

EMI TEST REPORT

Test report No. : EMC- FCC- 0044

Type of equipment : Portable Storage Controller

Model No. : Masto 2200

Applicant : Digital camp Co., Ltd.

Test standards : FCC part 15 subpart B, Class B

Test Procedure and Items :

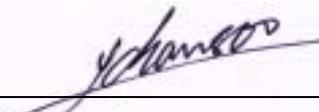
- AC Power Line Conducted Emissions Measurement : ANSI C63.4-1992
- Radiated Emissions Measurement : ANSI C63.4-1992

Test result : **Complied**

The above equipment was tested by EMC compliance Testing Laboratory for compliance with the requirements of FCC Rules and Regulations.

The results of testing in this report apply to the product/system which was tested only. Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.

Date of test: 2002.12.11~12.12 Issued date: 2002 . 12. 17

Tested by : 
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Approved by: 
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1. Client information

Applicant: Digital camp Co., Ltd.
Address: 1627-1 Seocho 1 dong, Kyodae Venture Tower 8F,
Seocho-gu Seoul, Korea
Telephone number: 82-2-525-5247
Facsimile number: 82-2-3471-9616
Contact person: Doo-Yong Kim/Manager

Manufacture: Digital camp Co., Ltd.
Address: 1627-1 Seocho 1 dong, Kyodae Venture Tower 8F,
Seocho-gu Seoul, Korea
Telephone number: 82-2-525-5247
Facsimile number: 82-2-3471-9616

2. Laboratory information

Address

EMC compliance Ltd.

82-1, JEIL-RI, YANGJI-MYUN, YOUNGIN-CITY, KYUNGGI-DO, KOREA

Telephone Number : 82 31 336 9919

Facsimile Number : 82 31 336 4767

FCC Filing No. : 793334

SITE MAP



82-1, JEIL-RI, YANGJI-MYUN, YOUNGIN-CITY, KYUNGGI-DO, KOREA

TEL: 82 31 336 9919 FAX : 82 31 336 4767

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3. TEST SYSTEM CONFIGURATION

3.1 Operation Environment

	Temperature	Humidity	Pressure
OATS :	5 °C	45 %	1014 hPa
Shielded room :	19 °C	43 %	1011 hPa

Test site

These testing were performed following locations;

Shielded room: Conducted emission,
OATS(10m) : Radiated emission

3.2 Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMI. The factors contributing to uncertainties are test receiver, Cable Loss, antenna factor calibration, Antenna directivity, antenna factor Variation with height, antenna phase center variation, antenna Frequency interpolation, measurement distance variation, Site imperfection, mismatching, and system repeatability.

Based on NIS 80, 81, The measurement uncertainty level with a 95% confidence level was applied.

3.3 Sample calculation

Conducted emission

The field strength is calculated by adding the LISN factor, cable loss to the measured reading.

The sample calculation is as follows :

$$\begin{aligned} \text{FS} &= \text{MR} + \text{LF} + \text{CL} & \text{MR} &= \text{Meter Reading} \\ & & \text{LF} &= \text{LISN Factor} \\ & & \text{CL} &= \text{Cable Loss} \end{aligned}$$

If MR is 30dB, LISN Factor 1dB, CL 1dB

The result (MR) is

$$30 + 1 + 1 = 32\text{dBuV}$$

Radiated emission

The field strength is calculated adding the antenna Factor, cable loss and, Antenna pad adding, subtracting the amplifier gain from the measured reading.

The sample calculation is as follows :

$$\begin{aligned} \text{FS} &= \text{MR} + \text{AF} + \text{CL} + \text{AT} - \text{AG} \\ \text{MR} &= \text{Meter Reading} \\ \text{AF} &= \text{Antenna Factor} \\ \text{CL} &= \text{Cable Loss} \\ \text{AP} &= \text{Antenna Pad} \\ \text{AG} &= \text{Amplifier Gain} \end{aligned}$$

If MR is 30dB, AF 12dB, CL 5dB, AP 10dB, AG 35dB

The result (MR) is

$$30 + 12 + 5 + 10 - 35 = 22\text{dBuV/m}$$

4. Description of EUT

4.1 Product Description

Manufactured by:	Digital camp Co., Ltd.
Address:	1627-1 Seocho 1 dong, Kyodae Venture Tower 8F, Seocho-gu Seoul, Korea
Type of equipment:	Portable Storage Controller
Model:	Masto 2200
Serial Number:	N/A
Features:	<ul style="list-style-type: none"> - Support USB 1.1, USB2.0 and Firewire(IEEE1394) interface - True plug & play, hot pluggable and hot swappable - Fast data transfer rate up to 400~480 Mbps - Slim, light and compact design : 128(L) X 79(W) X 18(H) mm - Powered by USB port and Firewire port

