Certification of Compliance

CFR 47 Part 15 Subpart B

Test Report File No. :	08-IST-0405	**Date of Issue** :	May 20, 2008
Model(s) :	MC30		
Kind of Product :	LCD Monitor		
FCC ID :	**TJLMC30**		
Applicant :	HEEYOUNG Co., Ltd.		
Address :	1048-8, Shingil-Dong, Danwon-Gu, Ansan-City, Kyunggi-Do,		
	Korea		
Manufacturer :	HEEYOUNG Co., Ltd.		
Address :	1048-8, Shingil-Dong, Danwon-Gu, Ansan-City, Kyunggi-Do,		
	Korea		

Test Result ■ **Positive** ☐ **Negative**

Reviewed By

S.J.Cho / EMC Group Manager

Approved By

B.S.Kim / Chief

Comment(s)

- Investigations requested : Measurement to the relevant clauses of FCC rules and regulations Part 15 Subpart B – Unintentional Radiators, Class B.
- The test report with appendix consists of 19 pages.
- The test result only responds to the tested sample.
- It is not allowed to copy this report even partly without the allowance of IST EMC Laboratory.
- This equipment as for has been shown to be capable of continued compliance 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 2003.

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Note:

INFORMATIONS OF TEST LABORATORY

EMC LABORATORY of IST Co., Ltd. ***(FCC Filing Lab.)***
400-19, Singal-dong, Giheung-gu, Yongin-si,
Kyonggi-Do, 446-599, Korea
TEL : +82 31 326 6700 FAX : +82 31 326 6797

ENVIRONMENTAL CONDITIONS

Temperature	14.6 ℃
Humidity	46 %
Atmospheric pressure	1014 mbar

POWER SUPPLY SYSTEM USED

Power supply system	120 Vac, 60 Hz (Refer to the product information)

PRODUCT INFORMATION

- **The Equipment Under Test(EUT) is LCD Monitor of Heeyoung Co., Ltd.**

Model Name	MC30	
FCC ID	TJLMC30	
LCD Panel	Size	20.8”
	Type	a-Si TFT active matrix
	Display Size	423(H) x 318(V) mm
	Brightness	450 cd/m2
	Viewing Angle	170(H), 170(V)
	Pixel Pitch	0.270 x 0.270 mm
	Contrast Ratio	450 : 1
Resolution	Landscape	2048 x 1536
Digital Interface	DVI-D Connector	
Serial Port	RS-232C	
USB Port	1Up stream, 2Down stream	
Power	AC Input	100 ~ 240 Vac, 50/60 Hz
	Consumption	75 W
	Saving Mode	Less than 2 W
Dimension	473(W) x 508(H) x 236(D) mm	
Operating Environment	Temperature	10 ℃ to 40 ℃
	Humidity	10 % to 80 %

- EMC suppression device is not used during the test.
- Please refer to user’s manual.

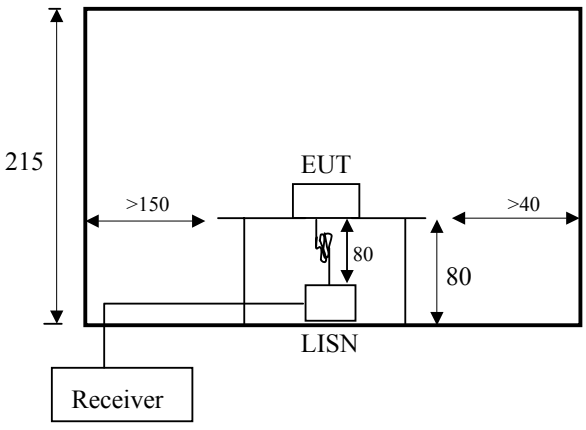
DESCRIPTIONS OF TEST

Conducted Emissions:

The measurement were performed over the frequency range of 0.15 MHz to 30 MHz using a 50 Ω/50 uH LISN as the input transducer to a Spectrum Analyzer or a Field Intensity Meter. The measurements were made with the detector set for "Peak" amplitude within a bandwidth of 10KHz or for "quasi-peak" & "Average" within a bandwidth of 9 KHz.

-Procedure of Test

The line-conducted facility is located inside a shielded room No.1. A 1 m X 1.5 m wooden table 80 cm height is placed 40 cm away from the vertical wall and 1.5 m away from the other wall of the shielded room. The R/S ESH3 and Hyup-Rip KNW-407 LISN are bonded to bottom of the shielded room. The EUT is located on the wooden table with distance more than 80cm from the LISN and powered from the EMCO LISN. The peripheral equipment is powered from the other LISN. Power to the LISNs are filtered by a noise cut power line filters. All electrical cables are shielded by braided tinned steel tubing with inner ϕ 1.2 cm. If the EUT is a DC-powered device, power will be derived from the source power supply it normally will be powered from and this supply lines will be connected to the EMCO LISN. All interconnecting cables more than 1 m were shortened by non-inductive bundling to a 1m length. Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating conditions. The RF output of the LISN was connected to the R/S receiver to determine the frequency producing the maximum emission from the EUT. The frequency producing the maximum level was reexamined using Quasi-Peak mode by manual measurement, after scanned by automatic Peak mode for frequency range from 0.15 to 30 MHz. The bandwidth of the receiver was set to 10 kHz. The EUT, peripheral equipment, and interconnecting cables were arranged and manipulated to maximize each EME emission.



