

243 Jubug-Ri, Yangji-Myeon, Yongin-Si, Gyeonggi-Do, Korea 449-822 Tel: +82-31-323-6008 Fax: +82-31-323-6010

http://www.ltalab.com



Dates of Tests: August. 25 ~ 29, 2008 Test Report S/N: LR500190808D Test Site: LTA CO., LTD.

## **CERTIFICATION OF COMPLIANCE**

Class II permissive change

FCC ID.

**APPLICANT** 

**TT2BHF700** 

ENUSTECH.,INC.

FCC Classification : Low Power Communication Device Transmitter

Manufacturing Description : Wireless Handsfree Carkit

Manufacturer : ENUSTECH.,INC.

Model name : BHF-700

Test Device Serial No.: : Identical prototype

Rule Part(s) : FCC Part 15.239 Subpart C; ANSI C-63.4-2003

Frequency Range : 88.1 ~ 107.9MHz Data of issue : August 30, 2008

This test report is issued under the authority of:

The test was supervised by:

Dong -Min JUNG, Technical Manager

Kyung-Taek LEE, 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

NVLAP LAB Code.: 200723-0

# TABLE OF CONTENTS

1. GENERAL INFORMATION'S	3
2. INFORMATION'S ABOUT TEST ITEM	4
3. TEST REPORT	5
3.1 SUMMARY OF TESTS	5
3.2 TECHNICAL CHARACTERISTICS TEST	6
3.2.1 Field Strength of Fundamental and Emissions within Permitted Band	6
3.2.2 Radiated Emissions	7
3.2.3 AC Conducted Emissions	11
3.2.4 20dB Bandwidth	18
APPENDIX	
APPENDIX TEST EQUIPMENT USED FOR TESTS	20

## 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 : <a href="http://www.ltalab.com">http://www.ltalab.com</a>
E-mail : <a href="mailto:chahn@ltalab.com">chahn@ltalab.com</a>
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 competent 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	2008-09-30	ECT accredited Lab.	
RRL	KOREA	KR0049	2009-06-20	EMC accredited Lab.	
FCC	U.S.A	610755	2011-04-22	FCC filing	
VCCI	JAPAN	R2133, C2307	2011-06-21	VCCI registration	
IC	CANADA	IC5799	2010-05-03	IC filing	

## 2. Information's about test item

## 2-1 Applicant & Manufacturer

Company name : ENUSTECH.,INC.

Address : Dooi Bldg, 5FL, 1196-2 Gaepo-4dong, Gangnam-gu,

: Seoul 135-515, Korea

Telephone / Facsimile +82-2-565-0785 / +82-2-565-0785

## 2-2 Equipment Under Test (EUT)

Trade name : Wireless Handsfree Carkit

FCC ID : TT2BHF700

Model name : BHF-700

Serial number : Identical prototype

Date of receipt : August 22, 2008

EUT condition : Pre-production, not damaged

Antenna type : Wire Antenna, Frequency Range : 88.1 ~ 107.9MHz

Operator Selection of Operating Frequency: Manual Switch

Power Source : 1100mAh rechargeable Lithium Polymer

## 2-3 Tested frequency & signal

		LOW	MID	HIGH		
1	Frequency (MHz)	88.1	98.0	107.9		
		We tested only under the module of audio input. The device audio input source				
<u>2</u>	Audio signal:	from maximum audio input for the tested. Test report is recorded the worst				
		mode data.				

## 2-4 Ancillary Equipment

Equipment	Model No.	Serial No.	Manufacturer
DC Power Supply	E3615A	KR72705061	НР
DC/DC Charger	-	-	-

## 3. Test Report

## 3.1 Summary of tests

FCC Part Section(s)	Parameter	Limit	Status (note 1)
15.239	Field Strength of Fundamental and Emissions within permitted band.	< 250 uV @ 3m	С
15.239	Occupied channel bandwidth	< 200kHz	С
15.209	Radiated Emission	< FCC 15.209 limits	С
15.207	AC Conducted Emissions	< FCC 15.207 limits	NA / Note2
15.203	Antenna Requirement	-	С

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

Note 2: It is not need to test this requirement, because the EUT shall be operated by car battery

Note 3: The data in this test report are traceable to the national or international standards.

