

EMI TESTING REPORT

EUT : MAIN BOARD

MODEL : MB61

FCC ID : OJK-MB61

PREPARED FOR :

MAXNAV ELECTRONICS CORP.
3 TEZ CHIANG 1 ROAD,
CHUNGLI INDUSTRIAL PARK,
TAO YUAN HSIEN,
TAIWAN, R.O.C.

PREPARED BY :

SPECTRUM RESEARCH & TESTING LABORATORY INC.
NO. 101-10, LING 8, SHAN-TONG LI CHUNG-LI CITY,
TAOYUAN, TAIWAN, R. O. C.

TEL : (03) 4987684

FAX : (03) 4986528

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1. TEST REPORT CERTIFICATION

APPLICANT : MAXNAV ELECTRONICS CORP.

ADDRESS : 3 TEZ CHIANG 1 ROAD,
CHUNGLI INDUSTRIAL PARK,
TAO YUAN HSIEN,
TAIWAN, R.O.C.

EUT DESCRIPTION : MAIN BOARD

(A) POWER SUPPLY : 115/230V

(B) MODEL : MB61

(C) FCC ID : OJK-MB61

FINAL TEST DATE : 03/20/1999

MEASUREMENT PROCEDURE USED :

* PART 15 SUB PART B OF FCC RULES AND REGULATIONS (47 CFR PART 15)

* ANSI C63.4 - 1992

We hereby show that :

The measurement shown in the attachment were made in accordance with the procedures indicated, and the energy emitted by the equipment was found to be within the limits applicable.

TESTING ENGINEER :


Jeffrey Chin

DATE 03/20/1999

SUPERVISOR :


Jesse Ho

DATE 3/20/99

APPROVED BY :


Johnson Ho

DATE

3/20/99

2. TEST STATEMENT

2.1 TEST STATEMENT

1. This letter is to explain the test condition of this project.
The EUT be tested as the following status.
2. The data was shown in this report reflects the worst – case data for the condition as listed above.
Please disregard any other oricessir(s) speed shown in this user manual.
3. EUT conditions.

CPU :PENTIUM II – 333MHz CLOCK CHIP : 66MHz
CPU :PENTIUM II – 400MHz CLOCK CHIP: 100MHz

RESOLUTION : 640 * 480

4. NVLAP logo is to be approved by management (it is according to NVLAP requirement if it need) before use.

2.2 DEPARTURE FROM DOCUMENT POLICIES, PROCEDURE OR SPECIFICATIONS , THE STATEMNT

- A. Did have
Any departure from document policies & procedures or from specifications.
Yes , No ☒.
If yes, the description as below.
- B. The certificate and report shall not be reproduced except in full, without the written approval of SRT laboratory.
- C. The report must not be used by the client to claim product endorsement by NVLAP or any agency the government.
- D. This product is a prototype product.
- E. The effect that the results relate only to the items tested.

3. EUT MODIFICATIONS

The following accessories were added to the EUT during testing :

- 1). CP3 ,CP4,CP9 from empty to cap 15pf.
- 2). RP2,RP4,RP8 from 0 ohm to 22 ohm.
- 3). R58 Parallel CAP 22PF to ground.
- 4). Power conn : VCC 3.3V parallel cap 0.1uf * 3.
- 5). Power conn : VCC \pm 5V parallel cap 0.1uf.
- 6). Power conn : pwrgood.pson parallel cap 220f.
- 7). fan1 pin 1,2,EC12,EC13 parallel cap 0.1uf.
- 8). R14 from 0 ohm to 22 ohm.
- 9). Spread spectrum of bios must enable.
- 10). I/O jack must contact case.
- 11). Power cable must near CPU.

4. MODIFICATION LETTER

This section contains the following documents :

A. Letter of modifications.



力航

光 電 科 技 股 份 有 限 公 司
MAXNAV ELECTRONICS CORP.

3 Tez Chiang 1 Road, Chungli Industrial Park, Tao Yuan Hsien, Taiwan, R.O.C.

TEL: 886-3-4528200

FAX: 886-3-4522289


www.maxnav.com.tw

Federal Communications Commission
Authorization and Evaluation Division
7435 Oakland Mills Road
Columbia, MD 21046

To whom it may concern :

This is to serve as proper notice that our company agrees to make all modifications to FCC
ID : OJK-MB61 as listed in section 3.0 of modification to submitted
by Spectrum Research and Testing Laboratory, Inc.

