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Certification of Compliance

ENTERTECH CO., LTD.

401-22 HWAGOK-DONG, GANGSEO-GU

SEOUL, Korea

Dates of Tests: December 16 ~ 23, 2008

Test Report S/N: DR50110901AG

Test Site : DIGITAL EMC CO., LTD.

FCC ID

PBN-EX190

APPLICANT

ENTERTECH CO., LTD.

FCC Classification : Part 15 Low Power Communication Device Transmitter
Device name : WIRELESS MICROPHONE
FCC ID : PBN-EX190
Model name : EX190
Test Device Serial number : Identical prototype
FCC Rule Part(s) : FCC Part 15.249; ANSI C-63.4-2003
Frequency Range : 904 MHz
Data of issue : January 12, 2009

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.



NVLAP LAB CODE 200559-0

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1. General information

This report contains the result of tests performed by:

DIGITAL EMC 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 competent of calibration and testing laboratory”.

This laboratory is accredited by NVLAP for NVLAP Lab. Code : 200559-0.

Test operator: engineer

January 12, 2009

D.C. Cha

Data

Name

Signature

Report Reviewed By: manager

January 12, 2009

Harvey Sung

Data

Name

Signature

Ordering party:

Company name : ENTERTECH CO., LTD.
 Address : 401-22 Hwagok-dong, Gangseo-Gu
 City/town : Seoul
 Country : Korea
 Date of order : December 11, 2008

2. Information about test item

PBN-EX190

2.1 Equipment information

Equipment model name	EX190
Type of equipment	WIRELESS MICROPHONE
Frequency band	904MHz
Type of Modulation	FM
Channel Spacing	-
Type of antenna	Pattern Antenna
Power Supply	DC 3.0V(1.5V AA Battery × 2EA)

2.2 Tested frequency

Frequency	904 MHz
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2.3 Tested environment

Temperature	:	15 ~ 35 (°C)
Relative humidity content	:	20 ~ 75 %
Air pressure	:	86 ~ 103 kPa
Details of power supply	:	DC 3.0V

2.4 Ancillary Equipment

Equipment	Model No.	Serial No.	Manufacturer

2.5 EMI Suppression Device(s)/Modifications

EMI suppression device(s) added and/or modifications made during testing -> none

3. Test Report

3.1 Summary of tests

FCC Part Section(s)	Parameter	Limit	Test Condition	Status (note 1)
I. Transmit mode(Tx)				
15.249 (a)/(d)	Field Strength Limits /Out of band emission	Refer to the FCC 15.249(a)/(d)	Radiated	C
15.205 / 15.209	General Field Strength Limits (Restricted Bands and Radiated Emission Limits)	< FCC 15.209 limits	Radiated	C
15.207	AC Conducted Emissions	< FCC 15.207 limits	Line Conducted	NA
Note 1: C=Complies NC=Not Complies NT=Not Tested NA=Not Applicable				

The sample was tested according to the following specification:

FCC Parts 15.249; ANSI C-63.4-2003

3.2 Transmitter requirements

3.2.1 AC Conducted Emissions

- Procedure:

The conducted emissions are measured in the shielded room with a spectrum analyzer in peak hold. While the measurement, EUT operates at the middle channels in line with Section 15.31(m). Emissions closest to the limit are measured in the quasi-peak detector mode and average detector mode 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

- **Conducted emission test is not applicable. Because power source of this device is only battery.**