The sample was tested according to the following specification:

FCC Parts 15.239; ANSI C-63.4-2003

#### → Antenna Requirement

The ENUSTECH.,INC. BHF500 unit complies with the requirement of §15.203.

Refer to the Internal photo.

#### 3.2 Transmitter requirements

### 3.2.1 Field Strength of Fundamental and Emissions within permitted band.

#### **Procedure:**

The field strength of emissions from intentional radiators operated within the bands 88 ~108MHz was measured in accordance with FCC Part §15.239. The test set-up was made according to ANSI C 63.4:2003.

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 an 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:

Span = 1 MHz

RBW = 120 kHz Sweep = auto

VBW = 300 kHz Detector function = Peak & Average

Trace = max hold

**Measurement Data: Complies** 

## → For Spurious emission of the fundamental, refer to the item '3.2.2 radiated emission'

Operating Condition: Transmit the audio signal (modulated signal)

Frequency		Read (dBu	Level V/m)	C.F		Level V/m)		mit V/m)		rgin B)
(MHz)	(H/V)	PK	AV	(dB)	PK	AV	PK	AV	PK	AV
88.1	Н	65.38	53.9	-16.99	48.39	36.91	68	48	19.61	11.09
88.1	V	54.73	43.2	-16.99	37.74	26.21	68	48	30.26	21.79
98.0	Н	62.58	51.16	-15.93	46.65	35.23	68	48	21.35	12.77
98.0	V	52.4	41.1	-15.93	36.47	25.17	68	48	31.53	22.83
107.9	Н	65.61	55.15	-14.96	50.65	40.19	68	48	17.35	7.81
107.9	V	53.9	43.15	-14.96	38.94	28.19	68	48	29.06	19.81

Note 1: Field Strength Calculation

C.F = Antenna Factor + Cable Loss - Preamp Factor

Margin = Limit - Level

#### Minimum Standard: FCC Part 15.239

The maximum Field Strength authorized within 200kHz is 250 uV/m@3m

#### 3.2.2 Radiated Emissions

#### **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 =  $30 \text{ MHz} \sim 10^{\text{th}}$  harmonic.

 $RBW = 100 \text{ kHz} (30 \text{MHz} \sim 1 \text{ GHz})$   $VBW \geq RBW$ 

= 1 MHz  $(1 \text{ GHz} \sim 10^{\text{th}} \text{ harmonic})$ 

Span = 100 MHz Detector function = peak

Trace =  $\max \text{ hold}$  Sweep = auto

**Measurement Data: Complies** 

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

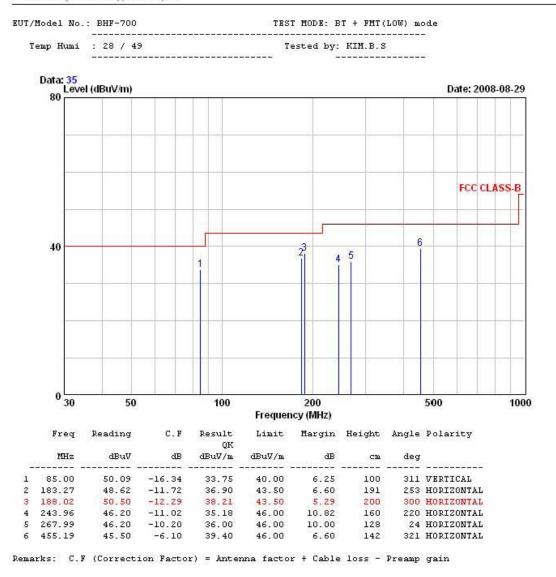
Frequency (MHz)	Limit (uV/m) @ 3m
30 ~ 88	100 **
88 ~ 216	150 **
216 ~ 960	200 **
Above 960	500

<sup>\*\*</sup> 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.

