


 Dates of Tests: May 16 ~ 23, 2011  
 Test Report S/N: LR5001111050  
 Test Site : LTA CO., LTD.

## CERTIFICATION OF COMPLIANCE

FCC ID.

**WLHBAS-1000**

APPLICANT

**BNB Solutions Co., Ltd.**

<b>FCC Classification</b>	:	Licensed Portable Transmitter Worn on body (PCT)
<b>Manufacturing Description</b>	:	AVL-GSM
<b>Manufacturer</b>	:	BNB Solutions Co., Ltd.
<b>Manufacturer (RF Module)</b>	:	Cinterion Wireless Modules GmbH
<b>Model name</b>	:	BAS-1000
<b>Test Device Serial No.:</b>	:	Identical prototype
<b>Rule Part(s)</b>	:	§24(E), §22(H), §2
<b>TX Frequency Range</b>	:	824.2 ~ 848.8 MHz (GSM850)/1850.2 ~ 1909.8 MHz (PCS1900)
<b>RX Frequency Range</b>	:	869.2 ~ 893.8 MHz (GSM850)/1930.2 ~ 1989.8 MHz (PCS1900)
<b>RF Output Power</b>	:	GSM850 (33dBm: Level 5) / PCS1900 (30dBm: Level 0)

This test report is issued under the authority of:

The test was supervised by:

Hyun-Chae You, Manager

Il-Shin kim, 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. The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.

NVLAP LAB Code.: 200723-0

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## 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	2011-09-30	ECT accredited Lab.
KCC	KOREA	KR0049	2013-04-24	EMC accredited Lab.
FCC	U.S.A	610755	2014-04-27	FCC filing
FCC	U.S.A	649054	2011-05-26	FCC CAB
VCCI	JAPAN	R2133(10m), C2307	2011-06-21	VCCI registration
VCCI	JAPAN	T-2009	2013-12-23	VCCI registration
IC	CANADA	IC5799	2012-05-14	IC filing

## 2. Information's about test item

### 2-1 Client & Manufacturer

Company name : BNB Solutions Co., Ltd.  
 Address : 169-1, Jubuk-ri, Yangji-Myeon, Cheoin-gu, Yongin-si, Gyeonggi-do, Korea  
 Tel / Fax : TEL: +82-31-337-1203 FAX: +82-31-337-1209

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

Trade name : AVL-GSM  
 Model name : BAS-1000  
 Serial number : Identical prototype  
 Date of receipt : May 21, 2011  
 EUT condition : Pre-production, not damaged  
 GSM Module : Cinterion Wireless Modules GmbH (BG2-W)  
     Identification mark: 0682  
 Antenna type : Patch Antenna(TA070040) / 2dBi@850MHZ ; 1dBi@1800MHZ  
 RF output power : 0.49 W ERP GSM850 (26.81dBm)  
     0.68 W EIRP GSM1900 (28.34dBm)  
 Modulation : GMSK, 8PSK  
 Power Source : DC 12/24 V  
 Firmware version : V 1.0

### 2-3 Tested frequency

Frequency	Ch.	GSM 850	Ch	GSM1900
Low frequency (MHz)	128	824.2	512	1850.2
Middle frequency (MHz)	190	836.6	661	1880.0
High frequency (MHz)	251	848.8	810	1909.8

### 2.4 Test conditions

Temperature	: +15~35 °C	Humidity	: 30~65 %RH
Pressure	: 860~1030 mbar	Operating mode	: Air link mode
GSM850	A communication link is established between the mobile station and the test simulator. The transmitter is operated at its maximum rated output power: 33 dBm (power class 4 = power control level 5)		
GSM1900	A communication link is established between the mobile station and the test simulator. The transmitter is operated at its maximum rated output power: 30 dBm (power class 1 = power control level 0)		

### 3. Test Report

#### 3.1 Summary of tests

FCC Part Section(s)	Parameter	Test Condition	Status (note 1)
22.913(a)(2)	Effective radiated power	Radiated	C
24.232(c)	Effective isotropic radiated power		C
2.1053 22.917(a) 24.238(a)	Spurious radiated emission		C
15.209	Field Strength of Harmonics		C
15.207	AC Conducted Emissions	Line Conducted	NA <sup>Note3</sup>

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

Note 2: The data in this test report are traceable to the national or international standards.

