 MHz to 846.60 MHz (WCDMA 850) 1 852.4 MHz to 1 907.6 MHz (WCDMA 1 900) 1 850.7 MHz to 1 909.3 MHz (LTE B2) 2 500 MHz to 2 570 MHz (LTE B7) 824 MHz to 849 MHz (LTE B5) 704 MHz to 716 MHz (LTE B17) |
| RX Frequency | 869.20 MHz to 893.80 MHz (GSM 850) 1 930.20 MHz to 1 989.80 MHz (GSM 1 900) 871.40 MHz to 891.60 MHz (WCDMA 850) 1 932.4 MHz to 1 987.6 MHz (WCDMA 1 900) 1 930.00 MHz to 1 990.00 MHz (LTE B2) 2 620 MHz to 2 690 MHz (LTE B7) 869 MHz to 894 MHz (LTE B5) 734 MHz to 746 MHz (LTE B17) |

1.2 Related Submittal(s) / Grant(s)

Original submittal only.

1.3 Tested System Details

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

| Device Type | Manufacturer | Model Name | FCC ID / DoC | Connected To |
|---------------------|-----------------------------|--------------------------|--------------|---------------------------------|
| E.U.T | LG | E971 | ZNFE971 | Notebook PC |
| Notebook PC | H.P | ProBook 6560b | DoC | E.U.T Notebook PC adaptor |
| Notebook PC adaptor | CHICONY POWER TECHNOLOGY | Series PPP012H-S | - | Notebook PC |
| Mouse | Radio shack | Series 2-button mouse | FSUGMZE3 | Notebook PC |
| USB cable | BD | EAD61965801 | - | E.U.T Notebook PC |
| Headset | CRESYN | SGEY0003744 | - | E.U.T |
| Net Hard | LG | N1A1DD1 | DoC | Net Hard adaptor Notebook PC |
| Net Hard Adaptor | Yang Ming Industrial | DA-60M12 | - | Net Hard |
| RJ45 cable | - | - | - | Notebook PC Net Hard |

1.4 Cable Description

| Product Name | Port | Power Cord Shielded (Y/N) | I/O Cable Shielded (Y/N) | Length (m) |
|--------------|----------------|---------------------------|--------------------------|------------|
| E.U.T | Micro USB | - | Y | (D)1.2 |
| | Headset jack | - | N | (D)1.1 |
| Notebook PC | RJ 45 | - | N | (D)1.5 |
| | Serial (Mouse) | - | N | (D)1.8 |

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

1.5 Noise Suppression Parts on Cable. (I/O cable)

| Product Name | Port | Ferrite Bead (Y/N) | Location | Metal Hood (Y/N) | Location |
|--------------|----------------|--------------------|----------|------------------|-----------------|
| E.U.T | Micro USB | N | N/A | Y | Both End |
| | Headset jack | N | N/A | Y | E.U.T End |
| Notebook PC | RJ 45 | N | N/A | N | Both End |
| | Serial (Mouse) | - | - | Y | Notebook PC End |

1.6 Test Methodology

Both Conducted and Radiated testing was performed according to the procedures in ANSI C63.4/2003. Radiated testing was performed at an antenna to E.U.T distance of 3 m

1.7 Test Facility

The 3 m semi anechoic chamber used to collect the test data is located at the 105-1, Jangam-Ri, Majang-Myeon, Icheon-Si, Kyoungki-Do, Republic of Korea. Those measurement facilities are constructed in conformance with the requirements of ANSI C63.4.

Detailed description of test facilities was submitted to the Commission and accepted dated Mar 02, 2011 (Registration Number: 90661)

1.8 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 th harmonic of the highest frequency or 40 GHz, whichever is lower |

