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Dates of Tests: September 16 ~ October 04, 2013

Test Report S/N: LR500111310I

Test Site : LTA Co., Ltd.

CERTIFICATION OF COMPLIANCE

FCC ID

SS4EP3XX

APPLICANT

BLUEBIRD INC.

FCC Classification : **Part 15 Low Power Communication Device Transmitter**
Manufacturing Description : **Mobile Payment Terminal**
Manufacturer : **BLUEBIRD INC.**
Model name : **EP3XX**
Test Device Serial No.: : **Identical prototype**
Rule Part(s) : **FCC Part 15.225 Subpart C; ANSI C-63.4-2003**
Frequency Range : **13.56MHz**
RF power : **76.35dBuV/m @ 3m**
Data of issue : **October 07, 2013**

This test report is issued under the authority of:

Jae-Ho Lee, Manager

The test was supervised by:

Young-Jin 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. 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

1-1 Test Performed

Company name : LTA Co., Ltd.
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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	UPDATING	ECT accredited Lab.
RRA	KOREA	KR0049	2015-03-06	EMC accredited Lab.
FCC	U.S.A	610755	2014-04-27	FCC filing
FCC	U.S.A	649054	Updating	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 about test item

2-1 Client& Manufacturer

Company name : BLUEBIRD INC.
 Address : (Dogok-dong, SEI Tower 13~14), 39, Eonju-ro30-gil, Gangnam-gu
 Seoul, Korea
 Tel / Fax : Tel : +82-70-7730-8210 / Fax :+82-2-548-0870

2-2 Equipment Under Test (EUT)

Trade name : 
 Model name : EP3XX
 Serial number : Identical prototype
 Date of receipt : September 13, 2013
 EUT condition : Pre-production, not damaged
 Antenna type : Loop Antenna
 Frequency Range : 13.56 MHz
 RF output power : 76.35dBuV/m @ 3m
 Power Source : DC 3.7 V by Battery
 Power for Adaptor. : Input: 100-240VAC, 0.4A Output: 5.0VDC, 3A
 Firmware Version : V 1.0.0

2-3 Tested frequency

	LOW	MID	HIGH
Frequency (MHz)	-	13.56	-

3. Test Report

3.1 Summary of tests

FCC Part Section(s)	Parameter	Test Condition	Status (note 1)
15.225(a)	Electric Field Strength - Fundamental Emission	Radiated	C
15.225(b)	Electric Field Strength - Outside the Band		C
15.225(b) / 15.209	Electric Field Strength - Spurious Emission		C
15.225(c)	Frequency Tolerance		C
15.207 /15.107	AC Conducted Emissions	Line Conducted	N/A

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.

The sample was tested according to the following specification:

FCC Parts 15.225; ANSI C-63.4-2003

3.2 Transmitter requirements

3.2.1 Electric Field Strength

Procedure: About the Fundamental Emission, Outside the Band and Spurious Emission

The Radiated Electric Field Strength intensity has been measured with a ground plane and at a distance of 3m.

→ From 9kHz to 30MHz at distance 3m

The EUT was rotated a full revolution in order to obtain the maximum value of the electric field intensity.

The measurements were performed for each antenna angle 0deg., 45deg. and 90deg.

→ From 30MHz to 1000MHz at distance 3m

The measuring antenna height was varied between 1 and 4m and EUT was rotated a full revolution in order to obtain the maximum value of the electric field intensity.

The measurements were performed for both vertical and horizontal antenna polarization.

Bandwidth settings per frequency range;

	From 9kHz to 150kHz	From 150kHz to 30MHz	From 30MHz to 1000MHz
IF Bandwidth	200Hz	9kHz	120kHz

Part 15 Section 15.31 (f)(2) (9kHz ~ 30MHz)

9kHz ~ 490kHz [Limit at 3m] = [Limit at 300m]-20log(3[m]/300[m])

490kHz ~ 30MHz [Limit at 3m] = [Limit at 30m]-20log(3[m]/30[m])

3.2.1.1 Electric Field Strength - Fundamental Emission

Test method : Part 15.225(a)
 Tx Frequency : 13.56 MHz
 Result : **Complies**

Measurement data:

Freq (MHz)	Pol.	Reading (dB μ V/m)	T.F (dB)	Field Strength @3m (dB μ V/m)	Limit @3m (dB μ V/m)	Margin (dB)
13.56	H	83.13	-6.78	76.35	104	27.65
13.56	V	81.37	-6.78	74.59	104	29.41

-- Note 1--

Field strength of 13.553MHz to 13.567MHz Limit@3m = 84dB μ V/m + 20log30m/3m
 = 104dB μ V/m