#### Fundamental Frequency: 88.1MHz



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

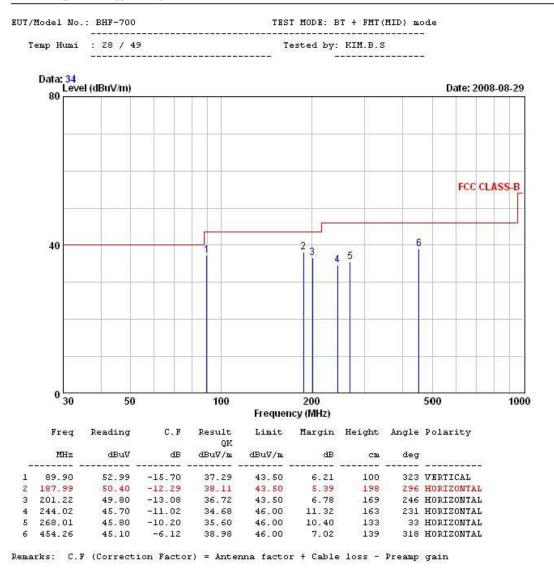


→ No other emissions were detected at a level greater than 20dB below limit.

#### Fundamental Frequency: 98.0MHz



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

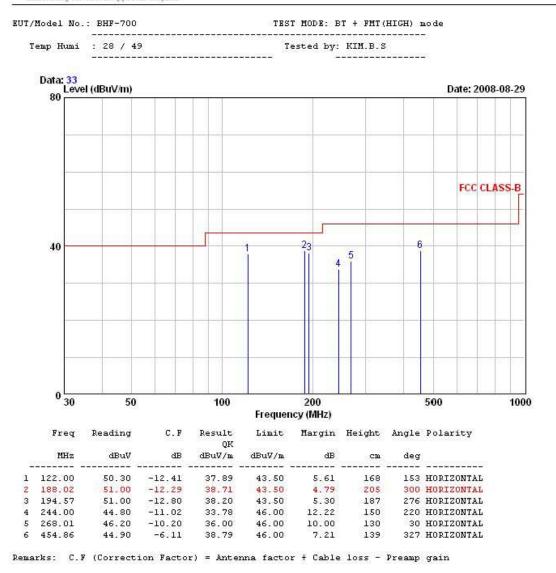


→ No other emissions were detected at a level greater than 20dB below limit.

#### Fundamental Frequency: 107.9MHz



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



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

#### 3.2.3 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: Complies**

Refer to the next page.

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

Frequency Range	Conducted Limit (dBuV)			
(MHz)	Quasi-Peak	Average		
0.15 ~ 0.5	66 to 56 *	56 to 46 *		
0.5 ~ 5	56	46		
5 ~ 30	60	50		