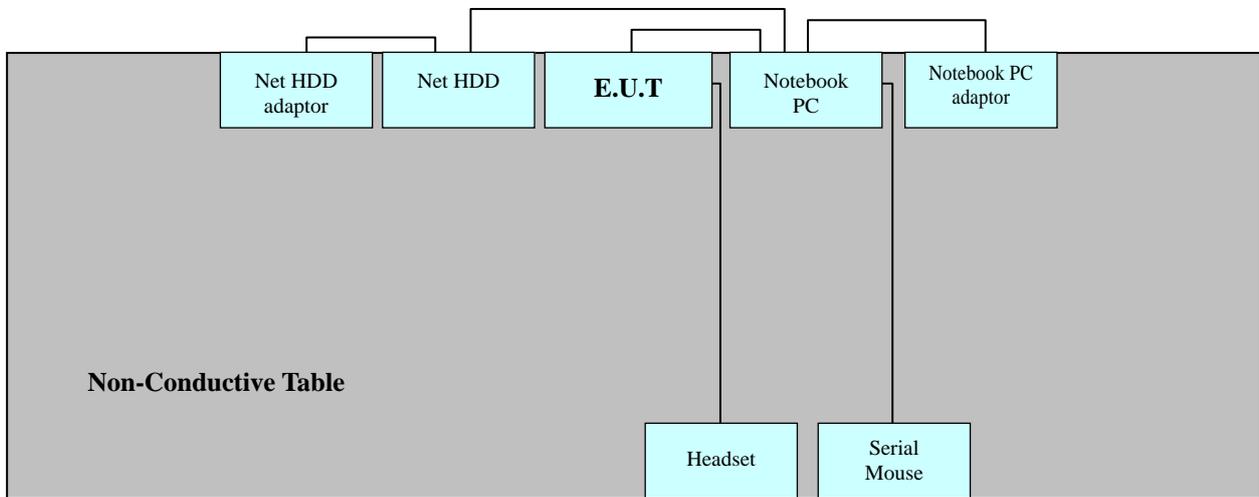
2. SYSTEM TEST CONFIGURATION

2.1 Configuration of Test System

Power Line Conducted test : E.U.T was connected to LISN via Notebook PC.
Preliminary Power Line Conducted Emission tests were performed by using the procedure in ANSI C63.4/2003 7.2.3 to determine the worst operating conditions.

Radiated Emission test : Preliminary Radiated Emission tests were performed by using the procedure in ANSI C63.4/2003 8.3.1.1 to determine the worst operating condition. Final Radiated Emission tests were performed at 3 m semi-anechoic chamber.

[Configuration of Tested System]



Power Line: 120 VAC

3. PRELIMINARY TEST

3.1 Conducted Emission Test

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

Operation Mode: Data Communication mode

3. 2 Radiated Emission Test

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

Operation Mode: Data Communication mode

4. CONDUCTED AND RADIATED EMISSION TEST SUMMARY

4.1 Conducted Emission Test

The following table shows the highest levels of conducted emissions on both polarization of hot and neutral line.

| | |
|----------------|---|
| Limit Apply to | : FCC PART 15 Subpart B Class B |
| Detector | : Quasi-Peak, Average (6 dB Bandwidth: 9 kHz) |
| Operation Mode | : Data communication mode |
| Temperature | : 26.1 °C |
| Humidity Level | : 46.3 % |
| Test Date | : September 06, 2012 |

| Frequency (MHz) | Transd (dB) | Conductor | Quasi-Peak | | | Average | | |
|--------------------|----------------|-----------|------------|-------------------|--------------|---------|-------------------|--------------|
| | | | Limit | Measurement Level | Result Level | Limit | Measurement Level | Result Level |
| | | | (dBuV) | (dBuV) | (dBuV) | (dBuV) | (dBuV) | (dBuV) |
| 0.500 | 10.0 | N | 56 | 24.0 | 34.0 | 46 | 11.30 | 21.30 |
| 0.604 | 10.0 | N | 56 | 25.3 | 35.3 | 46 | - | - |
| 1.664 | 9.9 | H | 56 | - | - | 46 | 14.20 | 24.10 |
| 1.868 | 10.1 | N | 56 | - | - | 46 | 14.90 | 25.00 |
| 16.096 | 11.1 | H | 60 | - | - | 50 | 14.90 | 26.00 |
| 16.552 | 11.2 | H | 60 | - | - | 50 | 13.90 | 25.10 |

※ **NOTE:** Refer to page 10 to page 13 for details.

