



FCC TEST REPORT

Model No. : PSD-12P
Test Report No. : BWS-02-EF-0040

BWS Tech, Inc.

294-9, Jungdae-Dong, Gwangju-City, Gyeoeonggi-Do 464-080 Korea

TEL: 82 31 764 0125 FAX: 82 31 764 0126

FCC EMI TEST REPORT

Date of Test : November 26, 2002

Test Report No. : BWS-02-EF-0040

Test Site : BWS Tech, Inc. (Registration No. : 553281)

Trade Name : N/A

Manufacturer : Jungsoft Co., Ltd.

Address : #274-5, Seohyun-Dong, Bundang-Gu, Seongnam-City, Gyeonggi-Do, Korea

Contact Person : Kim, Yeong-Uk

Tel No. : 82-31-788-5270

Fax No. : 82-31-708-3477

Product Name : USB Storage Device

Model Name : PSD-12P

FCC Rule Part(s) : FCC Part 15 Subpart B

Classification : Class B

The device bearing the trade name and model specified above has been complied with the applicable technical standards as described in this test report and was tested in accordance with the measurement procedures specified in ANSI C.63.4-2000.

I attest to the accuracy of data and all measurement reported herein were performed by our test personnel were made under my supervision.

I assume the responsibility for the completeness of these measurements and for the qualification of all our personnel conducting this testing.

Dec. 10, 2002

Choi, Jae-Ho
EMC Manager of BWS Tech., Inc.



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1. DESCRIPTION OF DEVICE

1.1 General

Responsible Party	Jungsoft Co., Ltd.
Contact Person	Kim, Yeong-Uk Tel No. : 82-31-788-5200 Fax No. : 82-31-708-3477
Manufacturer	Jungsoft Co., Ltd. #274-5, Seohyun-Dong, Bundang-Gu, Seongnam-City, Gyeonggi-Do, Korea

- Trade name **N/A**
- Model name **PSD-12P**
- EUT Type **USB Storage Device**
- Classification **FCC Part 15 Subpart B Class B**
- Clock Speed **12.000 MHz**
- Rule Part(s) **FCC Part 15 & Part 2**
- Test Procedure(s) **ANSI C63.4-2000**
- Date of Tests **November 26, 2002**
- Test Lab **BWS Tech, Inc.**

1.2 EUT Descriptions

This equipment is portable storage device with USB interface and Flash Memory. As you can read or write data on this equipment when plug in this equipment USB port of any personal computer, you don't need any additive cable or power.

* Operational Description :

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Note. Please refer to the duties and responsibilities of the Responsible Party attached.



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2. TEST FACILITY

The open field test site and conducted measurement facility used for this measurement, is located following address. This site was fully described in a report dated Dec. 26, 2001 that was submitted to the FCC. Our site and facility had been accepted in a letter dated Dec. 26, 2001(Registration No. : 553281) :

BWS Tech, Inc.

Address : 294-9, Jungdae-Dong, Gwangju-City, Gyeonggi-Do 464-080 Korea

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 Dec. 08, 2000.

3. SUMMARY OF RESULTS

3.1 Electromagnetic Emission

RFI Voltage Measurement **PASS**

RFI Field Strength Measurement **PASS**

Although the measured emissions indicate that the EUT complies with the required limits, some measurement s are close to these limits.

When the uncertainty of measurement is considered, there is a possibility that the EUT may not be compliant.

