



Dates of Tests: : Oct 08~18, 2012

Test Report S/N: LR50011210B

Test Site : LTA CO., LTD.

## CERTIFICATION OF COMPLIANCE

FCC ID.

**A2GM3BFUS04**

APPLICANT

**U-Chang Precision Co., Ltd.**

## TEST REPORT

Equipment Class : Part 15 Security/Remote Control Transmitter  
Manufacturing Description : Automotive Vehicle Key  
Manufacturer : U-Chang Precision Co., Ltd.  
Model name : M3BFUS04  
Test Device Serial No.: Identification  
Rule Part(s) : FCC Part 15 Subpart C ; ANSI C-63.4-2003  
Frequency Range : 314.9 MHz  
Data of issue : Oct 18, 2012

This test report is issued under the authority of:



Kyu-Hyun Lee, Manager

The test was supervised by:



Jung-Moo Her, Test Engineer

This test result only responds to the tested sample. It is not allowed to copy this report even partly without the allowance of the test laboratory. This report must not be used by the applicant to claim product endorsement by any agency.



NVLAP LAB Code.: 200723-0

## **TABLE OF CONTENTS**

|                                  |                                                  |    |
|----------------------------------|--------------------------------------------------|----|
| 1. GENERAL INFORMATION'S         | -----                                            | 3  |
| 2. INFORMATION'S ABOUT TEST ITEM | -----                                            | 4  |
| 3. TEST REPORT                   |                                                  |    |
| 3.1 SUMMARY OF TESTS             | -----                                            | 5  |
| 3.2 TRANSMITTER REQUIREMENTS     |                                                  |    |
| 3.2.1 CONDUCTED EMISSION         | -----                                            | 6  |
| 3.2.2 RADIATED EMISSION          | -----                                            | 7  |
| <b>APPENDIX</b>                  |                                                  |    |
| APPENDIX 1                       | BANDWIDTH OF EMISSION -----                      | 10 |
| APPENDIX 2                       | THE EMITTING TIME OF FUNDAMENTAL FREQUENCY ----- | 12 |
| APPENDIX 3                       | TEST EQUIPMENT USED FOR TESTS -----              | 14 |

## 1. General information's

### **1-1 Test Performed**

Company name : LTA Co., Ltd.  
 Address : 243, Jubug-ri, Yangji-Myeon, Youngin-Si, Kyunggi-Do, Korea. 449-822  
 Web site : <http://www.ltalab.com>  
 E-mail : [chahn@ltalab.com](mailto:chahn@ltalab.com)  
 Telephone : +82-31-323-6008  
 Facsimile : +82-31-323-6010

Quality control in the testing laboratory is implemented as per ISO/IEC 17025 which is the “General requirements for the competents of calibration and testing laboratory”.

### **1-2 Accredited agencies**

LTA Co., Ltd. is approved to perform EMC testing by the following agencies:

| Agency | Country | Accreditation No. | Validity   | Reference           |
|--------|---------|-------------------|------------|---------------------|
| NVLAP  | U.S.A   | 200723-0          | 2013-09-30 | ECT accredited Lab. |
| RRL    | KOREA   | KR0049            | 2013-04-24 | EMC accredited Lab. |
| FCC    | U.S.A   | 610755            | 2014-04-27 | FCC filing          |
| FCC    | U.S.A   | 649054            | 2013-04-13 | FCC CAB             |
| VCCI   | JAPAN   | R2133(10m), C2307 | 2014-06-21 | VCCI registration   |
| VCCI   | JAPAN   | T-2009            | 2013-12-23 | VCCI registration   |
| VCCI   | JAPAN   | G-563             | 2015-05-28 | VCCI registration   |
| IC     | CANADA  | 5799A-1           | 2015-06-21 | IC filing           |

## 2. Information's about test item

### 2-1 Client & Manufacturer

Company name : U-Chang Precision Co., Ltd.  
Address : 632-7, Sunggok-Dong, Danwon-Gu, Ansan-City, Kyungki-Do, Korea  
Telephone / Facsimile : +82-31-491-9437 / +82-31-491-1802

### 2-2 Equipment Under Test (EUT)

Trade name : Automotive Vehicle Key  
Model name : M3BFUS04  
Serial number : Identification  
Date of receipt : Oct 8, 2012  
EUT condition : Pre-production, not damaged  
Antenna type : Pattern Antenna  
Frequency Range : 314.9 MHz  
RF Output Power : Below 10 mW  
Type of Modulation : ASK  
Power Source : DC 3.0V By Battery  
Firmware version : V2.0