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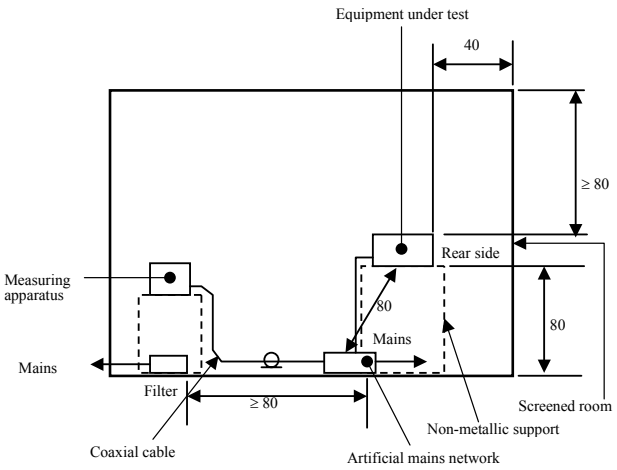


< Concept Drawing >

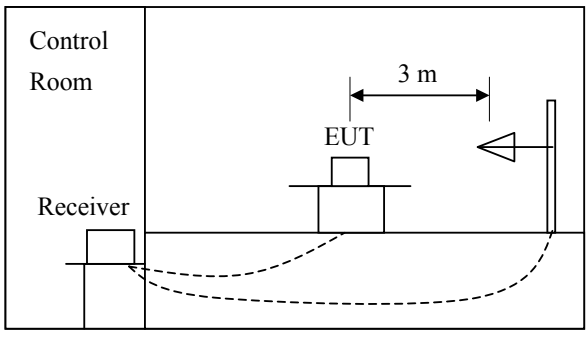
DESCRIPTION OF TEST

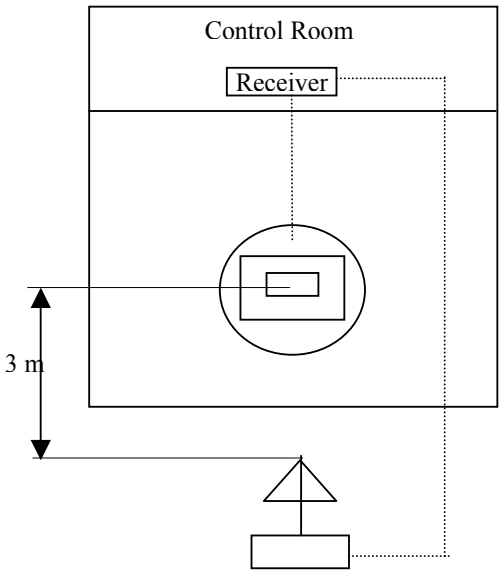
Radiated Emissions:

The measurement was performed over the frequency range of 30 MHz to 1 GHz using antenna as the input transducer to a Spectrum analyzer or a Field Intensity Meter. The measurement was made with the detector set for "quasi-peak" within a bandwidth of 120 KHz.

-Procedure of Test

Preliminary measurements were made at 3 meter using bi-conical and log-periodic antennas, and spectrum analyzer to determine the frequency producing the max. emission in anechoic chamber. Appropriate precaution was taken to ensure that all emission from the EUT were maximized and investigated. The system configuration, mode of operation, turn-table azimuth and height with respect to the antenna were noted for each frequency found. The spectrum was scanned from 30 MHz to 1 GHz using S/B bi-log antenna. Above 1 GHz, linearly polarized double ridge horn antennas were used. Final measurements were made at open site with 10-meters test distance using S/B bi-log antenna or horn antenna. The OATS have been verified in regular for its normalized site attenuation. The test equipment was placed on a wooden table. Sufficient time for the EUT, peripheral equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. Each frequency found during pre-scan measurements was re-examined by manual. The detector function was set to CISPR quasi-peak mode and the bandwidth of the receiver was set to 120 kHz or 1 MHz depending on the frequency of type of signal. The EUT, peripheral equipment and interconnecting cables were re-configured to the set-up producing the max. emission for the frequency and were placed on top of a 0.8-meter high nonmetallic 1 x 1.5 meter table. The EUT, peripheral equipment, and interconnecting cables were re-arranged and manipulated to maximize each emission. The turntable containing the system was rotated; the antenna height was varied 1 to 4 meters and stopped at the azimuth or height producing the maximum emission. Each emission was maximized by: varying the mode of operation to the EUT and/or peripheral equipment and changing the polarity of the antenna, whichever determined the worst-case emission.





Measurement Uncertainty Calculations

The measurement uncertainties stated were calculated in accordance with the requirements of NIST Technical Note 1297 and NIS 81 (1994).

