

**HYUNDAI CALIBRATION & CERTIFICATION TECH. CO., LTD.**



PRODUCT COMPLIANCE DIVISION  
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## VERIFICATION

INNOMTEK Co.,Ltd.

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Gangnam Gu, Seoul, Korea 135-864

FRN: 0014856983

Date of Issue: March 25, 2006

Test Report No.: HCT-SAR06-0313

Test Site: HYUNDAI CALIBRATION & CERTIFICATION  
TECHNOLOGIES CO., LTD.

FRN: 0005866421

**FCC ID** :

**T42ICU-E640**

**APPLICANT** :

**INNOMTEK Co.,Ltd.**

|                       |                                              |
|-----------------------|----------------------------------------------|
| FCC Rule Part(s):     | FCC Part 15 Class B: 2003 / CISPR 22 CLASS B |
| Equipment(EUT) Type:  | CDMA USB MODEM                               |
| Tx Frequency:         | 824.70 — 848.31 MHz (CDMA)                   |
| Rx Frequency:         | 869.70 — 893.31 MHz (CDMA)                   |
| Max. RF Output Power: | 0.237W CDMA (23.8dBm)                        |
| Trade Name/Model(s):  | INNOMTEK / ICU-E640                          |

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.

HYUNDAI C-Tech. certifies that no party to application has been denied the FCC benefits pursuant to Section 5301 of the Anti-Drug Abuse of 1988,21 U.S.C.853(a).

**Report prepared by : Ki-Soo Kim**  
**Manager of Product Compliance 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 Test Methodology.....                             | 4     |
| 1.5 Test Facility.....                                | 4     |
| 2. SYSTEM TEST CONFIGURATION.....                     | 5     |
| 2.1 Cable Description.....                            | 5     |
| 2.2 Noise Suppression Parts on Cable.....             | 5     |
| 2.3 EUT Exercise Software.....                        | 6     |
| 2.4 Equipment Modifications.....                      | 6     |
| 2.5 Configuration of Tested System.....               | 7     |
| 3. CONDUCTED AND RADIATED EMISSION TESTS SUMMARY..... | 8     |
| 3.1 Conducted Emission Tests.....                     | 8-10  |
| 3.2 Radiated Emission Tests.....                      | 11    |
| 3.3 Test Setup Photos.....                            | 12-13 |
| 4. FIELD STRENGTH CALCULATION.....                    | 14    |
| 5. Test Equipment.....                                | 15    |
| 6. Conclusion.....                                    | 16    |

## 1. GENERAL INFORMATION

### 1.1 Product Description

The INNOMTEK Co.,Ltd. ICU-E640 CDMA USB MODEM (CDMA) phone. Its basic purpose is used for communications. It transmits from CDMA(824.70~848.31), and receives from CDMA(869.70~893.31), MHz. The RF power is rated at CDMA(0.237W).

|                      |                                                       |
|----------------------|-------------------------------------------------------|
| FCC ID               | T42ICU-E640                                           |
| EUT Type             | CDMA USB MODEM                                        |
| Model                | ICU-E640                                              |
| TX Frequency         | 824.70 — 848.31 MHz (CDMA)                            |
| RX Frequency         | 869.70 — 893.31 MHz (CDMA)                            |
| FCC Classification   | Licensed Portable Transmitter worn on body (PCT)      |
| Max RF. Output Power | 0.237W CDMA (23.8dBm)                                 |
| Modulation           | CDMA                                                  |
| Power Voltage        | Input AC: 110~240(1.5A) 50-60 Hz / Output DC: 15V(4A) |