4.2 Peripherals

Description	Model / Part #	Serial Number	Manufacture
PC	MP10	910992FT201127	SAMSUNG ELECTRONICS
MONITOR	JT700D	DP17H1DR100659	JOOYONTECH
PRINTER	EPSON STYLUS C60	DR5K014977	EPSON
KEYBOARD	KB-9963	B28AC0NGANB14DI	COMPAQ
MOUSE1	M-S48A	HCA11819280	LOGITECH
MOUSE2	Microsoft HOME	00489798	Microsoft Corp.
HEADSET	C-322	N/A	LABTEC

4.3 Used cables

EUT Port	Type	Shield (Y/N)	Length (m)	Connection point 1	Connection point 2
IEEE1394(6Pin)	IEEE1394	N	1.5	EUT	PC
IEEE1394(4Pin)	IEEE1394	N	0.5		PC
USB	USB	Y	0.5		PC
DC/IN	-	N	1.0		PC
VGA	D-Sub	Y	1.8	PC	MONITOR
PARALLEL	PARALLEL	Y	2.0		PRINTER
PS/2	PS/2	Y	1.8		KEYBOARD
PS/2	PS/2	Y	1.8		MOUSE1
SERIAL	SERIAL	Y	1.8		MOUSE2
MIC	P-JACK	N	2.0		HEADSET
AUDIO OUT	P-JACK	N	2.0		HEADSET

4.4 Operating conditions

Operating : 1. Data read and write mode

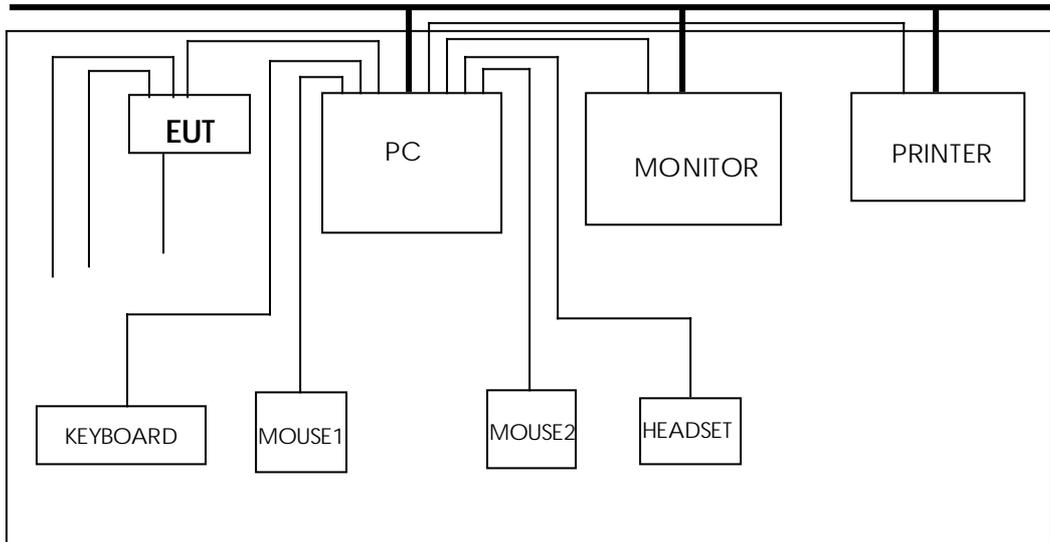
2. Moving picture display mode

- The system was configured in typical fashion (as a customer would normally use it) for testing.

- The EUT was tested IEEE1394 test mode.

The EUT was performed worst case mode.

4.5 EUT test configuration



5. Summary of test results

5.1 Modification to the E.U.T.

- USB CABLE(The EUT side): Ferrite Core(ZCAT 1325 0530)
- 1394-6Pin(The EUT side): Ferrite Core(ZCAT 1730-0730)

Manufacture provide these ferrite cores for sale.

5.2 Standards & results

FCC Part 15 Subpart B (Class B)

ANSI C63.4 – 1992

Test items	Test methods	Result
Conducted emission	ANSI C63.4-1992	Pass
Radiated emission	ANSI C63.4-1992	Pass

6. Test results

6.1 Conducted emission

6.1.1 Measurement procedure

Mains

The measurements were performed in a shielded room.

EUT was placed on a non-metallic table height of 0.8m above the reference ground plane.

The rear of tabletop was located 0.4m to the vertical conducted plane.

All other surfaces of tabletop was at least 0.8m away from any other grounded conducting surface.

