

Electromagnetic Emission

F C C M E A S U R E M E N T R E P O R T

CERTIFICATION OF COMPLIANCE

FCC Part 15 Certification Measurement

PRODUCT : Internet Phone
MODEL/TYPE NO : DotPhone3000
FCC ID : QC6DotPhone3000
APPLICANT : Ntel Technology Co., Ltd.
604. SK Twin Tech Tower, B dong,
345-9 Gasan-Dong, Geumcheon-gu, Seoul, Korea
Attn. : Yun, Kye Seog / I BIZ Department of Ioam Leader
FCC CLASSIFICATION : Part 15 Class B Computing Device Peripheral (JBP)
FCC RULE PART(S) : FCC Part 15 Subpart B
FCC PROCEDURE : Certification
TRADE NAME : Ntel Technology Co., Ltd.
TEST REPORT No. : E02.0411.FCC.213N
DATES OF TEST : April 8 ~ 10, 2002
DATES OF ISSUE : April 11, 2002
TEST LAB. : ETL Inc (FCC Registration Number : 95422)
#584 Sangwhal-ri, Kanam-myon, Yoju-kun,
Kyounggi-do, 469-880, Korea
Tel : (031) 885-0072 Fax : (031) 885-0074

This Internet Phone, Model DotPhone3000 has been tested in accordance with the measurement procedures specified in ANSI C63.4-1992 at the ETL/EMC Test Laboratory and has been shown to be complied with the electromagnetic radiated emission limits specified in FCC Rule Part15 Subpart B.

I attest to the accuracy of data. All measurement herein performed by me or made under my supervision and 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.

The results of testing in this report apply to the product/system which was tested only. Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.



Name : Yo Han, Park

Title : Chief Engineer

E-RAE Testing Laboratory Inc.

**#584 Sangwhal-ri, Kanam-myon, Yoju-kun,
Kyounggi-do, 469-880, Korea**

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FCC MEASUREMENT REPORT

Scope - *Measurement and determination of electromagnetic emission(EME) of radio frequency devices including intentional radiators and/or unintentional radiators for compliance with the technical rules and regulations of the U.S Federal Communications Commission(FCC)*

General Information

Applicant Name : Ntel Technology Co., Ltd.
Address : 604. SK Twin Tech Tower, B dong,
345-9 Gasan-Dong, Geumcheon-gu,
Seoul, Korea
Attention : Yun, Kye Seog / I BIZ Department of Ioam Leader

- EUT Type : Internet Phone
- Model Number : DotPhone3000
- FCC Identifier : QC6DotPhone3000
- S/N : N/A
- Modulation : N/A
- FCC Rule Part(s) : Part 15 Subpart B
- Test Procedure : ANSI C63.4-1992
- FCC Classification : Part 15 Class B Computing Device Peripheral(JBP)
- Dates of Tests : April 08 ~ 10, 2002
- Place of Tests : ETL Inc
EMC Testing Lab (FCC Registration Number : 95422)
584, Sangwhal-ri, Kanam-Myun, Yoju-Kun,
Kyounggi-Do, 469-880, Korea
Tel : (031) 885-0072 Fax : (031) 885-0074
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1. INTRODUCTION

The measurement test for radiated and conducted emission test were conducted at the open area test site of E-RAE Testing Laboratory Inc. facility located at 584, Sangwhal-ri, Ganam-myun, Yoju-kun, Kyounggi-do, Korea. The site is constructed in conformance with the requirements of the ANSI C63.4-1992 and CISPR Publication 16. The ETL has site descriptions on file with the FCC for 3 and 10 meter site configurations. Detailed description of test facility was found to be in compliance with the requirements of Section 2.948 FCC Rules according to the ANSI C63.4-1992 and registered to the Federal Communications Commission (Registration Number : 95422).

The measurement procedure described in American National Standard for Method of Measurement of Radio-Noise Emission from Low-Voltage Electrical and Electronic Equipment in the Range of 9kHz to 40GHz (ANSI C.63.4-1992) was used in determining radiated and conducted emissions from the Ntel Technology Co., Ltd. Internet Phone Model : DotPhone3000.