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

ORIGINAL SUBMITTAL ONLY

### **1.3 Tested System Details**

The Model names for all equipment, plus descriptions used in the tested system (including inserted cards) are:

| DEVICE TYPE    | MANUFACTURER      | MODEL NUMBER  | FCC ID / DoC | CONNECTED TO |
|----------------|-------------------|---------------|--------------|--------------|
| CDMA USB MODEM | INNOMTEK Co.,Ltd. | ICU-E640      | T42ICU-E640  | Adaptor/ P.C |
| Note- Book P.C | Toshiba           | PA550K-04W007 | DoC          | N/A          |
| Adaptor        | Toshiba           | PA3282U-1ACA  | N/A          | P.C          |
| PRINTER        | H/P               | C4569A        | DoC          | P.C          |

### **1.4 Test Methodology**

Both conducted and radiated testing were performed according to the procedures in ANSI C63.4/2003. Radiated testing was performed at an antenna to EUT distance of 3 meters.

### **1.5 Test Facility**

The open area test site and conducted measurement facility used to collect the radiated data are located at the 254-1, Maekok-Ri, Hobup-Myun, Ichon-Si, Kyoungki-Do, 467-701, 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 July 23, 2003(Confirmation Number: 90661)

## 2.SYSTEM TEST CONFIGURATION

### 2.1 Cable Description

The marked "(D)" means the Data Cable and "(P)" means the Power Cable.

|                      | Power Cord<br>Shielded (Y/N) | I/O Cable Shielded<br>(Y/N) | Length (M)    |
|----------------------|------------------------------|-----------------------------|---------------|
| Note- Book P.C (EUT) | N                            | N/A                         | 1.8(P)        |
| Adapter              | N                            | N/A                         | 1.8(P)        |
| Printer              | N                            | Y                           | 1.8(P),1.8(D) |

### 2.2 Noise Suppression Parts on Cable.

|                | Ferrite Bead<br>(Y/N) | Location    | Metal Hood<br>(Y/N) | Location                |
|----------------|-----------------------|-------------|---------------------|-------------------------|
| Note- Book P.C | N                     | N/A         | N                   | CDMA USB MODEM<br>(EUT) |
| Adapter        | Y                     | Adapter END | Y                   | Note- Book P.C END      |
| Printer        | N                     | N/A         | Y                   | BOTH END                |

## **2.3 EUT exercise Software**

The EUT was tested on the standby during the radiated and conducted emission testing

