IST EMC LAB.

E M I S S I O N T E S T R E P O R T

Test report file No.	: **02-IST-032/FB**	Date of issue : Feb. 27, 2002
Model / Type No.	: Pent@U+	■ Basic □ Alternate
Kind of product	: Digital Satellite Receiver	
Brand name	: PentaMedia	
Applicant	: PentaMedia Co.,Ltd.	
Manufacturer	: PentaMedia Co.,Ltd.	
License holder	: PentaMedia Co.,Ltd.	
Address	: 66-1, Yangjae-dong, Seocho-gu, Seoul, Korea	

Test result according to the regulation(s)

■ Positive □ Negative

at page 3.

This test report with appendix consists of 18 pages.
The test result only responds to the tested sample.
It is not allowed to copy this report even partly without the allowance of the Test Laboratory.
This equipment is complied 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.

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DIRECTORY

A) Documentation.

B) Test Data.

C) Appendix

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TEST REGULATIONS

The tests were performed according to the following regulations ;

■ - FCC Part 15, Subpart B (Unintentional Radiators, Class B)

Information of Test Laboratory

IST EMC Lab.
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EQUIPMENT UNDER TEST

Equipment Description :

Tuner :	Input : F-type 75 ohm
	Input Frequency : 950~2150 MHz
	Input Level : - 65 ~ -25 dBm
LNB control :	LNB supply voltage 13 or 18 V
	Antenna and LNB control 22 kHz tone
	Max. LNB supply current : 400 mA with short circuit and surge protection
USB interface :	USB interface: Version 1.1 compliant
	Maximum USB bus speed: 12 Mbps
Demultiplexing :	Max. no. section filtering: 32 PIDs
	Engine : RISC engine
	Descrambler : DVB descrambler
	Streams capture: PES or TS
	Date rate: 60 Mbps with 32 simultaneous PIDs
Dimension :	210 x 180 x 40 mm

EQUIPMENT UNDER TEST

EUT Type :

- ☒ Table-Top.
- ☐ Floor-Standing.
- ☐ Table-Top and Floor-Standing(Combination).

Operation – mode of the E.U.T. :

The equipment under test was operated during the measurement under following conditions :

- ☐ Standby.
- ☒ Operational Condition :
  After the device was connected to the satellite antenna by BNC cable. This device was continuosly connected with the satellite broadcast during the test.
  The status of connecting with satellite broadcast was investigated.

Configuration of the equipment under test :

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

Equipment	Type	Brand	Serial No
PC	Brio BA600/550	HP	SG01603779
Monitor	529B	Daewoo	unknown
Keyboard	SK-2502C	HP	M000456820
Printer	A0302384	Northern Telecom	26633S60168
Mouse1	M-S48A	HP	LZA01051466
Mouse2	M-M28	Logitech	LCA53305547

Connecting Interface Cables :
- Unshielded AC power cable : 1.8 m
- Shielded monitor's signal cable : 1.5 m
- Shielded printer's signal cable : 1.8 m
- Unshieled BNC cable : about 50 m

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TEST CONDITIONS

The **measurement of the conducted emissions (Interference voltage)** was performed in a shielded room.

Test location :

☒ Shielded room. No.1 ☐ Compact chamber 2

Used testing instruments :

Name	Type	Manufacturer	Calibration. Date	Serial Number
ESH 3	Test Receiver	Rohde & Schwarz	Jun. 16, 2001	861742/015
3725/2	LISN	EMCO	Jul. 30, 2001	9101-2068
KNW-407	LISN	Hyup-Rip	Jul. 26, 2001	8-883-10
ESH 3-Z2	Pulse Limiter	Rohde & Schwarz	Jul. 13, 2001	357.8810.52

Test - accessories :

Type	Manufacturer
Aneroid Barometer	Sato
Hygrometer	Sato

Measurement Procedures :

Conducted emissions measurments were made in accordance with ANSI C-63.4-1992, "Method of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz". The measurement were performed over the frequency range of 0.45MHz to 30MHz using a 50Ω/50uH LISN as the input transducer to an EMI/Field Intensity Meter. The measurements were made with the detector set for "Peak" amplitude within an IF bandwidth of 10kHz or for "quasi-peak" within a bandwidth of 9kHz.

All used test-instruments as well as the test-accessories are calibrated regularly.

Test engineer :

S. G, Kim / Research Engineer
IST EMC Lab.

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The **measurement of the radiated emissions (Electric field)** in the frequency range from 30 MHz to 1GHz was performed in horizontal and vertical antenna polarization at a open-site which meet the site attenuation requirement of ANSI C63.4-1992 and a test distance of :

Location : ☐ Open Site No. 1 ☒ Open Site No. 2 (from 30 MHz to 1 GHz)
☒ Compact Chamber No. 1 (from 1 GHz to 11 GHz)
Distance : ☒ 3 meters ☐ 10 meters

Above 1 GHz, the measurement of the radiated emissions was performed at a compact chamber.

