



HCT CO., LTD.

CERTIFICATE OF COMPLIANCE FCC Certification

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| Applicant Name: LG Electronics MobileComm U.S.A., Inc. | Date of Issue: June 07, 2013 |
| Address: 1000 Sylvan Avenue, Englewood Cliffs NJ 07632 | Test Site/Location: HCT CO., LTD., 105-1, Jangam-ri, Majang-Myeon, Icheon-si, Kyunggi-Do, Korea |
| | Report No.: HCTR1306FR09 |
| | HCT FRN: 0005866421 |

| | |
|-------------------|---|
| FCC ID: | ZNFE440 |
| APPLICANT: | LG Electronics MobileComm U.S.A., Inc. |

| | |
|---------------------------------|---|
| FCC Model(s): | LG-E440 |
| Additional FCC Model(s): | LGE440, E440 |
| EUT Type: | GSM Phone with Bluetooth3.0, WIFI802.11 b/g/n |
| FCC Classification: | Licensed Portable Transmitter Held to Ear (PCE) |
| FCC Rule Part(s): | §22, §24, §2 |
| Tx Frequency: | 824.20 - 848.80 MHz (GSM850) 1 850.20 - 1 909.80 MHz (GSM1900) |
| Rx Frequency: | 869.20 - 893.80 MHz (GSM850) 1 930.20 - 1 989.80 MHz (GSM1900) |
| Max. RF Output Power: | 0.899 W ERP GSM850 (29.54 dBm) / 0.714 W EIRP GSM1900 (28.54 dBm) |
| Emission Designator(s): | 248 KGXW (GSM850) 250 KGXW (GSM1900) |

The measurements shown in this report were made in accordance with the procedures specified in §2.947. I assume full responsibility for the accuracy and completeness of these measurements, and for the qualifications of all persons taking them.

HCT CO., LTD. Certifies that no party to this application has subject to a denial of Federal benefits that includes FCC benefits pursuant to section 5301 of the Anti-Drug Abuse Act of 1998,21 U.S. C.853(a)



Report prepared by
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Test engineer of RF Team



Approved by
: Chang Seok Choi
Manager of RF Team

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Version

| TEST REPORT NO. | DATE | DESCRIPTION |
|-----------------|---------------|-----------------------|
| HCTR1306FR09 | June 07, 2013 | First Approval Report |
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MEASUREMENT REPORT

1. GENERAL INFORMATION

Applicant Name: LG Electronics MobileComm U.S.A., Inc.
Address: 1000 Sylvan Avenue, Englewood Cliffs NJ 07632
FCC ID: ZNFE440
Application Type: Certification
FCC Classification: Licensed Portable Transmitter Held to Ear (PCE)
FCC Rule Part(s): §22, §24, §2
EUT Type: GSM Phone with Bluetooth3.0, WIFI802.11 b/g/n
FCC Model(s): LG-E440
Additional FCC Model(s): LGE440, E440
Tx Frequency: 824.20 - 848.80 MHz (GSM850)
1 850.20 - 1 909.80 MHz (GSM1900)
Rx Frequency: 869.20 - 893.80 MHz (GSM850)
1 930.20 - 1 989.80 MHz (GSM1900)
Max. RF Output Power: 0.899 W ERP GSM850 (29.54 dBm) / 0.714 W EIRP GSM1900 (28.54 dBm)
Emission Designator(s): 248 KGXW (GSM850) 250 KGXW (GSM1900)
Date(s) of Tests: May 20, 2013 ~ May 29, 2013
Antenna Specification Manufacturer: Komatech Co., Ltd.
Antenna type: Internal antenna
Peak Gain: GSM850 : -1.48 dBi
GSM1900 : 0.81 dBi



2. INTRODUCTION

2.1. EUT DESCRIPTION

The LG Electronics MobileComm U.S.A., Inc. LG-E440 GSM Phone with Bluetooth3.0, WIFI802.11 b/g/n consists of GSM850, GSM1900 and GPRS Class12.

2.2. MEASURING INSTRUMENT CALIBRATION

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipment, which is traceable to recognized national standards.

2.3. TEST FACILITY

The Fully-anechoic chamber and conducted measurement facility used to collect the radiated data are located at the 105-1, Jangam-ri , Majang-Myeon, Icheon-si, 467-811, KOREA.

