

**FCC TEST REPORT**

for

Part 15, Subpart B Class B

Equipment : AGP VGA CARD

Model No. : APOLLO-TNT

FCC ID : FQIRIVATNT

Filing Type : Certification

Applicant : JOYTECH COMPUTER CO., LTD.  
3F, No. 1, ALLEY2, SZU-WEI LANE, CHUNG CHENG RD.,  
HSIN TIEN CITY, TAIPEI HSIEN, TAIWAN, R.O.C.

- The test result refers exclusively to the test presented test model / sample.
- Without the written authorization of the test lab., the Test Report may not be copied.

**SPORTON International Inc.**

6F, No.106, Sec. 1, Hsin Tai Wu Rd., Hsi Chih, Taipei Hsien, Taiwan, R.O.C.

## Table of Contents

<b>CERTIFICATE OF COMPLIANCE .....</b>	<b>3</b>
<b>1. General Description of Equipment under Test .....</b>	<b>4</b>
1.1. Applicant .....	4
1.2. Manufacturer .....	4
1.3. Basic Description of Equipment under Test .....	4
1.4. Feature of Equipment under Test .....	4
<b>2. Test Configuration of Equipment under Test .....</b>	<b>5</b>
2.1. Test Manner .....	5
2.2. Description of Test System .....	7
2.3. Connection Diagram of Test System .....	8
<b>3. Test Software .....</b>	<b>9</b>
<b>4. General Information of Test .....</b>	<b>9</b>
4.1. Test Facility .....	9
4.2. Standard for Methods of Measurement .....	9
4.3. Test in Compliance with .....	9
4.4. Frequency Range Investigated .....	9
4.5. Test Distance .....	10
<b>5. Test of Conducted Powerline .....</b>	<b>10</b>
5.1. Major Measuring Instruments .....	11
5.2. Test Procedures .....	12
5.3. Typical Test Setup Layout of Conducted Powerline .....	13
5.4. Test Result of AC Powerline Conducted Emission .....	16
5.5. Photographs of Counducted Powerline Test Configuration .....	20
<b>6. Test of Radiated Emission .....</b>	<b>20</b>
6.1. Major Measuring Instruments .....	21
6.2. Test Procedures .....	22
6.3. Typical Test Setup Layout of Radiated Emission .....	23
6.4. Test Result of Radiated Emission .....	26
6.5. Photographs of Radiated Emission Test Configuration .....	28
<b>7. Antenna Factor &amp; Cable Loss .....</b>	<b>29</b>
<b>8. List of Measuring Equipments Used .....</b>	

**CERTIFICATE OF COMPLIANCE****for****FCC Part 15, Subpart B Class B**

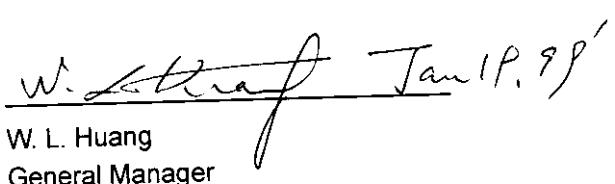
Equipment : AGP VGA CARD

Model No. : APOLLO-TNT

FCC ID : FQIRIVATNT

Applicant : JOYTECH COMPUTER CO., LTD.  
3F, No. 1, ALLEY2, SZU-WEI LANE, CHUNG CHENG RD.,  
HSIN TIEN CITY, TAIPEI HSIEN, TAIWAN, R.O.C.**I HEREBY CERTIFY THAT :**

The measurements shown in this test report were made in accordance with the procedures given in **ANSI C63.4 - 1992** and the energy emitted by this equipment was **passed** both radiated and conducted emission class B limits. Testing was carried out on Jan. 14, 1999 at **SPORTON International Inc.** LAB. in Nei Hwu.

  
W. L. Huang  
General Manager**SPORTON International Inc.**

6F, No.106, Sec. 1, Hsin Tai Wu Rd., Hsi Chih, Taipei Hsien, Taiwan, R.O.C.