Used testing instruments :

Name	Type	Manufacturer	Calibration. Date	Serial Number
ESVP	Test Receiver	Rohde & Schwarz	Nov. 07, 2001	892111/027
VULB 9160	Antenna	Schwarzbeck	Jun. 04, 2001	3047
3115	Horn Antenna	EMCO	Nov. 15, 2001	9012-3602
8566B	Sepectrum Analyzer	Hewlett Packard	Jul. 13, 2001	3014A07159
85650A	Quasi-Peak Adaptor	Hewlett Packard	Jul. 13, 2001	3107A01532
85685A	RF Preselector	Hewlett Packard	Jul. 13, 2001	3107A01233

Test - accessories :

Type	Manufacturer
Aneroid Barometer	Sato
Hygrometer	Sato

Measurement procedures

Radiated measurements were in accordance with ANSI C63.4-1992 “Method of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz”. The measurements were performed over the frequency range of 30 MHz to 11 GHz using antenna as the input transducer to a EMI/Field Intensity Meter. The measurements were made with the detector set for “quasi-peak” within a bandwidth of 120kHz.

Above 1 GHz, peak detector function mode is used. The radiated measurements above 1 GHz were performed at a compact chamber which meet the site attenuation requirement of ANSI C63.4-1992.
All used test-instruments as well as the test-accessories are calibrated regularly.

Test engineer :

S. G, Kim / Research Engineer
IST EMC Lab.

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TEST RESULT

Conducted emissions : 0.15 kHz - 30 MHz

The requirements are.

☒ KEPT ☐ NOT KEPT

Min. limit margin

10.4 dB at 2.789 MHz

Remarks : See test-graph to be attached at pages 11 ~ 13.

Radiated emissions (electric field) : 30 MHz - 11 GHz

The requirements are.

☒ KEPT ☐ NOT KEPT

Min. limit margin

3.2 dB at 239.9 MHz

Remarks : See test-graph to be attached at pages 14 ~ 17.

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TEST SETUP (Photos)

Type : Pent@U+

Conducted Emissions 0.15 MHz - 30 MHz

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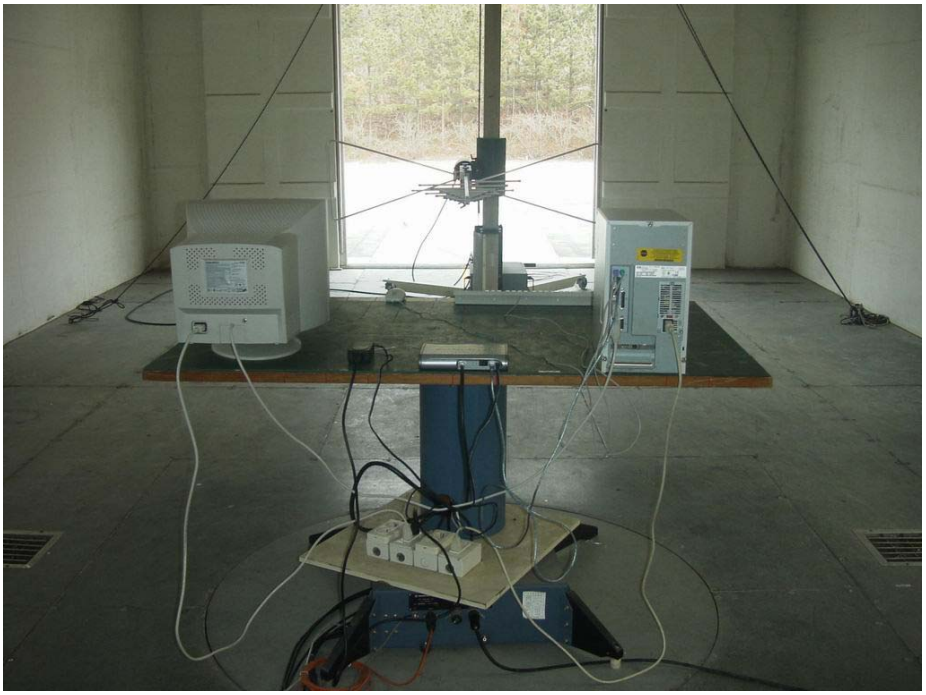
TEST SETUP(Photos)