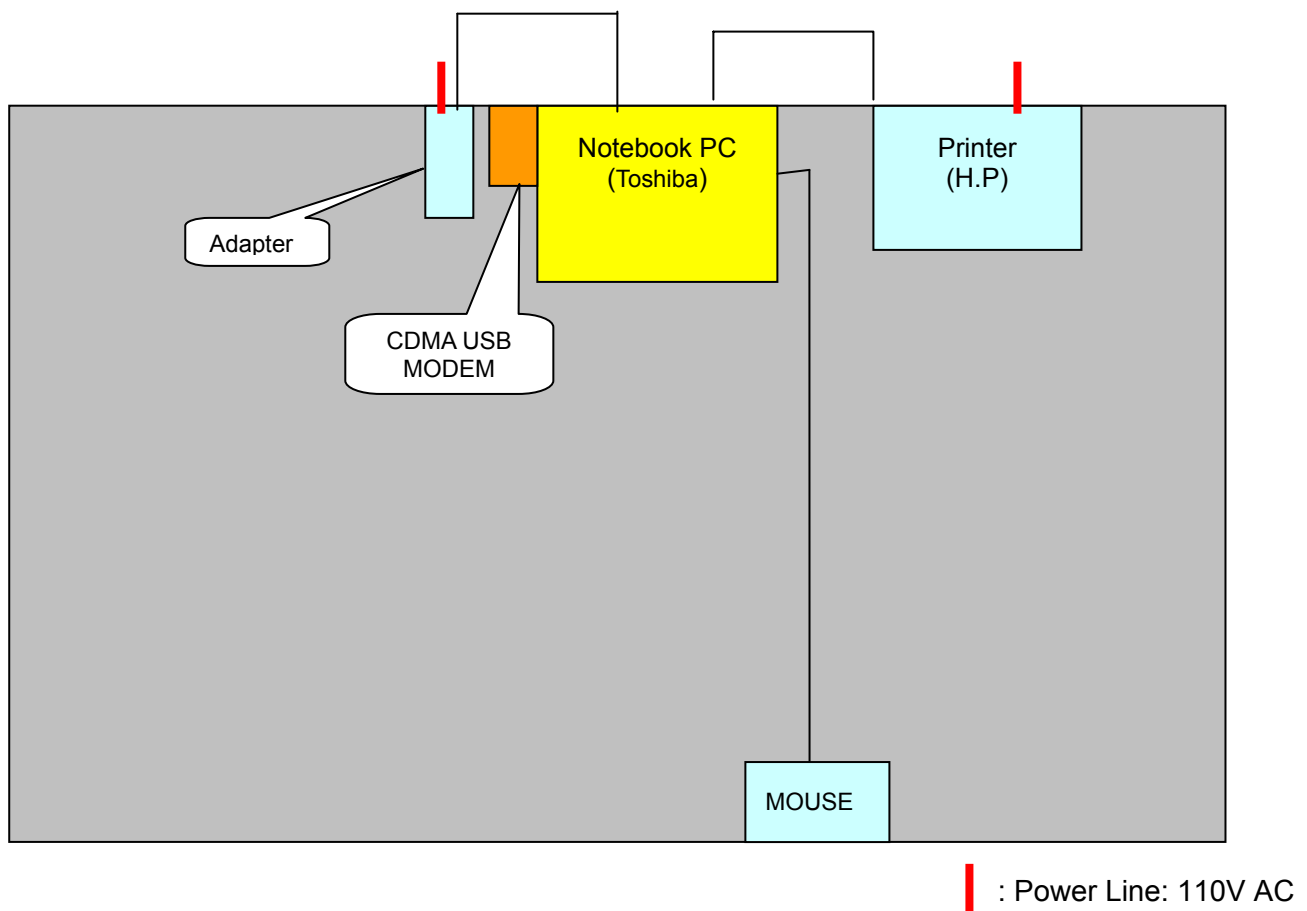
## **2.4 Equipment Modifications**

N/A

## 2.5 Configuration of Test system

Line Conducted Test : EUT was connected to LISN, all other supporting equipment were connected to another LISN. Preliminary Power line Conducted Emission tests were performed by using the procedure in ANSI C63.4/2003 7.2.3 to determine the worse operating conditions.

Radiated Emission Test : Preliminary Radiated Emissions tests were conducted using the procedure in ANSI C63.4/2003 8.3.1.1 to determine the worse perating condition. Final Radiated Emission tests were conducted at 3 meter open area test site.



[Configuration of Tested System]

### 3. CONDUCTED AND RADIATED EMISSION TESTS SUMMARY

#### 3.1 Conducted Emissions Tests

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

=====

|                     |                                            |             |           |
|---------------------|--------------------------------------------|-------------|-----------|
| Humidity Level      | : 21 %                                     | Temperature | : 21.3 °C |
| Result              | : PASSED BY -14.4 dB                       |             |           |
| EUT                 | : ICU-E640                                 |             |           |
| Operating Condition | : Normal                                   |             |           |
| Detector            | : CISPR Quasi-Peak (6 dB Bandwidth: 9 KHz) |             |           |

| Power Line Conducted Emissions |           |            | FCC Class B  |             |
|--------------------------------|-----------|------------|--------------|-------------|
| Frequency (MHz)                | Conductor | Result     | Limit (dBuV) | Margin (dB) |
| 0.2051                         | HOT       | Quasi-Peak | 64           | -18.8       |
| 0.2701                         | HOT       | Quasi-Peak | 54           | -16.9       |
| 0.2020                         | NEUTRAL   | Quasi-Peak | 64           | -16.4       |
| 0.2026                         | NEUTRAL   | Quasi-Peak | 54           | -14.4       |