The site is constructed in conformance with the requirements of ANSI C63.4 and CISPR Publication 22. Detailed description of test facility was submitted to the Commission and accepted dated March 02, 2011 (Registration Number: 90661)

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3. DESCRIPTION OF TESTS

3.1 ERP/EIRP RADIATED POWER AND RADIATED SPURIOUS EMISSIONS

Note: ERP(Effective Radiated Power), EIRP(Effective Isotropic Radiated Power)

Test Procedure

Radiated emission measurements are performed in the Fully-anechoic chamber. The equipment under test is placed on a non-conductive table 3-meters away from the receive antenna in accordance with ANSI/TIA-603-C-2004 Clause 2.2.17. The turntable is rotated through 360 degrees, and the receiving antenna scans in order to determine the level of the maximized emission. The level and position of the maximized emission is recorded with the spectrum analyzer using a positive peak detector.

A half wave dipole is then substituted in place of the EUT. For emissions above 1GHz, a horn antenna is substituted in place of the EUT. The substitute antenna is driven by a signal generator and the previously recorded signal was duplicated.

The power is calculated by the following formula;

$$P_{d(dBm)} = P_{g(dBm)} - \text{cable loss}_{(dB)} + \text{antenna gain}_{(dB)}$$

Where: P_d is the dipole equivalent power and P_g is the generator output power into the substitution antenna.

The maximum EIRP is calculated by adding the forward power to the calibrated source plus its appropriate gain value. These steps are repeated with the receiving antenna in both vertical and horizontal polarization. the difference between the gain of the horn and an isotropic antenna are taken into consideration

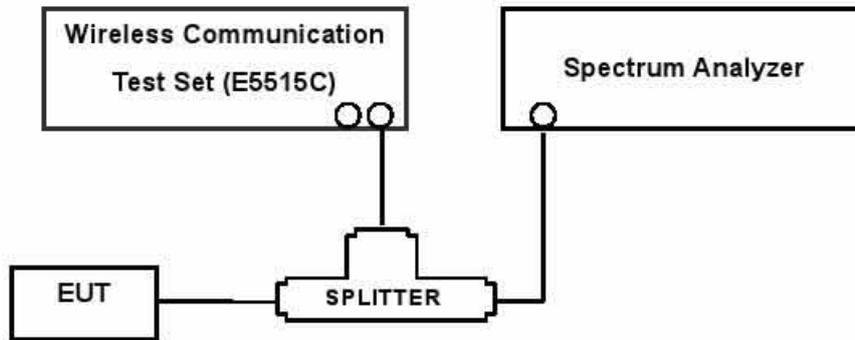
3.2 PEAK- TO- AVERAGE RATIO

A peak to average ratio measurement is performed at the conducted port of the EUT. For CDMA and WCDMA signals, the spectrum analyzers Complementary Cumulative Distribution Function (CCDF) measurement profile is used to determine the largest deviation between the average and the peak power of the EUT in a given bandwidth. The CCDF curve shows how much time the peak waveform spends at or above a given average power level. The percent of time the signal spends at or above the level defines the probability for that particular power level. For GSM signals, an average and a peak trace are used on a spectrum analyzer to determine the largest deviation between the average and the peak power of the EUT in a bandwidth greater than the emission bandwidth. Plots of the EUT's Peak- to- Average Ratio are shown herein.

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3.3 OCCUPIED BANDWIDTH.

Test set-up



(Configuration of conducted Emission measurement)

The width of a frequency band such that, below the lower and above the upper frequency limits, the mean powers emitted are each equal to a specified percentage 0.5 % of the total mean power of a given emission.

Test Procedure

The EUT makes a call to the communication simulator. The power was measured with R&S Spectrum Analyzer. All measurements were done at 3 channels(low, middle and high operational range.)

The conducted occupied bandwidth used the power splitter via EUT RF power connector between simulation base station and spectrum analyzer.

The communication simulator station system controlled a EUT to export maximum output power under transmission mode and specific channel frequency. Use OBW measurement function of Spectrum analyzer to measure 99 % occupied bandwidth

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3.4 SPURIOUS AND HARMONIC EMISSIONS AT ANTENNA TERMINAL.

Test Procedure

The level of the carrier and the various conducted spurious and harmonic frequencies is measured by means of a calibrated spectrum analyzer.

On any frequency outside a licensee's frequency block, the power of any emission shall be attenuated below the transmitter power (P) by at least $43 + 10 \log(P)$ dB. The RBW settings used in the testing are greater than 1 % of the occupied bw. The 1 MHz RBW was used to scan from 10 MHz to 10 GHz. (GSM1900 Mode: 10 MHz to 20 GHz). A display line was placed at - 13 dBm to show compliance. The high, lowest and a middle channel were tested for out of band measurements.

Measurements of all out of band are made on RBW = 1MHz and VBW \geq 3 MHz in the worst case despite RBW = 100 kHz and VBW \geq 300 kHz upon 1 GHz.