Type : Pent@U+

Radiated Emissions 30 MHz - 11 GHz



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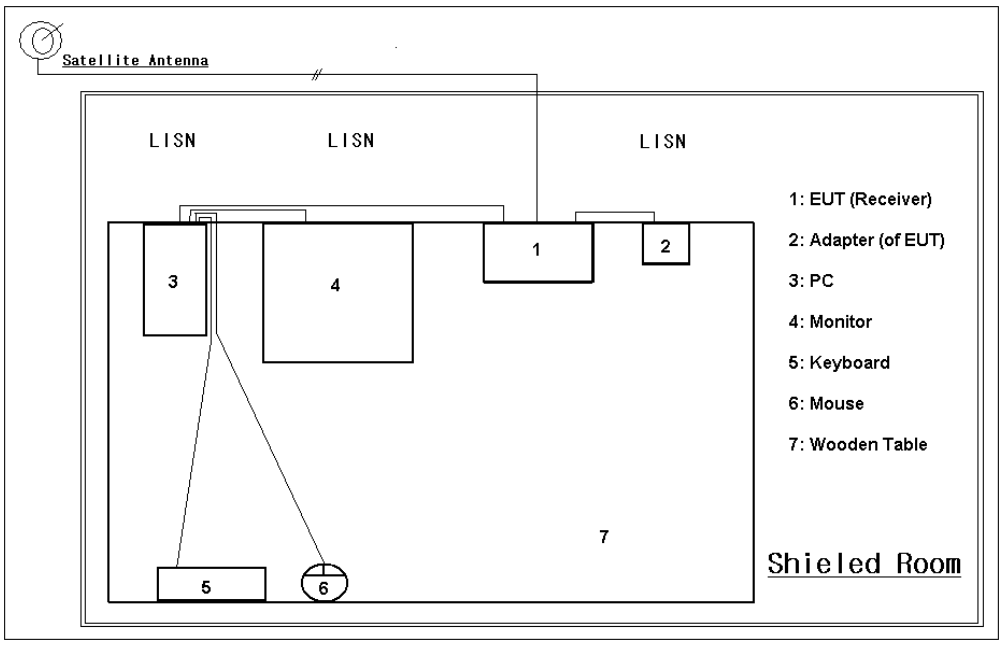
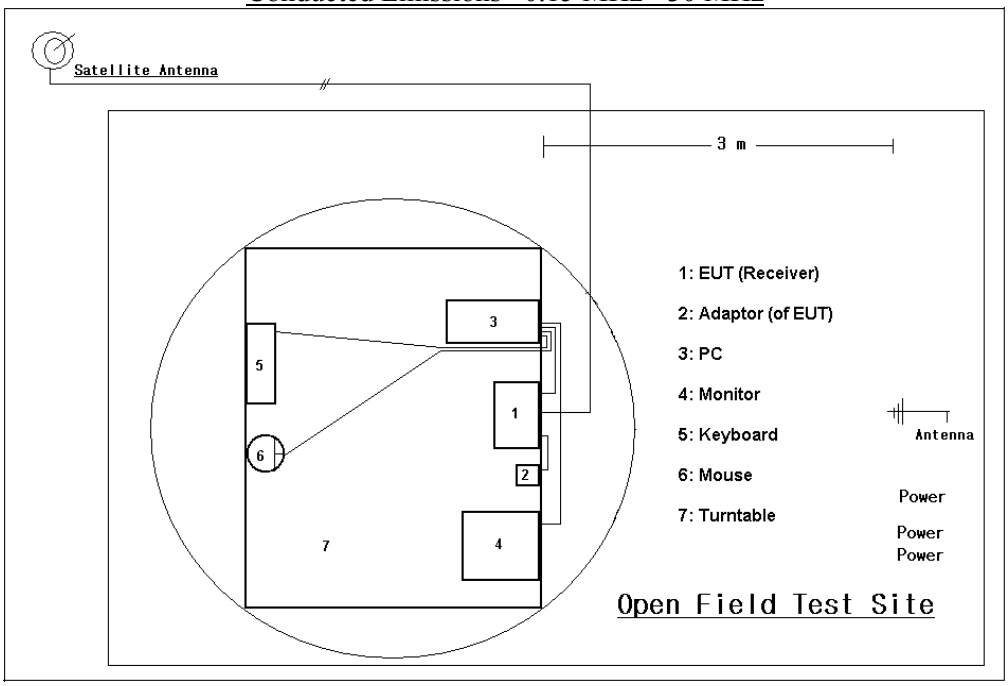
TEST SETUP(Figures)

Type : Pent@U+



Conducted Emissions 0.15 MHz - 30 MHz



Radiated Emissions 30 MHz - 11 GHz

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Conducted Emission Test Data