Note3: This device is only operated by DC

The sample was tested according to the following specification:

ANSI C-63.4-2003

### 3.2 Technical Characteristics Test

#### 3.3.1 Conducted Output Power

Band	Frequency (MHz)	GPRS Data	
		GPRS 1 Tx Slot	GPRS 2 Tx Slot
		(dBm)	(dBm)
GSM850	824.2	31.8	31.6
	836.6	31.8	31.7
	848.8	31.7	31.4
GSM1900	1950.2	29.1	29.0
	1880.0	29.3	29.1
	1909.8	29.2	29.0

We found out the test mode with the highest power level after we analyzer all the data rates. So we chose GSM850/GSM1900 as a representative

### 3.2.2 Effective Radiated Power Output

#### **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 wooden turn 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 GSM signals, an average detector is used, with RBW=VBW=3MHz, SPAN=10MHz. 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.

### 3.2.2 Radiation Spurious and Harmonic Emissions

#### **Effective Radiated Power Output Measurements by Substitution Method according to ANSI/TIA/EIA-603-C-2004, Aug. 17, 2004:**

Radiation and harmonic emissions are measured outdoors at our 3-meter test range. The equipment under test is placed on a wooden turntable 3-meters from the receive antenna. The receive antenna height and turntable rotations were adjusted for the highest reading on the receive spectrum analyzer. The Spectrum was investigated from 30MHz to the 10<sup>th</sup> Harmonic of the fundamental. A peak detector is used. With RBW=VBW=1MHz. The value that we could measure was only reported. A half-wave dipole was substituted in place of the EUT. This dipole antenna was driven by a signal generator with the level of the signal generator being adjusted to obtain the same receive spectrum analyzer reading. This level is recorded. For readings above 1GHz, the above procedure is repeated using horn antennas and the difference between the gain of the horn and an isotropic or dipole antenna are taken into consideration.

**Effective Radiated Power Output (GSM850)****Measurement Data:****GSM850**

Channel	Frequency (MHz)	TEST CONDITIONS		Power Step: 5	
		Ref. level (dBm)	Pol. (H/V)	ERP (dBm)	ERP (W)
128	824.2	-13.43	H	26.81	0.49
190	836.6	-13.37	H	26.75	0.47
251	848.8	-13.54	H	26.59	0.46

*Note 1:* Radiated measurements at 3 meters by Substitution Method.

**Equivalent Isotropic Radiated Power (PCS1900)****Measurement Data:****PCS1900**

Channel	Frequency (MHz)	TEST CONDITIONS		Power Step: 0	
		Ref. level (dBm)	Pol. (H/V)	EIRP (dBm)	EIRP (W)
512	1850.2	-13.83	H	27.62	0.58
661	1880.0	-12.83	H	28.34	0.68
810	1909.8	-12.43	H	28.09	0.64

*Note 2:* Radiated measurements at 3 meters by Substitution Method.

### 3.3.3 Field Strength of spurious Radiation

OPERATING FREQUENCY : 824.2 MHz  
 CHANNEL : 128(Low)  
 MEASURED OUTPUT POWER : 26.81 dBm = 0.49 W  
 MODULATION : GSM850  
 DISTANCE : 3 meters  
 LIMIT :  $43 + 10 \log_{10} (W)$  = 39.90 dBc

Freq. (MHz)	LEVEL@ ANTENNA TERMINALS (dBm)	SUBSTITUTE ANTENNA GAIN (dBd)	CORRECT GENERATOR LEVEL (dBm)	POL (H/V)	
-	-	-	-	-	-
No emissions were detected are a level greater than 20dB below limit.					
-	-	-	-	-	-

*Note1:* Radiated measurements at 3 meters by Substitution Method.