## 1. General Description of Equipment under Test

### 1.1. Applicant

JOYTECH COMPUTER CO., LTD.  
3F, No. 1, ALLEY2, SZU-WEI LANE,  
CHUNG CHENG RD., HSIN TIEN CITY,  
TAIPEI HSIEN, TAIWAN, R.O.C.

### 1.2. Manufacturer

Same as 1.1.

### 1.3. Basic Description of Equipment under Test

Equipment	: AGP VGA CARD
Model No.	: APOLLO-TNT
FCC ID	: FQIRIVATNT
Trade Name	: JOYTECH
VGA DATA CABLE	: Shielded
AV-Video DATA CABLE	: Non-shielded, 1.8m
S-Video DATA CABLE	: Non-shielded, 1.6m
Power Supply Type	: N/A
Power Cord	: N/A

### 1.4. Feature of Equipment under Test

- 1.8GB/second frame buffer bandwidth architecture.
- Maximum 3D/2D resolution of 1920 x 1200 @ 75Hz.
- Optimized Direct3D acceleration.
- Complete DirectX5.0 and 6.0 support.
- 128-bit TwiN-Texel (TNT) architecture.
- Comprehensive AGP 2X support, including sideband.
- NTSC and PAL TV output.
- Flexible memory configurations, up to 16MB of SDRAM/SGRAM.
- OpenGL ICD for Windows 95 and NT (passes compliance tests).

## **2. Test Configuration of Equipment under Test**

### **2.1. Test Manner**

- a. The EUT has been associated with personal computer and peripherals pursuant to ANSI C63.4-1992 and configuration operated in a manner which tended to maximize its emission characteristics in a typical application.
- b. The HITACHI Monitor, DELL PS/2 Keyboard, GENIUS PS/2 Mouse, HP Printer, ACEEX Modem, SONY TV and EUT were connected to the FIC PC for EMI test.
- c. The following display resolution were investigated during the compliance test:
  1. Horizontal frequency (640x480 to 1920x1200, 31.47Khz to 107Khz)
  2. Vertical frequency (60Hz to 85Hz)
  3. TV Mode
- d. According to the above tests, we listed the following display modes as the worst cases:
  1. 1920x1200 (non-interlaced 94Khz), refresh rate 75Hz.
  2. 1600x1200 (non-interlaced 107Khz), refresh rate 85Hz.
  3. TV MODE
- e. Frequency range investigated: conduction 450 KHz to 30 MHz, radiation 30 MHz to 2,000 MHz.

### **2.2. Description of Test System**

#### **Support Device 1. --- MONITOR (HITACHI)**

FCC ID	: N/A
Model No.	: CM814U
Serial No.	: SP1006
Data Cable	: Shielded, 360 degree via metal backshells, 2.0m
Power Supply Type	: Switching
Power Cord	: Non-shielded

( Remark : This support device was tested to comply with FCC standards and authorized under a declaration of conformity.)

#### **Support Unit 2. -- PS/2 Keyboard (DELL)**

FCC ID	: GYUM90SK
Model No.	: AT101W
Serial No.	: SP0027
Data Cable	: Shielded, 360 degree via metal backshells

**Support Unit 3. -- PS/2 Mouse (Genius)**

FCC ID : FSUGMZFC  
Model No. : Netmouse  
Serial No. : SP0022  
Data Cable : Non-Shielded, 1.5m

**Support Unit 4. -- Printer (HP)**

FCC ID : DSI6XU225  
Model No. : 2225C  
Power Supply Type : Linear  
Serial No. : SP0014  
Data Cable : Shielded, 360 degree via metal backshells

**Support Unit 5. -- Modem (ACEEX)**

FCC ID : IFAXDM1414  
Model No. : DM1414  
Power Supply Type : Linear  
Serial No. : SP0015  
Data Cable : Shielded, 360 degree via metal backshells