<sup>\*</sup> Decreases with the logarithm of the frequency

#### **LINE - HIGH**

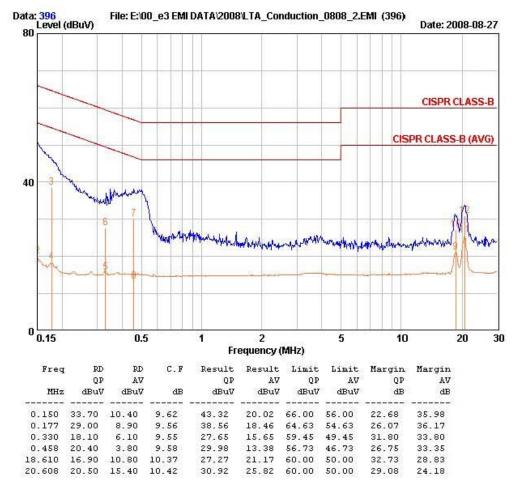


243 Jubug-ri, yangji-Myeon, Youngin-si, Gyeonggi-do 449-822 Korea Tel:+82-31-323-6008 Fax:+82-31-323-6010

EUT / Model No. : BHF-700 Phase : LINE

Test Mode : BT + FMT(HIGH) mode Test Power : 120 / 60

Temp./Humi. : 25 / 48 Test Engineer : B.S.KIM



#### **NEUTRAL - HIGH**

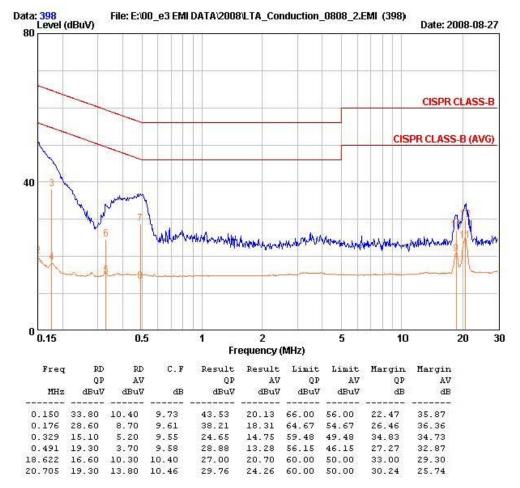


243 Jubug-ri, yangji-Myeon, Youngin-si, Gyeonggi-do 449-822 Korea Tel:+82-31-323-6008 Fax:+82-31-323-6010

EUT / Model No. : BHF-700 Phase : NEUTRAL

Test Mode : BT + FMT(HIGH) mode Test Power : 120 / 60

Temp./Humi. : 25 / 48 Test Engineer : B.S.KIM



#### LINE - MID

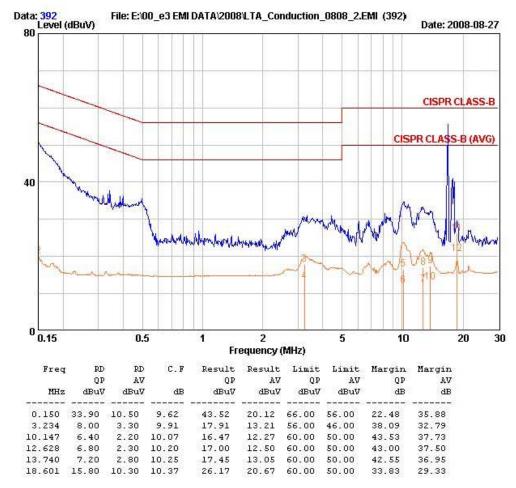


243 Jubug-ri, yangji-Myeon, Youngin-si, Gyeonggi-do 449-822 Korea Tel:+82-31-323-6008 Fax:+82-31-323-6010

EUT / Model No. : BHF-700 Phase : LINE

Test Mode : BT + FMT(MID) mode Test Power : 120 / 60

Temp./Humi. : 25 / 48 Test Engineer : B.S.KIM



#### **NEUTRAL - MID**

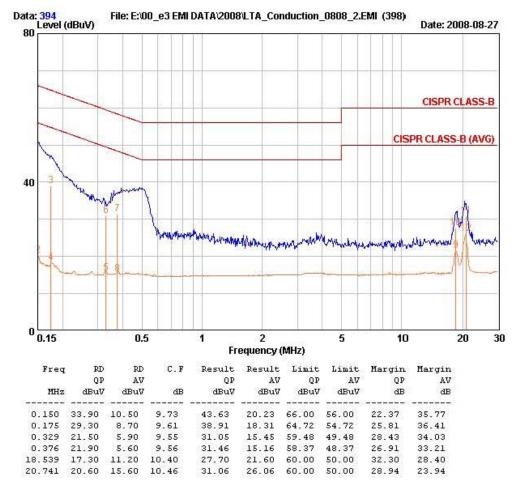


243 Jubug-ri, yangji-Myeon, Youngin-si, Gyeonggi-do 449-822 Korea Tel:+82-31-323-6008 Fax:+82-31-323-6010

EUT / Model No. : BHF-700 Phase : NEUTRAL

Test Mode : BT + FMT(MID) mode Test Power : 120 / 60

Temp./Humi. : 25 / 48 Test Engineer : B.S.KIM



#### **LINE - LOW**

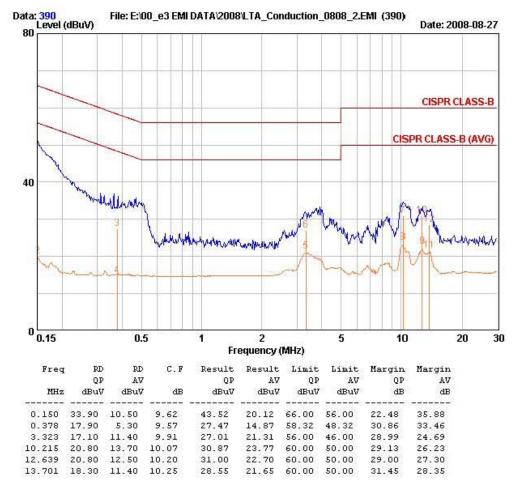


243 Jubug-ri, yangji-Myeon, Youngin-si, Gyeonggi-do 449-822 Korea Tel:+82-31-323-6008 Fax:+82-31-323-6010

EUT / Model No. : BHF-700 Phase : LINE