1. Line H = Hot, Line N = Neutral
2. Transd = LISN factor + Cable Loss factor

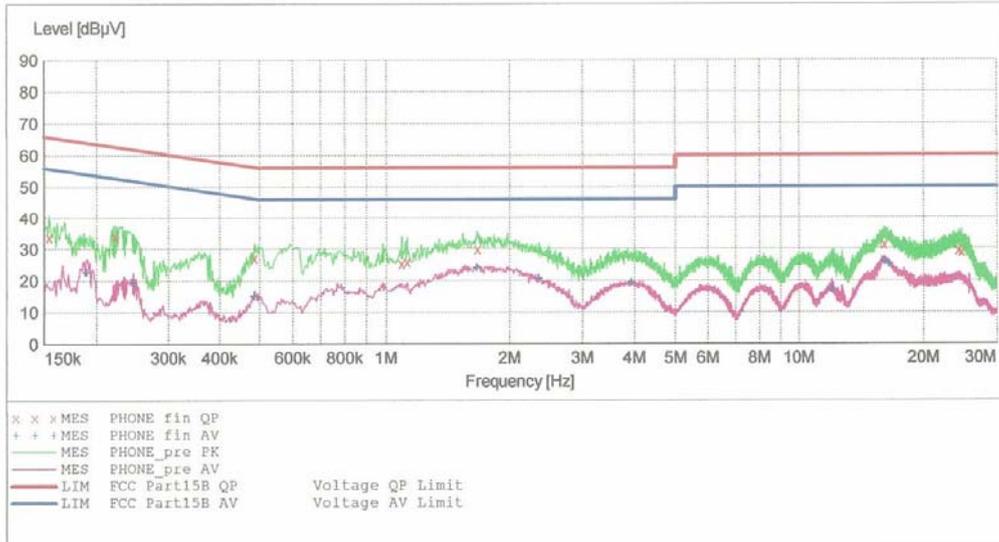
HCT

EMC

EUT: E971
 Manufacturer: LG
 Operating Condition: DATA MODE
 Test Site: SHIELD ROOM
 Operator: JH CHOI
 Test Specification: FCC PART 15 B
 Comment: H

SCAN TABLE: "FCC PART 15 B(H)"

| Short Description: | | | FCC PART 15 CLASS B | | | |
|--------------------|-----------|---------|---------------------|------------|-----------|------------|
| Start | Stop | Step | Detector | Meas. Time | IF Bandw. | Transducer |
| 150.0 kHz | 500.0 kHz | 1.0 kHz | MaxPeak | 10.0 ms | 9 kHz | None |
| | | | Average | | | |
| 500.0 kHz | 5.0 MHz | 4.0 kHz | MaxPeak | 10.0 ms | 9 kHz | None |
| | | | Average | | | |
| 5.0 MHz | 30.0 MHz | 4.0 kHz | MaxPeak | 10.0 ms | 9 kHz | None |
| | | | Average | | | |



MEASUREMENT RESULT: "PHONE_fin QP"

9/6/2012 3:15PM

| Frequency MHz | Level dBµV | Transd dB | Limit dBµV | Margin dB | Line | PE |
|---------------|------------|-----------|------------|-----------|------|-----|
| 0.154010 | 33.90 | 9.8 | 66 | 31.9 | --- | --- |
| 0.222010 | 34.00 | 9.7 | 63 | 28.7 | --- | --- |
| 0.486010 | 27.10 | 9.8 | 56 | 29.2 | --- | --- |
| 1.096000 | 25.40 | 9.8 | 56 | 30.6 | --- | --- |
| 1.128000 | 26.10 | 9.8 | 56 | 29.9 | --- | --- |
| 1.668000 | 30.00 | 9.9 | 56 | 26.0 | --- | --- |
| 16.104000 | 31.40 | 11.1 | 60 | 28.6 | --- | --- |
| 24.204000 | 29.50 | 11.9 | 60 | 30.5 | --- | --- |
| 24.600000 | 29.00 | 12.0 | 60 | 31.0 | --- | --- |

MEASUREMENT RESULT: "PHONE_fin AV"