Contribution (Conducted Emissions)	Probability Distribution	Uncertainty (±dB) 0.15-30MHz
Receiver Specification	Rectangular	1.5
LISN Coupling Specification	Rectangular	1.5
Cable and Input Attenuator Calibration	Normal (k=2)	0.5
Mismatch to Reciver	U-Shaped	-0.8 / +0.7
System Repeatability	Normal (k=1)	0.2
Combined Standard Uncertainty	Normal (k=2)	-1.85 / +1.71
Expanded Uncertainty U	Normal (k=2)	-3.7 / +3.42

$U_{c,minus}$ = -1.85, $U_{c,plus}$ = 1.71

U = -3.70 / +3.42 (k=2, 95.45% confidence level)

Contribution (Radiated Emissions)	Probability Distribution	Uncertainties(±dB) 3 m
Antenna		
Factor	Normal (k=2)	0.9968
Frequency Interpolation	Rectangular	0.1039
Height Variation	Rectangular	-2.6 / +1.5
Directivity Difference	Rectangular	-1.0 / +0
Phase Center Location	Rectangular	1.0
Cable Loss	Normal (k=2)	0.5
Receiver		
Voltage Accuracy	Normal (k=2)	2.0
Pulse Response	Rectangular	1.5
Absolute Repetition Rate	Rectangular	1.5
Mismatch to Receiver $\lvert \Gamma_{antenna} \rvert = 0.33$ $\lvert \Gamma_{receiver} \rvert = 0.33$	U-Shaped	-1.0 / +0.9
System Repeatibility	Std Deviation	0.5
Combined Standard Uncertainty	Normal	-2.6048 / 2.2775
Expanded Uncertainty U	Normal (k=2)	-5.21 / +4.55

$U_{c,minus}$ = -2.6048, $U_{c,plus}$ = 2.2775

U = -5.21 / +4.55 (k=2, 95.45% confidence level

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 Mode

■ Operational Condition : Display Scrolling 'H' Patterns on the Windows at 2048 x 1536

Configuration of the equipment under test :

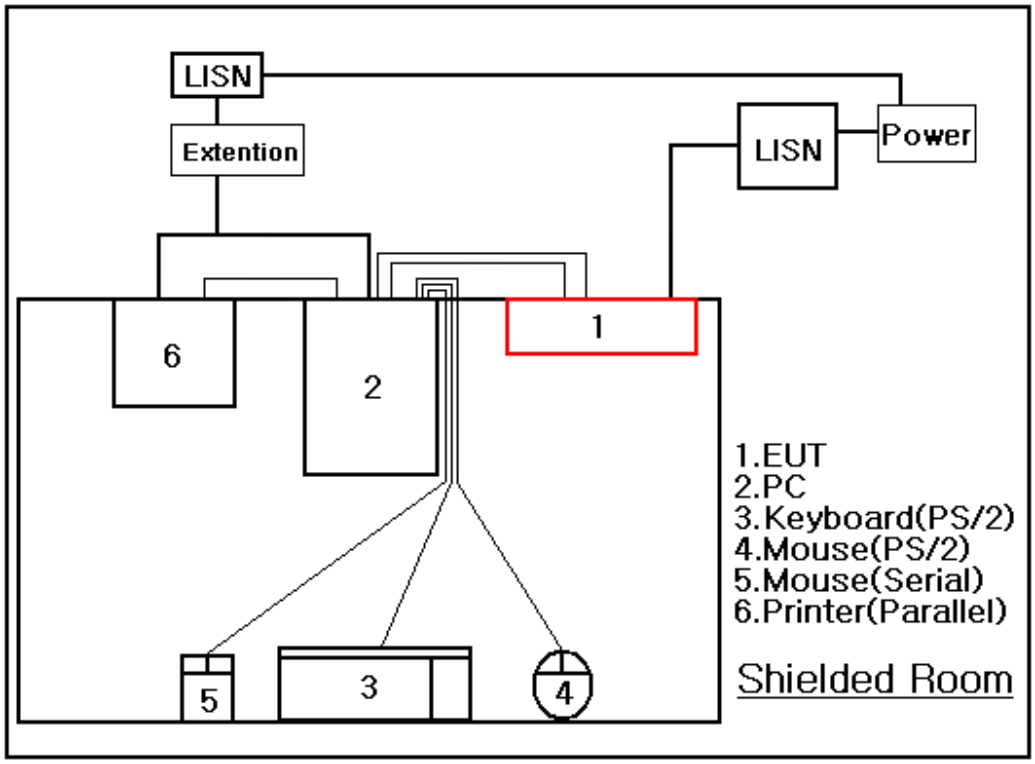
Following peripheral devices and interface cables were connected during the measurement :

Equipment	Type	Brand	Serial No.	FCC Compliance Info.
PC	VL420 MT	HP	N/A	DoC
Keyboard(PS/2)	IGK-2000S	KEM INTERNATIONAL Corp.	100090903491	DoC
Mouse(PS/2)	P801	KYE SYSTEMS CORP.	3872B111	DoC
Mouse(Serial)	M-MD14-2	Logitech Inc.	N/A	DoC
Printer(Parallel)	A0302380	Northern Telecom	2519S60650	DoC