Test Mode : BT + FMT(LOW) mode Test Power : 120 / 60

Temp./Humi. : 25 / 48 Test Engineer : B.S.KIM



#### **NEUTRAL - LOW**

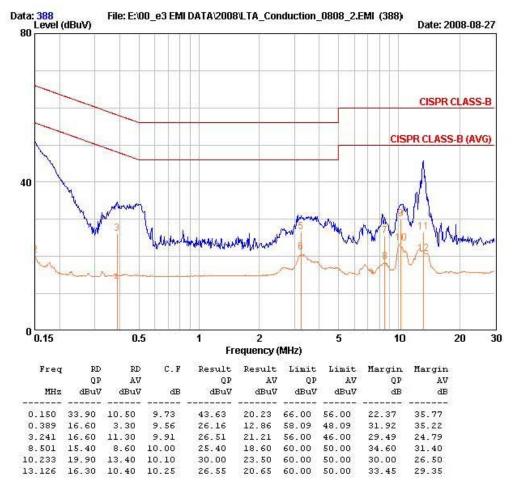


243 Jubug-ri, yangji-Myeon, Youngin-si, Gyeonggi-do 449-822 Korea Tel:+82-31-323-6008 Fax:+82-31-323-6010

EUT / Model No. : BHF-700 Phase : NEUTRAL

Test Mode : BT + FMT(LOW) mode Test Power : 120 / 60

Temp./Humi. : 25 / 48 Test Engineer : B.S.KIM



#### 3.2.4 20dB Bandwidth

#### **Procedure:**

The channel Bandwidth is defined as the minimum declared bandwidth within which the transmitter's necessary bandwidth can be contained. The transmitter was adjusted to work at the selected channels. The Channel BW was measured at an amplitude level reduced from the reference level by the 20dB.

Occupied Bandwidth was measured as shown in the below.

The EUT was placed on a 0.8m high wooden table. An antenna was placed near the EUT and measurements of frequencies were recorded for reference during final measurements. Measurements were performed with the EUT rotated 360 degrees to determine worst-case orientation for maximum emissions.

 $\rightarrow$ 

The spectrum analyzer is set to:

Frequency Range = 88 ~ 108MHz

RBW = 10 kHz VBW = 30 kHz

Trace = max hold Detector function = Peak

Sweep = auto Span = 300 kHz

Operating Condition: Transmit the maximum audio signal (modulation)

we played a song from the COWON Q5 with the maximum audio input.

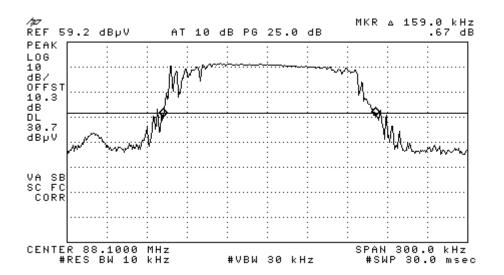
**Measurement Data:** Complies

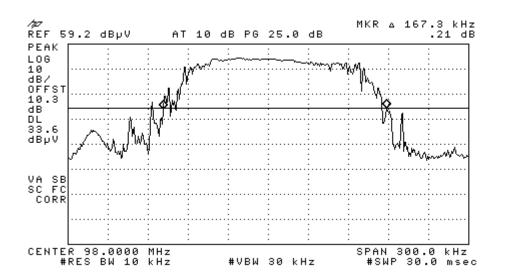
Refer to the next page.