9/6/2012 3:15PM

| Frequency MHz | Level dBμV | Transd dB | Limit dBμV | Margin dB | Line | PE |
|------------------|---------------|--------------|---------------|--------------|------|-----|
| 0.190010 | 22.60 | 9.7 | 54 | 31.4 | --- | --- |
| 0.246010 | 19.40 | 9.8 | 52 | 32.4 | --- | --- |
| 0.486010 | 15.10 | 9.8 | 46 | 31.1 | --- | --- |
| 1.664000 | 24.10 | 9.9 | 46 | 21.9 | --- | --- |
| 2.352000 | 20.70 | 10.0 | 46 | 25.3 | --- | --- |
| 3.936000 | 19.40 | 10.1 | 46 | 26.6 | --- | --- |
| 12.020000 | 17.00 | 10.7 | 50 | 33.0 | --- | --- |
| 16.096000 | 26.00 | 11.1 | 50 | 24.0 | --- | --- |
| 16.552000 | 25.10 | 11.2 | 50 | 24.9 | --- | --- |

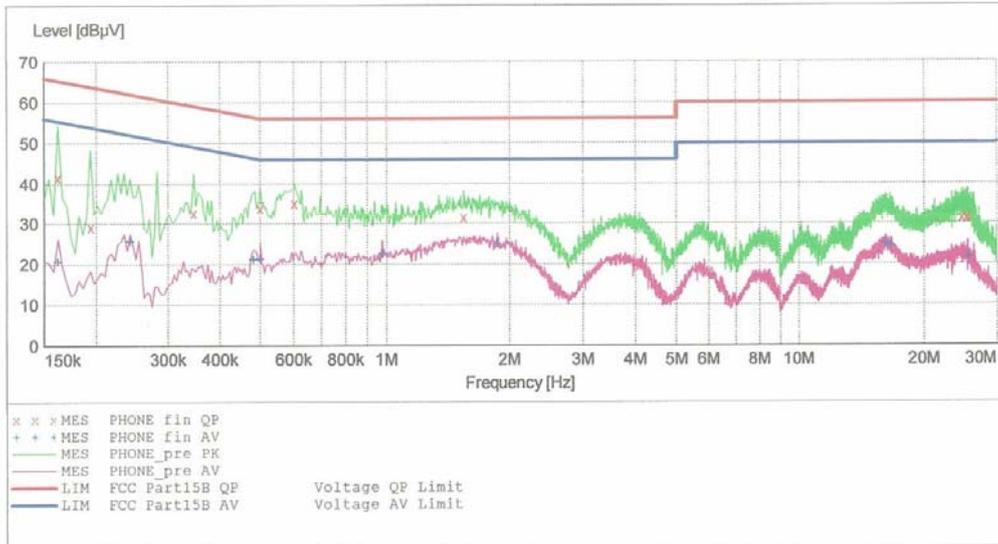
HCT

EMC

EUT: E971
 Manufacturer: LG
 Operating Condition: DATA MODE
 Test Site: SHIELD ROOM
 Operator: JH CHOI
 Test Specification: FCC PART 15 CLASS B
 Comment: N

SCAN TABLE: "FCC PART 15 B(N)"

| Short Description: | | | FCC PART 15 CLASS B | | | | Transducer |
|--------------------|----------------|------------|---------------------|------------|-----------|------|------------|
| Start Frequency | Stop Frequency | Step Width | Detector | Meas. Time | IF Bandw. | | |
| 150.0 kHz | 500.0 kHz | 4.0 kHz | MaxPeak | 10.0 ms | 9 kHz | None | |
| | | | Average | | | | |
| 500.0 kHz | 5.0 MHz | 4.0 kHz | MaxPeak | 10.0 ms | 9 kHz | None | |
| | | | Average | | | | |
| 5.0 MHz | 30.0 MHz | 4.0 kHz | MaxPeak | 10.0 ms | 9 kHz | None | |
| | | | Average | | | | |



MEASUREMENT RESULT: "PHONE_fin QP"