### 2-3 Ancillary Equipment

| Equipment | Model No. | Serial No. | Manufacturer |
|-----------|-----------|------------|--------------|
| -         | -         | -          | -            |

### 3. Test Report

#### 3.1 Summary of tests

| FCC Part<br>Section(s) | Parameter                     | Test Condition | Status<br>(note 1) |
|------------------------|-------------------------------|----------------|--------------------|
| FCC Part 15.205/209    | Restricted Bands of Operation | Radiated       | C                  |
| FCC Part 15.231 a)     | Operation mode                |                | C <sup>2)</sup>    |
| FCC Part 15.231 b)     | Radiated emissions            |                | C                  |
| FCC Part 15.231 c)     | 20dB Bandwidth                |                | C                  |
| 15.207 /15.107         | AC Conducted Emissions        | Line Conducted | NA <sup>3)</sup>   |

Note 1: C=Complies    NC=Not Complies    NT=Not Tested    NA=Not Applicable

Note 2 The emitting time of fundamental frequency is less than 5seconds.

Refer to the APPENDIX 2.

Note 3: This device is only operated by battery.

Note 4: The data in this test report are traceable to the national or international standards.

#### A sample calculation:

COR. F (correction factor)= Antenna factor + Cable loss- Amp.gain- Distance correction

Emission Level= meter reading + COR.F

**Note 1:** The sample was tested according to the following specification:

FCC Parts 15 Subpart C ; ANSI C-63.4-2003

## 3.2 Transmitter requirements

### 3.2.1 Conducted Emission

#### Procedure:

The conducted emissions are measured in the shielded room with a spectrum analyzer in peak hold. While the measurement, EUT had its hopping function disabled at the middle channels in line with Section 15.31(m). Emissions closest to the limit are measured in the quasi-peak mode (QP) with the tuned receiver using a bandwidth of 9 kHz. The emissions are maximized further by cable manipulation and Exerciser operation. The highest emissions relative to the limit are listed.

#### Measurement Data: **Not applicable**

- The EUT operates by the Battery
- According to the rule of section 15.207(c), The EUT exempt to the power line conducted test.

#### LIMIT:

| Frequency Range | Near-peak    | Average      |
|-----------------|--------------|--------------|
| 0.15 ~ 0.5 MHz  | 66 ~ 56 dBuV | 56 ~ 46 dBuV |
| 0.5 ~ 5 MHz     | 56 dBuV      | 46 dBuV      |
| 5 ~ 30 MHz      | 60 dBuV      | 50 dBuV      |

Note: The limits will decrease with the frequency logarithmically within 0.15MHz to 0.5MHz

### 3.2.2 Radiated Emission

#### Definition:

The field strength of emissions from intentional radiators was measured.

|                     |                                                     |
|---------------------|-----------------------------------------------------|
| Test method         | : FCC Part 15.205 / 209                             |
| Transmit Frequency  | : 314.9MHz                                          |
| Frequency Range     | : 9kHz ~30MHz / 30 MHz ~ 10 <sup>th</sup> harmonic. |
| Bandwidth           | : 120 kHz (F < 1GHz)    1 MHz (F > 1GHz)            |
| Distance of antenna | : 3 meters                                          |
| Test mode           | : Tx mode                                           |
| Result              | : <b>Complies</b>                                   |

#### Measurement Data:

- No other emissions were detected at a level greater than 20dB below limit.
- Refer to the next page.

#### Field Strength Limit of fundamental and Harmonics: Part 15.231(b)

| Frequency (MHz) | Limit @ 3m                                                                                                             |
|-----------------|------------------------------------------------------------------------------------------------------------------------|
| 314.9           | 41.6667(314.9) – 7083.3333 = 6037 uV/m = 75.6 dBuV/m (Average)<br>95.6dBuV/m (Peak)                                    |
| Harmonics       | 60.8 dBuV/m<br>(The maximum permitted unwanted emission level is 20 dB below the maximum permitted fundamental level.) |

#### Part 15.209 LIMIT:

| Frequency (MHz) | Limit (uV/m) @ 3m   |
|-----------------|---------------------|
| 0.009 ~ 0.490   | 2400/F (kHz) @ 300m |
| 0.490 ~ 1.705   | 24000/F (kHz) @ 30m |
| 1.705 ~ 30      | 30 @ 30m            |
| 30 ~ 88         | 100**               |
| 88 ~ 216        | 150**               |
| 216 ~ 960       | 200**               |
| Above 960       | 500                 |

\*\* Except as provided in 15.209(g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88MHz, 174-216MHz or 470-806MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g. 15.231 and 15.241.

