K.E.S CORPORATION EMC Laboratory

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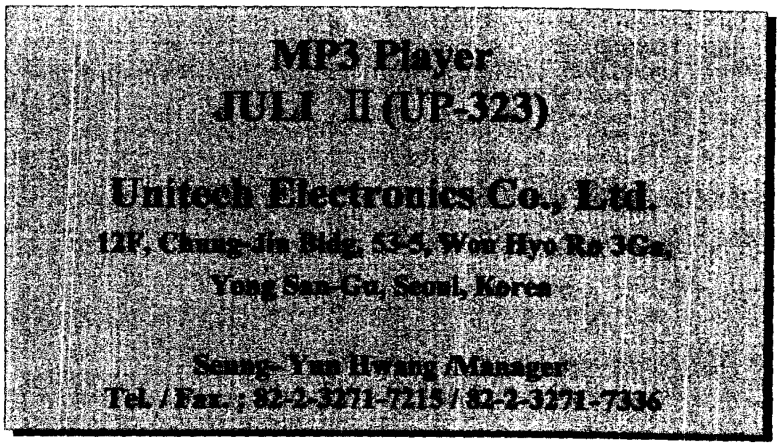
FCC VERIFICATION CERTIFICATE

Manufacture :

Unitech Electronics Co., Ltd.
12F, Chung-Jin Bldg, 53-5, Won Hyo Ro 3Ga,
Yong San-Gu, Seoul, Korea
Attn : Seung - Yun Hwang /Manager

Dates of Tests : 18 June, 1 August 2001
Test Report No. : 2001KESEMC-II-0173.FCC
Test Site : KES Corporation EMC site, Korea.

TYPE of EUT
MODEL No.

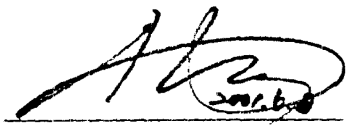


CONTACT PERSON

FCC Rule Part(s) :	Part 15 & 2
Classification :	FCC Class B Device
Port/Connector(s) :	USB(1), H-Phone(1)

The device bearing the trade name and model specified above has been shown to comply with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in ANSI C63.4-1992.

I attest to the accuracy of data and 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.



Kew - Seung , Lim
Lab. General Manager

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MEASUREMENT REPORT

Scope - Measurement and determination of electromagnetic emissions (EME) of radio frequency devices including intentional and/or unintentional radiators for compliance with the technical rules and regulations of the Federal Communications Commission under FCC part 15 verification.

Responsible Party* : **Contact Person :**	**Unitech Electronics Co., Ltd.** **Seung-Yun Hwang/Manager** **Tel No. 82-2-3271-7215** **Fax No. 82-2-3271-7336**
Manufacturer :	**Unitech Electronics Co., Ltd.** **12F, Chung-Jin Bldg, 53-5, Won Hyo Ro 3Ga,** **Yong San-Gu, Seoul, Korea**

- Trade / Model : ***JULI II(UP-323)***
- Brand Name : Unitech Elctronics Co., Ltd.
- EUT Type : MP3 Player
- Port/Connectors : USB(1), H-Phone(1)
- Classification : FCC Class B
- Rule Part(s) : FCC Part 15 & Part 2
- Test Procedure(s): ANSI C63.4 (1992)
- Dates of Test: 18 June, 1 August 2001
- Place of Tests: KES Corporation EMC Site
- Test Report No.: 2001KESEMC-II-0173.FCC
- Order No. : MK600-01- 747

INTRODUCTION

The measurement procedure described in American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9kHz to 40GHz (ANSI C63.4-1992) was used in determining radiated and conducted emissions emanating from **Unitech Electronics Co., Ltd.**

Model : **JULI Ⅱ(UP-323)**

These measurement tests were conducted at ***KES Corporation EMC Laboratory*** .

The site address is 705, Dongchun-Ri, Sooji-Eub, Yongin-Shi, Kyungki-Do, Korea.

The area of KES Corporation EMC Test Site is located in a mountain area at 45 kilometers (28 miles) southeast and Seoul International Airport (Kimpo Airport), 23 kilometers (14miles) south-southeast from central Seoul.

It is located in the valley surrounded by mountains in all directions where ambient radio signal conditions are quiet and a favorable area to measure the radio frequency interference on open field test site for the computing and ISM devices manufactures.