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## 3.3.3 Field Strength of spurious Radiation

--- Continue

OPERATING FREQUENCY : 836.6 MHz

CHANNEL : 190(Mid)

MEASURED OUTPUT POWER : 26.81 dBm = 0.49 W

MODULATION : GSM850

DISTANCE : 3 meters

LIMIT :  $43 + 10 \log_{10} (W)$  = 39.90 dBc

Freq. (MHz)	LEVEL@ ANTENNA TERMINALS (dBm)	SUBSTITUTE ANTENNA GAIN (dBd)	CORRECT GENERATOR LEVEL (dBm)	POL (H/V)	
-	-	-	-	-	-
No emissions were detected are a level greater than 20dB below limit.					
-	-	-	-	-	-

*Note1:* Radiated measurements at 3 meters by Substitution Method.

--- Blank ---

## 3.3.3 Field Strength of spurious Radiation

--- Continue

OPERATING FREQUENCY : 848.8 MHz

CHANNEL : 251(High)

MEASURED OUTPUT POWER : 26.81 dBm = 0.49 W

MODULATION : GSM850

DISTANCE : 3 meters

LIMIT :  $43 + 10 \log_{10} (W)$  = 39.90 dBc

Freq. (MHz)	LEVEL@ ANTENNA TERMINALS (dBm)	SUBSTITUTE ANTENNA GAIN (dBd)	CORRECT GENERATOR LEVEL (dBm)	POL (H/V)	
-	-	-	-	-	-
No emissions were detected are a level greater than 20dB below limit.					
-	-	-	-	-	-

*Note1:* Radiated measurements at 3 meters by Substitution Method.

--- Blank ---

OPERATING FREQUENCY : 1850.2 MHz

CHANNEL : 512(Low)

MEASURED OUTPUT POWER : 28.34 dBm = 0.68 W

MODULATION : GSM1900

DISTANCE : 3 meters

LIMIT :  $43 + 10 \log_{10} (W)$  = 41.33 dBc

Freq. (MHz)	LEVEL@ ANTENNA TERMINALS (dBm)	SUBSTITUTE ANTENNA GAIN (dBi)	CORRECT GENERATOR LEVEL (dBm)	POL (H/V)	
-	-	-	-	-	-
No emissions were detected are a level greater than 20dB below limit.					
-	-	-	-	-	-

*Note1:* Radiated measurements at 3 meters by Substitution Method.

--- Blank ---

**3.3.3 Field Strength of spurious Radiation****--- Continue**

OPERATING FREQUENCY : 1880.0 MHz

CHANNEL : 661(Mid)

MEASURED OUTPUT POWER : 28.34 dBm = 0.68 W

MODULATION : GSM1900

DISTANCE : 3 meters

LIMIT :  $43 + 10 \log_{10} (W)$  = 41.33 dBc

Freq. (MHz)	LEVEL@ ANTENNA TERMINALS (dBm)	SUBSTITUTE ANTENNA GAIN (dBi)	CORRECT GENERATOR LEVEL (dBm)	POL (H/V)	
-	-	-	-	-	-
No emissions were detected are a level greater than 20dB below limit.					
-	-	-	-	-	-

*Note1:* Radiated measurements at 3 meters by Substitution Method.

**3.3.3 Field Strength of spurious Radiation****--- Continue**

OPERATING FREQUENCY : 1909.8 MHz

CHANNEL : 810 (High)

MEASURED OUTPUT POWER : 28.34 dBm = 0.68 W

MODULATION : GSM1900

DISTANCE : 3 meters

LIMIT :  $43 + 10 \log_{10} (W)$  = 41.33 dBc

Freq. (MHz)	LEVEL@ ANTENNA TERMINALS (dBm)	SUBSTITUTE ANTENNA GAIN (dBi)	CORRECT GENERATOR LEVEL (dBm)	POL (H/V)	
-	-	-	-	-	-
No emissions were detected are a level greater than 20dB below limit.					
-	-	-	-	-	-

*Note1:* Radiated measurements at 3 meters by Substitution Method.