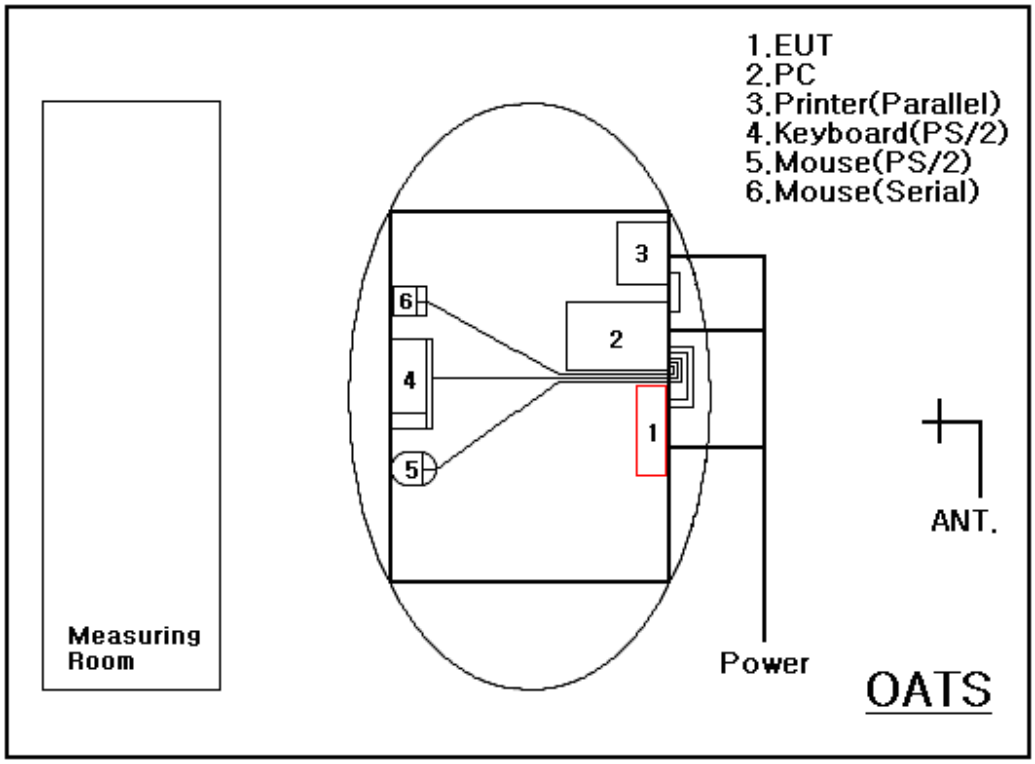
Connecting Interface Cables :
- Shielded USB cable (with one ferrite core) : 0.8 m
- Shielded DVI cable (with two ferrite core) : 1.2 m

Note :

Test Set-Up



Conducted Emissions



Radiated Emissions

SUMMARY

Emissions

■ Conducted Emission

The requirements are ● MET ○ Not MET
Minimum limit margin 7.34 dB at 0.88 MHz
Maximum limit exceeding
Remarks : Limits are kept with more 3dB margin.
Find the test data in following pages 11 to 12.

■ Radiated Emission

The requirements are ● MET ○ Not MET
Minimum limit margin 7.53 dB at 390.84 MHz
Maximum limit exceeding
Remarks : Limits are kept with more 3dB margin.
Find the test data in following page 14 to 16.

test Date

Begin of testing : May 08, 2008
End of testing : May 12, 2008

Note :

- ■ means the test is applicable,
- □ is not applicable.

Prepared By

H.J.KIM / EMC Engineer

TEST CONDITIONS AND DATA

Conducted Emissions

[Applicable]

◆ Test Equipment Used

Model Name	Description	Manufacturer	Calibration Date	Serial No.
ESCI	Test Receiver	Rohde & Schwarz	Jun. 26, 2007	100373
KNW-407	LISN	Hyup-Rip	Oct. 11, 2007	8-883-10
ESH3-Z2	Pulse Limiter	Rohde & Schwarz	May 21, 2008	357.8810.52

◆ Test Accessories Used

Type	Manufacturer
Aneroid Barometer	Sato
Hygrometer	Sato

◆ Test Program See test configuration page 7.