-- Note 2--

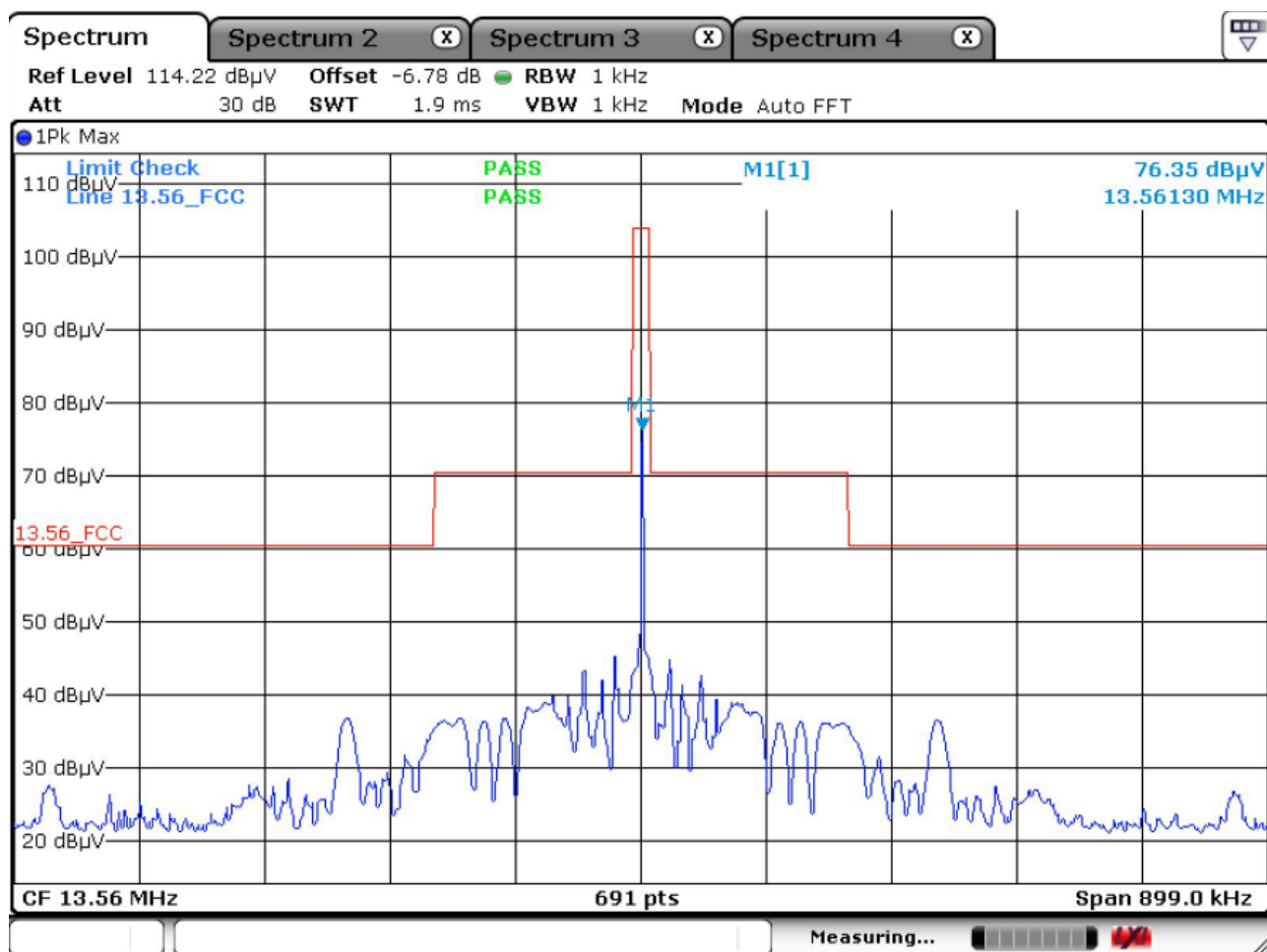
T.F(Total Factor) = Antenna Factor + Cable Loss – Amp Gain

Field Strength @3m = Reading + T.F

3.2.1.2 Electric Field Strength - Outside the Allocated Band

Test method : Part 15.225(b)
 Tx Frequency : 13.56 MHz
 Result : **Complies**

Measurement Data:



3.2.1.3 Electric Field Strength – Spurious Emission

Test method : Part 15.225(b) / Part 15.209
 Tx Frequency : 13.56 MHz
 Result : **Complies**

Measurement Data:

Freq (MHz)	Pol.	Reading (dB μ V/m)	T.F (dB)	Field Strength @3m (dB μ V/m)	Limit @3m (dB μ V/m)	Margin (dB)
48.40	V	34.10	-15.81	18.29	40.00	11.21
118.23	V	34.30	-16.31	17.99	43.52	15.01
134.56	H	34.20	-15.01	19.11	43.52	13.81
818.63	H	29.40	-2.05	27.35	46.02	8.25
894.32	H	22.80	-0.76	22.04	46.02	13.56
934.32	H	20.80	-0.16	20.64	46.02	14.96

-- Note 1--

T.F(Total Factor) = Antenna Factor + Cable Loss – Amp Gain

Field Strength @3m = Reading + T.F

-- Note 2--

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

3.2.2 Frequency Tolerance

Procedure:

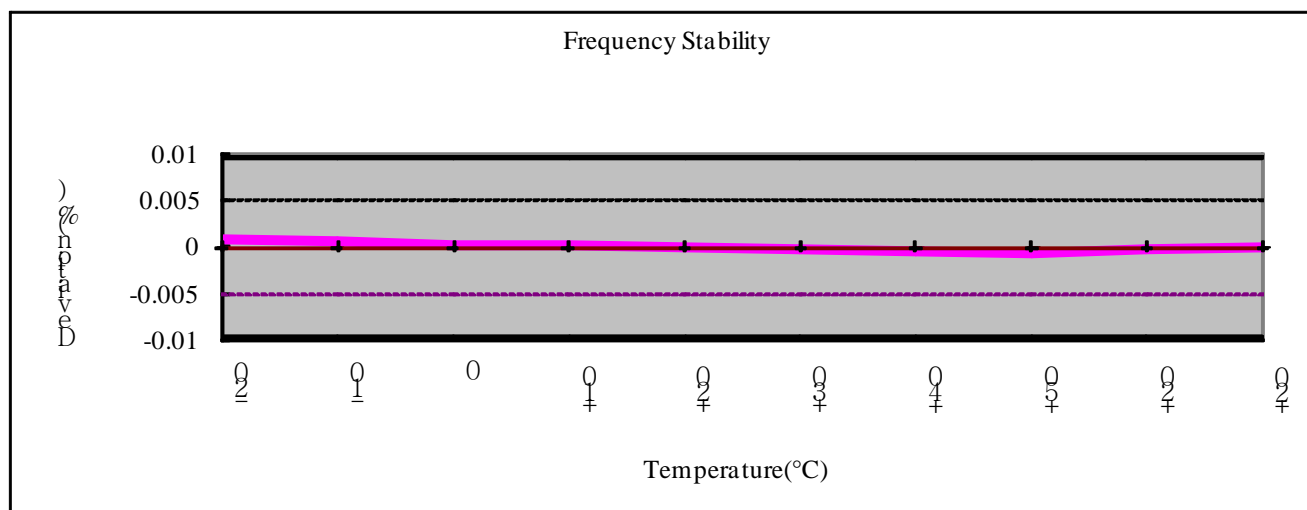
The temperature test was started after the temperature stabilization time of 30 minutes.

Test method : Part 15.225(c)
 Tx Frequency : 13.56 MHz
 Result : **Complies**

Measurement Data:

OPERATING FREQUENCY: 13,561,056 **Hz**
Freq. Tolerance Limit: ± 0.01 **%**

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQ (Hz)	Deviation (%)
100	3.700	-20	13,561,161	0.000774
100		-10	13,561,137	0.000597
100		0	13,561,098	0.000310
100		10	13,561,082	0.000192
100		20	13,561,056	0.000000
100		30	13,561,038	-0.000133
100		40	13,561,009	-0.000347
100		50	13,560,977	-0.000583
85		3.145	20	13,561,042
115	4.255	20	13,561,071	0.000111



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.
- No other emissions were detected at a level greater than 20dB below limit
- It gave the worse case emissions