9/6/2012 3:01PM

| Frequency MHz | Level dBµV | Transd dB | Limit dBµV | Margin dB | Line | PE |
|---------------|------------|-----------|------------|-----------|------|-----|
| 0.162010 | 41.60 | 9.9 | 65 | 23.8 | --- | --- |
| 0.194010 | 29.10 | 9.9 | 64 | 34.8 | --- | --- |
| 0.346010 | 32.80 | 9.9 | 59 | 26.2 | --- | --- |
| 0.500000 | 34.00 | 10.0 | 56 | 22.0 | --- | --- |
| 0.604000 | 35.30 | 10.0 | 56 | 20.7 | --- | --- |
| 1.544000 | 31.60 | 10.1 | 56 | 24.4 | --- | --- |
| 24.584000 | 31.30 | 12.4 | 60 | 28.7 | --- | --- |
| 25.276000 | 31.20 | 12.4 | 60 | 28.8 | --- | --- |
| 25.432000 | 31.70 | 12.4 | 60 | 28.3 | --- | --- |

MEASUREMENT RESULT: "PHONE_fin AV"

9/6/2012 3:01PM

| Frequency MHz | Level dBμV | Transd dB | Limit dBμV | Margin dB | Line | PE |
|------------------|---------------|--------------|---------------|--------------|------|-----|
| 0.162010 | 20.60 | 9.9 | 55 | 34.8 | --- | --- |
| 0.242010 | 25.60 | 10.0 | 52 | 26.4 | --- | --- |
| 0.482010 | 21.10 | 10.0 | 46 | 25.2 | --- | --- |
| 0.500000 | 21.30 | 10.0 | 46 | 24.7 | --- | --- |
| 0.980000 | 22.40 | 10.0 | 46 | 23.6 | --- | --- |
| 1.868000 | 25.00 | 10.1 | 46 | 21.0 | --- | --- |
| 16.188000 | 25.00 | 11.4 | 50 | 25.0 | --- | --- |
| 16.604000 | 24.40 | 11.5 | 50 | 25.6 | --- | --- |
| 25.424000 | 21.50 | 12.4 | 50 | 28.5 | --- | --- |

4.2 Radiated Emission Test

The following table shows the highest levels of Radiated Emissions on both polarization of horizontal and vertical.

Limit Apply to : FCC PART 15 Subpart B Class B

-For measurement below 1 GHz

Detector : Quasi-Peak (6 dB Bandwidth: 120 kHz)

Operation Mode : Data Communication mode

Temperature : 25.9 °C

Humidity Level : 56.4 %

Test Date : September 05, 2012

| Frequency (MHz) | Reading (dBUV) | Polarity (H/V) | Antenna Height (m) | Correction Factor | | Limit (dBUV/m) | Level (dBUV/m) | Margin (dB) |
|-----------------|----------------|----------------|--------------------|-------------------|------------|----------------|----------------|-------------|
| | | | | Antenna (dB/m) | Cable (dB) | | | |
| 45.500 | 12.63 | V | 1.0 | 12.36 | 3.51 | 40.0 | 28.5 | 11.5 |
| 76.600 | 13.63 | V | 1.2 | 8.81 | 3.77 | 40.0 | 26.2 | 13.8 |
| 121.800 | 20.76 | V | 1.1 | 11.94 | 4.00 | 43.5 | 36.7 | 6.8 |
| 140.800 | 18.87 | V | 1.0 | 12.82 | 4.01 | 43.5 | 35.7 | 7.8 |
| 249.900 | 24.63 | H | 1.7 | 11.77 | 4.50 | 46.0 | 40.9 | 5.1 |
| 807.500 | 6.23 | H | 1.2 | 22.65 | 5.72 | 46.0 | 34.6 | 11.4 |

-For measurement above 1 GHz

Limit Apply to : FCC PART 15 Subpart B Class B

Detector : Peak mode: Peak (RBW: 1 MHz / VBW: 1 MHz)
 : Average mode: Peak (RBW: 1 MHz / VBW: 10 Hz)

Temperature : 23.4 °C

Humidity Level : 57.7 %

Test Date : September 06, 2012

| Frequency (GHz) | Peak | | | POL | Average | | |
|-----------------|----------------------|----------------------|-------------|-----|----------------------|----------------------|-------------|
| | Total (dB μ V/m) | Limit (dB μ V/m) | Margin (dB) | | Total (dB μ V/m) | Limit (dB μ V/m) | Margin (dB) |
| 1.9900 | 54.10 | 74 | 19.9 | V | 36.00 | 54 | 18.0 |
| 3.0000 | 48.70 | 74 | 25.3 | H | 29.80 | 54 | 24.2 |

※ NOTE:

1. Measurement above 1 GHz was performed from 1 GHz to the 5th harmonic of highest fundamental frequency. Test was measured by 12 GHz.