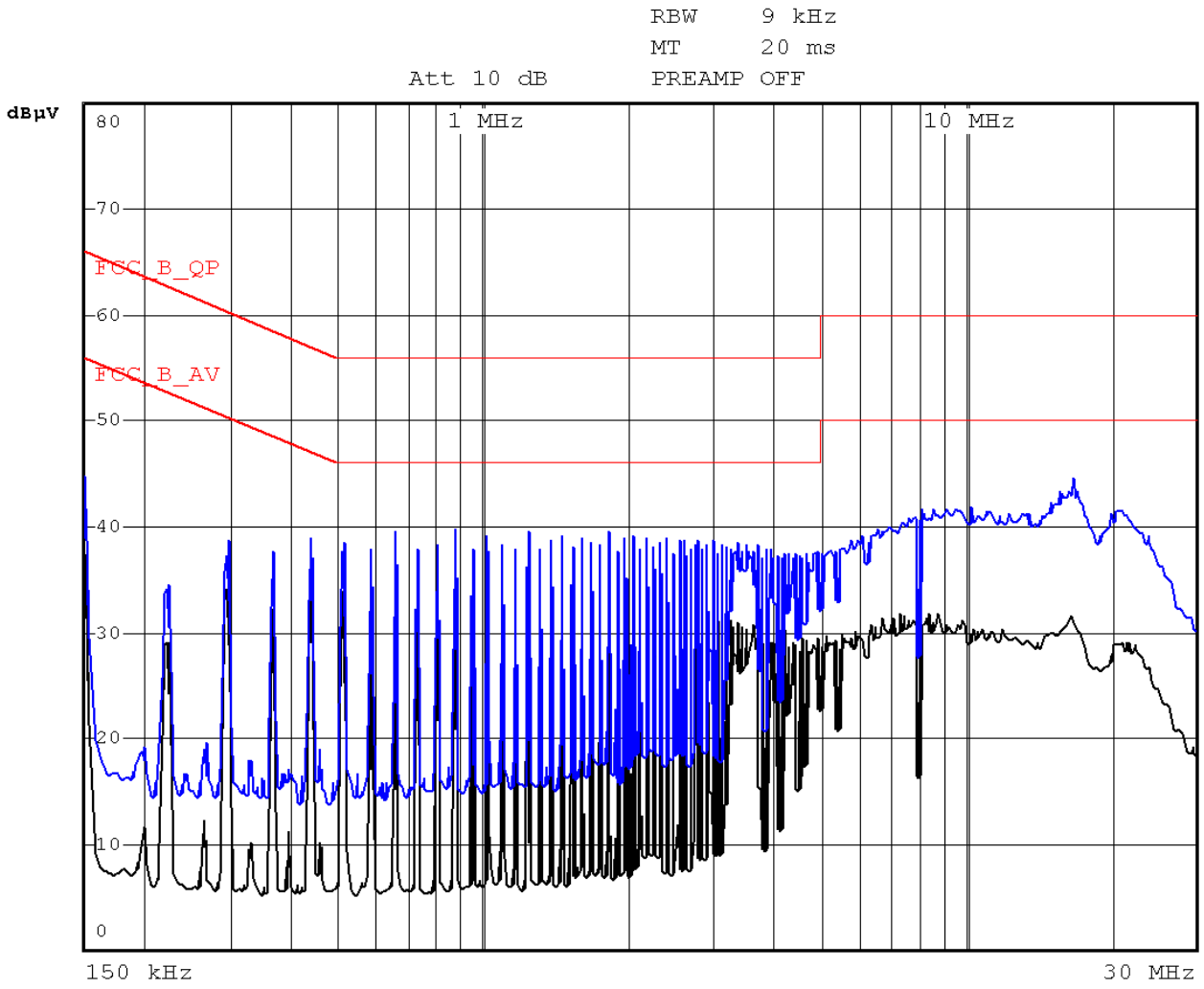
◆ Test Date May 12, 2008

◆ Test Area Conducted room No.1

Note : The equipment used is calibrated in regular for every year.