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

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

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

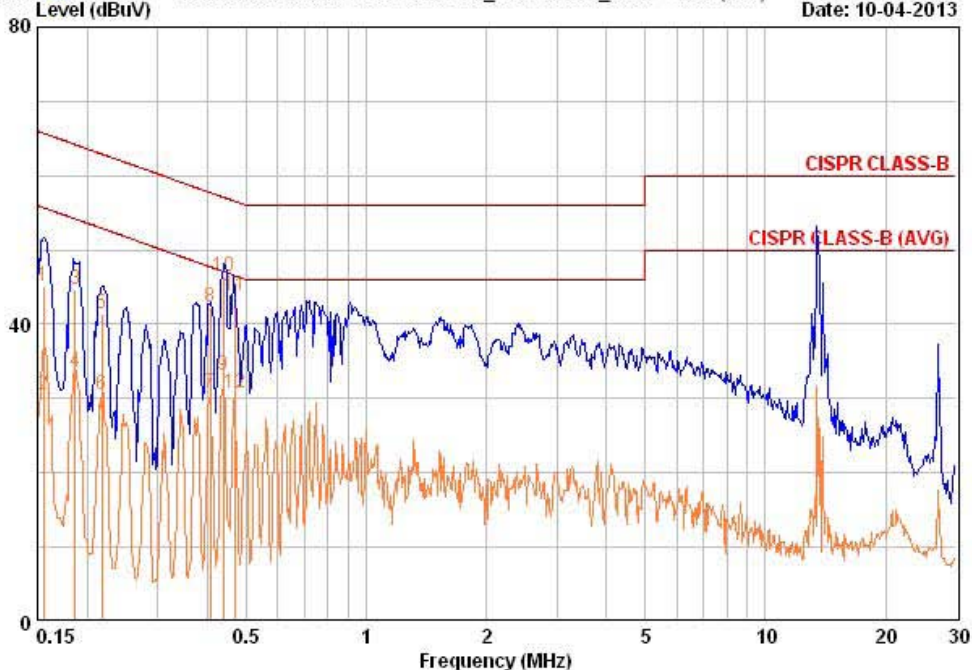
Radiated Emissions – RFID mode - LINE



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EUT / Model No. : EP3XX	Phase : LINE
Test Mode : RF ID mode	Test Power : 120 / 60
Temp./Humi. : 23 / 52	Test Engineer : HA J M

Data: 787 File: C:\Conducted Data\2013\LTA_Conduction_1309-1.EMI (787) Date: 10-04-2013



Freq MHz	RD		C.F	Result		Limit		Margin	
	QP dBuV	AV dBuV		QP dBuV	AV dBuV	QP dBuV	AV dBuV	QP dB	AV dB
0.155	45.04	30.44	0.18	45.22	30.62	65.73	55.73	20.51	25.11
0.186	44.45	33.45	0.17	44.62	33.62	64.21	54.21	19.59	20.59
0.217	41.35	30.35	0.17	41.52	30.52	62.93	52.93	21.41	22.41
0.406	42.05	30.55	0.18	42.23	30.73	57.73	47.73	15.50	17.00
0.439	46.15	33.05	0.18	46.33	33.23	57.08	47.08	10.75	13.85
0.468	43.55	30.65	0.18	43.73	30.83	56.55	46.55	12.82	15.72

Remarks: C.F (Correction Factor) = Insertion loss + Cable loss

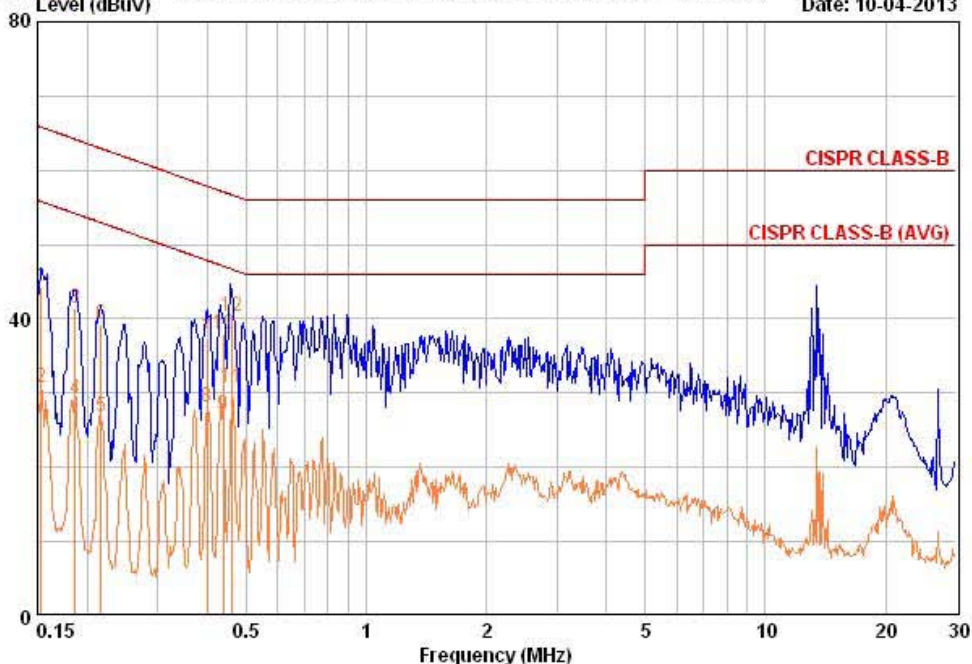
Radiated Emissions – RFID mode – NEUTRAL