They were folded back and forth forming a bundle 0.3m to 0.4m long and were hanged at a 0.4m height to the ground plane.

Each EUT power lead, except ground (safety) lead, was individually connected through a LISN to input power source.

Both lines of power cord, hot and neutral were measured.

6.1.2 Used equipments

Equipment	Model	Serial no.	Makers	Next cal.date	Used
Test receiver	ESHS 10	843276/003	R&S	03.05.08	
L.I.S.N.	L3-32A	0120J20305	PMM	03.03.05	
	L2-16A	0000J10705	PMM	03.03.28	
Test site	Shield room	-	-	-	

6.1.3 Measurement uncertainty

Conducted emission measurement : ± 2.4 (K=2)

6.1.4 Test data

Frequency	Correction		Line	Quasi-peak			Average		
	Factor			Limit	Reading	Result	Limit	Reading	Result
[MHz]	LISN	Cable		[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dBuV]
0.156	1.5	0.1	H	65.7	51.72	53.32	55.7	44.88	46.48
0.471	1.0	0.1	H	56.5	41.88	42.98	46.5	36.66	37.76
0.516	0.7	0.1	N	56.0	49.38	50.18	46.0	41.92	42.72
0.546	0.7	0.1	N	56.0	43.24	44.04	46.0	36.60	37.40
0.753	0.5	0.1	H	56.0	41.45	42.05	46.0	32.97	33.57
16.540	0.3	0.2	N	60.0	41.33	41.83	50.0	38.20	38.70

- Note. QP = Quasi-Peak, AV= Average
- <5 : mean less than 5 dB
- Loss = LISN Loss + Cable Loss
- Measurement time : 1 s

6.1.5. Result

Complied

6.2 Radiated emission

6.2.1 Measurement procedure

A pretest was performed at 3m distance in a semi-anechoic chamber for searching correct frequency.

The final test was done at a 10m open area test site with a quasi-peak detector.

EUT was placed on a non-metallic table height of 0.8m above the reference ground plane.

They were folded back and forth forming a bundle 0.3m to 0.4m long and were hanged at a 0.4m height to the ground plane.

Cables connected to EUT were fixed to cause maximum emission.

Test was made with the antenna positioned in both the horizontal and vertical planes of polarization.

The measurement antenna was varied in height above the conducting ground plane to obtain the maximum signal strength.

6.2.2 Used equipments

Equipment	Model no.	Serial no.	Makers	Next cal date	Used
Test receiver	ESVS10	827864/006	R&S	03.05.08	
Spectrum	SA-9270A	01080005	LG	03.05.10	
Biconnical antenna	SAS-540	560	A.H.System	03.04.04	
Log-Periodic antenna	SAS-510-2	1035	A.H.System	03.04.04	
Antenna Mast	A109	N/A	DEAIL	.	
Turn Table	TS14	N/A	DEAIL	.	
10m OATS	-	-	EMC Compliance	-	

6.2.3 Measurement uncertainty

Radiated Emission measurement : (K=2)

30-300 MHz ; 3 m: ± 3.67 , 10 m: ± 4.4

300-1000 MHz ; 3 m: $\pm 4.6/-2.92$, 10 m: $\pm 2.94/-2.88$

6.2.4 Test data

Frequency	Reading	Pol.	Height	angle	Correction		Limits	Result	Margin
					Factor				
[MHz]	[dBuV/m]		[m]		Antenna	Cable	[dBuV/m]	[dBuV/m]	[dB]
110.90	14.0	V	1.0	283	10.20	2.65	30.0	26.85	3.15
147.47	10.5	V	1.0	118	11.57	3.01	30.0	25.08	4.92
185.40	6.7	H	3.4	158	13.15	3.30	30.0	23.15	6.85
196.63	8.8	V	1.0	174	13.48	3.52	30.0	25.80	4.20
294.00	4.5	V	1.0	59	17.79	3.79	37.0	26.10	10.90
491.00	1.5	H	1.0	117	17.02	5.65	37.0	24.20	12.80
540.74	2.7	H	1.6	69	18.64	5.94	37.0	27.28	9.72
786.53	3.7	H	1.2	203	20.76	7.50	37.0	31.96	5.04

* Receiving Antenna Mode : *Horizontal, Vertical* 10 m OATS

* <5 : mean less than 5dB

* Reading = Test Receiver meter, P= Polarization → POL H = Horizontal, POL V = Vertical

* Result = Field Strength (Antenna factor + Cable factor + Reading)

7. Test photographs

Conducted emission



Radiated emission



8. EUT photographs

EUT Front view



EUT Rear view



EUT Inside view



Cables

PC side connector



EUT side connector



9. Appendix

Conducted emission test graph