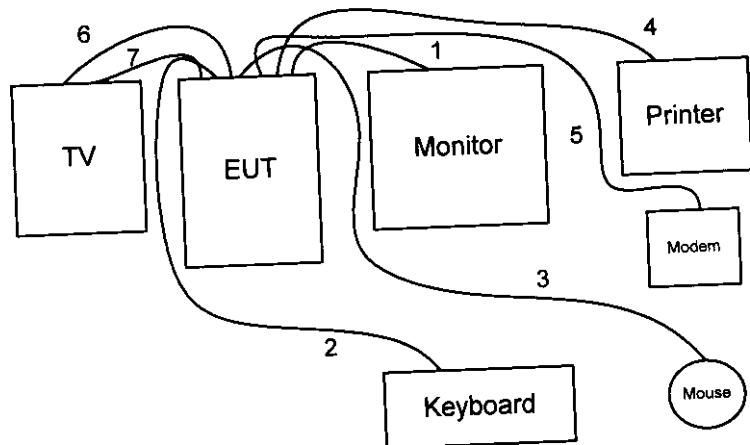
**Support Device 6. -- TELVEISION (SONY)**

FCC ID : N/A  
Model No. : PVM-14N2E  
Serial No. : SP1078  
AV-Video Data Cable : Non-Shielded, 1.8m  
S-Video Data Cable : Non-Shielded, 1.6m

**Support Device 7. --- P.C. (FIC)**

FCC ID : N/A  
Model No. : P2L97  
Serial No. : SP1005  
Data Cable : Shielded  
Power Cord : Non-shielded  
Power Supply Type : Switching

( Remark : This support device was tested to comply with FCC standards and  
authorized under a declaration of conformity.)

**2.3. Connection Diagram of Test System**

1. The I/O cable is connected from to the support unit 1.
2. The I/O cable is connected to the support unit 2.
3. The I/O cable is connected to the support unit 3.
4. The I/O cable is connected to the support unit 4.
5. The I/O cable is connected to the support unit 5.
6. The I/O cable is connected from EUT to the support unit 6.
7. The I/O cable is connected from EUT to the support unit 7.

### **3. Test Software**

An executive program, WINFCC.EXE under WIN 98, which generates a complete line of continuously repeating " H " pattern was used as the test software.

The program was executed as follows :

- a. Turn on the power of all equipment.
- b. The PC reads the test program from the floppy disk drive and runs it.
- c. The PC sends " H " messages to the monitor, and the monitor displays " H " patterns on the screen.
- d. The PC sends " H " messages to the printer, then the printer prints them on the paper.
- e. The PC sends " H " messages to the modem.
- f. The PC sends " H " messages to the internal Hard Disk, and the Hard Disk reads and writes the message.
- g. Repeat the steps from b to f.

**4. General Information of Test****4.1. Test Facility**

This test was carried out by SPORTON International Inc. in an openarea test site.

Openarea Test Site Location: No. 3, Lane 238, Kang Lo Street, Nei Hwu District,  
Taipei 11424, Taiwan, R.O.C.

TEL : 886-2-2631-9739

FAX : 886-2-2631-9740

**4.2. Standard for Methods of Measurement**

ANSI C63.4-1992

**4.3. Test in Compliance with**

FCC Part 15, Subpart B Class B

**4.4. Frequency Range Investigated**

- a. Conduction: from 450 kHz to 30 MHz
- b. Radiation : from 30 MHz to 2,000 MHz

**4.5. Test Distance**

The test distance of radiated emission from antenna to EUT is 3 M.

## **5. Test of Conducted Powerline**

Conducted Emissions were measured from 450 kHz to 30 MHz with a bandwidth of 9 KHz on the 115 VAC power and return leads of the EUT according to the methods defined in ANSI C63.4-1992 Section 3.1. The EUT was placed on a nonmetallic stand in a shielded room 0.8 meters above the ground plane as shown in section 5.3. The interface cables and equipment positioning were varied within limits of reasonable applications to determine the position produced maximum conducted emissions.

