

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 : PDP Monitor
MODEL/TYPE NO : EPM-42Q7BN
MULTIPLE MODEL : PDT423BKA
FCC ID : OIOPDT-423BKA
APPLICANT : Erae Electronics Industry Co., Ltd.
#371-51, Kasan-Dong, Keumcheon-Ku, Seoul, 153-803, Korea
Attn.: Woon Seok, Yu / Deputy General Manager
MANUFACTURER : Erae Electronics Industry Co., Ltd.
#371-51, Kasan-Dong, Keumcheon-Ku, Seoul, 153-803, Korea
FCC CLASSIFICATION : Class B personal computers and peripherals
FCC RULE PART(S) : FCC Part 15 Subpart B
FCC PROCEDURE : Certification
TRADE NAME : ERAE
TEST REPORT No. : ETLE060711.318
DATES OF TEST : July 24, 2006
REPORT ISSUE DATE : July 31, 2006
TEST LABORATORY : ETL Inc. (FCC Registration Number : 95422)

This PDP Monitor, Model EPM-42Q7BN has been tested in accordance with the measurement procedures specified in ANSI C63.4-2003 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 was performed by me or was made under my supervision and is 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.



Chon Sik, Kim / Chief Engineer

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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 : Erae Electronics Industry Co., Ltd.
Address : 371-51,Kasan-Dong,Keumcheon-Ku,Seoul,
153-803, Korea
Attention : Woon Seok, Yu / Deputy General Manager

- **EUT Type :** PDP Monitor
- **Model Number :** EPM-42Q7BN
- **FCC ID :** OIOPDT-423BKA
- **S/N :** N/A
- **FCC Rule Part(s) :** FCC Part 15 Subpart B
- **Test Procedure :** ANSI C63.4-2003
- **FCC Classification :** Class B personal computers and peripherals
- **Dates of Tests :** July 24, 2006
- **Place of Tests :**
ETL Inc.
EMC Testing Lab. (FCC Registration Number : 95422)
#584, Sangwhal-ri, Ganam-myeon, Yoju-gun,
Gyeonggi-do, 469-885, Korea
Tel : 82-2-858-0786 Fax : 82-2-858-0788
- **Test Report No. :** ETLE060711.318

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-myeon, Yoju-gun, Gyeonggi-do, 469-885, Korea. The site is constructed in conformance with the requirements of the ANSI C63.4-2003 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 C63.4-2003 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 9 kHz to 40 GHz (ANSI C63.4-2003) was used in determining radiated and conducted emissions from the Erae Electronics Industry Co., Ltd., Model: EPM-42Q7BN.

2. PRODUCT INFORMATION

2.1 Equipment Description

The Equipment Under Test (EUT) is the Erae Electronics Industry Co., Ltd., Model: EPM-42Q7BN.

Model Difference :

- The model EPM-42Q7BN is basic model that was tested.
- The multilisted model of PDT423BKA(Buyer model) is identical to basic model, except for model name.

2.2 General Specification

Aspect Ratio	16:9
Screen Size (H x V)	921,6 mm(H) x 519,2 mm(V)
Resolution	1 024 x 768 (XGA) (1 Pixel = 3 RGB Cells)
Cell pitch (H x V)	300 μm (H) x 676 μm (V)
Displayable Colors	16,7M
Brightness	1 200 cd/m ² (w/o filter)
Contrast	10 000:1 (MAX)
Viewing Angle	160 °
Input signal	NTSC SD, HD, VGA~SXGA
Tuner	NONE
PC Input	Analog RGB, HDMI
AC Input	AC 100 V – 240 V, 50 Hz / 60 Hz, 4 A (MAX)
Power Consumption	320 W (MAX)
Stand-by Mode	1 W

3. DESCRIPTION OF TESTS

3.1 Conducted Emission Measurement

Conducted emissions measurements were made in accordance with section 11, "Measurement of Information Technology Equipment" of ANSI C63.4-2003. The measurements were performed over the frequency range of 0,15 MHz to 30 MHz using a 50Ω / $50 \mu\text{H}$ LISN as the input transducer to a Spectrum Analyzer or a Test Receiver. The measurements were made with the detector set for "Peak" amplitude within a bandwidth of 9 kHz or for "quasi-peak" within a bandwidth of 9 kHz.