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EUT / Model No. : EP3XX	Phase : NEUTRAL
Test Mode : RF ID mode	Test Power : 120 / 60
Temp./Humi. : 23 / 52	Test Engineer : HA J M

Data: 783 File: C:\Conducted Data\2013\LTA_Conduction_1309-1.EMI (783) Date: 10-04-2013



Freq MHz	RD		C.F	Result		Limit		Margin	
	QP dBuV	AV dBuV		QP dBuV	AV dBuV	QP dBuV	AV dBuV	QP dB	AV dB
0.153	43.94	30.44	0.22	44.16	30.66	65.84	55.84	21.68	25.18
0.186	41.25	28.95	0.18	41.43	29.13	64.21	54.21	22.78	25.08
0.216	39.05	26.65	0.17	39.22	26.82	62.97	52.97	23.75	26.15
0.399	37.15	27.95	0.20	37.35	28.15	57.87	47.87	20.52	19.72
0.438	37.75	26.85	0.22	37.97	27.07	57.10	47.10	19.13	20.03
0.461	40.05	30.55	0.23	40.28	30.78	56.67	46.67	16.40	15.90

Remarks: C.F (Correction Factor) = Insertion loss + Cable loss

APPENDIX

TEST EQUIPMENT USED FOR TESTS

	Description	Model No.	Serial No.	Manufacturer	Interval	Last Cal. Date
1	Signal Analyzer (9kHz~30GHz)	FSV-30	100757	R&S	1 year	2013-01-15
2	Spectrum Analyzer (9kHz~2.9GHz)	8594E	3649A03649	HP	2 year	2012-03-26
3	Signal Generator (~3.2GHz)	8648C	3623A02597	HP	1 year	2013-03-25
4	SYNTHESIZED CW GENERATOR	83711B	US34490456	HP	1 year	2013-03-25
5	Attenuator (3dB)	8491A	37822	HP	2 year	2012-09-22
6	Attenuator (10dB)	8491A	63196	HP	2 year	2012-09-22
7	Test Receiver (~30MHz)	ESHS10	828404/009	R&S	1 year	2013-03-25
8	EMI Test Receiver (~7GHz)	ESCI7	100722	R&S	1 year	2013-09-16
9	RF Amplifier (~1.3GHz)	8447D OPT 010	2944A07684	HP	1 year	2013-09-16
10	RF Amplifier (1~26.5GHz)	8449B	3008A02126	HP	1 year	2013-03-25
11	Horn Antenna (1~18GHz)	3115	00114105	ETS	2 year	2013-05-13
12	DRG Horn (Small)	3116B	81109	ETS-Lindgren	2 year	2012-03-15
13	DRG Horn (Small)	3116B	133350	ETS-Lindgren	2 year	2012-03-15
14	TRILOG Antenna	VULB 9160	9160-3237	SCHWARZBECK	2 year	2013-05-03
15	Temp.Humidity Data Logger	SK-L200TH II A	00801	SATO	1 year	2013-03-14
16	Splitter (SMA)	ZFSC-2-2500	SF617800326	Mini-Circuits	-	-
17	Power Divider	11636A	06243	HP	2 year	2012-09-22
18	DC Power Supply	6674A	3637A01657	Agilent	-	-
19	Frequency Counter	5342A	2826A12411	HP	1 year	2013-03-25
20	Power Meter	EPM-441A	GB32481702	HP	1 year	2013-03-25
21	Power Sensor	8481A	US41030291	HP	1 year	2013-09-16
22	Audio Analyzer	8903B	3729A18901	HP	1 year	2013-09-16
23	Modulation Analyzer	8901B	3749A05878	HP	1 year	2013-09-16
24	TEMP & HUMIDITY Chamber	YJ-500	LTAS06041	JinYoung Tech	1 year	2013-09-16
25	Stop Watch	HS-3	601Q09R	CASIO	1 year	2013-03-15
26	LISN	KNW-407	8-1430-1	Kyoritsu	1 year	2013-09-16
27	Two-Lime V-Network	ESH3-Z5	893045/017	R&S	1 year	2013-04-25
28	UNIVERSAL RADIO COMMUNICATION TESTER	CMU200	106243	R&S	1 year	2013-07-25
29	Highpass Filter	WHKX1.5/15G-10SS	74	Wainwright Instruments	-	-
30	Highpass Filter	WHKX3.0/18G-10SS	118	Wainwright Instruments	-	-
31	Active Loop Antenna	FMZB 1519	1519-031	SCHWARZBECK	1 year	2012-12-14