The detailed description of the measurement facility was found to be in compliance with the requirements of § 2.948 according to ANSI C63.4 on October 19, 1992.

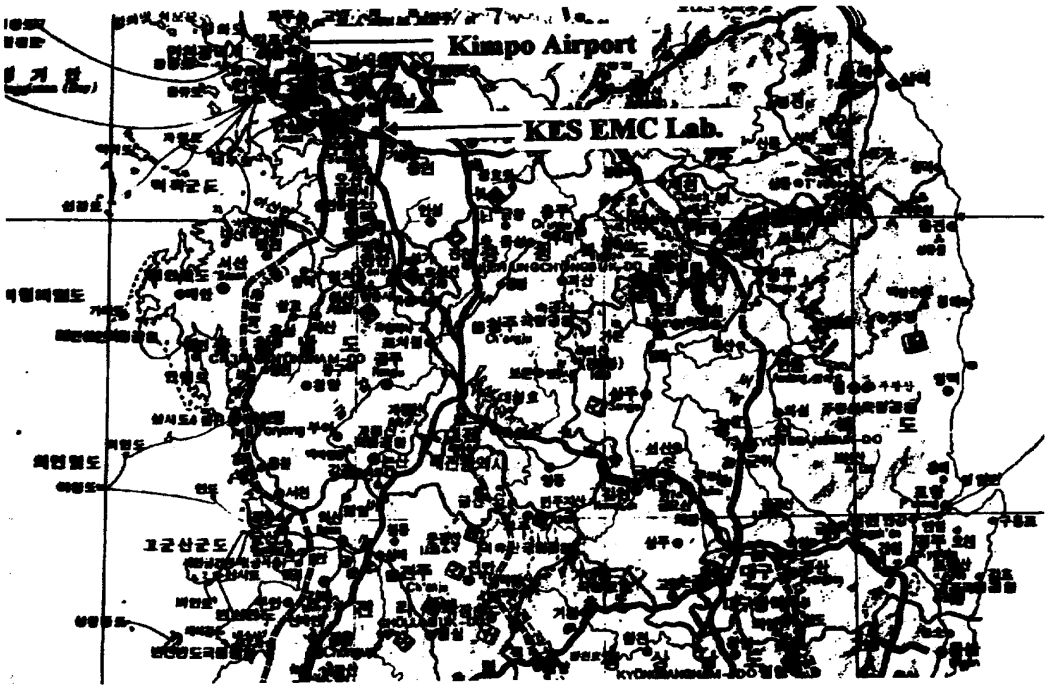


Fig. 1. The map above shows the Seoul in Korea vicinity area.
The map also shows KES Corporation EMC Lab and Kimpo Airport.

PRODUCT INFORMATION

The Equipment Under Test (EUT) is the **Unitech Elctronics Co., Ltd.**
Model : **JULI Ⅱ (UP-323)**

Clock :	48MHz, 14.725MHz, 16MHz	
Chipset(s) :	K9K5608U0M-YC80, PIC17LC756A, 9948K1864-1	
Port(s) :	USB(1), H-Phone(1)	
Power Consumption :	DC1.5V	
I/O Board :	Model : UP323 (N/A)	S/N : N/A
Display Board :	Model : N/A (N/A0	S/N : N/A

EMI suppression device(s) installed in production:

- see circuit diagram (Appendix B)

EMI suppression device(s) added and/or modified during testing:

- none

DESCRIPTION OF TESTS

Conducted Emissions

The line-conducted facility is located inside a 3.056.052.5 shielded enclosure. It is manufactured by Daeil EMC Engineering. The shielding effectiveness of the shielded room is in accordance with MIL-Std-285 or NSA 65-6. A 1m.51.5m. wooden table 0.8m. height is placed 0.4m. away from the vertical wall and 1.5m away from the side wall of the shielded room. PMM L3-25, L1-150 and EMCO Model 3825-2 (10kHz-30MHz) 50Ω /50 μH Line Impedance Stabilization Networks (LISNs) are bonded to the shielded room. The EUT is powered from the PMM LISN and the support equipment is powered from the EMCO LISN. Power to the LISNs are filtered by a high-current high-insertion loss Sangshin power line filters (100dB 14kHz-10GHz). The purpose of the filter is to attenuate ambient signal interference and this filter is also bonded to the shielded enclosure. All electrical cables are shielded by braided tinned copper zipper tubing with inner diameter of 1/2". If the EUT is a DC-powered device, power will be derived from the source power supply it normally will be powered from and this supply lines will be connected to the PMM LISN. LISN schematic diagram is shown in Figure 2. All interconnecting cables more than 1 meter were shortened by non-inductive bundling (serpentine fashion) to a 1-meter length. 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 spectrum analyzer to determine the frequency producing the maximum EME from the EUT. The spectrum was scanned from 450 kHz to 30 MHz with 20 msec sweep time. The frequency producing the maximum level was reexamined using EMI/Field Intensity Meter and Quasi-Peak adapter. The detector function was set to CISPR quasi-peak mode. The bandwidth of the receiver was set to 10 kHz. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each EME emission. Each emission was maximized by: switching power lines; varying the mode of operation or resolution; clock or data exchange speed; scrolling H pattern to the EUT and/or support equipment, and powering the monitor from the floor mounted outlet box and the computer aux AC outlet, if applicable; which ever determined the worst-case emission. Photographs of the worst-case emission can be seen in Appendix C. Each EME reported was calibrated using the R/S SMG signal generator.

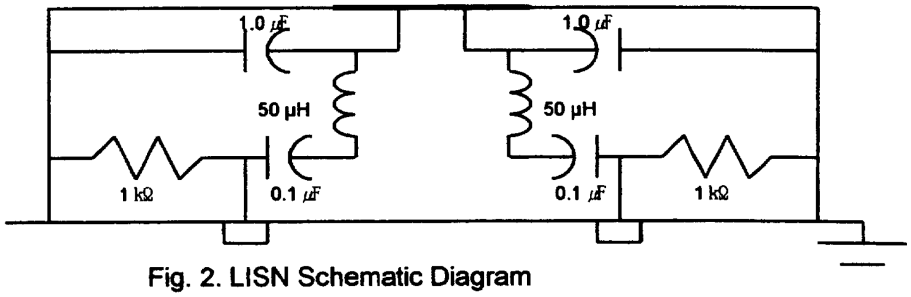


Fig. 2. LISN Schematic Diagram

Radiated Emissions

Preliminary measurements were made indoors at 1 meter using broadband antennas, broadband amplifier, and spectrum analyzer to determine the frequency producing the maximum EME. Appropriate precaution was taken to ensure that all EME from the EUT were maximized and investigated. The system configuration, clock speed, mode of operation or video resolution, turntable azimuth with respect to the antenna were note for each frequency found. The spectrum was scanned from 30 to 300 MHz using biconical antenna and 300 to 1000 MHz using log-periodic antenna. Above 1 GHz, linearly polarized double ridge horn antennas were used.

Final measurements were made outdoors at 3or10 meter test range using EMCO Dipole antennas or horn antenna . The test equipment was placed on a wooden and plastic bench situated on a 1.552 meter area adjacent to measurement area. 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 reexamined and investigated using EMI/Field Intensity Meter and Quasi-Peak Adapter. The detector function was set to CISPR quasi-peak mode and the bandwidth of the receiver was set to 100 kHz or 1 MHz depending on the frequency or type of signal.

The half-wave dipole antenna was tuned to the frequency found during preliminary radiated measurements. 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-meter high non-metallic 151.5 meter table. The EUT, support equipment, and interconnecting cables were re-arranged and manipulated to maximize each EME emission. The turntable containing the system was rotated; the antenna height was varied 1 to 4 meter and stopped at the azimuth or height producing the maximum emission. Each emission was maximized by: varying the mode of operation or resolution; clock or data exchange speed; scrolling H pattern to the EUT and/or support equipment, and powering the monitor from the floor mounted outlet box and the computer aux AC outlet, if applicable; and changing the polarity of the antenna, whichever determined the worst-case emission. Photographs of the worst-case emission can be seen in Appendix C. Each EME reported was calibrated using the R/S SMG signal generator.