The line-conducted emission test is conducted inside a shielded anechoic chamber room with 1 m x 1,5 m x 0,8 m wooden table which is placed 40 cm away from the vertical wall and 1,5 m away from the side wall of the chamber room. Two LISN are bonded to the shielded room. The EUT is powered from the LISN and the support equipment is powered from the other 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 1,2 cm. 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 LISN. Non-inductive bundling to a 1 m 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 EMI Test Receiver to determine the frequency producing the maximum emission from the EUT. The frequency producing the maximum level was reexamined using to set Quasi-Peak mode by manual, after scanned by automatic Peak mode from 0,15 MHz to 30 MHz. The bandwidth of the spectrum analyzer was set to 9 kHz. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each emission.

Photographs of the worst-case emission can be seen in photographs of conducted emission test setup in Appendix B.

3. DESCRIPTION OF TESTS

3.2 Radiated Emission Measurement

Radiated emission measurements were made in accordance with section 11, "Measurement of Information Technology Equipment" of ANSI C63.4-2003. The measurements were performed over the frequency range of 30 MHz to 1 GHz 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 120 kHz.

Preliminary measurements were made at 10 m using broadband antennas, and spectrum analyzer to determined the frequency producing the maximum 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 MHz to 1000 MHz using Log-Bicon antenna. Above 1 GHz, linearly polarized double ridge horn antennas were used. Final measurements were made open site at 10 m. 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 120 kHz 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 maximum emission for the frequency and were placed on top of a 0,8 m high nonmetallic 1 m x 1.5 m 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 m to 4 m and stopped at the azimuth or height producing the maximum 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 and which tends to maximize its emission level in a typical application.

4.2 EUT operation

Operating Mode	The worst operating condition
Stand-by mode	X
640 * 480 Vf = 60 Hz, Full "H" pattern display mode	X
800 * 600 Vf = 60 Hz, Full "H" pattern display mode	X
1024 * 768 Vf = 60 Hz, Full "H" pattern display mode	X
1280 * 1024 Vf = 60 Hz, Full "H" pattern display mode	◎

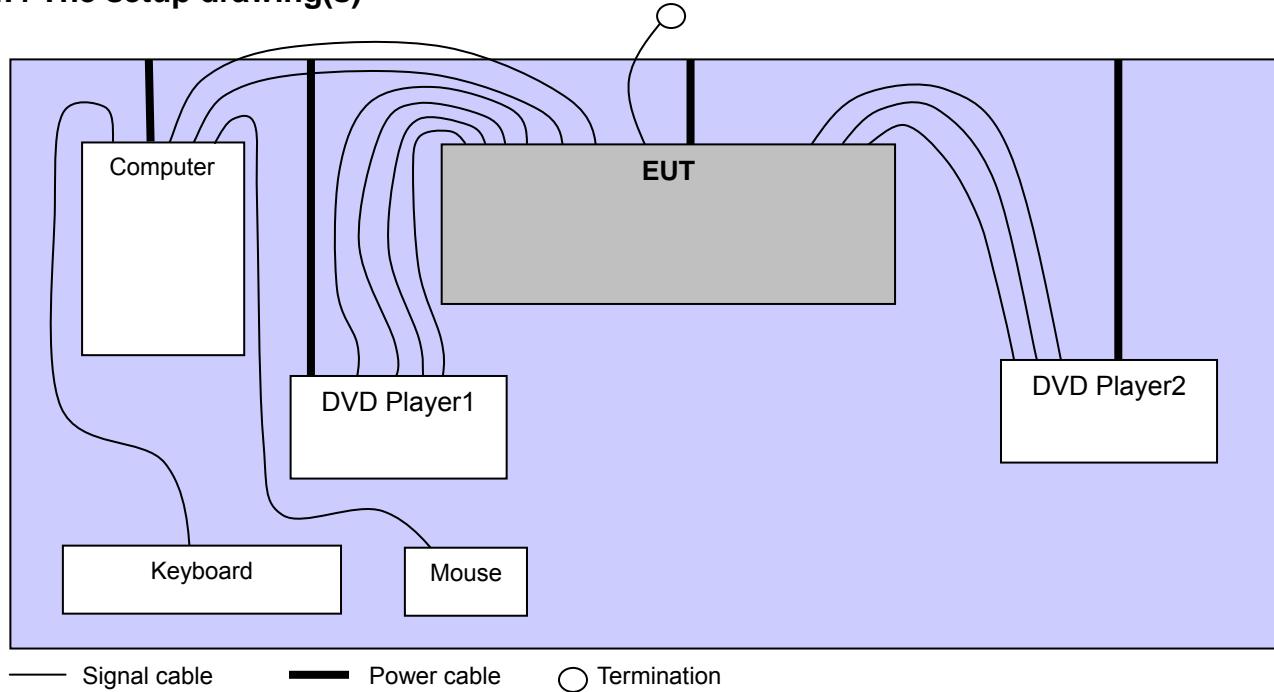
◎ : Worst case investigated during the test.