- RBW = 1 MHz
- VBW \geq 3 MHz
- Detector = Peak
- Trace Mode = max hold
- Sweep time = auto
- Number of points in sweep \geq 2 * Span / RBW

- Band Edge Requirement : According to FCC 22.917 , 24.238(a) specified that power of any emission outside of The authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB. In the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed.

The EUT makes a call to the communication simulator. The power was measured with R&S Spectrum Analyzer. All measurements were done at 2 channels(low and high operational frequency range.)

The band edge measurement used the power splitter via EUT RF power connector between simulation base station and spectrum analyzer.

The center frequency of spectrum is the band edge frequency and span is 1MHz RB of the spectrum is 3KHz and VB of the spectrum is 3KHz (GSM)

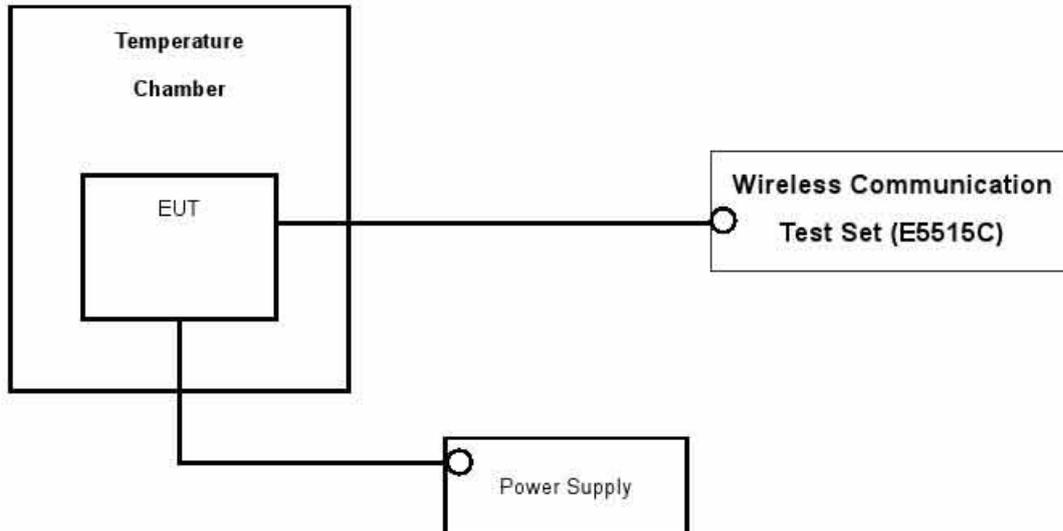
NOTES: The analyzer plot offsets were determined by below conditions.

- For GSM850, total offset 27 dBm = 20 dBm attenuator + 6 dBm Divider + 1 dBm RF cables.
- For GSM1900, total offset 27.7 dBm = 20 dBm attenuator + 6 dBm Divider + 1.7 dBm RF cables.

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3.5 FREQUENCY STABILITY / VARIATION OF AMBIENT TEMPERATURE

Test Set-up



* Nominal Operating Voltage

Test Procedure

The frequency stability of the transmitter is measured by:

- a.) **Temperature:** The temperature is varied from - 30 °C to + 50 °C using an environmental chamber.
- b.) **Primary Supply Voltage:** The primary supply voltage is varied from battery end point to 115 % of the voltage normally at the input to the device or at the power supply terminals if cables are not normally supplied.

Specification — the frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block. The frequency stability of the transmitter shall be maintained within $\pm 0.00025\%$ (± 2.5 ppm) of the center frequency.

Time Period and Procedure:

The carrier frequency of the transmitter is measured at room temperature (20°C to provide a reference).

1. The equipment is turned on in a "standby" condition for one minute before applying power to the transmitter. Measurement of the carrier frequency of the transmitter is made within one minute after applying power to the transmitter.
2. Frequency measurements are made at 10°C intervals ranging from -30°C to +50°C. A period of at least one half-hour is provided to allow stabilization of the equipment at each temperature level.

NOTE: The EUT is tested down to the battery endpoint.