3.2 Modifications to the EUT : None



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4. TESTED SYSTEM DETAILS

4.1 Peripherals and Others :

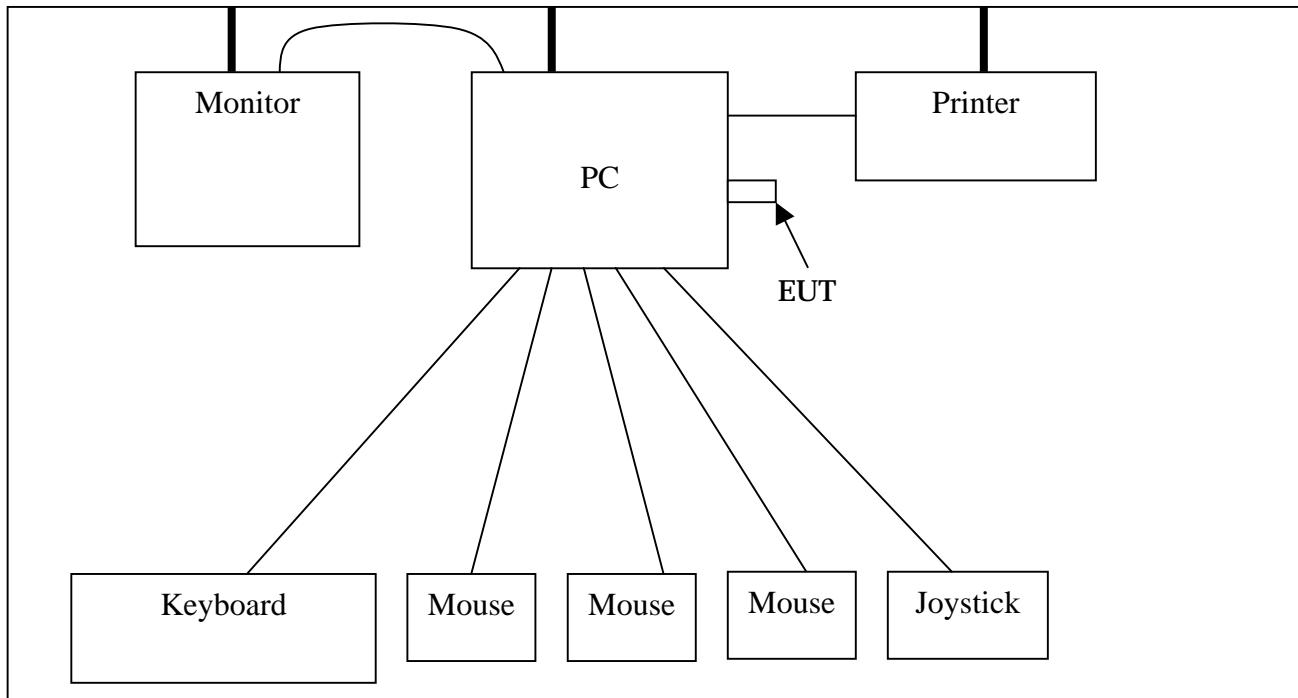
Description	Model Name	Serial No.	Manufacturer	FCC ID
Computer(Test 6)	VDHM(Optiplex GX240)	-	Dell	-
Monitor	M782	BH68-00440P-02	SAMSUNG	-
Printer	C6464C	TH11RH70Q7	Calcomp Elec	-
Keyboard	SK-8110	04N729	SILITEK	AQ6-22K15
PS2 Mouse	M-SAW34	LZE21070425	SUZHOU	DZL211029
Serial Mouse #1	AM-767-P	0119592	-	DoC
Serial Mouse #2	OK-520		A4 TECH	FSUGMZC7
Joystick	Plug & Play GamePad	-	Microsoft	DoC
USB Storage Device	PSD-12P	-	Jungsoft Co., Ltd.	EUT

4.2 Type of Cables Used:

Device from	Device to	Type of Cable	Length	Type of shield
Computer	PS/2 (Keyboard)	Signal cable	1.0	Shielded
Computer	PS/2 (Mouse)	Signal cable	1.0	Shielded
Computer	SERIAL (Mouse #1, #2)	Signal cable	1.0	Shielded
Computer	MIDI (Joystick)	Signal cable	1.2	Shielded
Computer	PARALLEL (Printer)	Signal cable	1.5	Shielded
Computer	VIDEO (Monitor)	Signal cable	1.0	Shielded
Power Cable	Power	-	1.5	Unshielded
EuT	USB (Computer)	-	-	-

4.3 System layout on EUT and peripherals

— Interface cable — Power cable



<Figure 4-1 System layout>



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5. TEST RESULT

5.1 RFI Voltage Measurement

5.1.1 Measurement Instrumentation Used

Measurement Instrument (model/serial no./manufacturer/last calibration/next calibration)

Signal Analyzer (PMM9000/3100570602/PMM/Aug. 16, 2002/Aug. 2003)

A.M.N. (L3-25/1110K70403/PMM/Oct. 02, 2002/Oct. 2003)