Conducted Emissions

Live Phase



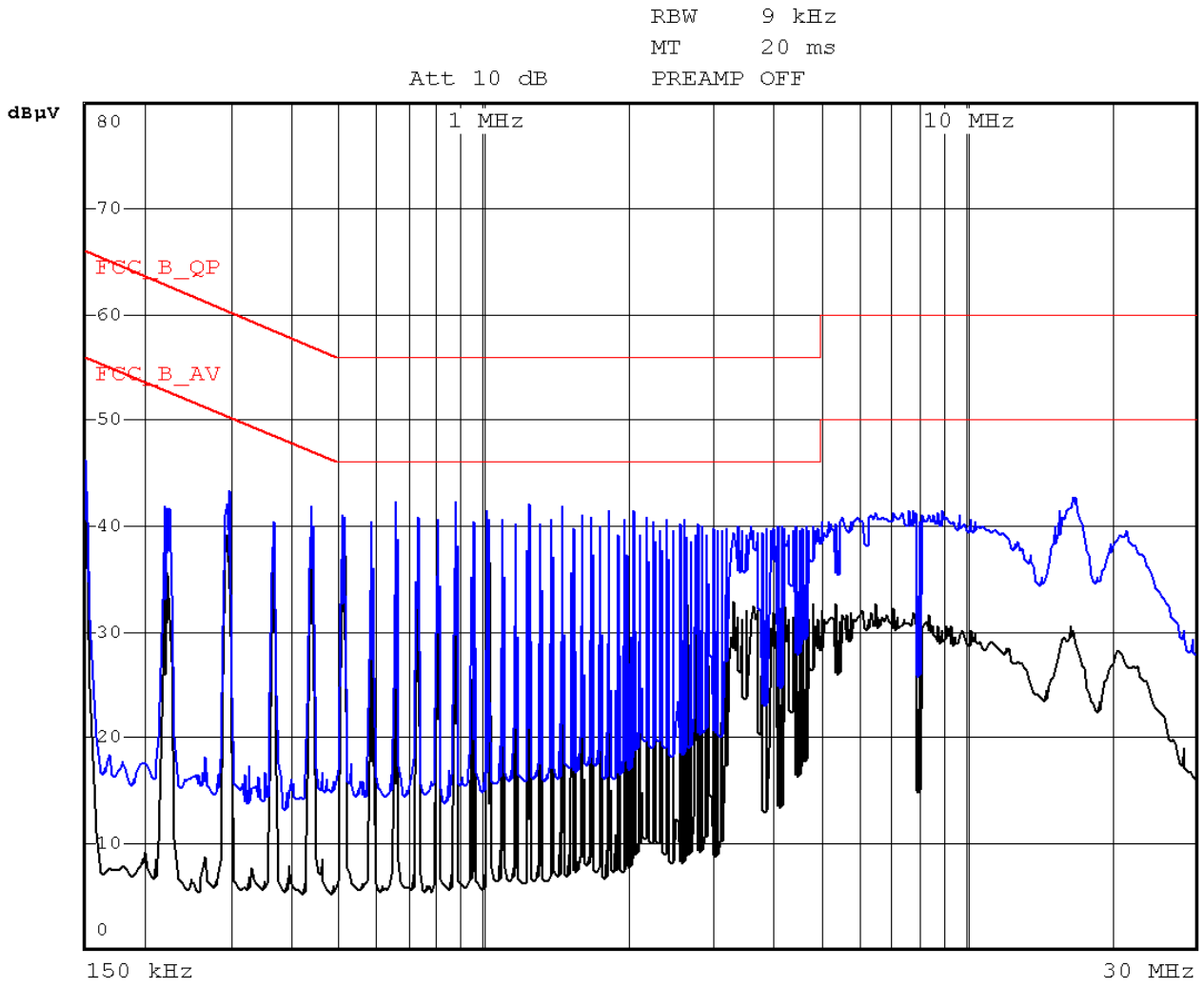
Model Name : MC30
120 Vac 60 Hz Phase : Live

Freq. [MHz]	Measurement [dB µV]		Limit [dB µV]		Insertion Loss	Cable Loss	Result [dB µV]		Margin [dB]	
	Q-peak	Average	Q-peak	Average	[dB]	[dB µV]	Q-peak	Average	Q-peak	Average
0.15	43.14	37.75	66.00	56.00	0.12	0.80	44.06	38.67	21.94	17.33
0.29	37.95	35.87	60.41	50.41	0.13	0.15	38.23	36.15	22.18	14.26
0.44	38.65	35.89	57.08	47.08	0.14	0.20	38.99	36.23	18.09	10.85
0.66	39.11	36.04	56.00	46.00	0.15	0.20	39.46	36.39	16.54	9.61
0.88	39.26	36.12	56.00	46.00	0.21	0.30	39.77	36.63	16.23	9.37

Note :

Conducted Emissions

Neutral Phase



Model Name : MC30
120 Vac 60 Hz Phase : Neutral

Freq. [MHz]	Measurement [dB µV]		Limit [dB µV]		Insertion Loss	Cable Loss	Result [dB µV]		Margin [dB]	
	Q-peak	Average	Q-peak	Average	[dB]	[dB µV]	Q-peak	Average	Q-peak	Average
0.15	45.02	42.78	66.00	56.00	0.12	0.80	45.94	43.70	20.06	12.30
0.29	42.84	40.83	60.47	50.47	0.12	0.15	43.11	41.10	17.36	9.37
0.44	41.22	38.60	57.08	47.08	0.12	0.20	41.54	38.92	15.54	8.16
0.66	41.57	38.25	56.00	46.00	0.12	0.20	41.89	38.57	14.11	7.43
0.88	41.53	38.25	56.00	46.00	0.11	0.30	41.94	38.66	14.06	7.34

Note :

TEST CONDITIONS AND DATA

Radiated Emission

[Applicable]

◆ Test Equipment Used

Name	Type	Manufacturer	Calibration. Date	Serial Number
ESCS30	Test Receiver	Rohde & Schwarz	Aug. 28, 2007	100171
VULB 9160	Antenna	Schwarzbeck	Aug. 10, 2007	3048

◆ Test Accessories Used

Type	Manufacturer
Aneroid Barometer	Sato
Hygrometer	Sato

◆ Test Program See test configuration page 7.