5. FIELD STRENGTH CALCULATION

The field strength is calculated by adding the antenna factor and cable factor.
The basic equation with a sample calculation is as follows:

$$FS = RA + AF + CF$$

Where FS = Field Strength

RA = Receiver Amplitude

AF = Antenna Factor

CF = Cable Attenuation Factor

Assume a receiver reading of 21.5 dB μ V is obtained. The antenna factor of 7.4 dB/m and a cable factor of 1.1 dB are added. The 30 dB μ V/m value is mathematically converted to its corresponding level in μ V/m.

$$FS = 21.5 + 7.4 + 1.1 = 30 \text{ dB}\mu\text{V/m}$$

[Radiated Emission Limits]

| Frequency of Emission (MHz) | Field Strength | |
|--------------------------------|----------------|--------------|
| | μ V/m | dB μ V/m |
| 30 to 88 | 100 | 40.0 |
| 88 to 216 | 150 | 43.5 |
| 216 to 960 | 200 | 46.0 |
| Above 960 | 500 | 54.0 |

6. TEST EQUIPMENT

| <u>Type</u> | <u>Manufacturer</u> | <u>Model Name</u> | <u>Serial Number</u> | <u>Calibration Cycle</u> | <u>Next CAL Date</u> |
|---|---------------------|-------------------|----------------------|--------------------------|----------------------|
| <u>Conducted Emission</u> | | | | | |
| <input checked="" type="checkbox"/> EMI Test Receiver | Rohde & Schwarz | ESCI | 100584 | 1 year | 2013.05.02 |
| <input type="checkbox"/> LISN | Rohde & Schwarz | ESH3-Z5 | 100282 | 1 year | 2013.07.04 |
| <input checked="" type="checkbox"/> LISN | Rohde & Schwarz | ENV216 | 100073 | 1 year | 2013.02.09 |
| <input checked="" type="checkbox"/> LISN | EMCO | 3816/2SH | 9706-1070 | 1 year | 2013.05.02 |
| <input type="checkbox"/> Attenuator | Rohde & Schwarz | ESH3-Z2 | 357.8810.352 | 1 year | 2013.07.31 |
| <u>Radiated Emission</u> | | | | | |
| <input checked="" type="checkbox"/> EMI Test Receiver | Rohde & Schwarz | ESI40 | 831564103 | 1 year | 2013.05.03 |
| <input type="checkbox"/> EMI Test Receiver | Rohde & Schwarz | ESU26 | 100241 | 1 year | 2013.07.30 |
| <input checked="" type="checkbox"/> Trilog Antenna | Schwarzbeck | VULB9160 | 3301 | 2 year | 2012.09.13 |
| <input type="checkbox"/> Antenna master | INNCO Systems | MA4000-EP | MA4000/283 | N/A | - |
| <input checked="" type="checkbox"/> Antenna master | HD GmbH | MA240 | 240/520 | N/A | - |
| <input checked="" type="checkbox"/> Turn Table | HD GmbH | 2090 | 9702/1224 | N/A | - |
| <input checked="" type="checkbox"/> Power Amplifier | Rohde & Schwarz | SCU-18 | 10094 | 1 year | 2012.09.19 |
| <input checked="" type="checkbox"/> Horn Antenna | Schwarzbeck | BBHA 9120D | 937 | 2 year | 2013.10.17 |
| <input checked="" type="checkbox"/> Horn Antenna | Schwarzbeck | BBHA 9120D | 296 | 2 year | 2014.02.20 |

7. CONCLUSION

The data collected shows that the **EUT type: GSM/EDGE/WCDMA/LTE Phone with WLAN, Bluetooth and NFC, Model: E971, FCC ID: ZNFE971** complies with §15.107 and §15.109 of the FCC rules.