**\*Measurement Data: (30MHz – 10th harmonic)**

| Frequency             | Reading    |      | Pol. | Correction<br>Factor | Limits     |      | Result     |      | Margin    |      |
|-----------------------|------------|------|------|----------------------|------------|------|------------|------|-----------|------|
| [MHz]                 | [dBuV / m] |      |      |                      | [dBuV / m] |      | [dBuV / m] |      | [dB]      |      |
|                       | AV / Peak  |      |      |                      | AV / Peak  |      | AV / Peak  |      | AV / Peak |      |
| 314.888 <sup>3)</sup> | 82.6       | 85.0 | H    | -10.42               | 75.6       | 95.6 | 72.2       | 74.6 | 3.4       | 21.0 |
| 944.760               | 42.9       | 45.5 | H    | 2.03                 | 60.8       | 80.8 | 44.9       | 47.5 | 15.9      | 33.3 |
| -                     | -          | -    | -    | -                    | -          | -    | -          | -    | -         | -    |
| Frequency             | Reading    |      | Pol. | Correction<br>Factor | Limits     |      | Result     |      | Margin    |      |
| [MHz]                 | [dBuV / m] |      |      |                      | [dBuV / m] |      | [dBuV / m] |      | [dB]      |      |
|                       | AV / Peak  |      |      |                      | AV / Peak  |      | AV / Peak  |      | AV / Peak |      |
| -                     | -          | -    | -    | -                    | -          | -    | -          | -    | -         | -    |
| -                     | -          | -    | -    | -                    | -          | -    | -          | -    | -         | -    |
| -                     | -          | -    | -    | -                    | -          | -    | -          | -    | -         | -    |
| Frequency             | Reading    |      | Pol. | Correction<br>Factor | Limits     |      | Result     |      | Margin    |      |
| [MHz]                 | [dBuV / m] |      |      |                      | [dBuV / m] |      | [dBuV / m] |      | [dB]      |      |
|                       | AV / Peak  |      |      |                      | AV / Peak  |      | AV / Peak  |      | AV / Peak |      |
| -                     | -          | -    | -    | -                    | -          | -    | -          | -    | -         | -    |
| -                     | -          | -    | -    | -                    | -          | -    | -          | -    | -         | -    |
| -                     | -          | -    | -    | -                    | -          | -    | -          | -    | -         | -    |

\*restricted band of operation §15.205

\* Result level = Reading value + Antenna factor – Amp Gain + Cable Loss

\* This EUT was tested in 3 orthogonal positions and the worst-case data was presented.

**Note 1:** No other emission were detected at a level greater than 20 dB below limit.

**Note 2:** All readings above 1GHz were taken using a peak detector function at a distance of 3 meters.

**Note 3:** Fundamental Frequency

**\*Measurement Data: (9kHz - 30MHz)**

| Frequency                                                            | Reading    |   | Pol. | Correction |           |       | Limits     |   | Result     |   | Margin    |   |
|----------------------------------------------------------------------|------------|---|------|------------|-----------|-------|------------|---|------------|---|-----------|---|
|                                                                      | [dBuV / m] |   |      | Factor     |           |       | [dBuV / m] |   | [dBuV / m] |   | [dB]      |   |
| [MHz]                                                                | AV / Peak  |   |      | Antenna    | Amp. Gain | Cable | AV / Peak  |   | AV / Peak  |   | AV / Peak |   |
| -                                                                    | -          | - | -    | -          | -         | -     | -          | - | -          | - | -         | - |
| No emissions were detected at a level greater than 20dB below limit. |            |   |      |            |           |       |            |   |            |   |           |   |
| -                                                                    | -          | - | -    | -          | -         | -     | -          | - | -          | - | -         | - |
| -                                                                    | -          | - | -    | -          | -         | -     | -          | - | -          | - | -         | - |

\*No emissions were detected at a level greater than 20dB below limit.