2. PRODUCT INFORMATION

2.1 Equipment Description

The Equipment Under Test(EUT) is the Ntel Technology Co., Ltd. Internet Phone Model : DotPhone3000.
Please refer to Users manual

2.2 General Specification

- Chassis Type	Plastic Cover
- List of Each OSC. Or X-Tal. Freq.(>=1MHz)	X-TAL:12 MHz
- Chipset Brand & Part No.	Motorola: MC14LC5480DW
	National: MC244A
	tjnet: TIGER 560
- Number of Layers	2-Layer
- I/O Cable(s)	Unshielded
- Keyboard	PAD – 15Key
- Physical Interface	USB Specification 1.1 compliant
- Operating OS	Windows 98, 98SE, 98ME, Windows 2000 PRO
- Operating HDD Capacity	Above 10Mbyte
- Operating Memory Capacity	Above 32Mbyte
- Power	5V 250mA from USB Port of PC

3. DESCRIPTION OF TESTS

3.1 Conducted Emission Measurement

Conducted emissions measurements were made in accordance with § 12.2 in ANSI C63.4-1992. "measurement of Information Technology Equipment". The measurement were performed over the frequency range of 0.15MHz to 30MHz using a 50 /50uH LISN as the input transducer to a Spectrum Analyzer or a Field Intensity Meter. The measurements were made with the detector set for "Peak" amplitude within a bandwidth of 10KHz or for "quasi-peak" within a bandwidth of 9KHz.

- Procedure of Test

The line-conducted facility is located inside a shielded room 1m x 1.5m wooden table 80cm high is placed 40cm away from the vertical wall and 1.5m away from the side wall of the shilded room. Two EMCO 3825/2 LISNs are bonded to the shielded room. The EUT is powered from the EMCO LISN and the support equipment is powered from the another EMCO LISN. Power to the LISNs are filtered by a noise cut power line filters. All electrical cables are shielded by braided tinned steel tubing with inner ϕ 1.2cm. If the EUT is a DC-powered device, power will be derived from the source power supply it normally will be powered from and these supply lines will be connected to the EMCO LISN. Non-inductive bonding to a 1m length shortened all interconnecting cables more than 1m. Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The RF output of the Lisn was connected to the R3261A Spectrum Analyzer to determine the frequency producing the max. emission from the EUT. The frequency producing the max level was reexamined using to set Quasi-peak mode dy manual, after scanned by automatic Peak mode from 0.15 to 30MHz. The bandwidth of the Spectrum Analyzer was set to 9KHz. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each emission.

3. DESCRIPTION OF TESTS

3.2 Radiated Emission Measurement

Radiated emission measurements were in accordance with § 12.2 in ANSI C63.4-1992 "Measurement of Information Technology Equipment ". The measurements were performed over the frequency range of 30MHz to 1GHz using antenna as the input transducer to a Spectrum analyzer or a Field Intensity Meter. The measurements were made with the detector set for "Quasi-peak" within a bandwidth of 120KHz.

- Procedure of Test

Preliminary measurements were made at 10 meter using broadband antennas, and spectrum analyzer to determined the frequency producing the max. emission in shielded room. Appropriate precaution was taken to ensure that all emission from the EUT were maximized and investigated. The system configuration, mode of operation, turntable azimuth and height with respect to the antenna were noted for each frequency found. The spectrum was scanned from 30 to 1000MHz using SchwarzBeck Log-Bicon antenna. Above 1GHz, linearly polarized double ridge horn antennas were used. Final measurements were made open site at 10-meters. The test equipment was placed on a wooden turn-table. Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. Each frequency found during pre-scan measurements was re-examined by manual. The detector function was set to CISPR Quasi-peak mode and the bandwidth of the receiver was set to 120kHz or 1MHz depending on the frequency of type of signal. The EUT, support equipment and interconnecting cables were re-configured to the set-up producing the max. emission for the frequency and were placed on top of a 0.8-meter high nonmetallic 1 x 1.5 meter table. The EUT, support equipment, and interconnecting cables were re-arranged and manipulated to maximize each emission. The turntable containing the system was rotated; the antenna height was varied 1 to 4 meters and stopped at the azimuth or height producing the max. emission. Each emission was maximized by: varying the mode of operation to the EUT and/or support equipment and changing the polarity of the antenna, whichever determined the worst-case emission. Photographs of the worst-case emission can be seen in Photographs of the worst-case emission test setup can be seen in Appendix B.

4. TEST CONDITION

4.1 Test Configuration

The device was configured for testing in a typical fashion (as a customer would normally use it). During the tests, the EUT and the supported equipments were installed to meet FCC requirement and operated in a manner which tends to maximize its emission level in a typical application.