A.M.N. (KNW-242C/8-920-20/KYORITSU/Aug. 31, 2002/Aug. 2003)

Coaxial cable (RG213U/---/MARLOW/-/-)

Shield Room (JASH01/---/SEMITECH/---/---)

5.1.2 Measurement Procedure

The power line conducted interference measurement were performed according to ANSI C63.4-2000 in a Shielded room placed on a table, 0.8 m high over a metal floor. It was located more than required distance away from the shielded enclosure wall. Deviations from the standard was none. The EUT was plugged into the LISN and the frequency range of interest scanned. **We measured device in 'worst case' condition mode.** We reported at maximum emission levels.

5.1.3 Operation Modes

EUT was tested according to the specifications given by the manufacturer, and measured in worst case.

5.1.4 Measurement Uncertainty

Measurement uncertainty of RFI Voltage Measurement test was estimated at ± 3.84 dB(k=2)



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5.1.5 Test Data

RFI Voltage Measurement Results (0.45 MHz to 30 MHz)

Operating mode : 'worst case' condition mode
Test procedure : ANSI C63.4-2000

Date of measurement : November 26, 2002
Temperature : 21 degree C
Humidity : 32 %

Model : PSD-12P

FREQ(MHz)	LEVEL(dBuV)	LINE	LIMIT(dBuV)	Result(dBuV)	MARGIN(dB)
0.482	23.30	H	48.00	23.30	-24.70
0.506	20.10	H		20.10	-27.90
0.805	12.60	H		12.60	-35.40
2.472	15.00	H		15.00	-33.00
3.999	15.60	H		15.60	-32.40
11.040	22.40	N		22.40	-25.60
12.030	20.20	H		20.20	-27.80
13.310	22.80	H		22.80	-25.20
16.000	16.10	H		16.10	-31.90
24.000	23.80	H		23.80	-24.20
27.060	16.10	H		16.10	-31.90
28.580	16.80	H		16.80	-31.20

Table 1. Line Conducted Emission Tabulated Data

Note :

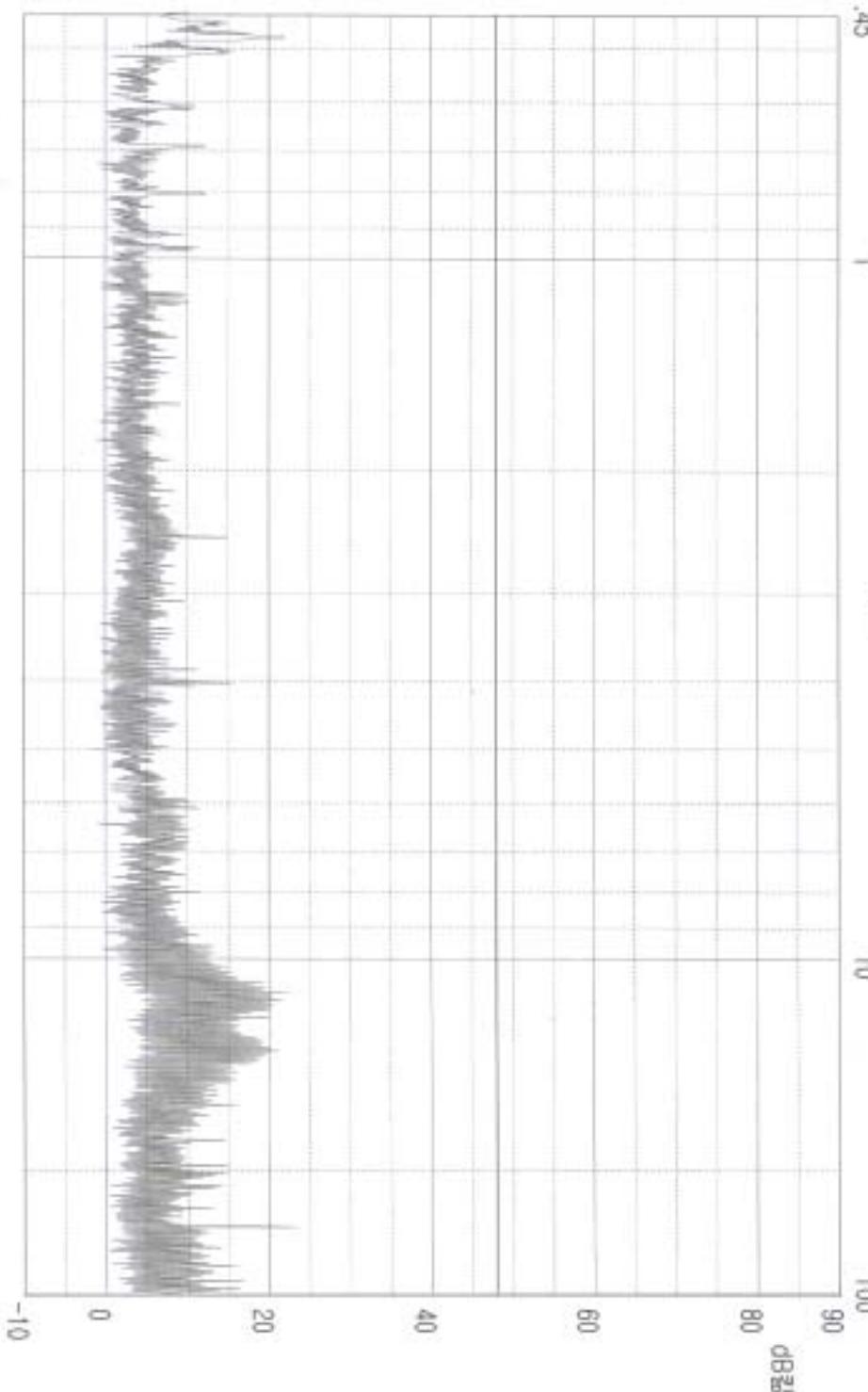
1. All modes of operation were investigated and the worst-case emissions are reported.
See attached Plots.
2. The limit for Class B digital device is 250 μ V (48.0 dB μ V) from 450 KHz to 30 MHz.
3. Line H = Hot