**Radiated Emissions**

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Tel +82-31-3236008,9  
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EUT/Model No.: M3BFUS04

TEST MODE: Wireless mode

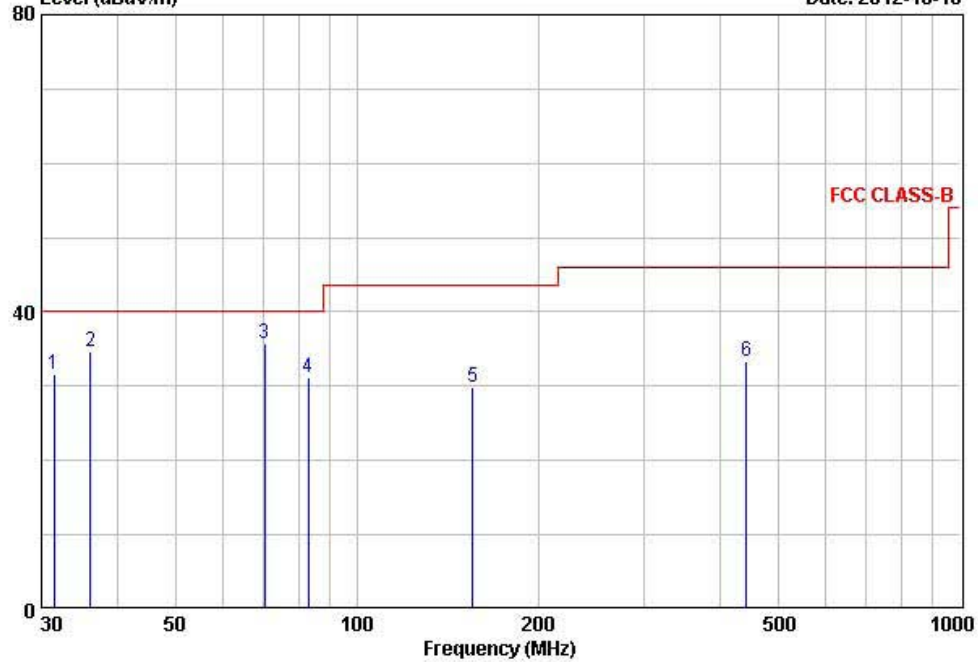
Temp Humi : 20 / 69

Tested by: PARK H W

Data: 10

Level (dBuV/m)

Date: 2012-10-16



|   | Freq   | Reading | C.F    | Result | Limit | Margin | Height | Angle | Polarity   |
|---|--------|---------|--------|--------|-------|--------|--------|-------|------------|
|   | MHz    | dBuV/m  | dB/m   | dBuV/m | QP    | dB     | cm     | deg   |            |
| 1 | 31.46  | 48.60   | -17.01 | 31.59  | 40.00 | 8.41   | 351    | 209   | HORIZONTAL |
| 2 | 36.16  | 51.30   | -16.59 | 34.71  | 40.00 | 5.29   | 100    | 217   | VERTICAL   |
| 3 | 70.35  | 52.80   | -17.11 | 35.69  | 40.00 | 4.31   | 100    | 256   | VERTICAL   |
| 4 | 83.16  | 50.60   | -19.52 | 31.08  | 40.00 | 8.92   | 100    | 225   | VERTICAL   |
| 5 | 155.64 | 42.80   | -12.84 | 29.96  | 43.50 | 13.54  | 100    | 346   | VERTICAL   |
| 6 | 443.14 | 41.14   | -7.71  | 33.43  | 46.00 | 12.57  | 221    | 108   | VERTICAL   |