◆ Test Date May 12, 2008

◆ Test Area Open site No.2

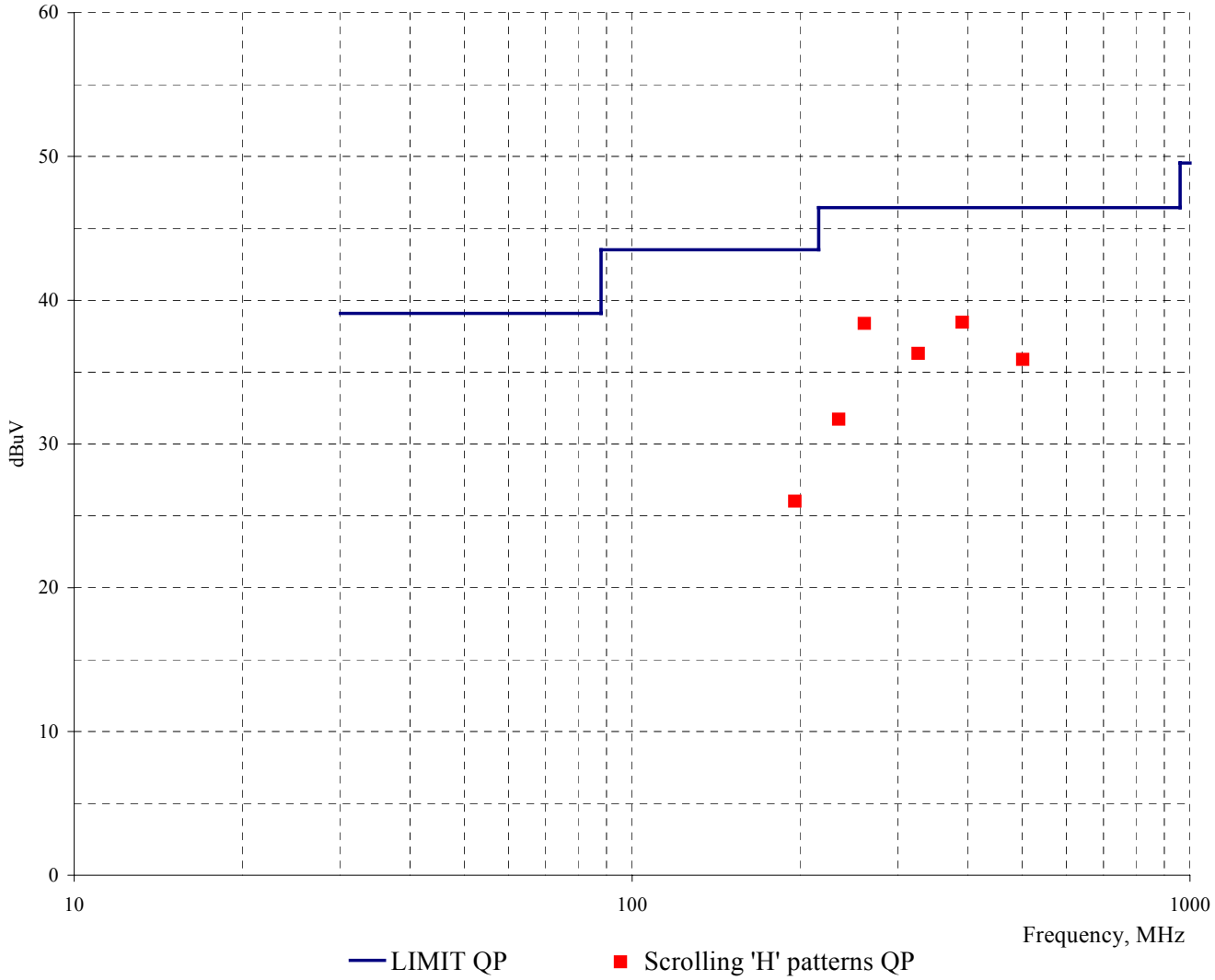
Note : The equipment used is calibrated in regular for every year.

Radiated Emissions

Freq. [MHz]	Reading [dBuV]	Antenna Factor [dB/m]	Cable Loss [dB]	Polar. [H/V]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]
195.87	14.40	9.39	2.23	V	26.02	43.50	17.48
234.67	19.10	10.35	2.27	V	31.72	46.00	14.28
260.86	24.70	11.27	2.42	V	38.39	46.00	7.61
325.85	20.60	13.05	2.65	V	36.30	46.00	9.70
390.84	21.00	14.51	2.96	V	38.47	46.00	7.53
501.40	15.60	16.89	3.40	H	35.89	46.00	10.11