Line Conducted Emissions Tabulated Data



Measured by : Keun-Ho Park / Engineer

Date : April 2, 2006

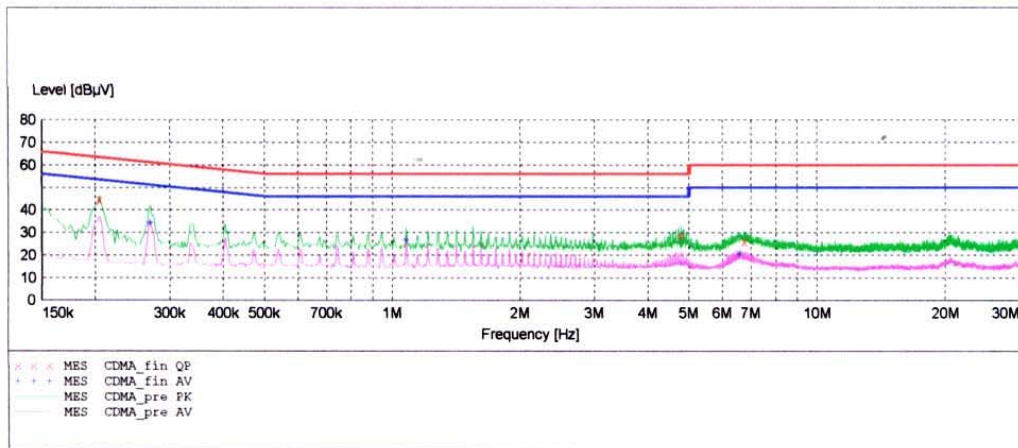


**HCT**
**EMC TEST LAB**

EUT: ICU-E640  
 Manufacturer: INNOMTEK  
 Operating Condition: NORMAL  
 Test Site: SHIELD ROOM  
 Operator: KEUN-HO PARK  
 Test Specification: CISPR 22 CLASS B  
 Comment: H

**SCAN TABLE: "CISPR 22 Voltage"**

| Short Description: |           |         | CISPR 22 Voltage |            |           |            |
|--------------------|-----------|---------|------------------|------------|-----------|------------|
| Start              | Stop      | Step    | Detector         | Meas. Time | IF Bandw. | Transducer |
| 150.1 kHz          | 500.0 kHz | 2.5 kHz | MaxPeak          | 10.0 ms    | 9 kHz     | None       |
|                    |           |         | Average          |            |           |            |
| 500.0 kHz          | 5.0 MHz   | 5.0 kHz | MaxPeak          | 10.0 ms    | 9 kHz     | None       |
|                    |           |         | Average          |            |           |            |
| 5.0 MHz            | 30.0 MHz  | 5.0 kHz | MaxPeak          | 10.0 ms    | 9 kHz     | None       |
|                    |           |         | Average          |            |           |            |


**MEASUREMENT RESULT: "CDMA\_fin QP"**

4/2/2006 2:41PM

| Frequency MHz | Level dBμV | Transd dB | Limit dBμV | Margin dB | Line | PE  |
|---------------|------------|-----------|------------|-----------|------|-----|
| 0.205100      | 44.60      | 10.1      | 63         | 18.8      | ---  | --- |
| 4.790000      | 28.70      | 10.3      | 56         | 27.3      | ---  | --- |
| 6.750000      | 26.00      | 10.3      | 60         | 34.0      | ---  | --- |