Remarks: C.F (Correction Factor) = Antenna factor + Cable loss - Preamp gain

APPENDIX 1

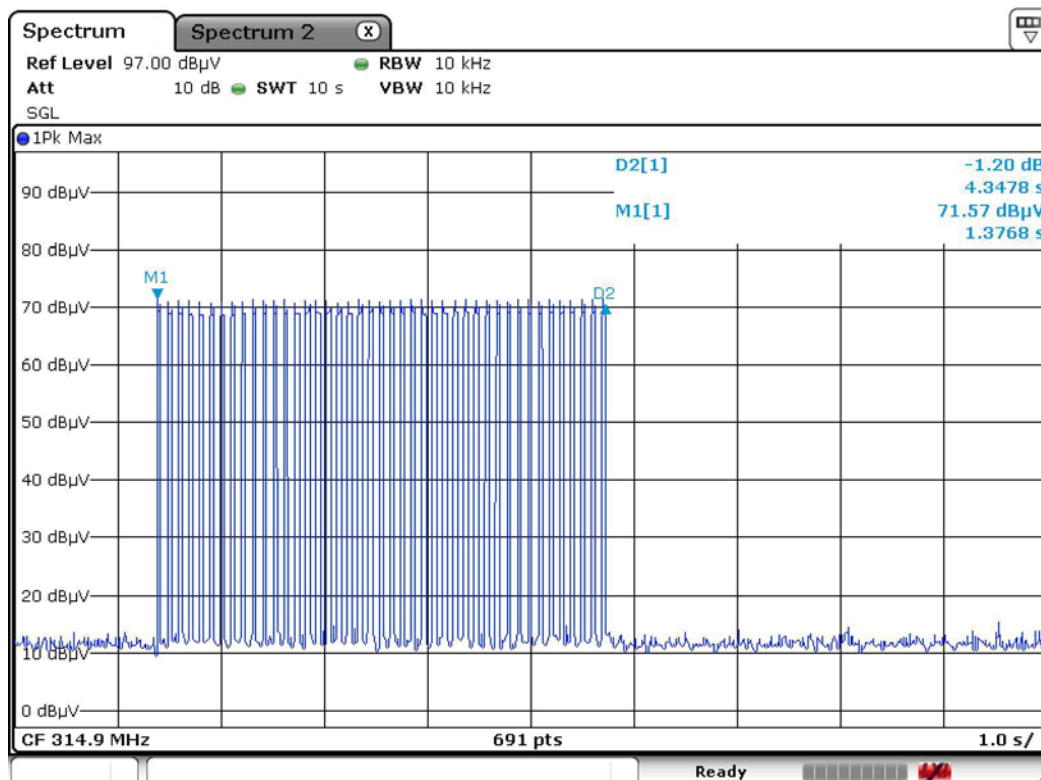
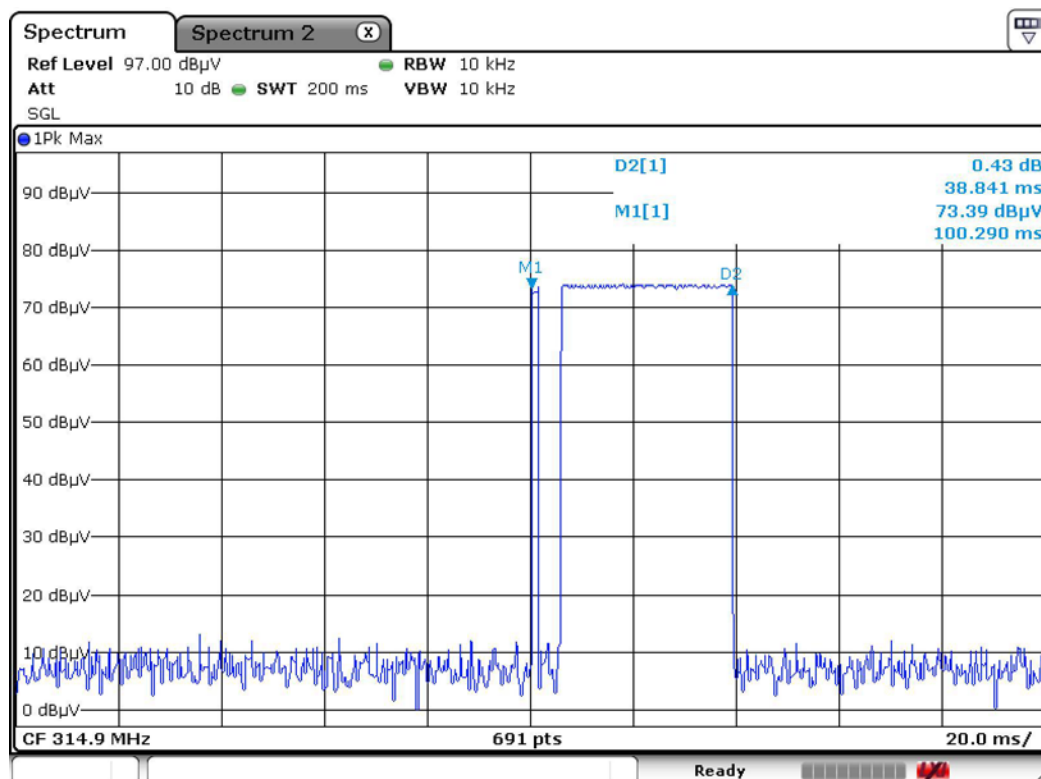
**BANDWIDTH OF EMISSION**



## APPENDIX 2

### **THE EMITTING TIME OF FUNDAMENTAL FREQUENCY**

## The Emitting time of Fundamental Frequency



Note . The above plots is the worst case plots generated with the full data rate.