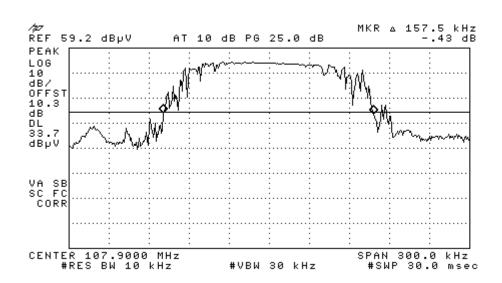
#### **Minimum Standard:**

Occupied Bandwidth < 200kHz.

## 20 dB Occupied Bandwidth







L

## **APPENDIX**

# TEST EQUIPMENT USED FOR TESTS

	Description	Model No.	Serial No.	Manufacturer	Next Cal. Date
1	Spectrum Analyzer	8594E	3649A03649	НР	Apr-09
2	Signal Generator	8648C	3623A02597	НР	Apr-09
3	Attenuator (3dB)	8491A	37822	HP	Oct-08
4	Attenuator (10dB)	8491A	63196	НР	Oct-08
5	EMI Test Receiver	ESVD	843748/001	R&S	Aug-09
6	LISN	KNW-407	8-1430-1	Kyoritsu	Jan-09
7	Two-Line V-Network	ESH3-Z5	893045/017	R&S	Oct-08
8	RF Amplifier	8447D	2949A02670	НР	Jan-09
9	RF Amplifier	8447D	2439A09058	НР	Oct-08
10	RF Amplifier	8449B	3008A02126	НР	Apr-09
11	Test Receiver	ESHS10	828404009	R&S	Aug-09
12	TRILOG Antenna	VULB 9160	9160-3212	SCHWARZBECK	Jul-09
13	LogPer. Antenna	VULP 9118	9118 A 401	SCHWARZBECK	Apr-09
14	Biconical Antenna	BBA 9106	VHA 9103-2315	SCHWARZBECK	Apr-09
15	Horn Antenna	3115	00055005	ETS LINDGREN	Mar-09
16	Dipole Antenna	VHA9103	2116	Schwarzbeck	Nov-08
17	Dipole Antenna	VHA9103	2117	Schwarzbeck	Nov-08
18	Dipole Antenna	UHA9105	2261	Schwarzbeck	Nov-08
19	Dipole Antenna	UHA9105	2262	Schwarzbeck	Nov-08
20	Spectrum Analyzer	8591E	3649A05888	HP	Oct-08
21	Spectrum Analyzer	8563E	3425A02505	HP	Apr-09
22	Hygro-Thermograph	THB-36	0041557-01	ISUZU	Apr-09
23	Splitter (SMA)	ZFSC-2-2500	SF617800326	Mini-Circuits	Jun-09
24	RF Switch	MP59B	6200414971	ANRITSU	Jun-09
25	RF Switch	MP59B	6200438565	ANRITSU	Jun-09
26	Power Divider	11636A	6243	HP	Oct-08
27	DC Power Supply	6622A	3448A03079	HP	Oct-08
28	Attenuator (30dB)	11636A	6243	HP	Oct-08
29	Frequency Counter	5342A	2826A12411	НР	Apr-09
30	Power Meter	EPM-441A	GB32481702	HP	Apr-09
31	Power Sensor	8481A	2702A64048	HP	Apr-09
32	Audio Analyzer	8903B	3729A18901	НР	Oct-08
33	Modulation Analyzer	8901B	3749A05878	НР	Oct-08
34	TEMP & HUMIDITY Chamber	YJ-500	L05022	JinYoung Tech	Oct-08
35	LOOP-ANTENNA	FMZB 1516	151602/94	SCHWARZBECK	Mar-09
36	Stop Watch	HS-3	601Q09R	CASIO	Apr-09