Radiated Emission Test

Preliminary radiated emission tests were conducted using the procedure in ANSI C63.4/1992 Clause 8.3.1.1 to determine the worst operating condition. Final radiated emission tests were conducted at 3meter open field test site.

To complete the test configuration required by the FCC, the EUT was tested in all three orthogonal planes. All testing was performed at AC/DC Adaptor.

4.2 EUT operation

Internet phone of EUT was connected to USB port of PC.

During the test executed communication between EUT and PC.

4.3 Support Equipment Used

Following peripheral devices and interface cables were connected during the measurement:

EUT- Internet Phone

FCC ID	: QC6DotPhone3000
Model Name	: DotPhone3000
Serial No.	: N/A
Manufacturer	: Ntel Technology Co., Ltd.
Power Supply Type	: 5V 250mA From USB Port of PC
Power Cord	: N/A
Data Cable	: Shielded, 1m

Support Unit 1-Personal computer(DELL)

FCC ID	: N/A(DoC)
Model Name	: MMP
Serial No.	: SK1W31S
Manufacturer	: DELL
Power Supply Type	: Switching
Power Cord	: Non-shielded, Detachable: 1.2m
Data Cable	: Shielded, Detachable:1.5m

Support Unit 2-Keyboard (DELL)

FCC ID	: N/A(DoC)
Model Name	: SK-8000
Serial No.	: 2965
Manufacturer	: DELL
Power Supply Type	: N/A
Power Cord	: N/A
Data Cable	: Shielded, 1.5m



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Support Unit 3-Mouse(LOGITECH)

FCC ID : DZL211029
Model Name : M-S34
Serial No. : LZC01002314
Manufacturer : LOGITECH
Power Supply Type : N/A
Power Cord : N/A
Data Cable : None-Shielded, 1.2m

Support Unit 4- EAR- MIC(JETECH)

FCC ID : N/A
Model Name : NCD-4JV
Serial No. : N/A
Manufacturer : DAWA
Power Supply Type : N/A
Power Cord : N/A
Data Cable : Shielded, 1.5m

Support Unit 6- Serial Mouse(PETRA)

FCC ID : JKGMUS5S01
Model Name : MUS5S
Serial No. : E183027
Manufacturer : PETRA
Power Supply Type : N/A
Power Cord : N/A
Data Cable : Shielded, 1.2m

Support Unit 7- Printer(H.P)

FCC ID : B94C2164X
Model Name : C4562B
Serial No. : TH9411434G
Manufacturer : H.P
Power Supply Type : DC 24V From Adaptor
Power Cord : Non-Shield, 1.5m
Data Cable : Shielded, 1.5m

Support Unit 4- Monitor(E-RAE)

FCC ID : OIOELM-150
Model Name : ELM-150A
Serial No. : N/A
Manufacturer : E-RAE Electronics Industry Co., Ltd.
Power Supply Type : DC12V From Adaptor
Power Cord : Non-shielded, Detachable: 1.2m
Data Cable : Shielded 15pin D-sub, 1.5m

5. TEST RESULTS

5.1 Summary of Test Results

The measurement results were obtained with the EUT tested in the conditions described in this report. Detailed measurement data and plots showing the maximum emission of the EUT are reported.

FCC Rule Parts	Measurement Required	Result
15.107(e)	Conducted Emission Measurement	Passed by -10.70dB
15.109(e)	Radiated Emissions Measurement	Passed by -3.80dB

The data collected shows that the **Ntel Technology Co., Ltd. Internet Phone DotPhone3000** complies with technical requirements of above rules part 15.107(e) and 15.109(e) Class B Limits.

The equipment is not modified anything, mechanical or circuits to improve EMI status during a measurement.

No EMI suppression device(s) was added and/or modified during testing.

5. TEST RESULTS

5.2 Conducted Emissions Measurement

EUT	Internet Phone / DotPhone3000 (SN: N/A)	
Limit apply to	15.107(e) : CISPR Pub.22(1997) Class B	
Test Date	April 8, 2002	
Operating Condition	Communication mode	
Environment Condition	Humidity Level : 40 %RH, Temperature : 19	
Result	Passed by -10.70dB	

Conducted Emission Test Data

The following table shows the highest levels of conducted emissions on both polarization of live and neutral line.