Type	Pent@U+	
Manufacturer	PentaMedia Co., Ltd.	
Operation mode	Connected with the satellite broadcast	
Environmental Conditon	Temperature	: 16 °C
	Humidity	: 40 %
	Atmospheric pressure	: 1000 mbar
Date	Feb. 19, 2002	

Highest Emissions ralative to the limit

Frequency [MHz]	Reading [dBμV]	Insertion loss [dB]	Phase (L1/N)	Result [dBμV]	Limit [dBμV]	Margin [dB]
0.542	34.8	0.8	L1	35.6	48.0	12.4
2.724	35.8	0.8		36.6	48.0	11.4
2.789	36.3	0.8		37.1	48.0	10.9
2.927	32.3	0.8		33.1	48.0	14.9
23.292	35.6	0.8		36.4	48.0	11.6
23.959	36.1	0.8		36.9	48.0	11.1
0.543	34.2	0.8	N	35.0	48.0	13.0
2.724	36.0	0.8		36.8	48.0	11.2
2.789	36.8	0.8		37.6	48.0	10.4
2.926	31.7	0.8		32.5	48.0	15.5
23.293	35.9	0.8		36.7	48.0	11.3
23.959	36.0	0.8		36.8	48.0	11.2
Cable loss are less than 0.1 dB						

*L1 : Live Line

**N : Neutral Line

*** **Please refer to data graphs at page 12 ~ 13**

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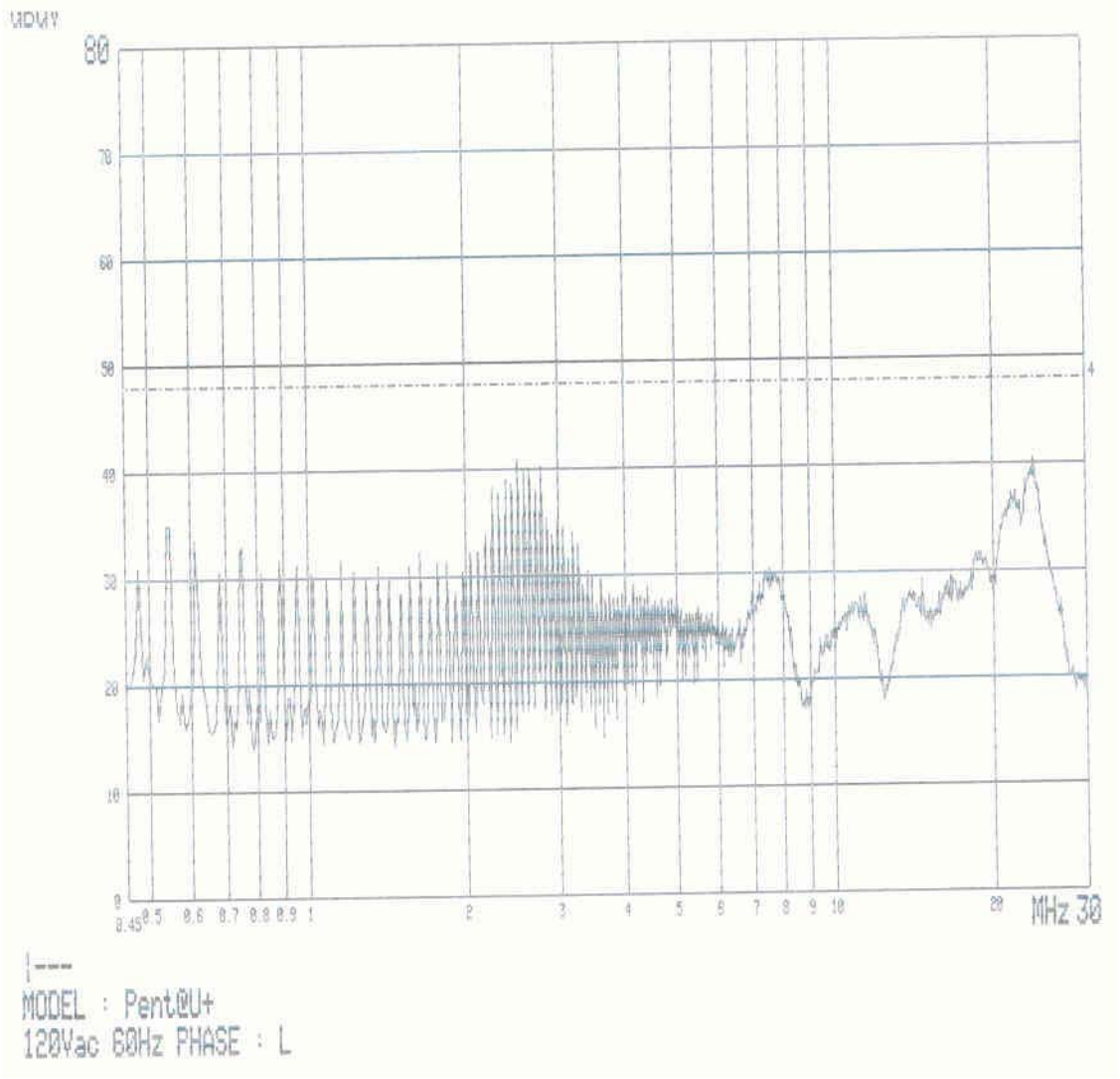