Respectfully,


(Name, Surname)

President
(Position/Title)

Effective Dates :

From 3-18-99 to 3-18-2000

DATE : 3-18-99

5. CONDUCTED POWER LINE TEST

5.1 TEST EQUIPMENT

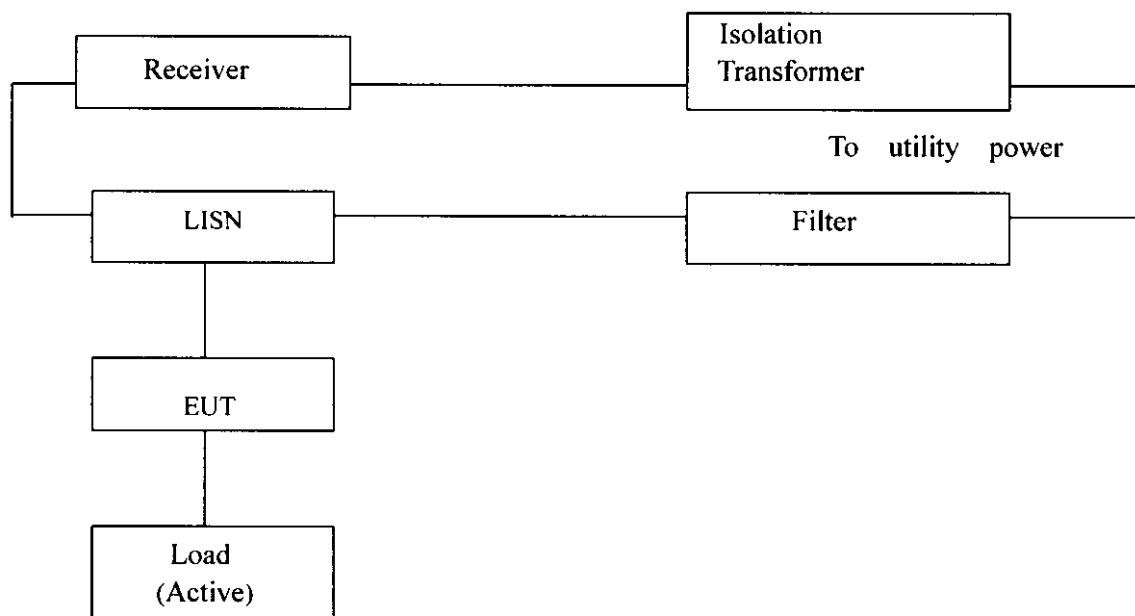
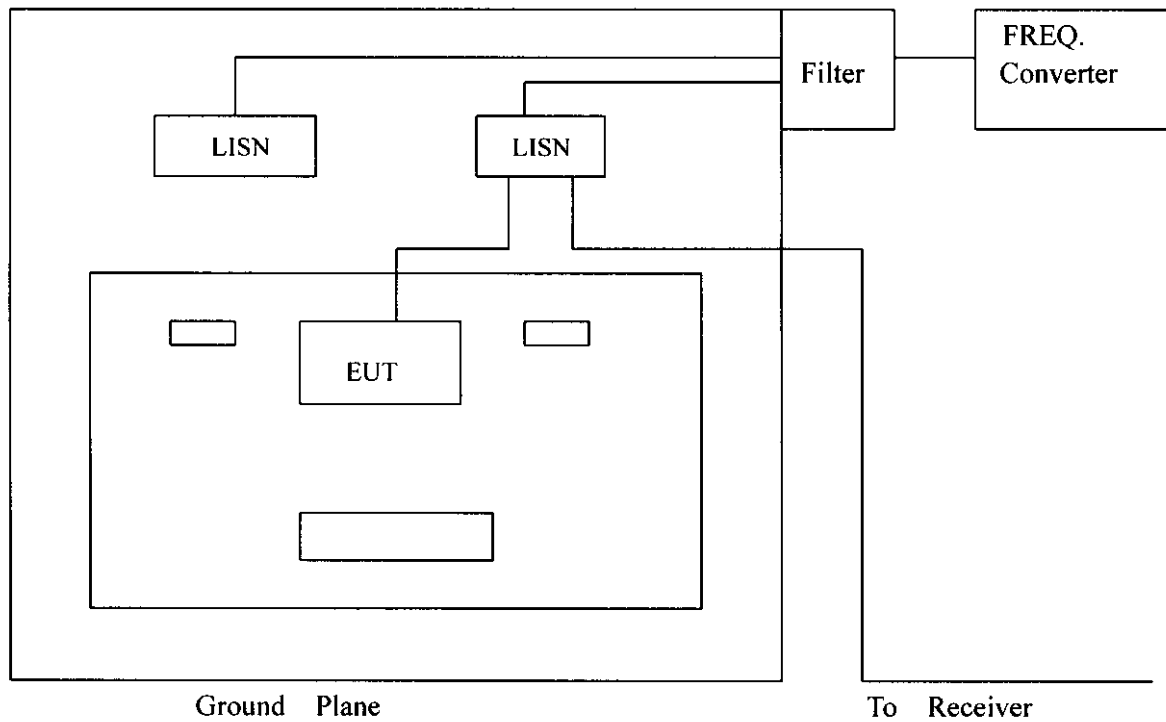
The following test equipment were used during the conducted power line test :