**MEASUREMENT RESULT: "CDMA\_fin AV"**

4/2/2006 2:41PM

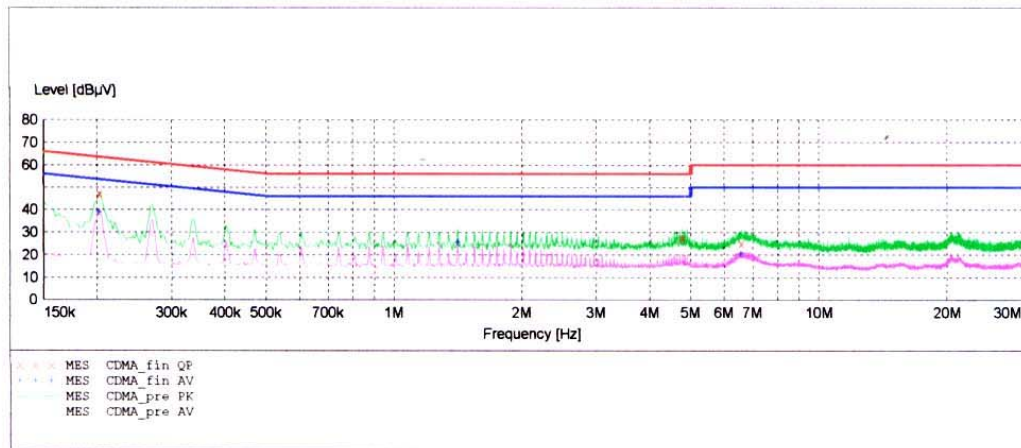
| Frequency MHz | Level dBμV | Transd dB | Limit dBμV | Margin dB | Line | PE  |
|---------------|------------|-----------|------------|-----------|------|-----|
| 0.270100      | 34.20      | 10.1      | 51         | 16.9      | ---  | --- |
| 1.080000      | 26.70      | 10.1      | 46         | 19.3      | ---  | --- |
| 6.610000      | 20.60      | 10.3      | 50         | 29.4      | ---  | --- |

**HCT**
**EMC TEST LAB**

EUT: ICU-E640  
 Manufacturer: INNOMTEK  
 Operating Condition: NORMAL  
 Test Site: SHIELD ROOM  
 Operator: KEUN-HO PARK  
 Test Specification: CISPR 22 CLASS B  
 Comment: N

**SCAN TABLE: "CISPR 22 Voltage"**

| Short Description: |           |         | CISPR 22 Voltage |            |           |            |  |
|--------------------|-----------|---------|------------------|------------|-----------|------------|--|
| Start              | Stop      | Step    | Detector         | Meas. Time | IF Bandw. | Transducer |  |
| 150.1 kHz          | 500.0 kHz | 2.5 kHz | MaxPeak          | 10.0 ms    | 9 kHz     | None       |  |
|                    |           |         | Average          |            |           |            |  |
| 500.0 kHz          | 5.0 MHz   | 5.0 kHz | MaxPeak          | 10.0 ms    | 9 kHz     | None       |  |
|                    |           |         | Average          |            |           |            |  |
| 5.0 MHz            | 30.0 MHz  | 5.0 kHz | MaxPeak          | 10.0 ms    | 9 kHz     | None       |  |
|                    |           |         | Average          |            |           |            |  |


**MEASUREMENT RESULT: "CDMA\_fin QP"**

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| Frequency MHz | Level dBμV | Transd dB | Limit dBμV | Margin dB | Line | PE  |
|---------------|------------|-----------|------------|-----------|------|-----|
| 0.202600      | 47.10      | 10.1      | 64         | 16.4      | ---  | --- |
| 4.775000      | 27.80      | 10.3      | 56         | 28.2      | ---  | --- |
| 6.590000      | 25.30      | 10.3      | 60         | 34.7      | ---  | --- |

**MEASUREMENT RESULT: "CDMA\_fin AV"**

4/2/2006 2:38PM

| Frequency MHz | Level dBμV | Transd dB | Limit dBμV | Margin dB | Line | PE  |
|---------------|------------|-----------|------------|-----------|------|-----|
| 0.202600      | 39.10      | 10.1      | 54         | 14.4      | ---  | --- |
| 1.415000      | 25.60      | 10.2      | 46         | 20.4      | ---  | --- |
| 6.590000      | 20.50      | 10.3      | 50         | 29.5      | ---  | --- |