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4. LIST OF TEST EQUIPMENT

| Manufacture | Model/ Equipment | Serial Number | Calibration Interval | Calibration Due |
|-------------------|-----------------------------|------------------------|----------------------|-----------------|
| Agilent | E9327A/ Power Sensor | MY4442009 | Annual | 04/16/2014 |
| MITEQ | AMF-6D-001180-35-20P/AMP | 1081666 | Annual | 09/11/2013 |
| Wainwright | WHK1.2/15G-10EF/H.P.F | 2 | Annual | 04/25/2014 |
| Wainwright | WHK3.3/18G-10EF/H.P.F | 1 | Annual | 04/25/2014 |
| Hewlett Packard | 11667B / Power Splitter | 10126 | Annual | 11/07/2013 |
| Digital | EP-3010/ Power Supply | 3110117 | Annual | 11/07/2013 |
| Schwarzbeck | UHAP/ Dipole Antenna | 557 | Biennial | 03/05/2015 |
| Schwarzbeck | UHAP/ Dipole Antenna | 558 | Biennial | 05/03/2015 |
| Korea Engineering | KR-1005L / Chamber | KRAB05063-3CH | Annual | 11/07/2013 |
| Schwarzbeck | BBHA 9120D/ Horn Antenna | 147 | Biennial | 05/15/2014 |
| Schwarzbeck | BBHA 9120D/ Horn Antenna | 937 | Biennial | 10/17/2013 |
| Agilent | E4440A/Spectrum Analyzer | US45303008 | Annual | 04/25/2014 |
| WEINSCHTEL | ATTENUATOR | BR0592 | Annual | 11/07/2013 |
| RECHDE&SCHWARZ | FSV40/Spectrum Analyzer | 1307.9002K40-100931-NK | Annual | 06/11/2013 |
| Agilent | 8960 (E5515C)/ Base Station | GB44400269 | Annual | 02/14/2014 |

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5. SUMMARY OF TEST RESULTS

| FCC Part Section(s) | Test Description | Test Limit | Test Condition | Test Result |
|---------------------------------|--|--|----------------|-------------|
| 2.1049, 22.917(a), 24.238(a) | Occupied Bandwidth | N/A | CONDUCTED | PASS |
| 2.1051, 22.917(a), 24.238(a) | Band Edge / Spurious and Harmonic Emissions at Antenna Terminal. | < 43 + 10log10 (P[Watts]) at Band Edge and for all out-of-band emissions | | PASS |
| *2.1046 | Conducted Output Power | - | | PASS |
| 24.232(d) | Peak- to- Average Ratio | < 13 dB | | PASS |
| 2.1055, 22.355, 24.235 | Frequency stability / variation of ambient temperature | < 2.5 ppm | | PASS |
| 22.913(a)(2) 24.232(c) | Effective Radiated Power | < 7 Watts max. ERP | RADIATED | PASS |
| | Equivalent Isotropic Radiated Power | < 2 Watts max. EIRP | | PASS |
| 2.1053, 22.917(a), 24.238(a) | Radiated Spurious and Harmonic Emissions | < 43 + 10log10 (P[Watts]) for all out-of band emissions | | PASS |

*: See SAR Report

6. SAMPLE CALCULATION

A. ERP Sample Calculation

| Mode | Ch./ Freq. | | Measured Level(dBm) | Substitute LEVEL(dBm) | Ant. Gain (dBd) | C.L | Pol. | ERP | |
|--------|------------|------------|---------------------|-----------------------|-----------------|------|------|-------|-------|
| | channel | Freq.(MHz) | | | | | | W | dBm |
| GSM850 | 128 | 824.20 | -21.37 | 38.40 | -10.61 | 0.95 | H | 0.483 | 26.84 |

ERP = SubstituteLEVEL(dBm) + Ant. Gain – CL(Cable Loss)

- 1) The EUT mounted on a non-conductive turntable is 0.8 meter above test site ground level.
- 2) During the test , the turn table is rotated and the antenna height is also varied from 1 to 4 meters until the maximum signal is found.
- 3) Record the field strength meter's level.
- 4) Replace the EUT with dipole/Horn antenna that is connected to a calibrated signal generator.
- 5) Increase the signal generator output till the field strength meter's level is equal to the item (3).
- 6) The signal generator output level with Ant. Gain and cable loss are the rating of effective radiated power (ERP).

B. Emission Designator

GSM Emission Designator

Emission Designator = 249KGXW

GSM BW = 249 kHz

G = Phase Modulation

X = Cases not otherwise covered

W = Combination (Audio/Data)

7. TEST DATA

7.1 EFFECTIVE RADIATED POWER OUTPUT (GSM)

(GSM850 Mode)

| Ch./ Freq. | | Measured Level(dBm) | Substitute LEVEL (dBm) | Ant. Gain (dBd) | C.L | Pol. | ERP | |
|------------|------------|------------------------|---------------------------|--------------------|------|------|-------|-------|
| channel | Freq.(MHz) | | | | | | W | dBm |
| 128 | 824.20 | -18.67 | 41.10 | -10.61 | 0.95 | V | 0.899 | 29.54 |
| 190 | 836.60 | -20.28 | 39.90 | -10.54 | 0.96 | V | 0.692 | 28.40 |
| 251 | 848.80 | -21.26 | 39.16 | -10.47 | 1.10 | V | 0.574 | 27.59 |

Note: Standard batteries are the only options for this phone. And a peak detector is used.