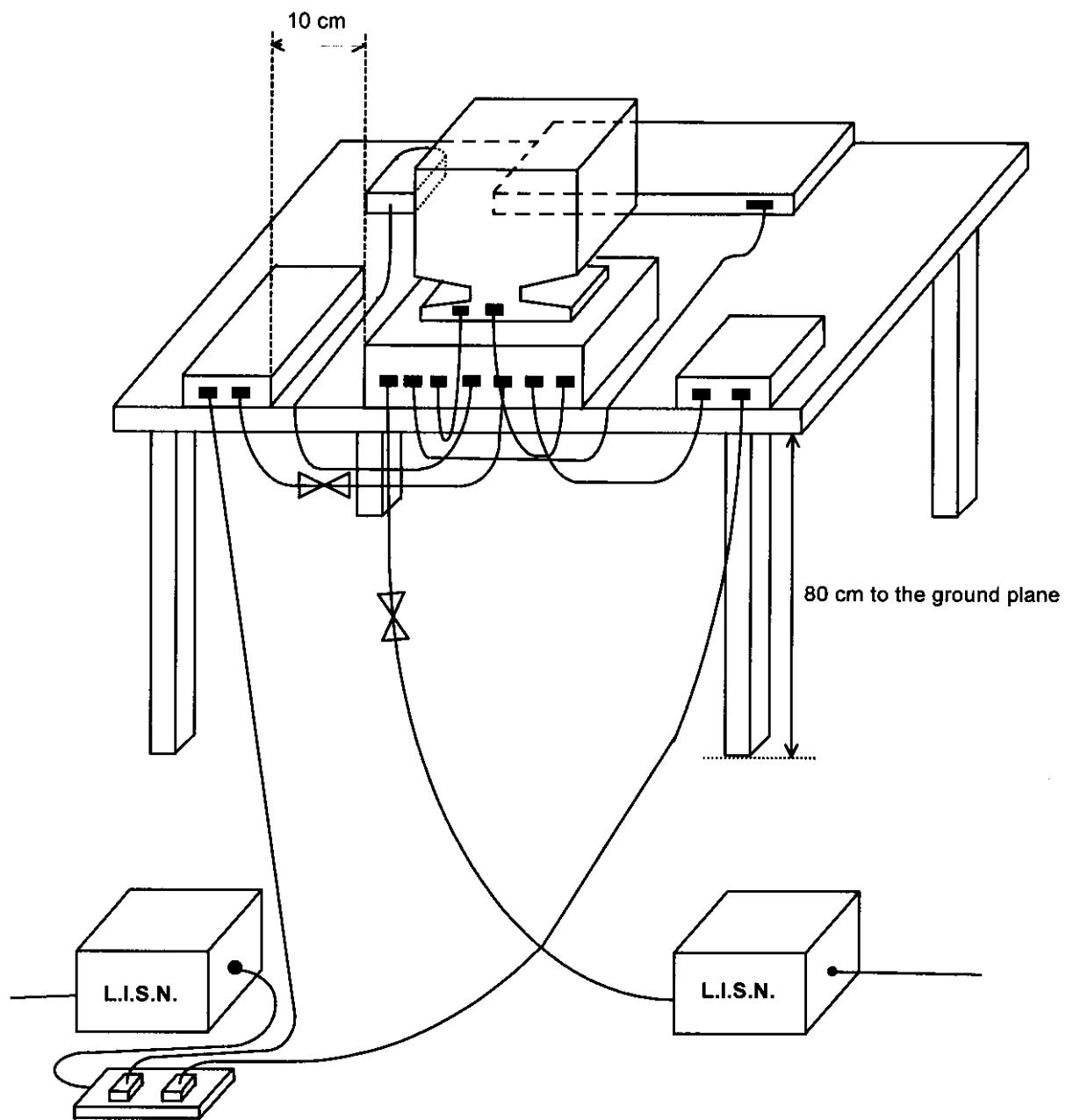
### **5.1. Major Measuring Instruments**