### 3.2 Radiated Emissions Tests

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

=====

Humidity Level : 23 %                      Temperature : 21.1 °C  
Result : PASSED BY -5.5 dB  
EUT : ICU-E640  
Operating Condition : Charging Battery  
Detector : CISPR Quasi-Peak (6 dB Bandwidth : 120 KHz)

| Frequency<br>MHz | Reading<br>dBuV | Ant. Factor<br>dB | Cable Loss<br>dB | ANT POL<br>(H/V) | Total<br>dBuV/m | Limit<br>dBuV/m | Margin<br>dB |
|------------------|-----------------|-------------------|------------------|------------------|-----------------|-----------------|--------------|
| 91.40            | 24.5            | 9.0               | 2.1              | V                | 35.6            | 43.5            | -7.9         |
| 97.00            | 23.5            | 9.7               | 2.2              | V                | 35.4            | 43.5            | -8.1         |
| 217.60           | 18.1            | 16.8              | 3.3              | V                | 38.2            | 46              | -7.8         |
| 326.60           | 20.0            | 16.3              | 4.2              | V                | 40.5            | 46              | <b>-5.5</b>  |
| 391.40           | 15.7            | 16.9              | 4.5              | V                | 37.1            | 46              | -8.9         |
| 500.40           | 13.3            | 19.1              | 5.1              | V                | 37.5            | 46              | -8.5         |
| 522.60           | 13.4            | 19.6              | 5.2              | V                | 38.2            | 46              | -7.8         |
| 217.60           | 18.5            | 16.8              | 3.3              | H                | 38.6            | 46              | -7.4         |
| 326.60           | 17.6            | 16.3              | 4.2              | H                | 38.1            | 46              | -7.9         |
| 391.40           | 17.1            | 16.9              | 4.5              | H                | 38.5            | 46              | -7.5         |
| 500.40           | 13.3            | 19.1              | 5.1              | H                | 37.5            | 46              | -8.5         |
| 522.60           | 13.4            | 19.6              | 5.2              | H                | 38.2            | 46              | -7.8         |