NOTES:

Effective Radiated Power Output Measurements by Substitution Method

according to ANSI/TIA/EIA-603-C-2004, Aug. 17, 2004:

The EUT was placed on a non-conductive styrofoam resin table 3-meters from the receive antenna. The receive antenna height and turntable rotation was adjusted for the highest reading on the receive spectrum analyzer. For CDMA signals, a peak detector is used, with RBW = VBW = 3 MHz. For WCDMA signals, a peak detector is used, with RBW = VBW = 5MHz. For AMPS, GSM, and NADC TDMA signals, a peak detector is used, with RBW = VBW = 1 MHz. A half-wave dipole was substituted in place of the EUT. This dipole antenna was driven by a signal generator and the level of the signal generator was adjusted to obtain the same receive spectrum analyzer reading. The conducted power at the terminals of the dipole is measured. The ERP is recorded.

This device was tested under all configurations and the highest power is reported in GSM mode and using a Power Control Level of "0" in the PCS Band and "5" in the Cellular Band. This unit was tested with its standard battery. Also, we have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna. The worst case of the EUT is in y plane in GSM850 mode. Also worst case of detecting Antenna is in vertical polarization in GSM850 mode.

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7.2 EQUIVALENT ISOTROPIC RADIATED POWER (GSM)

(GSM1900 Mode)

| Ch./ Freq. | | Measured | Substitute | Ant. Gain | C.L | Pol. | EIRP | |
|------------|------------|------------|-------------|-----------|------|------|-------|-------|
| channel | Freq.(MHz) | Level(dBm) | LEVEL (dBm) | (dBi) | | | W | dBm |
| 512 | 1,850.20 | -13.09 | 18.94 | 10.02 | 1.41 | H | 0.569 | 27.55 |
| 661 | 1,880.00 | -12.65 | 19.66 | 10.04 | 1.45 | H | 0.668 | 28.25 |
| 810 | 1,909.80 | -12.32 | 19.93 | 10.05 | 1.44 | H | 0.714 | 28.54 |

Note: Standard batteries are the only options for this phone. And a peak detector is used.

NOTES:

Equivalent Isotropic Radiated Power Measurements by Substitution Method

according to ANSI/TIA/EIA-603-C-2004, Aug. 17, 2004:

The EUT was placed on a non-conductive styrofoam resin table 3-meters from the receive antenna. The receive antenna height and turntable rotation was adjusted for the highest reading on the receive spectrum analyzer. For CDMA signals, a peak detector is used, with RBW = VBW = 3 MHz. For WCDMA signals, a peak detector is used, with RBW = VBW = 5MHz. For AMPS, GSM, and NADC TDMA signals, a peak detector is used, with RBW = VBW = 1 MHz. A Horn antenna was substituted in place of the EUT. This Horn antenna was driven by a signal generator and the level of the signal generator was adjusted to obtain the same receive spectrum analyzer reading. The conducted power at the terminals of the Horn antenna is measured. The difference between the gain of the horn and an isotropic antenna is taken into consideration and the EIRP is recorded.

This device was tested under all configurations and the highest power is reported in GSM mode and using a Power Control Level of "0" in the PCS Band and "5" in the Cellular Band. This unit was tested with its standard battery. Also, we have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna. The worst case of the EUT is in x plane in GSM1900 mode. Also worst case of detecting Antenna is in horizontal polarization in GSM1900 mode.

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7.3 RADIATED SPURIOUS EMISSIONS

7.3.1 RADIATED SPURIOUS EMISSIONS (GSM850)

- ▣ MEASURED OUTPUT POWER: 29.54 dBm = 0.899 W
- ▣ MODULATION SIGNAL: GSM850
- ▣ DISTANCE: 3 meters
- ▣ LIMIT: $43 + 10 \log_{10}(W) =$ 42.54 dBc