Test Receiver	R&S ESH3
Attenuation	0 dB
Start Frequency	0.45 MHz
Stop Frequency	30 MHz
Step MHz	0.007 MHz
IF Bandwidth	9 kHz

**5.2. Test Procedures**

- a. The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.
- b. Connect EUT to the power mains through a line impedance stabilization network (LISN).
- c. All the support units are connect to the other LISN.
- d. The LISN provides 50 ohm coupling impedance for the measuring instrument.
- e. The FCC states that a 50 ohm, 50 microhenry LISN should be used.
- f. Both sides of AC line were checked for maximum conducted interference.
- g. The frequency range from 450 kHz to 30 MHz was searched.
- h. Set the test-receiver system to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- i. If the emission level of the EUT in peak mode was 6 dB lower than the limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 6 dB margin will be retested one by one using the quasi-peak method and reported.

### 5.3. Typical Test Setup Layout of Conducted Powerline



**5.4. Test Result of AC Powerline Conducted Emission**

5.4.1. Test mode : 1920x1200 94KHz/75Hz

- Temperature : 20°C
- Relative Humidity : 58 %
- Test Date : Jan. 14, 1999

**The Conducted Emission test was passed at minimum margin****LINE 0.498 MHz / 39.20 dBuV.**

Freq. (MHz)	Line/ Neutral	Meter Reading (dBuV)	(uV)	Limits (dBuV)	(uV)	Margin (dB)
0.498	L	39.20	91.20	48.00	251.19	-8.80
1.562	L	38.70	86.10	48.00	251.19	-9.30
14.053	L	36.50	66.83	48.00	251.19	-11.50
0.496	N	39.00	89.13	48.00	251.19	-9.00
1.566	N	37.90	78.52	48.00	251.19	-10.10
14.056	N	36.20	64.57	48.00	251.19	-11.80

Test Engineer : Benson Tsai  
BENSON TSAI

## 5.4.2. Test mode : 1600x1200 107KHz/85Hz

- Temperature : 20°C
- Relative Humidity : 58 %
- Test Date : Jan. 14, 1999

**The Conducted Emission test was passed at minimum margin**

**LINE 0.496 MHz / 38.90 dBuV.**

Freq. (MHz)	Line/ Neutral	Meter Reading (dBuV)	(uV)	Limits (dBuV)	(uV)	Margin (dB)
0.496	L	38.90	88.10	48.00	251.19	-9.10
1.578	L	38.20	81.28	48.00	251.19	-9.80
14.162	L	34.90	55.59	48.00	251.19	-13.10
0.496	N	38.20	81.28	48.00	251.19	-9.80
1.523	N	37.50	74.99	48.00	251.19	-10.50
13.987	N	33.80	48.98	48.00	251.19	-14.20

Test Engineer : Benson Tsai  
BENSON TSAI

## 5.4.3. Test mode : TV Mode

- Temperature : 20°C
- Relative Humidity : 58 %
- Test Date : Jan. 14, 1999

**The Conducted Emission test was passed at minimum margin**

**LINE 0.498 MHz / 38.50 dBuV.**

Freq. (MHz)	Line/ Neutral	Meter Reading (dBuV)	(uV)	Limits		Margin (dB)
				(dBuV)	(uV)	
0.498	L	38.50	84.14	48.00	251.19	-9.50
1.563	L	37.80	77.62	48.00	251.19	-10.20
14.183	L	35.40	58.88	48.00	251.19	-12.60
0.496	N	37.90	78.52	48.00	251.19	-10.10
1.528	N	37.00	70.79	48.00	251.19	-11.00
13.996	N	36.20	64.57	48.00	251.19	-11.80