Detector mode : CISPR Quasi-Peak mode (6dB Bandwidth : 9 KHz)

Frequency [MHz]	Reading [dB μ V]		Phase (*H/**N)	Limit [dB μ V]		Margin [dB]	
	Quasi-peak	Average		Quasi-peak	Average	Q.P. Peak	Average
0.174	51.47		H	64.76	54.76	13.29	
0.195	50.15		H	63.82	53.82	13.67	
0.231	42.90		H	62.41	52.41	19.51	
0.591	39.80		N	56.00	46.00	16.20	
1.95	45.30		H	56.00	46.00	10.70	
6.72	38.75		H	60.00	50.00	21.25	
12.81	41.67		H	60.00	50.00	18.33	
20.06	36.87		H	60.00	50.00	23.13	
23.99	33.22		H	60.00	50.00	26.78	
28.88	35.77		H	60.00	50.00	24.23	

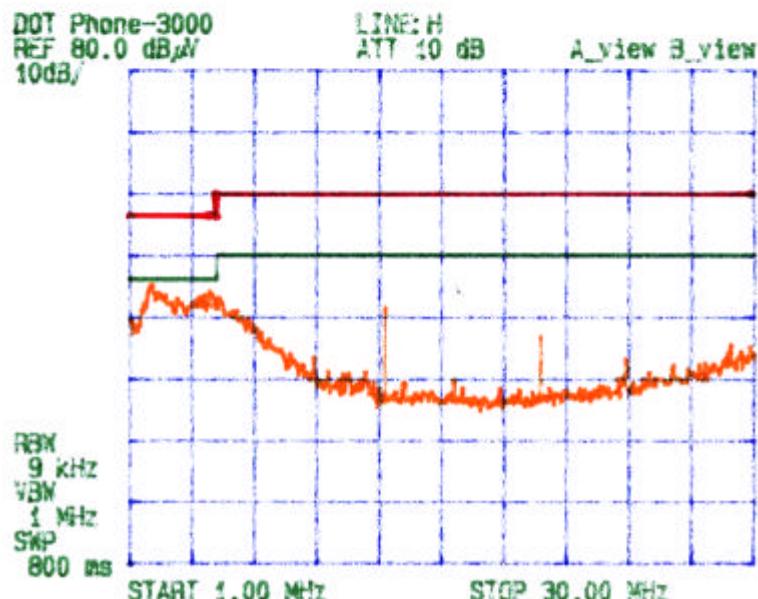
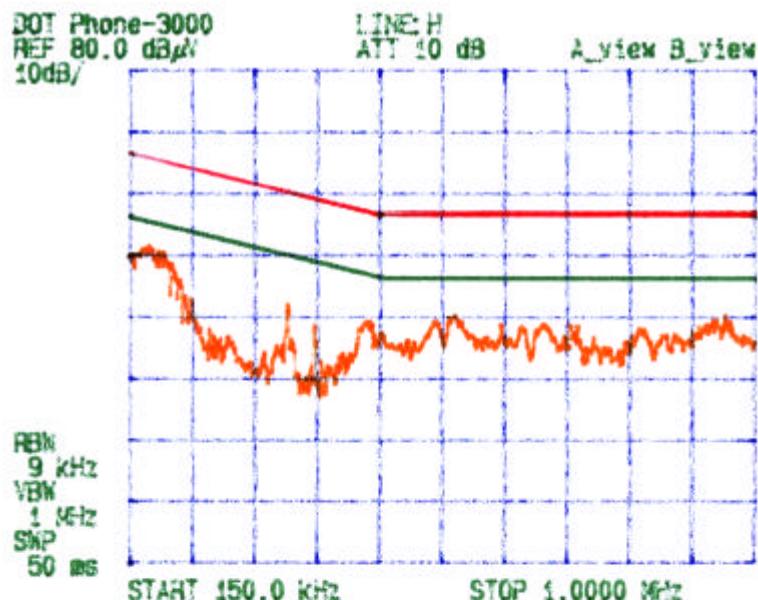
NOTES :

1. * H : HOT Line , **N : Neutral Line
2. Margin value = Limit – Reading
3. Measurement were performed at the AC/DC Power Inlet in the frequency band of 150kHz ~ 30MHz