| Ch. | Freq.(MHz) | Measured Level [dBm] | Ant. Gain (dBd) | Substitute Level [dBm] | C.L | Pol. | ERP (dBm) | dBc |
|----------------|------------|-------------------------|--------------------|------------------------------|------|------|--------------|-------|
| 128 (824.2) | 1,648.40 | -41.89 | 7.05 | -48.73 | 1.18 | V | -42.86 | 72.40 |
| | 2,472.60 | -38.66 | 7.90 | -42.41 | 1.57 | H | -36.08 | 65.62 |
| | 3,296.80 | -49.43 | 9.91 | -53.31 | 1.99 | V | -45.39 | 74.93 |
| 190 (836.6) | 1,673.20 | -40.45 | 7.22 | -47.45 | 1.20 | V | -41.43 | 70.97 |
| | 2,509.80 | -38.88 | 8.51 | -42.67 | 1.65 | H | -35.81 | 65.35 |
| | 3,346.40 | -50.96 | 10.09 | -55.35 | 2.00 | V | -47.26 | 76.80 |
| 251 (848.8) | 1,697.60 | -40.60 | 7.34 | -47.62 | 1.20 | V | -41.48 | 71.02 |
| | 2,546.40 | -39.16 | 8.61 | -42.70 | 1.65 | H | -35.74 | 65.28 |
| | 3,395.20 | -54.40 | 10.22 | -58.93 | 1.99 | V | -50.70 | 80.24 |

- NOTES:**
1. Radiated Spurious Emission Measurements at 3 meters by Substitution Method according to ANSI/TIA/EIA-603-C-2004, Aug. 17, 2004:
 2. The magnitude of spurious emissions attenuated more than 20dB below the limit above 5th Harmonic for all channel.
 3. we have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.

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7.3.2 RADIATED SPURIOUS EMISSIONS (GSM1900)

- MEASURED OUTPUT POWER: 28.54 dBm = 0.714 W
- MODULATION SIGNAL: GSM 1900
- DISTANCE: 3 meters
- LIMIT: $43 + 10 \log_{10}(W) =$ 41.54 dBc

| Ch. | Freq.(MHz) | Measured Level [dBm] | Ant. Gain (dBi) | Substitute Level [dBm] | C.L | Pol. | EIRP (dBm) | dBc |
|-----------------|------------|-------------------------|--------------------|------------------------------|------|------|---------------|-------|
| 512 (1850.2) | 3,700.40 | -50.39 | 12.27 | -55.13 | 2.19 | V | -45.05 | 73.59 |
| | 5,550.60 | -44.96 | 13.40 | -44.63 | 2.88 | V | -34.11 | 62.65 |
| | 7,400.80 | -55.32 | 11.37 | -45.03 | 3.29 | H | -36.95 | 65.49 |
| 661 (1880.0) | 3,760.00 | -46.75 | 12.31 | -51.30 | 2.11 | V | -41.10 | 69.64 |
| | 5,640.00 | -47.94 | 13.41 | -47.27 | 2.92 | V | -36.78 | 65.32 |
| | 7,520.00 | -58.47 | 11.55 | -48.95 | 3.34 | H | -40.74 | 69.28 |
| 810 (1909.8) | 3,819.60 | -47.55 | 12.37 | -52.03 | 2.14 | V | -41.80 | 70.34 |
| | 5,729.40 | -48.59 | 13.42 | -47.15 | 3.02 | H | -36.75 | 65.29 |
| | 7,639.20 | -57.42 | 11.70 | -47.66 | 3.13 | H | -39.09 | 67.63 |

- NOTES:**
1. Radiated Spurious Emission Measurements at 3 meters by Substitution Method according to ANSI/TIA/EIA-603-C-2004, Aug. 17, 2004:
 2. The magnitude of spurious emissions attenuated more than 20dB below the limit above 5th Harmonic for all channel.
 3. we have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.

7.4 PEAK-TO-AVERAGE RATIO

- Plots of the EUT's Peak- to- Average Ratio are shown Page 25.

7.5 OCCUPIED BANDWIDTH

| Band | Channel | Frequency(MHz) | Data (GSM: kHz) |
|---------|---------|----------------|-----------------|
| GSM850 | 128 | 824.20 | 242.9823 |
| | 190 | 836.60 | 247.9132 |
| | 251 | 848.80 | 243.7241 |
| GSM1900 | 512 | 1850.20 | 249.5897 |
| | 661 | 1880.00 | 247.9872 |
| | 810 | 1909.80 | 246.9503 |

- Plots of the EUT's Occupied Bandwidth are shown Page 22 ~ 24.

7.6 CONDUCTED SPURIOUS EMISSIONS

| Band | Channel | Frequency of Maximum Harmonic (GHz) | Maximum Data (dBm) |
|---------|---------|-------------------------------------|--------------------|
| GSM850 | 128 | 4.811390 | -29.00 |
| | 190 | 4.981860 | -29.05 |
| | 251 | 4.755230 | -28.88 |
| GSM1900 | 512 | 10.291610 | -25.08 |
| | 661 | 6.983060 | -25.22 |
| | 810 | 10.289420 | -25.11 |

- Plots of the EUT's Conducted Spurious Emissions are shown Page 29 ~ 35.