Test Engineer : Benson Tsai  
BENSON TSAI

## **6. Test of Radiated Emission**

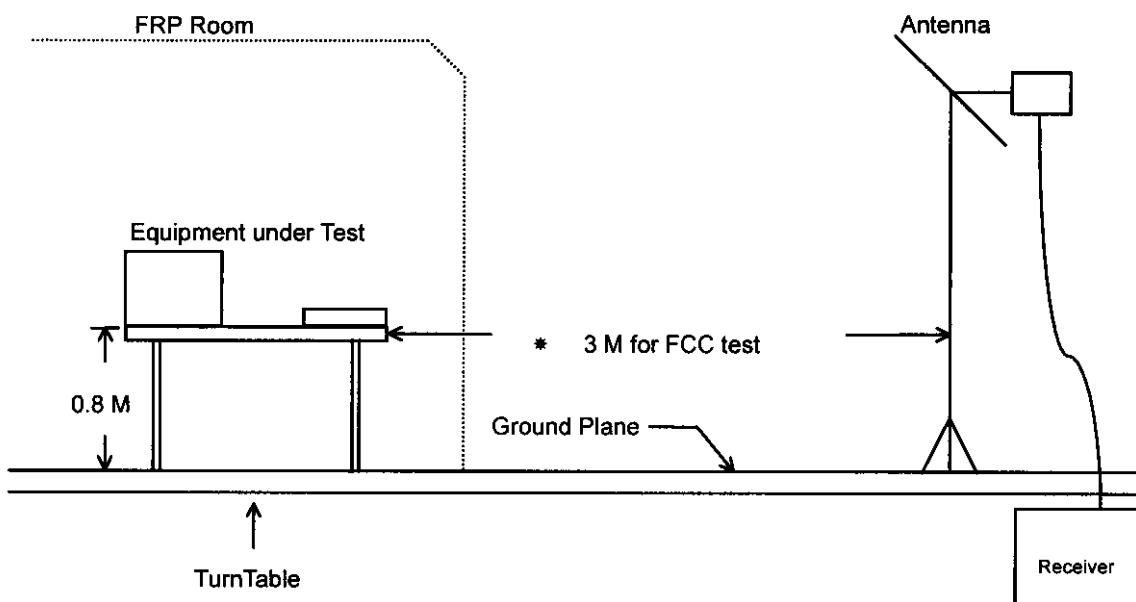
Radiated emissions from 30 MHz to 1,000 MHz were measured with a bandwidth of 120 kHz according to the methods defines in ANSI C63.4-1992. The EUT was placed on a nonmetallic stand in the open-field site, 0.8 meter above the ground plane, as shown in section 6.3. The interface cables and equipment positions were varied within limits of reasonable applications to determine the positions producing maximum radiated emissions.

### **6.1. Major Measuring Instruments**

RF Preselector	(HP 85685A)
Attenuation	0 dB
RF Gain	20 dB
Signal Input	20 MHz to 1.5 GHz
Spectrum Analyzer	(HP 8568B)
Attenuation	0 dB
Start Frequency	30 MHz
Stop Frequency	1,000 MHz
Resolution Bandwidth	1 MHz
Video Bandwidth	1 MHz
Signal Input	100 Hz to 1.5 GHz
Quasi-Peak Adapter	(85650A)
Resolution Bandwidth	120 KHz
Frequency Band	30 MHz to 1 GHz
Quasi-Peak Detector	ON for Quasi-Peak Mode OFF for Peak Mode

**6.2. Test Procedures**

- a. The EUT was placed on a rotatable table top 0.8 meter above ground.
- b. The EUT was set 3 meters from the interference receiving antenna which was mounted on the top of a variable height antenna tower.
- c. The table was rotated 360 degrees to determine the position of the highest radiation.
- d. The antenna is a half wave dipole and its height is varied between one meter and four meters above ground to find the maximum value of the field strength both horizontal polarization and vertical polarization of the antenna are set to make the measurement.
- e. For each suspected emission the EUT was arranged to its worst case and then tune the antenna tower (from 1 M to 4 M) and turn table (from 0 degree to 360 degrees) to find the maximum reading.
- f. Set the test-receiver system to Peak Detect Function and specified bandwidth with Maximum Hold Mode.
- g. If the emission level of the EUT in peak mode was 6 dB lower than the limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 6 dB margin will be repeated one by one using the quasi-peak method and reported.