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

* Decreases with the logarithm of the frequency

- Measurement Setup

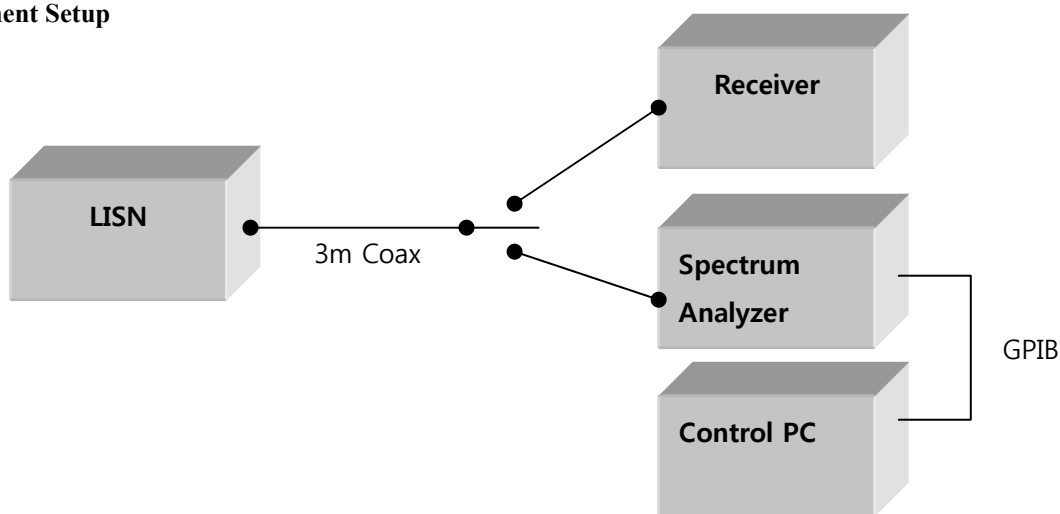


Figure 2: Measurement setup for AC Conducted Emission

3.2.2 Radiated Emission

Procedure:

The EUT was placed on a 0.8m high wooden table inside a semi anechoic chamber. An antenna was placed at 3m distance from the EUT. Measurements of frequencies and amplitudes of field strengths were recorded for reference during final measurements. For final radiated testing, measurements were performed on 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:

Frequency Range = 30 MHz ~ 10th harmonic.

RBW = 120 kHz (30MHz ~ 1 GHz)
= 1 MHz (1 GHz ~ 10th harmonic)

Distance = 3m

Trace = max hold

VBW ≥ RBW

Detector function = peak

Sweep = auto

- Measurement Data: Complies

- Refer to the next page.

- All operation modes (Each buttons pressed, Sound applied) were investigated and the worst case data was reported.

- Minimum Standard:

▪Fundamental / Harmonics emission: FCC Part 15.249(a)

Frequency (MHz)	Limit @ 3m	
	Fundamental (mV/m)	Harmonics (uV/m)
902 ~ 928	50	500

▪FCC Part 15.249 (d) Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in Section 15.209, whichever is the lesser attenuation.

▪ FCC Part 15.209(a) and (b)

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

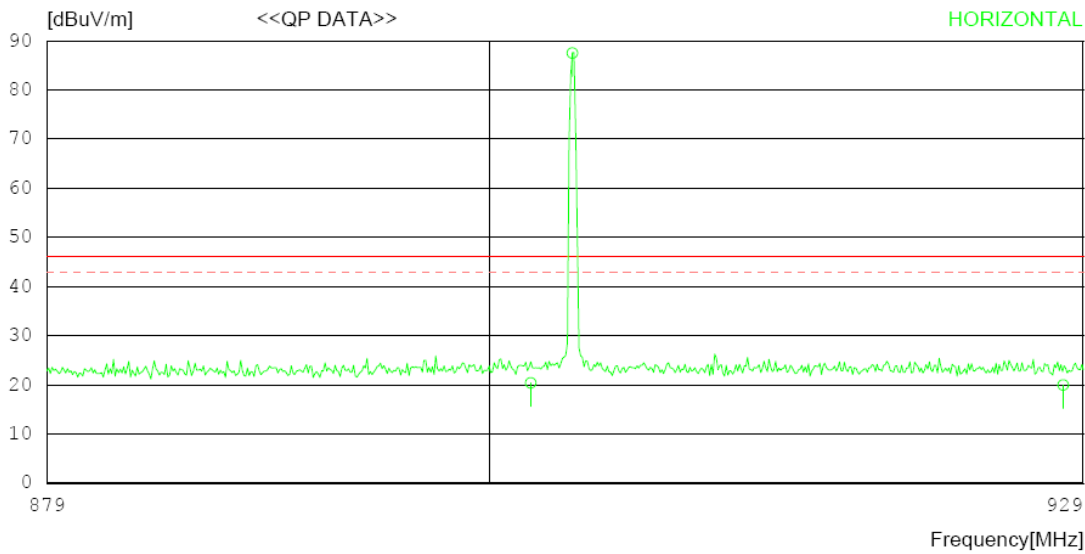
** Except as provided in 15.209(g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88MHz, 174-216MHz or 470-806MHz. However, operation within these frequency bands is permitted under other sections of this Part,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