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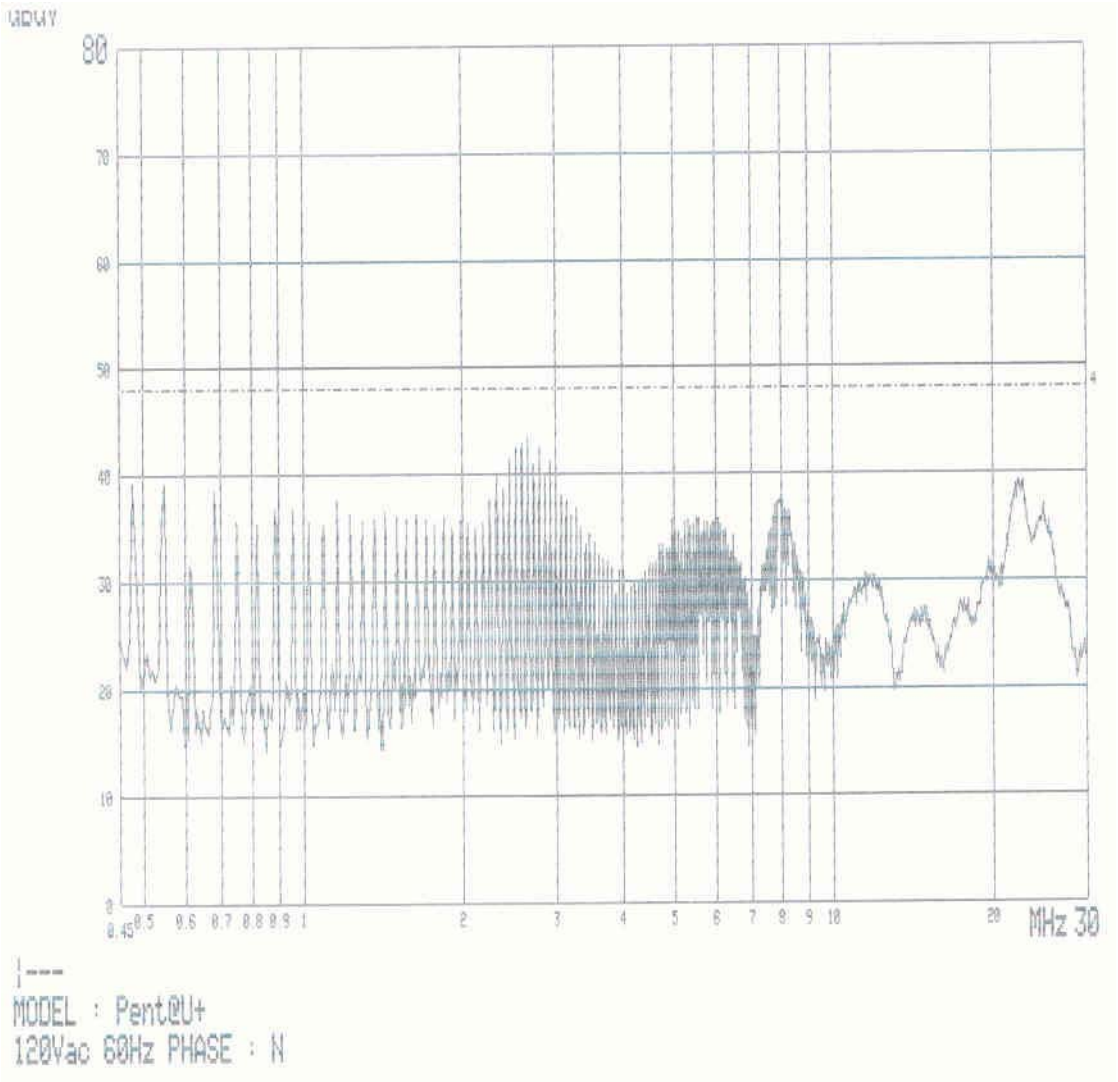