7.6.1 BAND EDGE

- Plots of the EUT's Band Edge are shown Page 25 ~ 29.

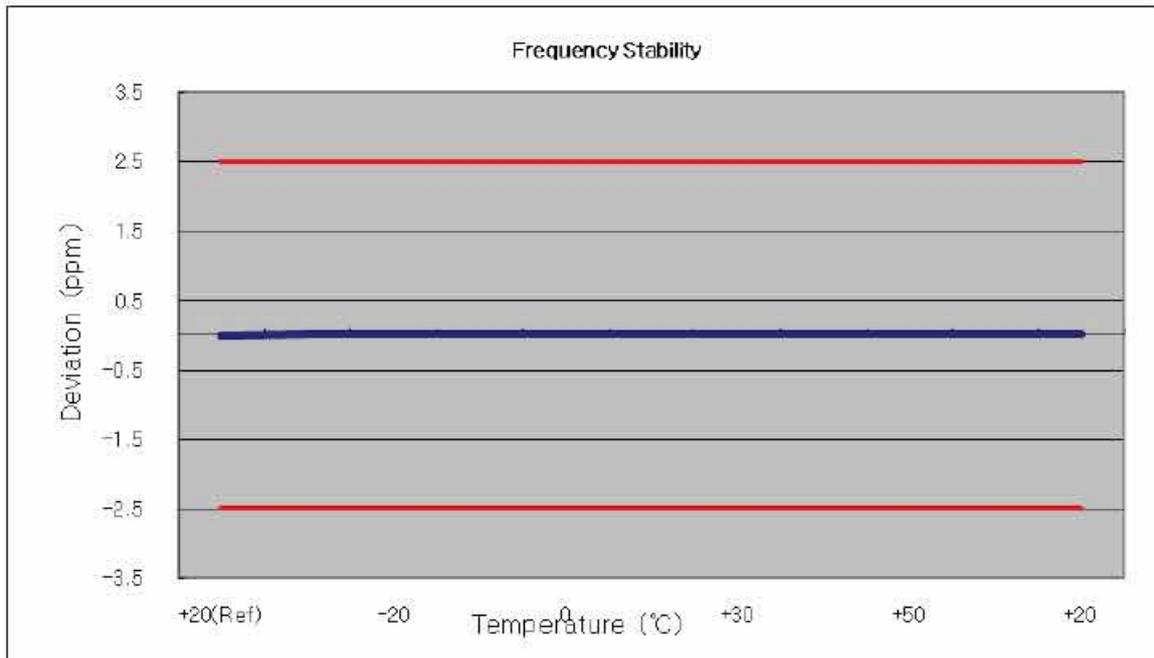
| FCC CERTIFICATION REPORT | | | www.hct.co.kr |
|--|--|---|--|
| Test Report No. HCTR1306FR09 | Date of Issue: June 07, 2013 | EUT Type: GSM Phone with Bluetooth3.0, WIFI802.11 b/g/n | FCC ID: ZNFE440 |

7.7 FREQUENCY STABILITY / VARIATION OF AMBIENT TEMPERATURE

7.7.1 FREQUENCY STABILITY (GSM850)

- ▣ OPERATING FREQUENCY: 836,600,000 Hz
- ▣ CHANNEL: 190
- ▣ REFERENCE VOLTAGE: 3.7 VDC
- ▣ DEVIATION LIM IT: ± 0.000 25 % or 2.5 ppm