### 3.2.3 Field Strength

## Procedure:

The EUT was placed on a 0.8m high wooden table inside a shielded enclosure. An antenna was placed near the EUT and measurements of frequencies and amplitudes of field strengths were recorded for reference during final measurements. For final radiated testing, measurements were performed in OATS. Measurements were performed with the EUT oriented in 3 orthogonal axis and rotated 360 degrees to determine worst-case orientation for maximum emissions.

The spectrum analyzer is set to:

Center frequency = the worst channel

Frequency Range = 30 MHz ~ 10<sup>th</sup> harmonic.

RBW = 100 kHz ( 30MHz ~ 1 GHz)

$$\text{VBW} \geq \text{RBW}$$

= 1 MHz (1 GHz  $\sim$  10<sup>th</sup> harmonic )

Span = 100 MHz

Detector function = Quasi-peak

Trace = max hold

Sweep = auto

**Measurement Data: Complies**

→ No other emissions were detected are a level greater than 20dB below limit.

### **Minimum Standard: FCC Part 15.209(a)**

Frequency (MHz)	Limit (uV/m) @ 3m
30 ~ 88	100 **
88 ~ 216	150 **
216 ~ 960	200 **
Above 960	500

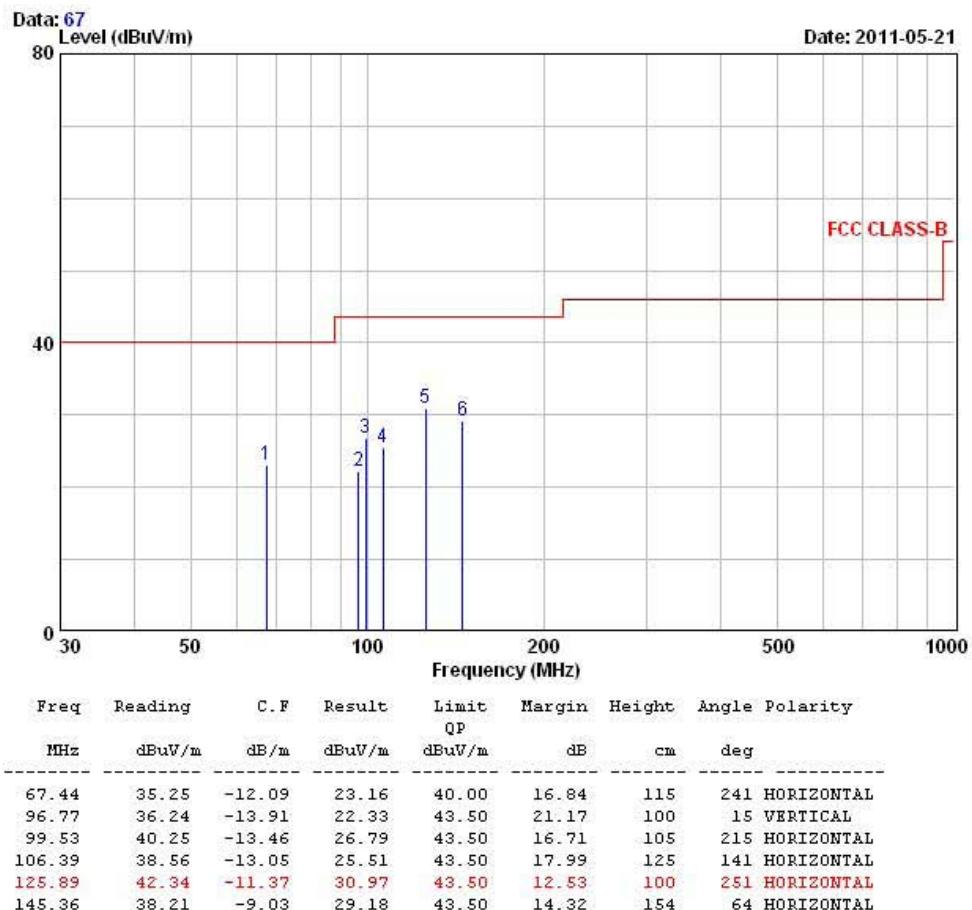
\*\* Except as provided in 15.209(g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88MHz, 174-216MHz or 470-806MHz. However, operation within these frequency bands is permitted under other sections of this Part,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