**6.3. Typical Test Setup Layout of Radiated Emission**

## 6.4. Test Result of Radiated Emission

### 6.4.1. Test mode : 1920x1200 94KHz/75Hz

- Test Distance : 3 M
- Temperature : 19°C
- Relative Humidity : 62 %
- Test Date : Jan. 14, 1999
- Emission level (dBuV/m) = 20 log Emission level (uV/m)
- Corrected Reading : Antenna Factor + Cable Loss + Reading = Emission

**The Radiated Emission test was passed at minimum margin**

**600.909 MHz / 41.64 dBuV (VERTICAL) Antenna Height 1 Meter, Turntable Degree 187 °.**

Frequency (MHz)	Polarity	Antenna Factor (dB)	Cable Loss (dB)	Reading (dBuV)	Limits		Emission (dBuV)	Level (uV)	Margin (dB)
					(dBuV)	(uV)			
382.493	H	15.16	3.11	19.51	46.00	199.53	37.78	77.45	-8.22
200.059	V	9.20	1.70	26.03	43.50	149.62	36.93	70.23	-6.57
309.420	V	13.18	2.45	21.40	46.00	199.53	37.04	71.12	-8.96
374.463	V	14.96	2.99	20.22	46.00	199.53	38.17	81.00	-7.83
501.337	V	17.04	3.11	18.15	46.00	199.53	38.30	82.22	-7.70
600.909	V	18.51	3.10	20.03	46.00	199.53	41.64	120.78	-4.36

Test Engineer : Benson Tsai  
BENSON TSAI

## 6.4.2. Test mode : 1600x1200 107KHz/85Hz

- Test Distance : 3 M
- Temperature : 19°C
- Relative Humidity : 62 %
- Test Date : Jan. 14, 1999
- Emission level (dBuV/m) = 20 log Emission level (uV/m)
- Corrected Reading : Antenna Factor + Cable Loss + Reading = Emission

**The Radiated Emission test was passed at minimum margin**

**59.064 MHz / 35.21 dBuV (VERTICAL) Antenna Height 1 Meter, Turntable Degree 0 °.**

Frequency (MHz)	Polarity	Antenna Factor (dB)	Cable Loss (dB)	Reading (dBuV)	Limits		Emission (dBuV)	Level (uV)	Margin (dB)
					(dBuV)	(uV)			
59.064	H	5.17	0.98	26.26	40.00	100.00	32.41	41.73	-7.59
294.966	H	12.80	2.45	19.87	46.00	199.53	35.12	57.02	-10.88
59.064	V	5.17	0.98	29.06	40.00	100.00	35.21	57.61	-4.79
265.255	V	12.28	2.08	21.54	46.00	199.53	35.90	62.37	-10.10
264.966	V	12.27	2.07	23.77	46.00	199.53	38.12	80.54	-7.88
501.337	V	17.04	3.11	16.75	46.00	199.53	36.90	69.98	-9.10

Test Engineer : Benson Tsai  
BENSON TSAI

## 6.4.3. Test mode : TV Mode

- Test Distance : 3 M
- Temperature : 19°C
- Relative Humidity : 62 %
- Test Date : Jan. 14, 1999
- Emission level (dBuV/m) = 20 log Emission level (uV/m)
- Corrected Reading : Antenna Factor + Cable Loss + Reading = Emission