APPENDIX 3

**TEST EQUIPMENT USED FOR TESTS**

|    | Description                | Model No.        | Serial No.  | Manufacturer           | Interval | Last Cal. Date |
|----|----------------------------|------------------|-------------|------------------------|----------|----------------|
| 1  | Spectrum Analyzer (~30GHz) | FSV-30           | 100757      | R&S                    | 1 year   | 2012-01-10     |
| 2  | Signal Generator (~3.2GHz) | 8648C            | 3623A02597  | HP                     | 1 year   | 2012-03-26     |
| 3  | Signal Generator (1~20GHz) | 83711B           | US34490456  | HP                     | 1 year   | 2012-03-26     |
| 4  | Attenuator (3dB)           | 8491A            | 37822       | HP                     | 2 year   | 2012-09-22     |
| 5  | Attenuator (10dB)          | 8491A            | 63196       | HP                     | 2 year   | 2012-09-22     |
| 6  | Attenuator (30dB)          | 8498A            | 3318A10929  | HP                     | 2 year   | 2011-01-05     |
| 7  | Test Receiver (~30MHz)     | ESHS10           | 828404/009  | R&S                    | 1 year   | 2012-03-26     |
| 8  | EMI Test Receiver (~1GHz)  | ESCI7            | 100722      | R&S                    | 1 year   | 2011-10-07     |
| 9  | RF Amplifier (~1.3GHz)     | 8447D            | 2439A09058  | HP                     | -        | -              |
| 10 | RF Amplifier (1~18GHz)     | 8449B            | 3008A02126  | HP                     | 2 year   | 2012-03-26     |
| 11 | Horn Antenna (1~18GHz)     | BBHA 9120D       | 9120D122    | SCHWARZBECK            | 2 year   | 2010-12-24     |
| 12 | Horn Antenna (18 ~ 40GHz)  | SAS-574          | 154         | Schwarzbeck            | 2 year   | 2010-11-25     |
| 13 | Horn Antenna (18 ~ 40GHz)  | SAS-574          | 155         | Schwarzbeck            | 2 year   | 2010-11-25     |
| 14 | TRILOG Antenna             | VULB 9160        | 9160-3242   | SCHWARZBECK            | 2 year   | 2011-06-09     |
| 15 | Dipole Antenna             | VHA9103          | 2116        | SCHWARZBECK            | 2 year   | 2010-11-25     |
| 16 | Dipole Antenna             | VHA9103          | 2117        | SCHWARZBECK            | 2 year   | 2010-11-25     |
| 17 | Dipole Antenna             | VHA9105          | 2261        | SCHWARZBECK            | 2 year   | 2010-11-25     |
| 18 | Dipole Antenna             | VHA9105          | 2262        | SCHWARZBECK            | 2 year   | 2010-11-25     |
| 19 | Hygro-Thermograph          | THB-36           | 0041557-01  | ISUZU                  | 2 year   | 2013-04-26     |
| 20 | Splitter (SMA)             | ZFSC-2-2500      | SF617800326 | Mini-Circuits          | -        | -              |
| 21 | DC Power Supply            | 6622A            | 3448A03079  | HP                     | -        | -              |
| 22 | Frequency Counter          | 5342A            | 2826A12411  | HP                     | 1 year   | 2012-03-26     |
| 23 | Power Meter                | EPM-441A         | GB32481702  | HP                     | 1 year   | 2012-03-26     |
| 24 | Power Sensor               | 8481A            | US41030291  | HP                     | 1 year   | 2011-10-07     |
| 25 | Audio Analyzer             | 8903B            | 3729A18901  | HP                     | 1 year   | 2011-10-07     |
| 26 | Modulation Analyzer        | 8901B            | 3749A05878  | HP                     | 1 year   | 2011-10-07     |
| 27 | TEMP & HUMIDITY Chamber    | YJ-500           | LTAS06041   | JinYoung Tech          | 1 year   | 2011-10-07     |
| 28 | Stop Watch                 | HS-3             | 601Q09R     | CASIO                  | 2 year   | 2012-03-26     |
| 29 | LISN                       | ENV216           | 100408      | R&S                    | 1 year   | 2011-10-07     |
| 30 | Highpass Filter            | WHKX1.5/15G-10SS | 74          | Wainwright Instruments | -        | -              |
| 31 | Highpass Filter            | WHKX3.0/18G-10SS | 118         | Wainwright Instruments | -        | -              |
| 32 | Loop Antenna               | FMZB 1516        | 151602/94   | SCHWARZBECK            | 2 year   | 2011-04-05     |