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Radiation Test Data

Type	Pent@U+	
Manufacturer	PentaMedia Co., Ltd.	
Operation mode	Connected with the satellite broadcast	
Environmental Conditon	Temperature	: 18 °C
	Humidity	: 40 %
	Atmospheric pressure	: 1000 mbar
Test distance	3 m	
Antenna	VULB9160 (30MHz~1GHz), 3115 (1GHz~11GHz)	
Date	Feb. 20, 2002 ~ Feb. 21, 2002	

Measured Data from 30 MHz to 1 GHz

Freq. [MHz]	Reading [dBuV]	Antenna Factor [dB]	Cable Loss [dB]	Angle [deg]	Height [cm]	Polar [H/V]	Result [dBuV]	Limit [dBuV]	Margin [dB]
50.0	19.5	10.6	1.3	26	112	V	31.4	40.0	8.6
61.2	22.9	11.3	1.4	356	110	V	35.6	40.0	4.4
75.8	22.1	8.7	1.6	15	110	V	32.4	40.0	7.6
81.0	23.7	7.7	1.6	0	111	V	33.0	40.0	7.0
119.9	21.3	9.8	2.0	14	105	V	33.1	43.5	10.4
143.9	26.2	11.8	2.2	354	105	V	40.2	43.5	3.3
162.0	16.3	12.3	2.3	16	100	V	30.9	43.5	12.6
192.0	17.3	9.1	2.5	15	113	V	28.9	43.5	14.6
209.7	18.7	8.4	2.5	11	105	H	29.6	43.5	13.9
239.9	29.8	10.1	2.9	178	108	V	42.8	46.0	3.2
360.0	27.2	11.7	3.6	22	254	H	42.5	46.0	3.5
384.0	26.3	12.5	3.8	354	225	V	42.6	46.0	3.4
431.9	19.2	13.7	4.4	333	284	V	37.3	46.0	8.7
443.8	8.5	13.9	4.5	355	265	V	26.9	46.0	19.1

Please refer to the data plots at page 15.

Measured Data from 1 GHz to 11 GHz

Above 1 GHz, peak detector function mode is used with 23dB gain of preamp. The following graphs show that all data of full frequencies are meet with the limit.

Please refer to the data plots at page 16~17.

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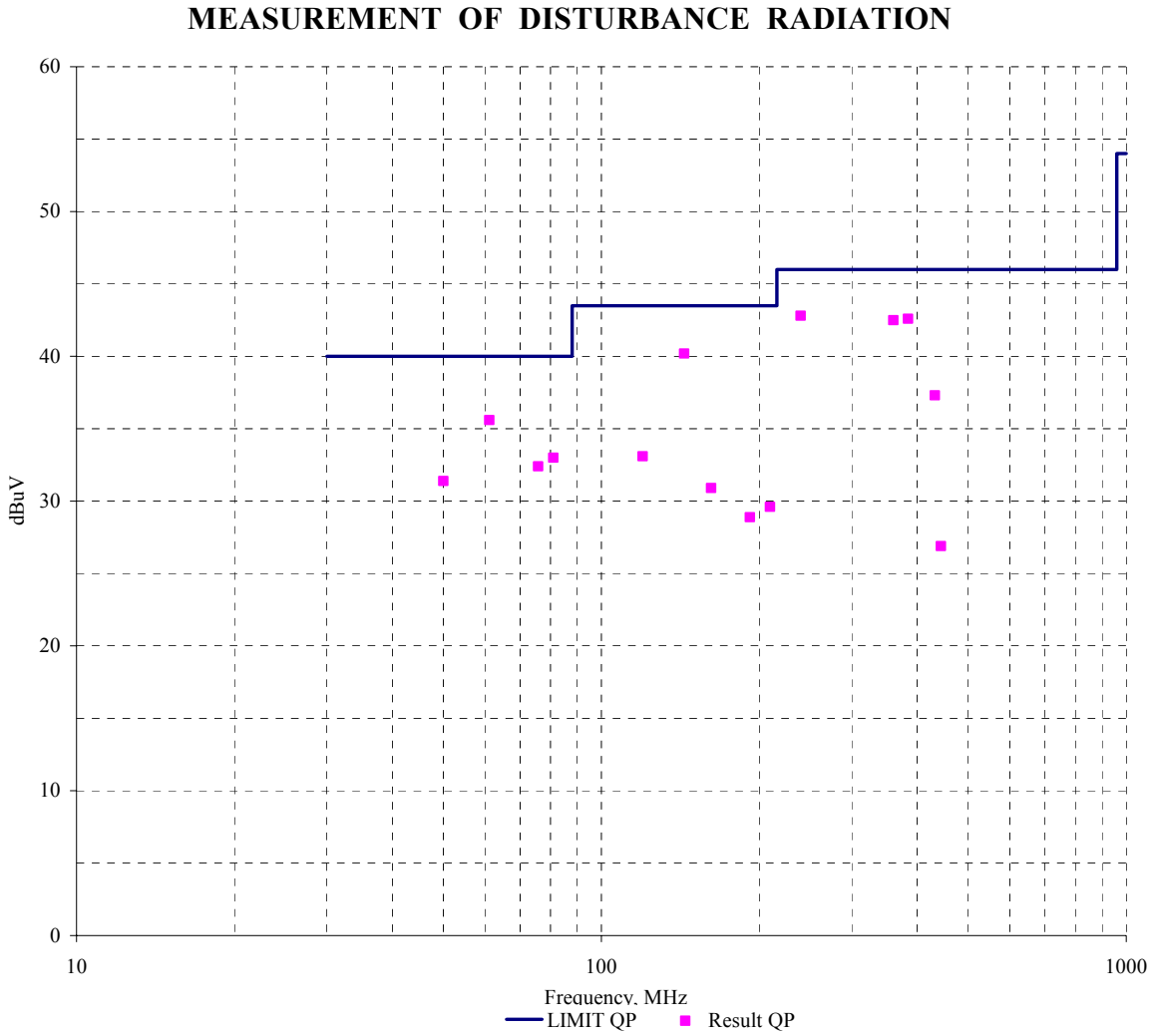
Radiation Test Data (Plot)