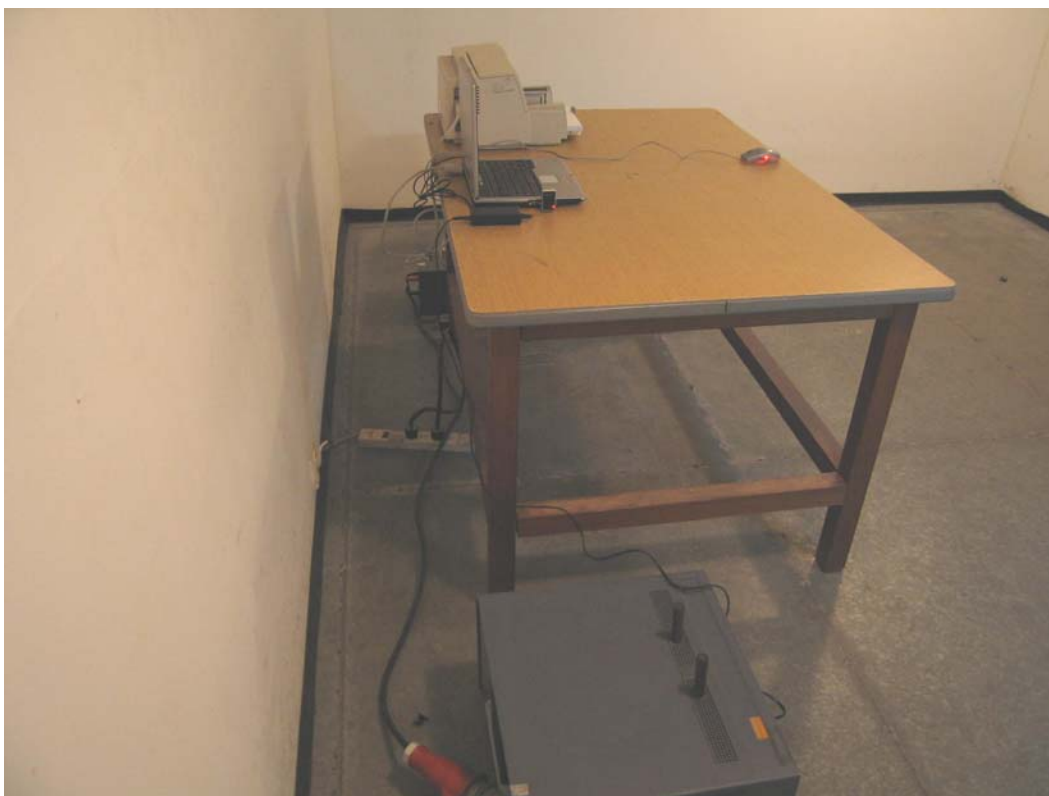
*Keun Ho. Park*

Measured by : Keun-Ho Park / Engineer

Date : April 2, 2006

### **3.3 Test Setup Photos**

#### **3.3.1 Conducted Radiated Emission**





### **3.3.2 Radiated Emission**



## 4.1 Field Strength Calculation

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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 dBuV is obtained. The Antenna Factor of 7.4 and a Cable Factor of 1.1 is added. The 30 dBuV/m value was mathematically converted to its corresponding level in uV/m.

$$FS = 21.5 + 7.4 + 1.1 = 30 \text{ dBuV/m}$$

$$\text{Level in uV/m} = \text{Common Antilogarithm} [(30 \text{ dBuV/m})/20] = 31.6 \text{ uV/m}$$

## 5.1 Test Equipment

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| Type                   | Manufacture      | Model Number    | CAL Date |
|------------------------|------------------|-----------------|----------|
| EMI Test Receiver      | Rohde & Schwarz  | ESH3            | 2006.02  |
| EMI Test Receiver      | Rohde & Schwarz  | ESVP            | 2005.06  |
| EMI Test Receiver      | Rohde & Schwarz  | ESI40           | 2006.02  |
| EMI Test Receiver      | Rohde & Schwarz  | ESVS30          | 2005.06  |
| LISN                   | EMCO             | 3816/2          | 2005.11  |
| LISN                   | EMCO             | 3816/2          | 2005.08  |
| Amplifier              | Hewlett-Packard  | 8447E           | 2005.08  |
| Absorbing Clamp        | Rohde & Schwarz  | MDS-21          | 2005.04  |
| Dipole Antennas        | Rohde & Schwarz  | VHAP            | 2005.07  |
| Dipole Antennas        | Rohde & Schwarz  | UHAP            | 2005.07  |
| Biconical Antenna      | Rohde & Schwarz  | VHA9103         | 2005.07  |
| Log-Periodic Antenna   | Rohde & Schwarz  | UHALP9107       | 2005.07  |
| Antenna Position Tower | EMCO             | 1051-12         | N/A      |
| Turn Table             | EMCO             | 1060-06         | N/A      |
| Power Analyzer         | Voltech          | PM 3300         | 2006.02  |
| Reference Network      | ImpedanceVoltech | IEC 555         | N/A      |
| AC Power Source        | PACIFIC          | Magnetic Module | N/A      |
| Controller             | HD GmbH          | HD 100          | N/A      |
| EMI in Motion          | HD GmbH          | KMS 560         | N/A      |

## **6.1 Conclusion**

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The data collected shows that the INNOMTEK Co.,Ltd. CDMA USB MODEM **FCC ID: T42ICU-E640**.  
Complies with §15.107 and §15.109 of the FCC Rules.