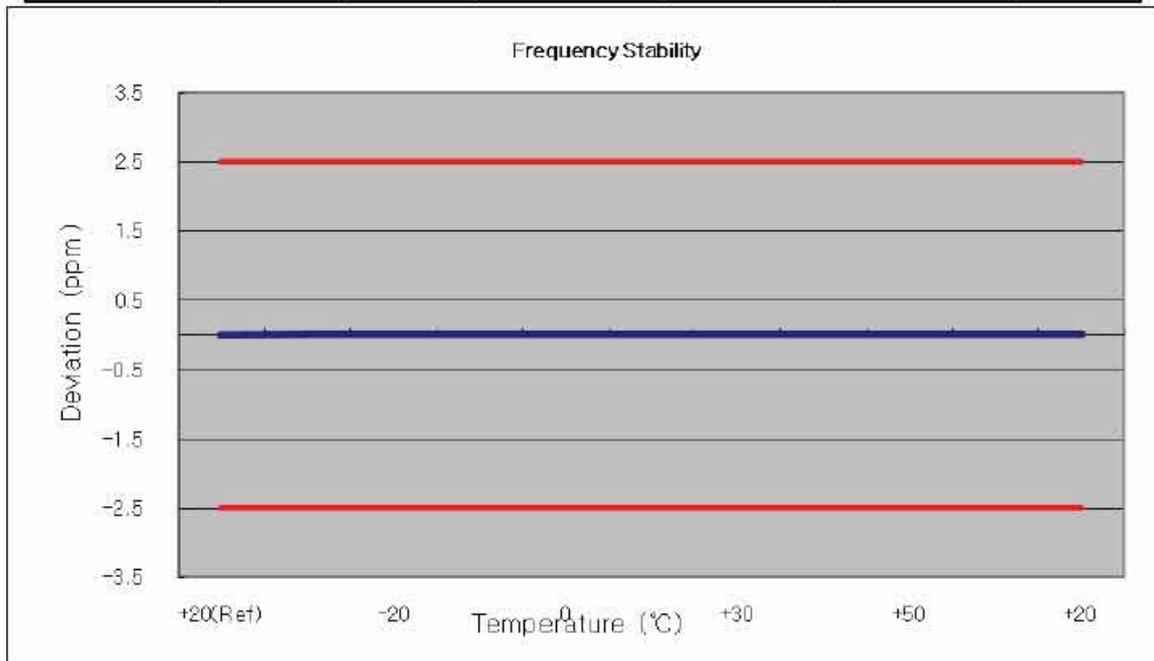
| Voltage (%) | Power (VDC) | Temp. (°C) | Frequency (Hz) | Frequency Error (Hz) | Deviation (%) | ppm |
|----------------|-------------|------------|----------------|----------------------|---------------|-------|
| 100% | 3.800 | +20(Ref) | 836 599 985 | 0 | 0.000 000 | 0.000 |
| 100% | | -30 | 836 600 001 | 15.46 | 0.000 002 | 0.018 |
| 100% | | -20 | 836 600 001 | 15.96 | 0.000 002 | 0.019 |
| 100% | | -10 | 836 599 998 | 13.29 | 0.000 002 | 0.016 |
| 100% | | 0 | 836 599 996 | 10.55 | 0.000 001 | 0.013 |
| 100% | | +10 | 836 599 998 | 13.04 | 0.000 002 | 0.016 |
| 100% | | +30 | 836 599 998 | 12.65 | 0.000 002 | 0.015 |
| 100% | | +40 | 836 599 998 | 13.32 | 0.000 002 | 0.016 |
| 100% | | +50 | 836 600 001 | 15.51 | 0.000 002 | 0.019 |
| 115% | 4.370 | +20 | 836 599 996 | 11.05 | 0.000 001 | 0.013 |
| Batt. Endpoint | 3.500 | +20 | 836 599 998 | 13.07 | 0.000 002 | 0.016 |



7.7.2 FREQUENCY STABILITY (GSM1900)

- ▣ OPERATING FREQUENCY: 1880,000,000 Hz
- ▣ CHANNEL: 661
- ▣ REFERENCE VOLTAGE: 3.7 VDC
- ▣ DEVIATION LIMIT: ± 0.000 25 % or 2.5 ppm

| Voltage (%) | Power (VDC) | Temp. (°C) | Frequency (Hz) | Frequency Error (Hz) | Deviation (%) | ppm |
|----------------|-------------|------------|----------------|----------------------|---------------|-------|
| 100% | 3.800 | +20(Ref) | 1879 999 963 | 0 | 0.000 000 | 0.000 |
| 100% | | -30 | 1879 999 996 | 33.24 | 0.000 002 | 0.018 |
| 100% | | -20 | 1879 999 997 | 34.32 | 0.000 002 | 0.018 |
| 100% | | -10 | 1880 000 002 | 38.70 | 0.000 002 | 0.021 |
| 100% | | 0 | 1879 999 988 | 24.45 | 0.000 001 | 0.013 |
| 100% | | +10 | 1879 999 997 | 34.08 | 0.000 002 | 0.018 |
| 100% | | +30 | 1879 999 997 | 33.49 | 0.000 002 | 0.018 |
| 100% | | +40 | 1879 999 997 | 33.74 | 0.000 002 | 0.018 |
| 100% | | +50 | 1879 999 998 | 34.72 | 0.000 002 | 0.018 |
| 115% | 4.370 | +20 | 1879 999 990 | 26.73 | 0.000 001 | 0.014 |
| Batt. Endpoint | 3.500 | +20 | 1879 999 998 | 34.82 | 0.000 002 | 0.019 |



FCC CERTIFICATION REPORT