▪ FCC Part 15.205 (a): Only spurious emissions are permitted in any of the frequency bands listed below:

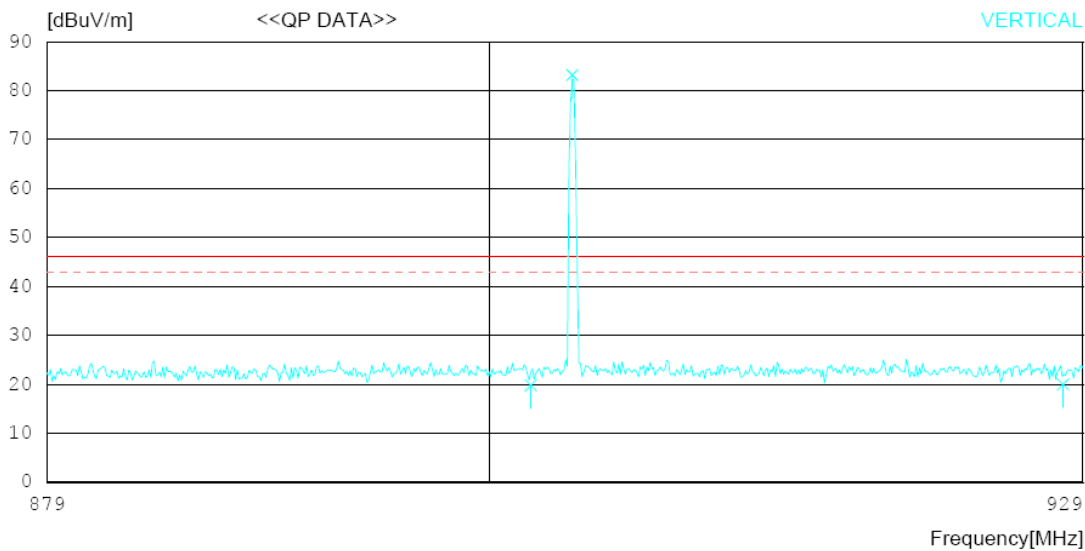
MHz	MHz	MHz	MHz	GHz	GHz
0.009 ~ 0.110	12.29 ~ 12.293	149.9 ~ 150.05	1645.5 ~ 1646.5	4.5 ~ 5.15	14.47 ~ 14.5
0.495 ~ 0.505	12.51975 ~ 12.52025	156.52475 ~ 156.52525	1660 ~ 1710	5.35 ~ 5.46	15.35 ~ 16.2
2.1735 ~ 2.1905	12.57675 ~ 12.57725	156.7 ~ 156.9	1718.8 ~ 1722.2	7.25 ~ 7.75	17.7 ~ 21.4
4.125 ~ 4.128	13.36 ~ 13.41	162.0125 ~ 167.17	2200 ~ 2300	8.025 ~ 8.5	22.01 ~ 23.12
4.17725 ~ 4.17775	16.42 ~ 16.423	167.72 ~ 173.2	2310 ~ 2390	9.0 ~ 9.2	23.6 ~ 24.0
4.20725 ~ 4.20775	16.69475 ~ 16.69525	240 ~ 285	2483.5 ~ 2500	9.3 ~ 9.5	31.2 ~ 31.8
6.215 ~ 6.218	16.80425 ~ 16.80475	322 ~ 335.4	2655 ~ 2900	10.6 ~ 12.7	36.43 ~ 36.5
6.26775 ~ 6.26825	25.5 ~ 25.67	399.90 ~ 410	3260 ~ 3267	13.25 ~ 13.4	Above 38.6
6.31175 ~ 6.31225	37.5 ~ 38.25	608 ~ 614	3332 ~ 3339		
8.291 ~ 8.294	73 ~ 74.6	960 ~ 1240	3345.8 ~ 3358		
8.362 ~ 8.366	74.8 ~ 75.2	1300 ~ 1427	3600 ~ 4400		
8.37625 ~ 8.38675	108 ~ 121.94	1435 ~ 1626.5			
8.41425 ~ 8.41475	123 ~ 138				

▪ FCC Part 15.205(b): The field strength of emissions appearing within these frequency bands shall not exceed the limits shown in §15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in §15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in §15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in §15.35 apply to these measurements.