Tested by : Ho Jin, Kim
 Test Engineer

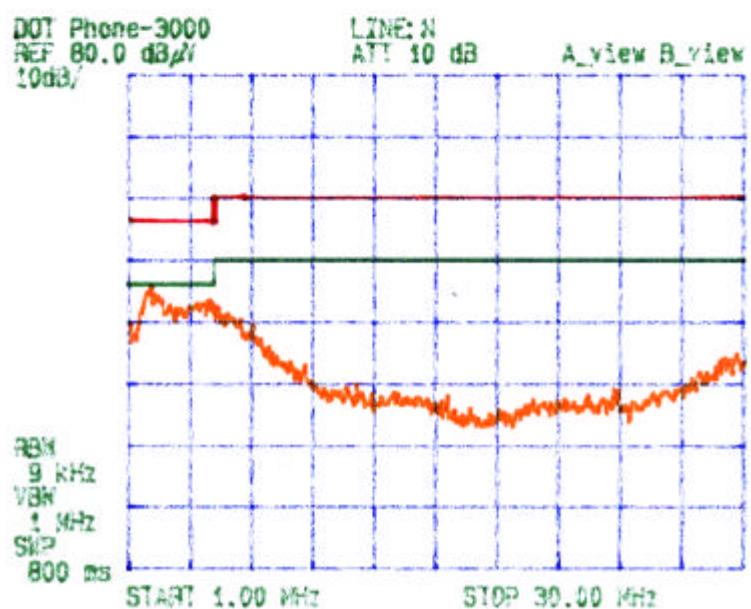
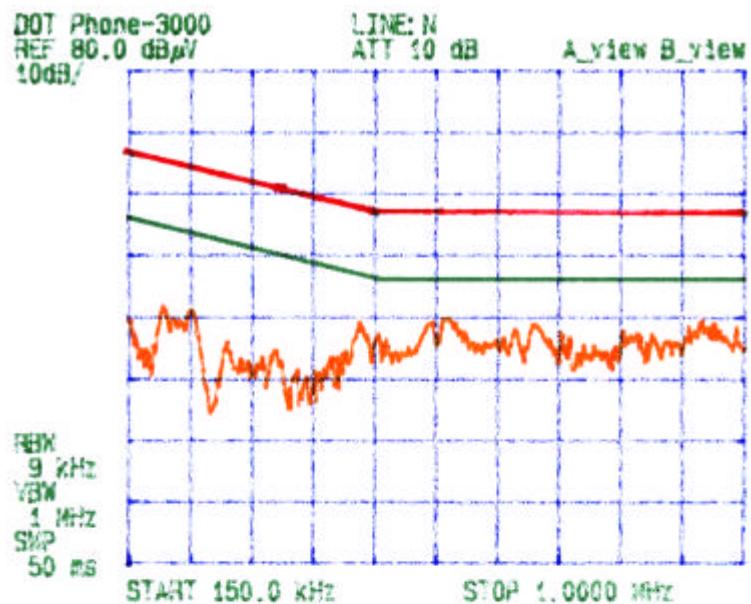
5. TEST RESULTS

Line Polarity : Hot



5. TEST RESULTS

Line Polarity : Neutral



5. TEST RESULTS

5.3 Out-of-band Radiated Emissions

EUT	Internet Phone / DotPhone3000 (SN: N/A)
Limit apply to	15.109(e) : CISPR Pub.22(1997) Class B
Test Date	April 10, 2002
Operating Condition	Communication mode
Environment Condition	Humidity Level : 37 %RH, Temperature : 22
Result	Passed by - 3.55dB

Radiated Emission Test Data

The following table shows the highest levels of radiated emissions on both polarization of horizontal and vertical.

Detector mode : CISPR Quasi-Peak mode (6dB Bandwidth : 120 kHz)

Measurement Distance : 10 meters

Frequency [MHz]	Reading [dB μ V]	Polarization (*H/**V)	Ant. Factor [dB]	Cable Loss [dB]	Emission Level [dB μ V/m]	Limit [dB μ V/m]	Margin [dB]
153.98	10.27	H	12.76	3.00	26.03	30.0	3.97
181.98	9.52	H	10.81	3.70	24.03	30.0	5.97
205.97	12.28	H	8.82	3.90	25.00	30.0	5.00
209.97	13.73	H	8.82	3.90	26.45	30.0	3.55
217.97	12.82	H	9.37	4.00	26.19	30.0	3.81
266.00	10.28	H	11.34	4.30	25.92	37.0	11.08
288.00	10.59	H	12.19	4.50	27.28	37.0	9.72
335.98	11.44	H	13.18	4.70	29.32	37.0	7.68
384.00	11.07	H	14.32	5.30	30.69	37.0	6.31
527.90	7.73	H	17.31	6.30	31.34	37.0	5.66

NOTES :

1. * H : Horizontal polarization , ** V : Vertical polarization
2. Emission Level = Reading + Antenna factor + Cable loss
3. Margin value = Limit - Emission Level
4. All other emissions not reported were more than 25dB below the permitted limit.
5. The EUT was tested in all the three orthogonal planes and the worst case of emissions was vertical axes.