4.3 Support Equipment Used

Description	Model Name	Serial No.	Manufacturer	FCC ID
EUT	EPM-42Q7BN	NONE	Erae Electronics Industry Co., Ltd.	N/A
Keyboard	KB-9963	B26960GBUKO13F	Chicony Elec.	N/A
Mouse	M-S34	LNA10212779	Logitech	N/A
Computer	DHM	G9MB71S	Dell Asia Pacific Sdn.	N/A
DVD Player 1	NONE	NONE	Ellion	N/A
DVD Player 2	NONE	NONE	Ellion	N/A

4. TEST CONDITION

4.4 The setup drawing(s)



4.5 Type of Cables Used

Device from	Device to	Type of Cable	Length(m)	Type of shield
EUT	Computer	RGB In	1,5	Shielded
EUT	Computer	Audio In	1,5	Shielded
EUT	Termination	HDMI	1,5	Shielded
EUT	DVD Player 1	Component 1 Input	3,0	Shielded
EUT	DVD Player 1	Component 1 Audio In	3,0	Shielded
EUT	DVD Player 2	Component 2 Input	3,0	Shielded
EUT	DVD Player 2	Component 2 Audio In	3,0	Shielded
EUT	DVD Player 1	Composite A/V Input	3,0	Shielded
EUT	DVD Player 2	Stereo Output	3,0	Shielded
EUT	DVD Player 1	S-Video In	3,0	Shielded
EUT	Power socket	AC INPUT	1,2	Unshielded
DVD Player1	Power Socket	Non-detachable Power	1,5	Unshielded
DVD Player2	Power Socket	Non-detachable Power	1,5	Unshielded
Computer	Keyboard	PS/2	1,5	Shielded
Computer	Mouse	PS/2	1,5	Shielded
Computer	Power Socket	AC Input	1,5	Unshielded

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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	Measurement Required	Result
15.107	Conducted Emission Measurement	Passed by 13,10 dB
15.109	Radiated Emission Measurement	Passed by 3,10 dB

The data collected shows that the **Erae Electronics Industry Co., Ltd. / PDP Monitor / EPM-42Q7BN** complied with technical requirements of above rules part 15.107 and 15.109 Class B Limits and CISPR Publication 22.

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	PDP Monitor / EPM-42Q7BN (SN :N/A)
Limit apply to	FCC Part 15. 107(CISPR Pub.22 Class B)
Test Date	July 24, 2006
Operating Condition	1280 * 1024 Vf = 60Hz, Full "H" pattern display mode
Result	Passed by 13,1 dB

Conducted Emission Test Data

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

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

Frequency [MHz]	Result [dB μ V]		Phase (*H/**N)	Limit [dB μ V]		Margin [dB]	
	Quasi-peak	Average		Quasi-peak	Average	Quasi-peak	Average
0,160	50,2	35,0	H	65,4	55,4	15,2	20,4
0,173	45,7	32,4	N	64,8	54,8	19,1	22,4
0,195	43,9	37,1	H	63,8	53,8	19,9	16,7
0,399	36,0	29,2	N	57,9	47,9	21,9	18,7
0,598	32,4	26,2	N	56,0	46,0	23,6	19,8
0,800	29,8	24,1	N			26,2	21,9
2,061	29,4	21,5	H			26,6	24,5
14,976	36,4	29,4	H	60,0	50,0	23,6	20,6
21,626	40,0	36,9	H			20,0	13,1