Line N = Neutral

** Measurement using CISPR quasi-peak mode

Tested by **Shim Min-Seob**

PLOTS OF EMISSIONS



Limit : FCC-b Detector: Peak

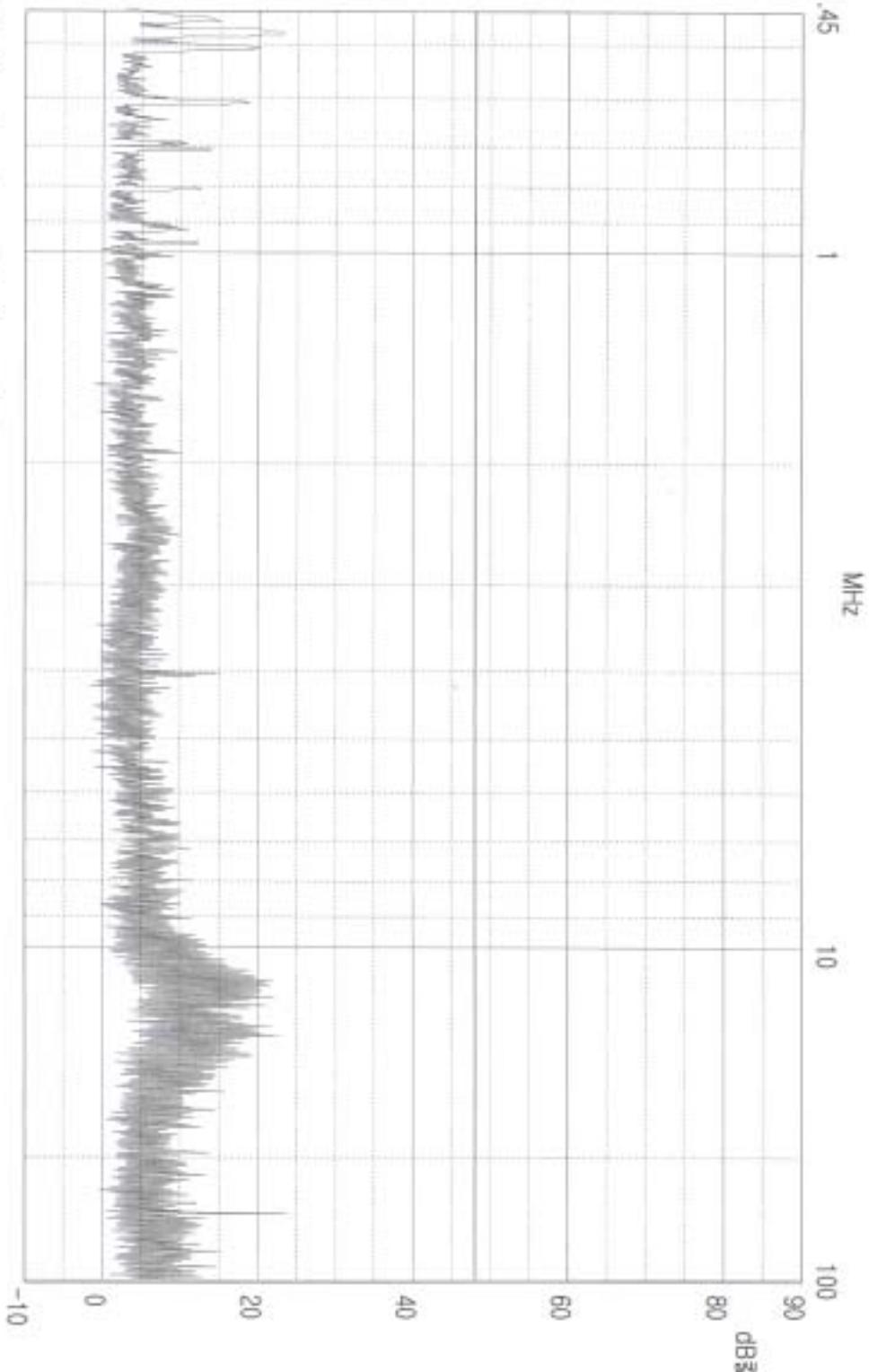
TEST SITE : BWS TECH.
TEST MODE : HOT
MODEL : PSD-12P
CLASSIFICATION : FCC PART 15 , CLASS B