- Measurement Data for Fundamental and Band Edge (Permitted Band : 902 ~ 928 MHz)



No.	FREQ [MHz]	READING QP [dBuV]	ANT FACTOR [dB]	LOSS [dB]	GAIN [dB]	RESULT [dBuV/m]	LIMIT [dBuV/m]	MARGIN [dB]	ANTENNA [cm]	TABLE [DEG]
----- Horizontal -----										
1	902.000	19.1	19.6	4.6	22.9	20.4	46.0	25.6	201	0
2	904.000	86.2	19.6	4.6	22.9	87.5	46.0	-41.5	201	0
3	928.000	18.1	20.0	4.7	22.8	20.0	46.0	26.0	101	0



No.	FREQ [MHz]	READING QP [dBuV]	ANT FACTOR [dB]	LOSS [dB]	GAIN [dB]	RESULT [dBuV/m]	LIMIT [dBuV/m]	MARGIN [dB]	ANTENNA [cm]	TABLE [DEG]
----- Vertical -----										
1	902.000	18.5	19.6	4.6	22.9	19.8	46.0	26.2	201	0
2	904.000	81.9	19.6	4.6	22.9	83.2	46.0	-37.2	201	0
3	928.000	18.1	20.0	4.7	22.8	20.0	46.0	26.0	201	0

- Measurement Data:

▪ Harmonic and other emissions Measurement Data

Frequency (MHz)	ANT Pol	Reading(dBuV)			T.F (dB)	Result(dBuV/m)			Limit(dBuV/m)			Margin(dB)		
		QP	PK	AV		QP	PK	AV	QP	PK	AV	QP	PK	AV
452	H	46.2	-	-	-4.4	41.8	-	-	46	-	-	4.2	-	-
452	V	47.7	-	-	-4.4	43.3	-	-	46	-	-	2.7	-	-
1808	H	-	47.59	39.74	-1.2	-	46.39	38.54	-	74	54	-	27.61	15.46
1808	V	-	47.16	36.83	-1.2	-	45.96	35.63	-	74	54	-	28.04	18.37
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Note 1. No other spurious and harmonic emissions were detected at a level greater than 20dB below limit.

Note 2. If peak result meet AV limit, AV measurement is omitted.

Note 3. Sample Calculation.

$$\text{Margin} = \text{Limit} - \text{Result} \quad / \quad \text{Result} = \text{Reading} + \text{T.F} \quad / \quad \text{T.F} = \text{AF} + \text{CL} - \text{AG}$$

Where, T.F = Total Factor, AF = Antenna Factor, CL = Cable Loss, AG = Amplifier Gain

APPENDIX
TEST EQUIPMENT USED FOR TESTS

To facilitate inclusion on each page of the test equipment used for related tests, each item of test equipment.