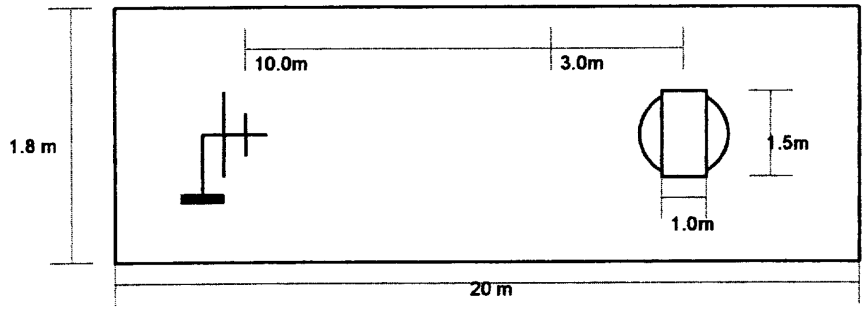


Fig. 3. Dimensions of Outdoor Test Site

SUPPORT EQUIPMENT USED

● PC :	Model : M5330FT006 (SAMSUNG)	S/N : 509692EN604160
● Monitor :	Model : SyncMaster 15Gle(G) (SAMSUNG)	S/N : P029H3LN600275
● Printer :	Model : 2225C+ (H.P)	S/N : 3040S87531
● Keyboard :	Model : SEM-DT35 (SAMSUNG)	S/N : 05068376
● PS/2 Mouse :	Model : OK-520 (TECH)	S/N : N/A
● Ear Phone :	Model : N/A (N/A)	S/N : N/A

TEST DATA

Conducted Emissions

Model No. : JULI Ⅱ(UP-323)
Date of Test : 18 June 2001
Measure Bandwidth : 9kHz

FREQ (MHz)	LEVEL(dBμV)	LINE	LIMIT(μV)	Result(μV)	MARGIN*(dB)
2.07	31.0	H	250	35.48	17.0
4.28	28.5	H	250	26.61	19.5
12.62	38.5	N	250	84.14	9.5
16.81	34.5	N	250	53.09	13.5
21.02	32.0	N	250	39.81	16.0
24.00	28.5	N	250	26.61	19.5

Table 1. Line Conducted Emissions Tabulated Data

NOTES:

1. ***All modes of operation were investigated and the worst -case emission are reported. See attached Plots.***
2. ***The limit for Class B digital device is 250 μV from 450 kHz to 30MHz.***
3. ***Line H = Hot Line N = Neutral***

* *Measurements using CISPR quasi-peak mode*

Tested by **Eun – Joo, Choi**

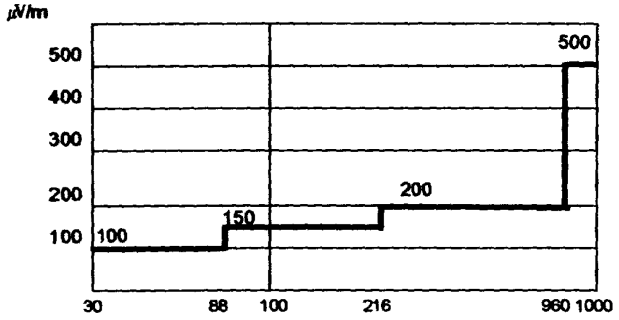
TEST DATA

Radiated Emissions

Model No. : JULI Ⅱ(UP-323)
Date of Test : 1 August 2001
Measure Bandwidth : 120kHz

Freq. (MHz)	Level (dBμV)	AF* (dB)	CL** (dB)	POL (H/V)	Limit (μV)	F/S (μV/m)	Margin*** (dB)
47.03	15.90	9.42	1.50	V	100	21.92	13.18
192.48	20.40	8.57	3.30	H	150	41.05	11.23
215.36	16.00	9.70	3.58	H	150	29.11	14.22
249.79	14.30	12.26	3.99	H	200	33.70	15.45
304.16	13.80	13.08	4.54	H	200	37.24	14.58
376.15	12.40	15.10	5.18	H	200	43.06	13.32

Table 2. Radiated Measurements at 10meters.



NOTES:

1. ***All modes of operation were investigated the worst-case emission are reported.***
2. ***The radiated limits are shown on Figure 4. Above 1GHz the limit is 500 μV/m.***

Fig. 4. Limits at 3 meters

* *AF = Antenna Factor.*

** *CL = Cable Loss.*

*** *Measurements using CISPR quasi-peak mode. Above 1GHz, peak detector function mode is used using a resolution bandwidth of 1MHz and a video bandwidth of 1MHz. The peak level complies with the average limit. Peak mode is used with linearly polarized horn antenna and low-loss microwave cable.*

Tested by ***Eun – Joo, Choi***