EQUIPMENT/ FACILITIES	SPECIFICATIONS	MANUFACTURER	MODEL#/ SERIAL#	DATE OF CAL. & CAL. CENTER	DUE DATE	FINAL TEST
SPECTRUM ANALYZER	9 KHz TO 1 GHz	HP	8590L/ 3624A01317	AUGUST 1998 ETC	1Y	
EMI TEST RECEIVER	9 KHz TO 30 MHz	ROHDE & SCHWARZ	ESHS30/ 826003/008	AUGUST 1998 ETC	1Y	√
LISN	50 uH, 50 ohm	SOLAR ELECTRONICS	9252-50- R24-BNC/ 951315	AUGUST 1998 ETC	1Y	√
LISN	50uH, 50 ohm	SOLAR ELECTRONICS	9252-50- R24-BNC/ 951318	AUGUST 1998 ETC	1Y	√
SIGNAL GENERATOR	9 KHz TO 1080 MHz	ROHDE & SCHWARZ	SMY01/ 841104/019	APRIL 1999 ETC	1Y	√
POWER CONVERTER	0 TO 300 VAC VAC 47-500 Hz	AFC	AFC-1KW/ 850510	MARCH 1999 SRT	1Y	√

5.2 TEST PROCEDURE

The EUT was tested according to ANSI C63.4 - 1992. The frequency spectrum from 0.45 MHz to 30 MHz was investigated. The LISN used was 50 ohm / 50 uhenry as specified by SECTION 5.1 of ANSI C63.4 - 1992. Cables and peripherals were moved to find the maximum emission levels for each frequency.

5.3 TEST SETUP



5.4 CONFIGURATION OF THE EUT

The EUT was configured according to ANSI C63.4 - 1992. All interface ports were connected to the appropriate peripherals. All peripherals and cables are listed below.

A. EUT

DEVICE	MANUFACTURER	MODEL #	FCCID / DoC
MAIN BOARD	MAXNAV ELECTRONICS CORP.	MB61	OJK-MB61

B. INTERNAL DEVICES

DEVICE	MANUFACTURER	MODEL #	FCCID / DoC
POWER SUPPLY	SEASONIC	SS-250GPX	FP84X5SS-250GPX
HDD	SEAGATE	ST32122A	N/A
FDD(3.5")	MITSUMI	D353M3	N/A
AGP CARD	ASUS	AGP-V3000	DoC

C. PERIPHERALS

DEVICE	MANUFACTURER	MODEL # SERIAL #	FCCID / DoC	CABLE
MONITOR	VIEWSONIC	1786PS	GSS17006	1.8m unshielded power cord 1.5m shielded data cable (S2)
PRINTER	HP	2225C	BS46XU2225C	1.8m unshielded power cord 1.5m shielded data cable (S2)
MODEM	TEAM	103/212A	EF56A5103/212A	1.8m unshielded power cord 1.5m shielded data cable (S2)
MODEM	DATARONICS	1200CK	E2050V1200CK	1.8m unshielded power cord 1.5m shielded data cable (S2)
KEYBOARD	HP	SK-2502	GYUR41SK	1.8m unshielded data cable
MOUSE	LOGITECH	M-CQ38	DZLM04	1.8m unshielded data cable
USB MOUSE	ABIT	97M32U	M5497M32U	1.5m shielded data cable (S1)
USB MOUSE	ABIT	97M32U	M5497M32U	1.5m shielded data cable (S1)

- **REMARK** :

- (1). Cable - uns : Unshielded
 s : Shielded
 S1 : Single point shielding
 S2 : 360° shielding
 S3 : Double point shielding

- (2). Cables - All 1m or greater in length – bundled according to
 ANSI C63.4 – 1992.