	Type	Manufacturer	Model	Cal.Due.Date (dd/mm/yy)	Next.Due.Date (dd/mm/yy)	S/N
<input type="checkbox"/>	Spectrum Analyzer	Agilent	E4440A	06/11/08	06/11/09	MY45304199
<input type="checkbox"/>	Spectrum Analyzer(RE)	H.P	8563E	13/10/08	13/10/09	3551A04634
<input type="checkbox"/>	Spectrum Analyzer	Rohde Schwarz	FSP	09/09/08	09/09/09	100385
<input type="checkbox"/>	Power Meter	H.P	EMP-442A	10/07/08	10/07/09	GB37170413
<input type="checkbox"/>	Power Sensor	H.P	8481A	14/07/08	14/07/09	3318A96332
<input type="checkbox"/>	Power Divider	Agilent	11636B	04/12/08	04/12/09	56471
<input type="checkbox"/>	Power Splitter	Anritsu	K241B	14/10/08	14/10/09	020611
<input type="checkbox"/>	Frequency Counter	H.P	5342A	16/09/08	16/09/09	2119A04450
<input type="checkbox"/>	TEMP & HUMIDITY Chamber	JISCO	KR-100/J-RHC2	10/10/08	10/10/09	30604493/021031
<input type="checkbox"/>	Digital Multimeter	H.P	34401A	20/03/08	20/03/09	3146A13475
<input type="checkbox"/>	Thermo hygrograph	SATO	NS II-Q	06/10/08	06/10/09	1503512
<input type="checkbox"/>	Thermo hygrograph	SATO	NS II-Q	17/10/08	17/10/09	1506426
<input type="checkbox"/>	Multifuction Synthesizer	HP	8904A	06/10/08	06/10/09	3633A08404
<input type="checkbox"/>	Signal Generator	Rohde Schwarz	SMR20	02/04/08	02/04/09	101251
<input type="checkbox"/>	Signal Generator	H.P	ESG-3000A	09/07/08	09/07/09	US37230529
<input type="checkbox"/>	Vector Signal Generator	Rohde Schwarz	SMJ100A	17/01/08	17/01/09	100148
<input type="checkbox"/>	Audio Analyzer	H.P	8903B	09/07/08	09/07/09	3011A09448
<input type="checkbox"/>	Modulation Analyzer	H.P	8901B	18/07/08	18/07/09	3028A03029
<input type="checkbox"/>	8960 Series 10 Wireless Comms. Test Set	Agilent	E5515C	31/07/08	31/07/09	GB43461134
<input type="checkbox"/>	Universal Radio communication Tester	Rohde Schwarz	CMU 200	02/04/08	02/04/09	107631
<input type="checkbox"/>	Bluetooth Tester	TESCOM	TC-3000A	16/12/08	16/12/09	3000A4A0121
<input type="checkbox"/>	BAND Reject Filter	Microwave Circuits	N0308372	06/10/08	06/10/09	3125-01DC0352
<input type="checkbox"/>	BAND Reject Filter	Wainwright	WRCG1750	06/10/08	06/10/09	2
<input type="checkbox"/>	High-Pass Filter	ANRITSU	MP526D	06/10/08	06/10/09	MP27756
<input type="checkbox"/>	High-pass filter	Wainwright	WHKX2.1	N/A	N/A	1
<input type="checkbox"/>	High-Pass Filter	Wainwright	WHKX3.0	N/A	N/A	9
<input type="checkbox"/>	Tunable Notch Filter	Wainwright	WRCT800.0/960.0-0.2/40-8SSK	N/A	N/A	10
<input type="checkbox"/>	Tunable Notch Filter	Wainwright	WRCD1700.0/2000.0-0.2/40-10SSK	N/A	N/A	27
<input type="checkbox"/>	Tunable Notch Filter	Wainwright	WRCT1900.0/2200.0-5/40-10SSK	N/A	N/A	7
<input type="checkbox"/>	AC Power supply	DAEKWANG	5KVA	20/03/08	20/03/09	20060321-1
<input type="checkbox"/>	DC Power Supply	HP	6622A	20/03/08	20/03/09	3448A03760
<input type="checkbox"/>	DC Power Supply	HP	6633A	20/03/08	20/03/09	3524A06634
<input checked="" type="checkbox"/>	HORN ANT	ETS	3115	13/06/08	13/06/09	6419
<input type="checkbox"/>	HORN ANT	ETS	3115	10/09/08	10/09/09	21097
<input type="checkbox"/>	HORN ANT	A.H.Systems	SAS-574	13/06/08	13/06/09	154
<input type="checkbox"/>	HORN ANT	A.H.Systems	SAS-574	13/06/08	13/06/09	155