Tested by : Ho Jin, Kim
 Test Engineer

6. SAMPLE CALCULATION

Sample Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor.

The basic equation with a sample calculation is as follows:

$$FS = RA + AF + CF$$

where FS = Field Strength

RA = Receiver Amplitude

AF = Antenna Factor

CF = Cable Attenuation Factor

$$dB(\mu V/m) = 20 \log_{10} (\mu V /m) : \text{Equation 1}$$

$$dB\mu V = dBm + 107 : \text{Equation 2}$$

Example 1 : @ 1.95MHz

$$\text{Class B Limit} = 630.9 \mu V = 56 \text{ dBuV}$$

$$\text{Reading} = 45.30 \text{ dBuV}$$

$$\text{Convert to } \mu V = 184.07 \mu V$$

$$\text{Margin} = 45.30 - 56.00 = -10.70$$

= -10.70 dB below Limit

Example 2 : @ 209.97 MHz

$$\text{Class B Limit} = 31.62 \mu V = 30.0 \text{ dBuV/m}$$

$$\text{Reading} = 13.73 \text{ dBuV}$$

$$\text{Antenna Factor + Cable Loss} = 12.72 \text{ dB}$$

$$\text{Total} = 26.45 \text{ dBuV/m}$$

$$\text{Margin} = 26.45 - 30.0 = -3.55$$

= -3.55 dB below Limit

7. TEST EQUIPMENT LIST

List of Test Equipments Used for Measurements

Test Equipment		Model	Mfg.	Serial No.	Cal. Due Date
<input checked="" type="checkbox"/>	Spectrum Analyzer	R3261A	Advantest	21720033	02-10-26
<input type="checkbox"/>	Spectrum Analyzer	ESA-L1500A	H.P	US37360920	02-10-20
<input checked="" type="checkbox"/>	Receiver	ESVS 10	R & S	835165/001	03-04-06
<input checked="" type="checkbox"/>	Preamplifier	HP8447D	HP	2944A07626	03-01-10
<input type="checkbox"/>	Preamplifier	HP 8347A	HP	2834A00544	02-05-23
<input checked="" type="checkbox"/>	LISN	3825/2	EMCO	9006-1669	02-12-27
<input checked="" type="checkbox"/>	LISN	3825/2	EMCO	9208-1995	02-12-27
<input checked="" type="checkbox"/>	TriLog Antenna	VULB9160	Schwarz Beck	3082	03-05-08
<input type="checkbox"/>	LogBicon	VULB9165	Schwarz Beck	2023	03-05-08
<input checked="" type="checkbox"/>	Dipole Antenna	VHAP	Schwarz Beck	964	03-05-03
<input checked="" type="checkbox"/>	Dipole Antenna	VHAP	Schwarz Beck	965	03-05-03
<input checked="" type="checkbox"/>	Dipole Antenna	UHAP	Schwarz Beck	949	03-05-03
<input checked="" type="checkbox"/>	Dipole Antenna	UHAP	Schwarz Beck	950	03-05-03
<input type="checkbox"/>	Double Ridged Horn	3115	EMCO	9809-2334	02-09-20
<input checked="" type="checkbox"/>	Turn-Table	DETT-03	Daeil EMC	-	N/A
<input checked="" type="checkbox"/>	Antenna Master	DEAM-03	Daeil EMC	-	N/A
<input type="checkbox"/>	Plotter	7440A	H.P	2725A 75722	N/A
<input checked="" type="checkbox"/>	Chamber	DTEC01	DAETONG	-	N/A
<input type="checkbox"/>	Impedance Matching Pad	6001.01.A	SUNNER	3252	02-09-22
<input checked="" type="checkbox"/>	Thermo Hygrograph	3-3122	ISUZU	3312201	02-12-20
<input type="checkbox"/>	BaroMeter	-	Regulus	-	-