5.5 EUT OPERATING CONDITION

Operating condition is according to ANSI C63.4 - 1992.

1. EUT power on.
2. "H" pattern sent to the following peripherals :
 - printer
 - monitor
 - modem *2
3. Test with CPU
 - CPU : Pentium II - 333MHz
 - Clock chip: 66MHz
 - CPU : Pentium II - 400MHz
 - Clock chip: 100MHz
4. Resolution : 640 * 480

5.6 CONDUCTED POWER LINE EMISSION LIMIT

FREQUENCY RANGE (MHz)	CLASS A	CLASS B
0.45 - 1.705	1000 uV	250 uV
1.705 - 30	3000 uV	250 uV

NOTE : In the above table, the tighter limit applies at the band edges.

5.7 CONDUCTED POWER LINE TEST RESULT

The frequency spectrum from 0.45 MHz to 30 MHz was investigated. All readings are quasi-peak values with a resolution bandwidth of 9 KHz.

Temperature : 28 C

Humidity : 78 %RH

QUASI - PEAK

FREQUENCY (MHz)	L1 (dBμV)	L2 (dBμV)	LIMIT (dBμV)
0.56	54.32	62.37	250
1.00	30.54	*	250
3.66	*	23.71	250
10.4	10.23	*	250
13.1	*	38.45	250

- REMARKS :**
- (1). * = Measurement does not apply for this frequency
 - (2). Uncertainty in conducted emission measured is ± 2 dB
 - (3). Any departure from specification : N/A
 - (4). CPU : Pentium II - 333MHz Clock chip: 66MHz
 - (5). Resolution : 640 * 480

SIGNED BY TESTING ENGINEER :



5.7 CONDUCTED POWER LINE TEST RESULT

The frequency spectrum from 0.45 MHz to 30 MHz was investigated. All readings are quasi-peak values with a resolution bandwidth of 9 KHz.

Temperature : 28 C

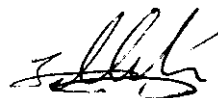
Humidity : 78 %RH

QUASI - PEAK

FREQUENCY (MHz)	L1 (dBm)	L2 (dBm)	LIMIT (dBm)
0.83	44.15	*	250
3.19	*	29.17	250
3.82	23.71	16.59	250
10.1	10.71	8.128	250
12.7	43.65	42.16	250

- REMARKS :**
- (1). * = Measurement does not apply for this frequency
 - (2). Uncertainty in conducted emission measured is ± 2 dB
 - (3). Any departure from specification : N/A
 - (4). CPU : Pentium II - 400MHz Clock chip: 100MHz
 - (5). Resolution : 640 * 480

SIGNED BY TESTING ENGINEER :