The plots for measured data from 30 MHz to 11 GHz were entire data including horizontal and vertical polarity at page 15 ~ 17.
We automatically change our antenna polarity, when measure radiated emission.



[Measured Data from 30 MHz to 1 GHz]

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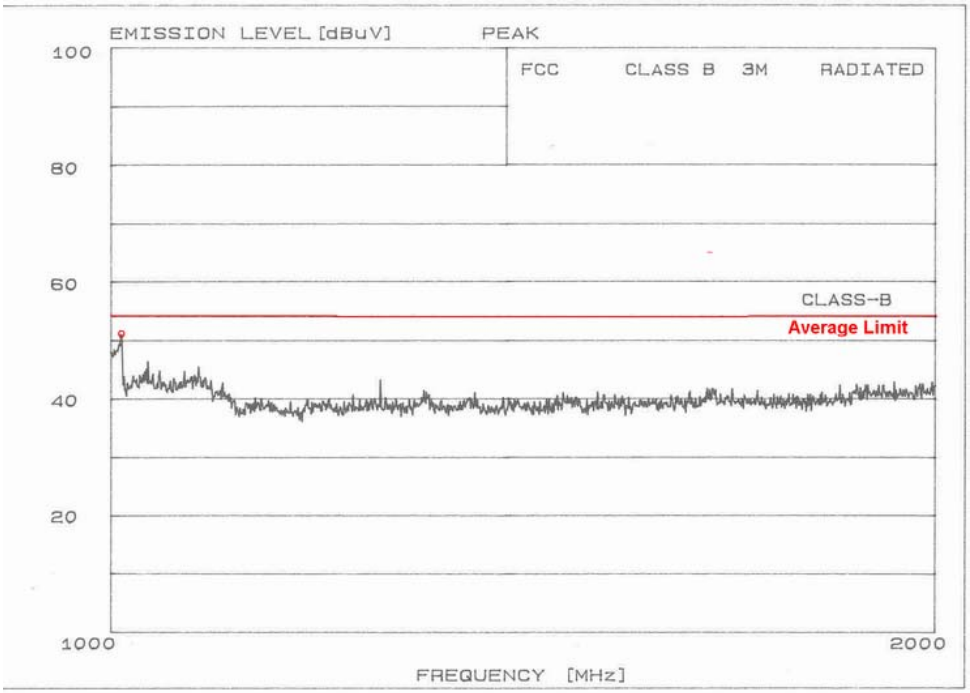
Radiation Test Data (Plot)



[Measured Data from 1 GHz to 2 GHz]

The spectrum plot was obtained with peak detect mode and maximum hold mode. It was used for plot the HP8566B spectrum analyzer, EMCO 3115 Horn antenna and HP85685A RF preselector.

(Section 15.35)
The peak value evaluation at the frequency of 1.006 GHz is
48.6 dB(measured) + 6.12 dB(antenna factor) + 7.8 dB(cable loss)
– 23 dB(gain of preamp) – 20 (corrective factor)
= 19.52 dB (less than average limit 54.0 dB)

The peak value evaluation is less than the average limit, EUT have the margin relative to peak value more than 10 dB for radiated emission for the above 1 GHz.
Please refer to the data graphs at page 16~17.