## 1. Measurement Data:



243 Jubug-ri, yangji-Myeon, Youngin-si,  
Gyeonggi-do 449-822 Korea  
Tel: +82-31-3236008,9  
Fax: +82-31-3236010

EUT/Model No.: BAS-1000 TEST MODE: GSM850 mode  
Temp Humi : 27 / 46 Tested by: PARK.H.W



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



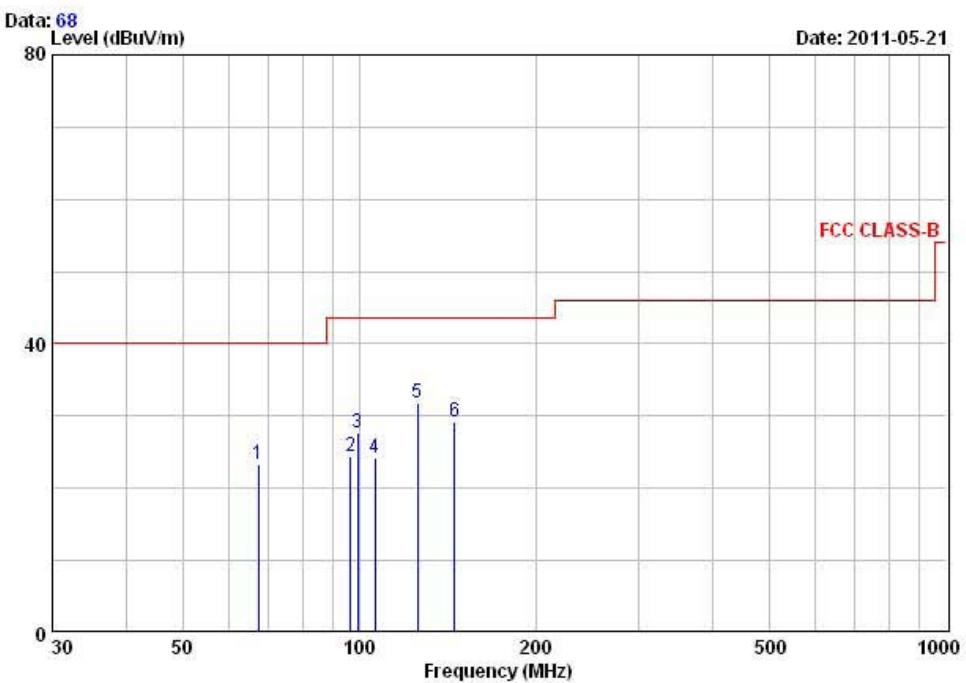
243 Jibug-ni, yangji-Myeon, Youngin-si,  
Gyeonggi-do 449-822 Korea  
Tel:+82-31-3236008,9  
Fax:+82-31-3236010

EUT/Model No.: BAS-1000

TEST MODE: GSM1900 mode

Temp Humi : 27 / 46

Tested by: PARK.H.W



Freq MHz	Reading dBuV/m	C.F dB/m	Result dBuV/m	Limit QP dBuV/m		Margin dB	Height cm	Angle deg	Polarity
				Limit QP dBuV/m	Margin dB				
1 67.44	35.34	-12.09	23.25	40.00	16.75	115	225	225	HORIZONTAL
2 96.77	38.33	-13.91	24.42	43.50	19.08	100	297	297	VERTICAL
3 99.53	41.13	-13.46	27.67	43.50	15.83	105	200	200	HORIZONTAL
4 106.39	37.25	-13.05	24.20	43.50	19.30	125	136	136	HORIZONTAL
5 125.89	43.25	-11.37	31.88	43.50	11.62	100	248	248	HORIZONTAL
6 145.36	38.15	-9.03	29.12	43.50	14.38	154	76	76	HORIZONTAL