NOTES: 1. * H: HOT Line , **N: Neutral Line

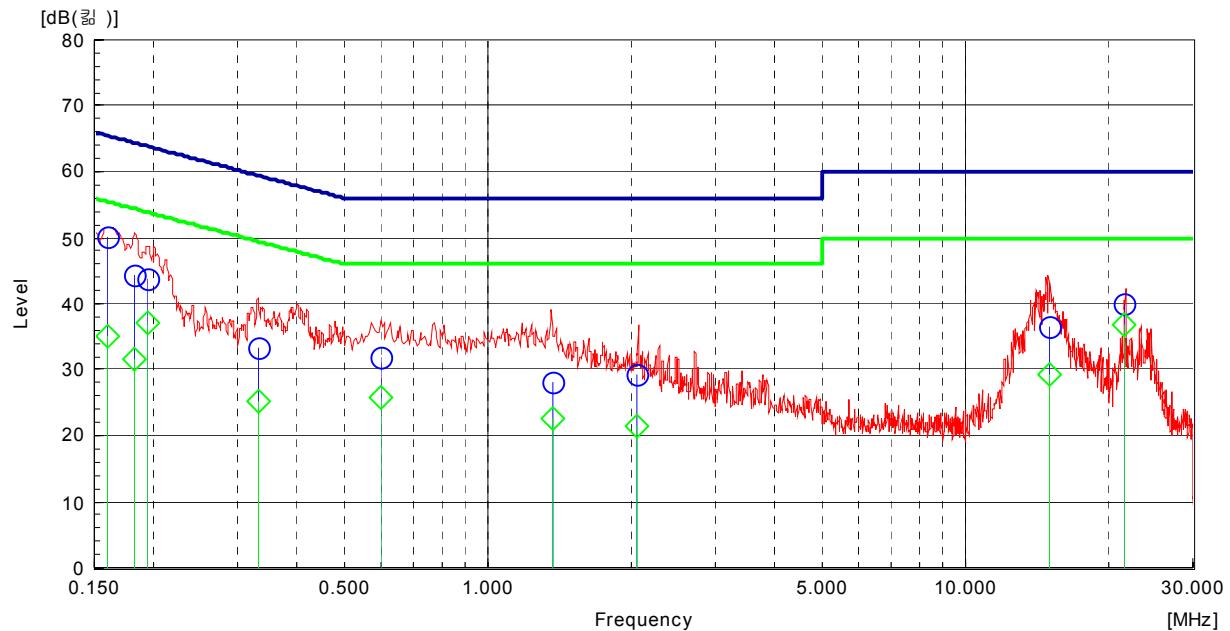
2. Margin value = Limit – Result

3. Measurement were performed at the AC Power Inlet in the frequency band of 150 kHz ~ 30 MHz according to the FCC Part 15 and CISPR 22 Class B