6. RADIATED EMISSION TEST**6.1 TEST EQUIPMENT**

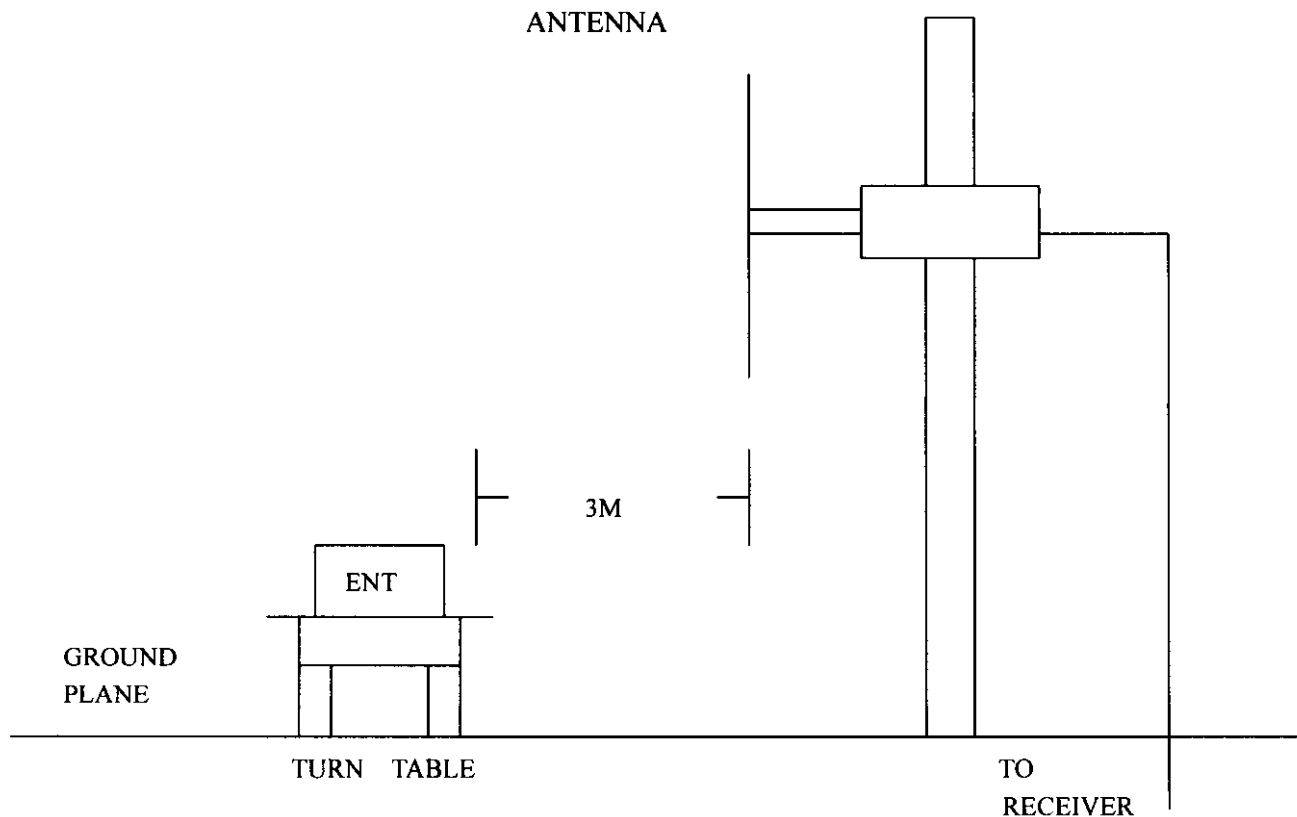
The following test equipment were used during the radiated emission test :

EQUIPMENT / FACILITIES	SPECIFICATIONS	MANUFACTURER	MODEL # / SERIAL #	DATE OF CAL. & CAL. CENTER	DUE DATE	FINAL TEST
RECEIVER	20 MHz TO 1000 MHz	R & S	ESVS30/ 841977/003	APRIL 1999 ETC	1Y	√
SPECTRUM ANALYZER	100 Hz TO 1500 MHz	HP	8568B/ 3019A05294	OCT. 1998 ETC	1Y	
SPECTRUM ANALYZER	9 KHz TO 22 GHz	HP	8593E/ 3322A00670	APRIL 1999 ETC	1Y	
SPECTRUM ANALYZER	100 Hz TO 1000 MHz	IFR	A-7550/ 2684/1248	JULY 1998 ETC	1Y	
SIGNAL GENERATOR	9 KHz TO 1080 MHz	ROHDE & SCHWARZ	SMY01/ 841104/019	APRIL 1999 ETC	1Y	√
DIPOLE ANTENNA	28 MHz TO 1000 MHz	EMCO	3121C/ 9003-534	MARCH 1999 SRT	1Y	
DIPOLE ANTENNA	28 MHz TO 1000 MHz	EMCO	3121C/ 9611-1239	SEP. 1998 SRT	1Y	
BI-LOG ANTENNA	26 MHz TO 2000 MHz	EMCO	3142/ 9608-1073	SEP. 1998 SRT	1Y	√
BI-LOG ANTENNA	26 MHz TO 1100 MHz	EMCO	3143/ 9509-1152	SEP. 1998 SRT	1Y	
PRE-AMPLIFIER	0.1 MHz TO 1300 MHz	HP	8447D/ 2944A08402	APRIL 1999 ETC	1Y	
PRE-AMPLIFIER	0.1 MHz TO 1300 MHz	HP	8447D/ 2944A06412	AUGUST 1998 ETC	1Y	
HORN ANTENNA	1 GHz TO 18 GHz	EMCO	3115/ 9012-3619	JAN. 1999 EMCO	1Y	