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

### 3.2.4 AC Conducted Emissions

#### 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 DC

#### Minimum Standard: FCC Part 15.207(a)/EN 55022

##### Class B

Frequency Range	quasi-peak	Average
0.15 ~ 0.5	66 to 56 *	56 to 46 *
0.5 ~ 5	56	46
5 ~ 30	60	50

\* Decreases with the logarithm of the frequency

##### Class A

Frequency Range	quasi-peak	Average
0.15 ~ 0.5 MHz	79 dBuV	66 dBuV
0.5 ~ 30 MHz	73 dBuV	60 dBuV

## APPENDIX

### TEST EQUIPMENT USED FOR TESTS

	Description	Model No.	Serial No.	Manufacturer	Interval
1	Spectrum Analyzer (~30GHz)	FSV-30	100757	R&S	1 year
2	Spectrum Analyzer (~2.9GHz)	8594E	3710A04074	HP	2 year
3	Signal Generator (~3.2GHz)	8648C	3623A02597	HP	1 year
4	Signal Generator (1~20GHz)	83711B	US34490456	HP	1 year
5	Attenuator (3dB)	8491A	37822	HP	2 year
6	Attenuator (10dB)	8491A	63196	HP	2 year
7	Attenuator (30dB)	8498A	3318A10929	HP	2 year
8	Test Receiver (~30MHz)	ESHS10	828404/009	R&S	1 year
9	EMI Test Receiver (~1GHz)	ESCI7	100722	R&S	1 year
10	RF Amplifier (~1.3GHz)	8447D	2439A09058	HP	2 year
11	RF Amplifier (1~18GHz)	8449B	3008A02126	HP	2 year
12	Horn Antenna (1~18GHz)	BBHA 9120D	9120D122	SCHWARZBECK	2 year
13	Horn Antenna (18 ~ 40GHz)	SAS-574	154	Schwarzbeck	2 year
14	Horn Antenna (18 ~ 40GHz)	SAS-574	155	Schwarzbeck	2 year
15	TRILOG Antenna	VULB 9160	9160-3172	SCHWARZBECK	2 year
16	Dipole Antenna	VHA9103	2116	SCHWARZBECK	2 year
17	Dipole Antenna	VHA9103	2117	SCHWARZBECK	2 year
18	Dipole Antenna	VHA9105	2261	SCHWARZBECK	2 year
19	Dipole Antenna	VHA9105	2262	SCHWARZBECK	2 year
20	Hygro-Thermograph	THB-36	0041557-01	ISUZU	2 year
21	Splitter (SMA)	ZFSC-2-2500	SF617800326	Mini-Circuits	-
22	Power Divider	11636A	6243	HP	2 year
23	DC Power Supply	6622A	3448A03079	HP	-
24	Frequency Counter	5342A	2826A12411	HP	1 year
25	Power Meter	EPM-441A	GB32481702	HP	1 year
26	Power Sensor	8481A	US41030291	HP	1 year
27	Audio Analyzer	8903B	3729A18901	HP	1 year
28	Modulation Analyzer	8901B	3749A05878	HP	1 year
29	TEMP & HUMIDITY Chamber	YJ-500	LTAS06041	JinYoung Tech	1 year
30	Stop Watch	HS-3	601Q09R	CASIO	2 year
31	LISN	ENV216	100408	R&S	1 year
32	UNIVERSAL RADIO COMMUNICATION TESTER	CMU200	106243	R&S	2 year
33	Highpass Filter	WHKX1.5/15G-10SS	74	Wainwright Instruments	-
34	Highpass Filter	WHKX3.0/18G-10SS	118	Wainwright Instruments	-