**The Radiated Emission test was passed at minimum margin**

**131.032 MHz / 36.24 dBuV (VERTICAL) Antenna Height 2 Meter, Turntable Degree 0 °.**

Frequency (MHz)	Polarity	Antenna Factor (dB)	Cable Loss (dB)	Reading (dBuV)	Limits		Emission (dBuV)	Level (uV)	Margin (dB)
					(dBuV)	(uV)			
131.032	H	10.76	1.20	24.28	43.50	149.62	36.24	64.86	-7.26
249.998	H	11.70	1.95	20.25	46.00	199.53	33.90	49.55	-12.10
382.493	H	15.16	3.11	16.51	46.00	199.53	34.78	54.83	-11.22
137.087	V	10.52	1.20	21.98	43.50	149.62	33.70	48.42	-9.80
264.452	V	12.27	2.07	22.89	46.00	199.53	37.22	72.61	-8.78
465.202	V	16.51	3.03	17.76	46.00	199.53	37.30	73.28	-8.70

Test Engineer : Benson Tsai  
BENSON TSAI

## 7. Antenna Factor &amp; Cable Loss

Frequency (MHz)	Antenna Factor (dB)	Cable Loss (dB)
30	17.7	.9
35	15.1	.8
40	12.3	.8
45	9.0	.8
50	7.4	.8
55	5.9	.9
60	5.0	1.0
65	4.8	1.1
70	5.1	1.2
75	5.7	1.3
80	6.6	1.4
85	7.6	1.5
90	8.5	1.5
95	9.3	1.6
100	10.1	1.8
110	10.7	1.7
120	11.2	1.5
130	10.8	1.2
140	10.4	1.2
150	9.9	1.6
160	9.4	1.7
170	9.0	1.8
180	8.6	2.3
190	8.5	1.8
200	9.2	1.7
220	9.9	2.1
240	11.2	1.9
260	12.2	2.0
280	12.5	2.3
300	12.9	2.5
320	13.5	2.4
340	14.0	2.5
360	14.6	2.7
380	15.1	3.1
400	15.6	3.2
450	16.3	3.0
500	17.0	3.1
550	18.5	3.4
600	18.5	3.1
650	18.9	3.0
700	18.9	2.9
750	19.6	3.5
800	19.9	3.7
850	20.2	4.1
900	20.6	4.0
950	20.8	3.3
1000	21.4	3.9

## 8. List of Measuring Equipments Used

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
Test Receiver	R&S	ESH3	893495/013	9 KHz - 30MHz	April 13, 1998	Conduction
LISN	TELEMETER	NNB-2/16Z	98007	50 ohm / 50 $\mu$ H	Jan. 29, 1998	Conduction
LISN	KYORITSU	KNW-407	8-1010-15	50 ohm / 50 $\mu$ H	Nov. 10, 1998	Conduction
EMI Filter	CORCOM	MRI-2030	N/A	480VAC / 30A	N/A	Conduction
Spectrum Monitor	R & S	EZM	894987/011	N/A	April 13, 1998	Conduction
RF Preselector (Site 1)	HP	85685A	2926A00951	20MHz -1.5GHz	July 18, 1998	Radiation
Spectrum Analyzer (site 1)	HP	8568B	2928A04713	100Hz – 1.5GHz	July 18, 1998	Radiation
Quasi-peak Adapter (site 1)	HP	85650A	2811A01285	9KHz -1 GHz	Jul. 18, 1998	Radiation
Bilog Antenna (1)	CHASE	CBL6112A	2302	30MHz - 2GHz	Jan. 27, 1998	Radiation
Half-wave dipole antenna (1)	EMCO	3121C	8912-496	20MHz - 1GHz	Aug. 12, 1998	Radiation
Turn Table	EMCO	1060-1.211	9507-1805	0 ~360 degree	N/A	Radiation
Antenna Mast	EMCO	1051-1.2	9502-1868	1 m - 4 m	N/A	Radiation