6.2 TEST PROCEDURE

- (1).The EUT was tested according to ANSI C63.4-1992. The radiated test was performed at SRT lab's open site. this site is on file with the FCC laboratory division, reference 31040/SIT.
- (2).The EUT, peripherals were put on the turntable which table size is 1m x 1.5 m, table high 0.8 m. All set up is according to ANSI C63.4-1992.
- (3).The frequency spectrum from 30 MHz to 2 GHz was investigated. All readings from 30 MHz to 1 GHz are quasi-peak values with a resolution bandwidth of 120 KHz. All readings are above 1 GHz, peak values with a resolution bandwidth of 1 MHz. Measurements were made at 3 meters.
- (4).The antenna high were varied from 1 m to 4 m high to find the maximum emission for each frequency.
- (5).The antenna polarization : Vertical polarization and horizontal polarization.

6.3 RADIATED TEST SET-UP

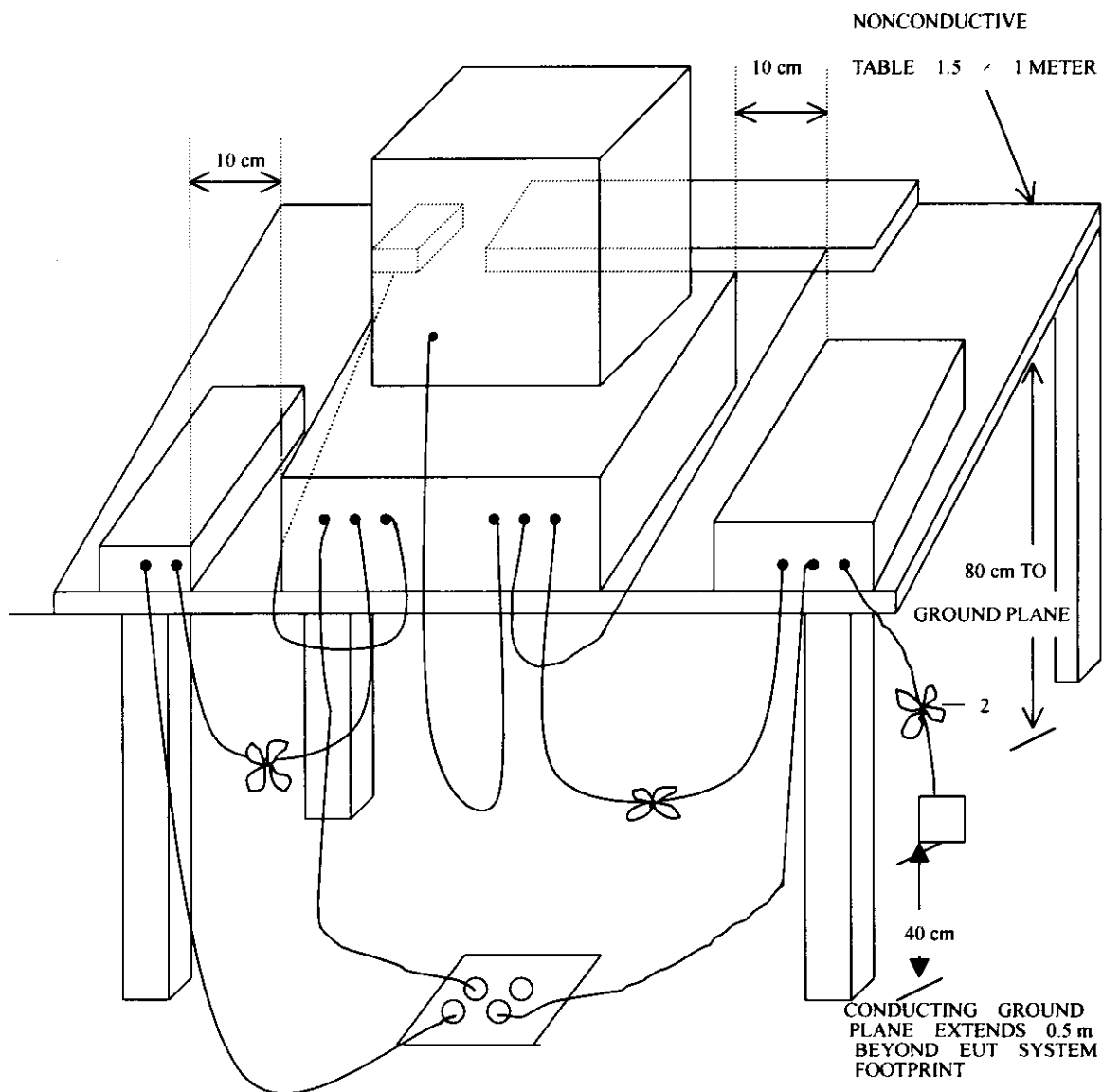


6.3 RADIATED TEST SET-UP

ANSI

ELECTRICAL AND ELECTRONIC EQUIPMENT IN THE RANGE IN THE RANGE OF 9 KHz TO 40 GHz

C63.4-1992



6.4 CONFIGURATION OF THE THE EUT

Same as section 4.4 of this report

6.5 EUT OPERATING CONDITION

Same as section 4.5 of this report.

6.6 RADIATED EMISSION LIMIT

All emission from a digital device, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strength specified below :

CLASS B

FREQUENCY (MHz)	DISTANCE (m)	FIELD STRENGTH (V/m)
30 - 88	3	100
88 - 216	3	150
216 - 960	3	200
ABOVE 960	3	500

CLASS B (OPEN CASE)

FREQUENCY (MHz)	DISTANCE (m)	FIELD STRENGTH (V/m)
30 - 88	3	199.5
88 - 216	3	298.5
216 - 960	3	398.1

CLASS A

FREQUENCY (MHz)	DISTANCE (m)	FIELD STRENGTH (V/m)
30 - 88	3	316.3
88 - 216	3	473.2
216 - 960	3	613.0
ABOVE 960	3	1000.0

- NOTE** : 1. In the emission tables above, the tighter limit applies at the band edges.