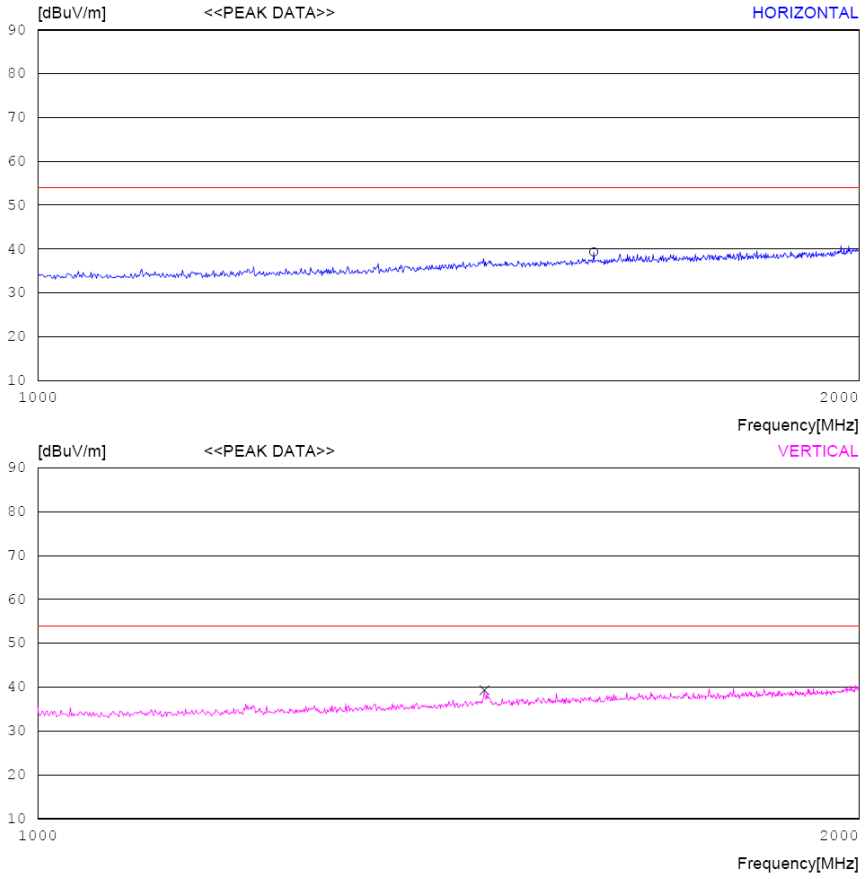
Note:

MEASUREMENT OF DISTURBANCE RADIATION



Radiated Emissions

(Disturbance Radiation)



Radiated Emission Test 1 GHz – 2 GHz

Measured Data from 1 GHz to 2 GHz

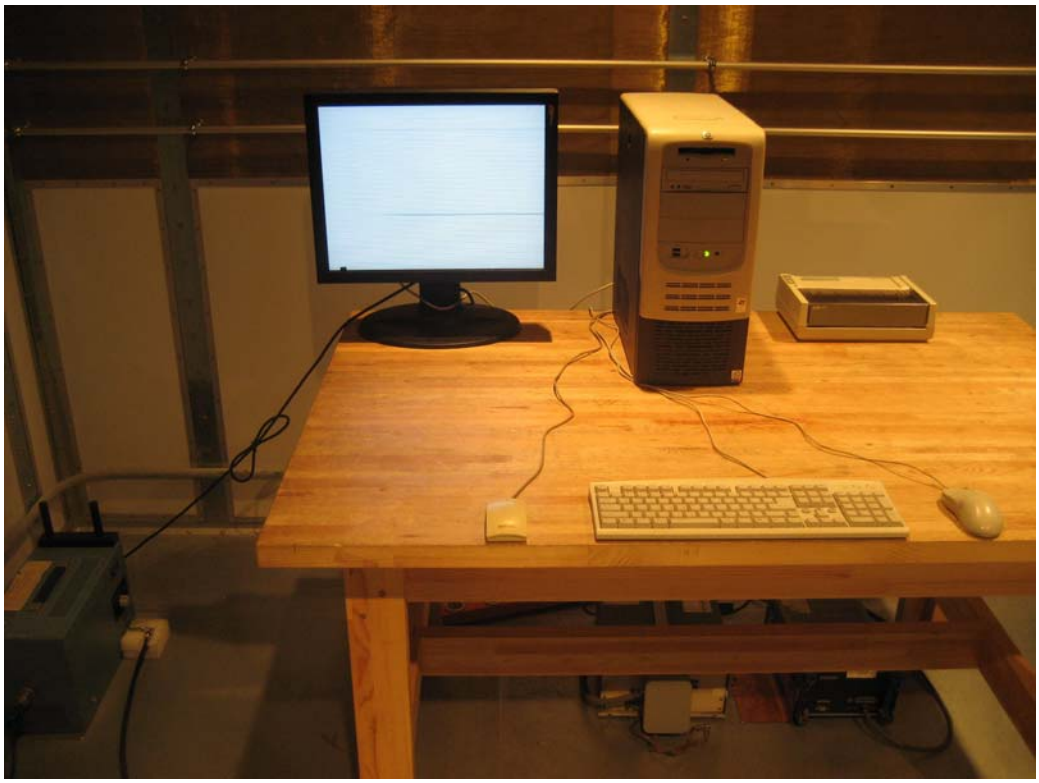
The following graphs show that all data of full frequencies are meet with the limit.
We automatically change our antenna polarity, when measure radiated emission.
The spectrum plot was obtained with peak detect mode and maximum hold mode. It was used
For plot the Advantest R3132 spectrum analyzer, EMCO 3115 Horn antenna.
(Section 15.35)
The peak value evaluation at the frequency of 1.458 GHz is

27.1 dB(measured) + 7.1 dB(antenna factor) + 5.1 dB(cable loss)
– 20 dB(corrective factor)
= 19.3 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.

Note :

Appendix A. The Photos of Test Setup



Conducted Emissions - Front View

Conducted Emissions - Rear View

Appendix A. The Photos of Test Setup

Radiated Emissions - Front View

Radiated Emissions - Rear View

Appendix B. The Photos of EUT

Front View

Rear View