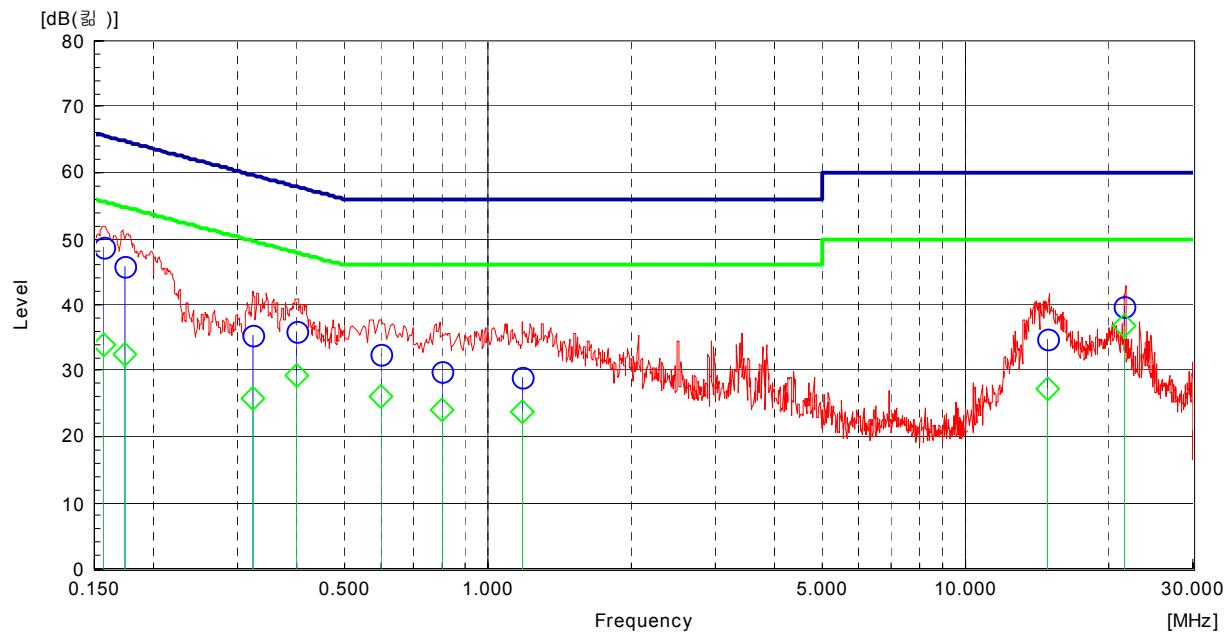


Test Engineer: Jae Young, Kwon

Line: HOT Line

Limit :
— Quasi-Peak
— Average

Line: Neutral Line



Quasi-peak



Average



5. TEST RESULTS

5.3. Radiated Emissions Measurement

EUT	PDP Monitor / EPM-42Q7BN (SN :N/A)
Limit apply to	FCC Part 15. 109(CISPR Pub.22 Class B)
Test Date	July 24, 2006
Operating Condition	1280 * 1024 Vf = 60Hz, Full "H" pattern display mode
Result	Passed by 3,10 dB

Radiated Emission Test Data

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

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

Frequency [MHz]	Reading [dB μ V]	Polarization (*H/**V)	Ant. Factor [dB/m]	Cable Loss [dB μ V]	Emission Level [dB μ V/m]	Limit [dB μ V/m]	Margin [dB]
45,15	12,51	V	9,79	2,00	24,30	30,0	5,70
80,55	14,11	V	7,35	2,34	23,80		6,20
130,55	12,31	V	11,33	3,26	26,90		3,10
140,05	11,72	V	11,68	3,40	26,80		3,20
182,85	12,32	V	9,97	3,91	26,20		3,80
257,50	12,61	V	11,03	4,96	28,60	37,0	8,40
400,10	11,03	H	14,47	6,60	32,10		4,90
474,50	7,67	H	16,43	7,40	31,50		5,50
540,30	7,31	H	17,85	8,24	33,40		3,60
665,50	3,49	H	19,92	9,39	32,80		4,20

NOTES :* H : Horizontal polarization , ** V : Vertical polarization

Result = Reading + Antenna factor + Cable loss

Margin value = Limit - Result

The measurement was performed for the frequency range 30 MHz ~ 1 000 MHz according to the CISPR 22 Class B



Test Engineer: Jae Young, Kwon

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

$$dB(\mu V) = 20 \log_{10} (\mu V)$$

$$dB\mu V = dBm + 107$$

Example : @ 130,55 MHz

$$\text{Class B Limit} = 31,70 \mu V/m = 30 \text{ dB } \mu V/m$$

$$\text{Reading} = 12,31 \text{ dB } \mu V$$

$$\text{Antenna Factor + Cable Loss} = 11,33 + 3,26 = 14,59 \text{ dB } \mu V/m$$

$$\text{Total} = 26,90 \text{ dB } \mu V/m$$

$$\text{Margin} = 30 - 26,90 = 3,10 \text{ dB}$$

$$= 3,10 \text{ dB below Limit}$$

7. List of test equipments used for measurements

Test Equipment		Model	Mfg.	Serial No.	Cal. Due Date
<input checked="" type="checkbox"/>	EMI TEST Receiver	ESVS 10	R & S	835165/001	07-04-25
<input checked="" type="checkbox"/>	EMI TEST Receiver	ESPI	R & S	100478	06-10-17
<input checked="" type="checkbox"/>	LISN	3816-2	EMCO	1002	06-10-17
<input checked="" type="checkbox"/>	LISN	3825/2	EMCO	9208-1995	07-04-06
<input checked="" type="checkbox"/>	LogBicon Antenna	VULB9160	Schwarz Beck	3128	06-09-23
<input checked="" type="checkbox"/>	Turn-Table	DETT-03	Daeil EMC	-	N/A
<input checked="" type="checkbox"/>	Antenna Master	DEAM-03	Daeil EMC	-	N/A

End of Test Report

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