2. Distance refers to the distance between measuring instrument, antenna, and the closest point of any part of the device or system.

The frequency spectrum from 30 MHz to 2 GHz was investigated. All readings from 30 MHz to 1 GHz are quasi-peak values with a resolution bandwidth of 120 KHz. All readings are above 1 GHz, peak values with a resolution bandwidth of 1 MHz. Measurements were made at 3 meters.

Temperature : 28 C

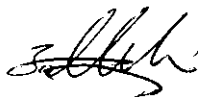
Humidity : 78 %RH

FREQ. (MHz)	FACTOR (dB)	ANT. FACTOR (dB/m)	READING (dBuV)		EMISSION (uV/m)		MIS (dB/10)
			UNCOR.	COR.	HORIZ	VERT	
142.5	1.0	11.3	25.00	24.00	73.28	65.31	298.5
238.5	1.3	14.0	20.00	20.00	58.21	58.21	398.1
366.5	1.7	16.1	23.00	23.00	109.6	109.6	398.1
600.0	2.1	23.2	13.00	20.00	82.22	184.0	398.1
668.1	2.2	22.2	24.00	19.00	263.0	147.9	398.1
800.1	2.8	21.2	25.00	23.00	281.8	223.8	398.1

- REMARKS :**
- (1). *=Measurement does not apply for this frequency.
 - (2). Uncertainty in radiated emission measured is <+/-4dB
 - (3). Any departure from specification : N/A
 - (4). Factor will include cable loss and correction factor.
 - (5). Sample calculation

$$20 \log (\text{emission}) \text{ uV/m} = \text{Factor(dB)} + \text{Ant. factor(dB/m)} + \text{reading(dBuV)}$$
 - (6). CPU : Pentium II - 333MHz Clock Chip: 66MHz
 - (7). Resolution : 640 * 480
 - (8). Open case

SIGNED BY TESTING ENGINEER :



6.7 RADIATED EMISSION TEST RESULT

The frequency spectrum from 30 MHz to 2 GHz was investigated. All readings from 30 MHz to 1 GHz are quasi-peak values with a resolution bandwidth of 120 KHz. All readings are above 1 GHz, peak values with a resolution bandwidth of 1 MHz. Measurements were made at 3 meters.