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PLOTS OF EMISSIONS



Limit : FCC-b Detector: Peak

TEST SITE : BWS TECH.
TEST MODE : NEUTRAL
MODEL : PSD-12P
CLASSIFICATION : FCC PART 15 , CLASS B



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5.2 RFI Field Strength Measurement

5.2.1 Measurement Instrumentation Used

Measurement Instrument (model/serial no./manufacturer/last calibration/next calibration)

Signal Analyzer.....(PMM9000/3100570602/PMM/Aug. 16, 2002/Aug. 2003)

Spectrum Analyzer.....(R3261C/61720002/ADVANTEST/ Aug. 22, 2002/ Aug. 2003)

Amplifier.....(8447E/2945A02712/HP/ Aug. 19, 2002/Aug. 2003)

Biconical antenna (BBA9106/ --- / SWALZBECK /Sep. 12, 2002/Sep. 2003)

Log periodic antenna (UPA6109/ --- / SCHAFFNER / Sep. 12, 2002/Sep. 2003)

Coaxial cable (RG213U/---/MARLOW/---)

5.2.2 Measurement Procedure

Final test was performed according to ANSI C63.4-1992 at the open field site .
Deviations from the standard were none.

The EUT was placed in a 0.8 m high table along with the peripherals. The turn table was separated from the antenna with the distance of 3 meter. Cables were placed in a position to produce maximum emissions as determined by experimentation, and operation mode was selected for maximum.

The frequencies and amplitudes of maximum emission were measured at varying azimuths, antenna heights and antenna polarities. **We measured device in 'worst case' condition mode.** We gathered data at maximum emission levels.

5.2.3 Operation Modes

EUT was tested according to the specifications given by the manufacturer, and reported the worst emissions.