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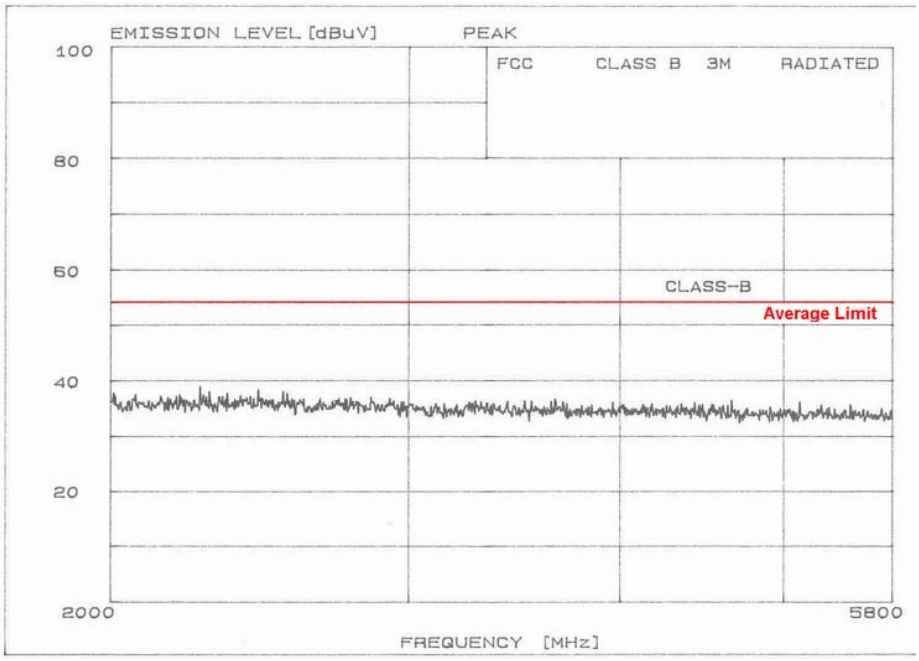
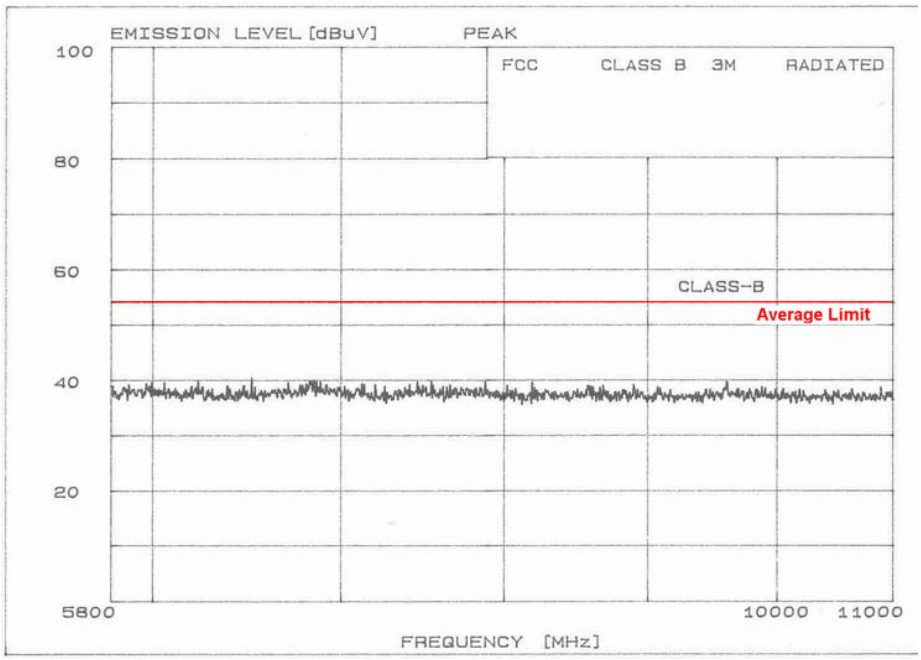
Radiation Test Data (Plot)



[Measured Data from 2 GHz to 5.8 GHz]



[Measured Data from 5.8 GHz to 11 GHz]

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SUMMARY

GENERAL REMARKS :

The equipment is not modified anything, mechanical or circuit to improve EMI status during a measurement and complied the regulation "Part 15 subpart B Class B of CFR 47"

FINAL JUDGMENT :

The requirements according to the technical regulations are

☒ Kept ☐ Not kept

The equipment under test does

☒ Fulfill the general approval requirements mentioned on page 3.
☐ Not fulfill the general approval requirements mentioned on page 3.

Begin of testing : Feb. 18, 2001

End of testing : Feb. 22, 2001

Reviewed by :

Joon H. Lee. EMC Manager
IST EMC Lab.

Approved by :

G. Chung Chief of EMC Lab.

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