Temperature : 28 C

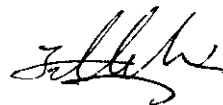
Humidity : 78 %RH

FREQ (MHz)	FACTOR (dB)	ANT FACTOR (dB/m)	READING (dBμV)		EMISSION (μV/m)		LIMIT (μV/m)
			HORIZ	VERT	HORIZ	VERT	
198.8	1.2	12.1	27.00	28.00	103.5	46.10	298.5
237.7	1.3	14.0	8.000	*	14.62	*	398.1
599.3	2.1	23.2	15.00	18.00	103.5	146.2	398.1
734.1	2.4	21.6	13.40	*	74.13	*	398.1
800.1	2.8	21.2	23.70	*	242.6	*	398.1

- REMARKS :**
- (1). *=Measurement does not apply for this frequency.
 - (2). Uncertainty in radiated emission measured is <+/-4dB
 - (3). Any departure from specification : N/A
 - (4). Factor will include cable loss and correction factor.
 - (5). Sample calculation

$$20 \log (\text{emission}) \text{ uV/m} = \text{Factor(dB)} + \text{Ant. factor(dB/m)} + \text{reading(dBuV)}$$
 - (6). CPU : Pentium II - 400MHz Clock Chip: 100MHz
 - (7). Resolution : 640 * 480
 - (8). Open case

SIGNED BY TESTING ENGINEER :



6.7 RADIATED EMISSION TEST RESULT

The frequency spectrum from 30 MHz to 2 GHz was investigated. All readings from 30 MHz to 1 GHz are quasi-peak values with a resolution bandwidth of 120 KHz. All readings are above 1 GHz, peak values with a resolution bandwidth of 1 MHz. Measurements were made at 3 meters.

Temperature : 28 C

Humidity : 78 %RH

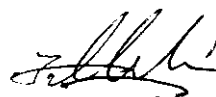
FREQ (MHz)	FACTOR (dB)	ANTENNA GAIN (dBm)	RECEIVED (dBm)	RECEIVED (dBuV)	EMISSION (dBuV)	RECEIVED (dBuV)	UNITS (dBuV/m)
97.90	0.8	8.80	20.00	*	20.19	*	150
198.5	1.2	12.1	23.00	15.00	65.31	26.00	150
359.5	1.7	16.0	18.00	16.00	60.95	48.41	200
668.7	2.2	22.2	10.00	14.00	52.48	83.17	200
896.2	2.9	24.0	*	10.00	*	69.98	200

- (1). *=Measurement does not apply for this frequency.
 (2). Uncertainty in radiated emission measured is <+/-4dB
 (3). Any departure from specification : N/A
 (4). Factor will include cable loss and correction factor.
 (5). Sample calculation

$$20 \log(\text{emission}) \text{ uV/m} = \text{Factor(dB)} + \text{Ant. factor(dB/m)} + \text{reading(dBuV)}$$

 (6). CPU : Pentium II - 333MHz Clock Chip: 66MHz
 (7). Resolution : 640 * 480
 (8). Close case

SIGNED BY TESTING ENGINEER :



6.7 RADIATED EMISSION TEST RESULT

The frequency spectrum from 30 MHz to 2 GHz was investigated. All readings from 30 MHz to 1 GHz are quasi-peak values with a resolution bandwidth of 120 KHz. All readings are above 1 GHz, peak values with a resolution bandwidth of 1 MHz. Measurements were made at 3 meters.

Temperature : 28 C

Humidity : 78 %RH

FREQ MHz	FACTOR (dB)	ANT FACTOR (dB/m)	READING (dBV)		EMISSION (uV/m)		LIMITS (uV/m)
			HORIZ	VERT	HORIZ	VERT	
98.50	0.8	8.80	18.50	20.00	25.40	30.19	150
169.6	1.1	10.2	20.00	*	36.72	*	150
500.4	1.7	18.0	16.00	16.50	60.95	64.56	200
600.0	2.1	23.2	14.00	13.90	92.25	91.20	200
800.1	2.8	21.2	10.00	11.00	50.11	56.23	200

- REMARKS :**
- (1). *=Measurement does not apply for this frequency.
 - (2). Uncertainty in radiated emission measured is ± 4 dB
 - (3). Any departure from specification : N/A
 - (4). Factor will include cable loss and correction factor.
 - (5). Sample calculation

$$20 \log (\text{emission}) \text{ uV/m} = \text{Factor(dB)} + \text{Ant. factor(dB/m)} + \text{reading(dBuV)}$$
 - (6). CPU : Pentium II - 400MHz Clock Chip: 100MHz
 - (7). Resolution : 640 * 480
 - (8). Close case

SIGNED BY TESTING ENGINEER :