5.2.4 Measurement Uncertainty

Measurement uncertainty of RFI Field Strength Measurement test was estimated at ± 4.44 dB($k=2$)



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5.2.5 Test Data

RFI Field Strength Measurement Results(30 MHz to 1000 MHz)

Operating mode : 'worst case' condition mode

Test procedure : ANSI C63.4-2000

Date of measurement : November 26, 2002

Temperature : 3 degree C

Humidity : 47 %

Model : PSD-12P

MEASUREMENT FREQ (MHz)	MEASUREMENT LEVEL (dBuV)	ANTENNA POLARITY (H/V)	ANTENNA FACTOR (dB)	CABLE LOSS (dB)	LIMIT (dBuV/m)	FIELD STRENGTH (dBuV/m)	MARGIN (dBuV)
48.01	22.80	V	11.64	1.24	40.00	35.68	-4.32
120.01	21.10	H	12.93	2.15		36.18	-7.32
131.99	17.70	V	13.86	2.25		33.81	-9.69
155.98	17.30	V	15.11	2.47		34.88	-8.62
168.01	16.90	V	15.50	2.59		34.99	-8.51
192.01	16.80	H	15.96	2.79		35.55	-7.95
240.01	18.50	H	11.34	3.05		32.89	-13.11
284.02	13.90	H	12.58	3.38		29.86	-16.14
331.83	17.70	H	13.70	3.69		35.09	-10.91
480.01	16.20	H	17.14	4.59		37.93	-8.07
503.93	16.90	H	17.64	4.71		39.25	-6.75
659.51	14.20	H	20.33	5.52		40.05	-5.95

Table 2. Radiated Measurements at 10meters.

Note :

1. All modes of operation were investigated and the worst-case emissions are reported.
2. The limit for Class B digital device is 100 μ V/m (40.0 dB μ V/m) from 30 MHz to 88 MHz, 150 μ V/m (43.5 dB μ V/m) from 88 MHz to 216 MHz, 200 μ V/m(46.0 dB μ V/m) from 216 MHz to 960 MHz and 500 μ V/m (53.98 dB μ V/m) from above 960 MHz.

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

Tested by Shim Min-Seob



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5.3 Minimum Margin

Conducted emission

PSD-12P **'worst case' condition mode** 24.00 MHz, 24.2 dB

Radiated emission

PSD-12P **'worst case' condition mode** 48.01 MHz, 4.32 dB

5.4 SAMPLE CALCULATIONS

$$\text{dB}\mu\text{V} = 20 \log 10 (\mu\text{V}/\text{m})$$

$$\begin{aligned} & (\text{dB}\mu\text{V}/20) \\ & \mu\text{V} = 10 \end{aligned}$$

EX. 1.

@ 24.00 MHz Class B limit = 250 μV = 48 dB μV

Reading = 23.80 dB μV (calibrated level)

(23.80/20)

10 = μV

Margin = 23.80 - 48 = -24.20

24.20 dB ; below limit

EX. 2.

@ 48.01 MHz Class B limit = 200 $\mu\text{V}/\text{m}$ = 40.00 dB $\mu\text{V}/\text{m}$

Reading = 22.80 dB μV (calibrated level)

Antenna factor + Cable Loss = 12.88 dB

Total = 35.68 dB $\mu\text{V}/\text{m}$

(35.68/20)

10 = $\mu\text{V}/\text{m}$

Margin = 35.68 - 46.00 = -4.32 dB

4.32 dB ; below limit



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6. TEST EQUIPMENTS

The listing below denotes the test equipments utilized for the test(s).

<u>Nomenclature</u>	<u>Manufacture Model Number</u>	<u>Serial Number</u>	<u>Calibration Date</u>
Signal Analyzer	PMM PMM9000	3100570602	02/08/16
EMC Analyzer	HP E7403A	US39150108	02/02/19
Spectrum Analyzer	ADVANTEST E7403A	61720002	02/08/22
Amplifier (0.1MHz-1.3GHz)	HP 8447E	2945A02712	02/08/19
Biconical Antenna	SWALZBECK BBA9106	N/A	02/09/12
Log Periodic Antenna	SCHAFFNER UPA6109	N/A	02/09/12
Plotter	HP 7475A	007475A	N/A
Shield Room 7m x 4m x 4m	SEMITECH	000815	N/A
Turn Table	JAEMC JAC-2	N/A	N/A
Antenna Mast	Dae-il EMC JAC-1	N/A	N/A
Artificial Mains Network	PMM L3-25	1110K70403	02/10/02
Artificial Mains Network	KYORITSU KNW-242C	8-920-20	02/08/31
Antenna Turntable Controller	JAEMC JAC-2	N/A	N/A