	Type	Manufacturer	Model	Cal.Due.Date (dd/mm/yy)	Next.Due.Date (dd/mm/yy)	S/N
<input type="checkbox"/>	Dipole Antenna	Schwarzbeck	VHA9103	25/11/08	25/11/09	2116
<input type="checkbox"/>	Dipole Antenna	Schwarzbeck	VHA9103	25/11/08	25/11/09	2117
<input type="checkbox"/>	Dipole Antenna	Schwarzbeck	UHA9105	25/11/08	25/11/09	2261
<input type="checkbox"/>	Dipole Antenna	Schwarzbeck	UHA9105	25/11/08	25/11/09	2262
<input type="checkbox"/>	Coaxial Fixed Attenuators	Agilent	8491B	01/08/08	01/08/09	MY39260700
<input type="checkbox"/>	Coaxial Fixed Attenuators	Agilent	8491B	15/07/08	15/07/09	MY39260699
<input type="checkbox"/>	Attenuator (10dB)	WEINSCHL	23-10-34	01/10/08	01/10/09	BP4386
<input type="checkbox"/>	Attenuator (20dB)	WEINSCHL	86-20-11	06/10/08	06/10/09	432
<input type="checkbox"/>	Attenuator (10dB)	WEINSCHL	86-10-11	06/10/08	06/10/09	446
<input type="checkbox"/>	Attenuator (10dB)	WEINSCHL	86-10-11	06/10/08	06/10/09	408
<input type="checkbox"/>	Attenuator (40dB)	WEINSCHL	57-40-33	01/10/08	01/10/09	NN837
<input type="checkbox"/>	Attenuator (30dB)	JFW	50FH-030-300	24/03/08	24/03/09	060320-1
<input type="checkbox"/>	Type N Coaxial CIRCULATOR	NOVA MICROWAVE	0088CAN	11/07/08	11/07/09	788
<input type="checkbox"/>	Type N Coaxial CIRCULATOR	NOVA MICROWAVE	0185CAN	11/07/08	11/07/09	790
<input type="checkbox"/>	Type N Coaxial CIRCULATOR	NOVA MICROWAVE	0215CAN	11/07/08	11/07/09	112
<input checked="" type="checkbox"/>	Amplifier (30dB)	Agilent	8449B	13/10/08	13/10/09	3008A01590
<input type="checkbox"/>	RF Power Amplifier	OPHIRRF	5069F	09/07/08	09/07/09	1006
<input type="checkbox"/>	Software	Agilent	Benchlink	N/A	N/A	A.01.09 021211
<input checked="" type="checkbox"/>	EMI TEST RECEIVER	R&S	ESU	11/01/08	11/01/09	100014
<input checked="" type="checkbox"/>	BILOG ANTENNA	SCHAFFNER	CBL6112B	13/06/08	13/06/09	2737
<input checked="" type="checkbox"/>	Amplifier (22dB)	H.P	8447E	27/02/08	27/02/09	2945A02865
<input checked="" type="checkbox"/>	Position Controller	TOKIN	5905A	N/A	N/A	N/A
<input checked="" type="checkbox"/>	Software	ToYo EMI	EP5/RE	N/A	N/A	Ver 2.0.800
<input type="checkbox"/>	EMI TEST RECEIVER	R&S	ESCI	13/05/08	13/05/09	100364
<input type="checkbox"/>	Log Periodic Antenna	Schwarzbeck	UHALP9108A1	30/09/08	30/09/09	1098
<input type="checkbox"/>	Biconical Antenna	Schwarzbeck	VHA9103	13/06/08	13/06/09	2233
<input type="checkbox"/>	Amplifier (25dB)	Agilent	8447D	21/05/08	21/05/09	2944A10144
<input type="checkbox"/>	Position Controller	TOKIN	5901T	N/A	N/A	14173
<input type="checkbox"/>	Software	AUDIX	e3	N/A	N/A	Ver 3.0
<input type="checkbox"/>	Driver	TOKIN	5902T2	N/A	N/A	14174
<input type="checkbox"/>	Spectrum Analyzer(CE)	H.P	8591E	26/04/08	26/04/09	3649A05889
<input type="checkbox"/>	LISN	Kyorits	KNW-407	04/08/08	04/08/09	8-317-8
<input type="checkbox"/>	LISN	Kyorits	KNW-242	11/09/08	11/09/09	8-654-15
<input type="checkbox"/>	CVCF	NF Electronic	4420	21/03/08	21/03/09	304935/337980
<input type="checkbox"/>	Software	ToYo EMI	EP5/CE	N/A	N/A	Ver 2.0.801
<input type="checkbox"/>	DC BLOCK	Hyuplip	KEL-007	N/A	N/A	7-1581-5
<input type="checkbox"/>	50 ohm Terminator	HME	CT-01	30/01/08	30/01/09	N/A
<input type="checkbox"/>	RFI/FIELD Intensity Meter	Kyorits	KNW-2402	11/09/08	11/09/09	4N-170-3