Certification of Compliance

CFR 47 Part 15 Subpart B / Class B PC Peripherals

Test Report File No. 03-IST-175 **Date of Issue** Jun. 24. 2003

Model **CA-K20MT**

Kind of Product MP3 Player (Digital Audio Player)

Applicant CM Tech Co., Ltd.

Address 4F Samil B/D, 362-5, Wonchun Dong, Paldal-Gu, Suwon-City, Kyungki-Do, 442-380 South Korea

Manufacturer CM Tech CO.,Ltd.

Address 4F Samil B/D, 362-5, Wonchun Dong, Paldal-Gu, Suwon-City, Kyungki-Do, 442-380 South Korea

Test Result **(*)Positive** **( ) Negative**

Reviewed By

J.H. Lee / General Manager of EMC

Approved By

G. Chung / Chief

- Investigations requested : Measurement to the relevant clauses of F.C.C rules and regulations Part 15 Subpart B - Class B PC Peripherals / FM Broadcast receivers
- 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 1992.

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INFORMATIONS OF TEST LABORATORY

EMC LABORATORY of IST Co., Ltd. (Yongin Lab., ***Filed to FCC***)
San 21-8, Goan-Ri, Baekam-Myun, Yongin-City
Kyonggi-Do, 449-860, Korea
TEL : +82 31 333 4093 FAX : +82 31 333 4094

EMC LABORATORY of IST Co., Ltd. (Yangji Lab., ***Filed to FCC***)
80, Jeil-RI, Yangji-Myun, Yongin-City
Kyonggi-Do, 449-825, Korea
TEL : +82 31 323 3012 FAX : +82 31 323 3014

ENVIRONMENTAL CONDITIONS

Temperature	22 ℃
Humidity	48 %
Atmospheric pressure	1001 mbar

POWER SUPPLY SYSTEM USED

Power supply system	12V 1A (Notebook AC Adapter)

Product Information

Power	DC 1.5V (SIZE 'AAA') 1EA
PC Interface	USB(Transmission Speed 3Mbps)
Memory Capacity	256MB / 128MB / 64MB
Size	13(mm)X 87(mm)X 29.5(mm)
S/N	90dB (20kHz LPF)
Display	STN LCD (EL Light)
The Others	Case (Aluminum/Plastic)

Find product information in User's manual.

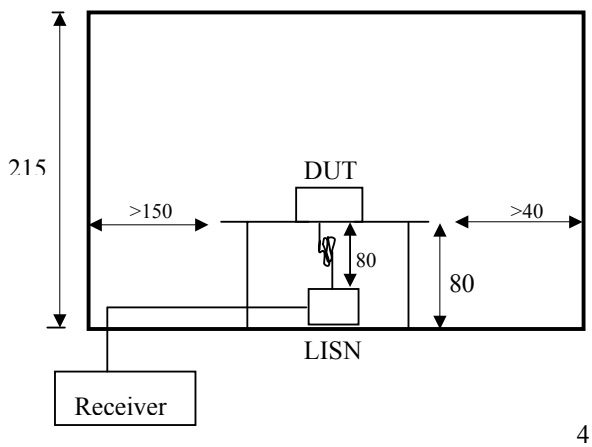
DESCRIPTIONS OF TEST

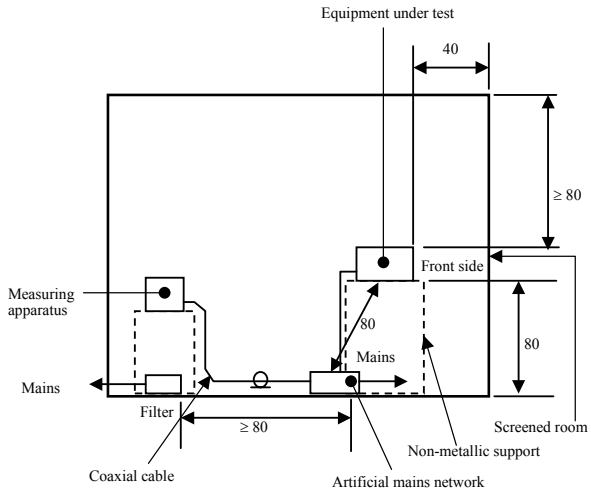
Conducted Emissions:

The measurement were performed over the frequency range of 0.45MHz to 30MHz using a 50Ω/50uH 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 an bandwidth of 10KHz or for "quasi-peak" within a bandwidth of 9KHz.

- Procedure of Test

The line-conducted facility is located in a shielded room. The wooden table 80cm height is placed 40cm away from the vertical wall and 1.5m away from the other wall of the shielded room. The LISNs 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 powered LISN .The peripheral equipment is powered from the other LISN. Power to the LISNs are filtered by a noise cutting power line filters. All electrical cables are shielded by braided tinned steel tubing with inner ϕ 1.2cm. 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 appropriate LISN. All interconnecting cables more than 1m 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 re-measured using Quasi-Peak detector and average detector by manual measurement or final measurement program of R&S, after scanned by automatic Peak mode for frequency range from 0.15 to 30MHz. The bandwidth of the receiver was set to 10kHz. The EUT, peripheral equipment, and interconnecting cables were arranged and manipulated to maximize each EME emission.





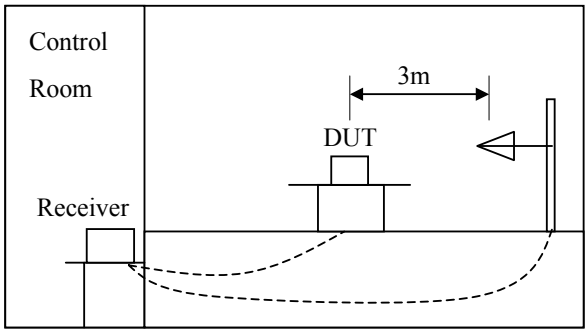
DESCRIPTION OF TEST

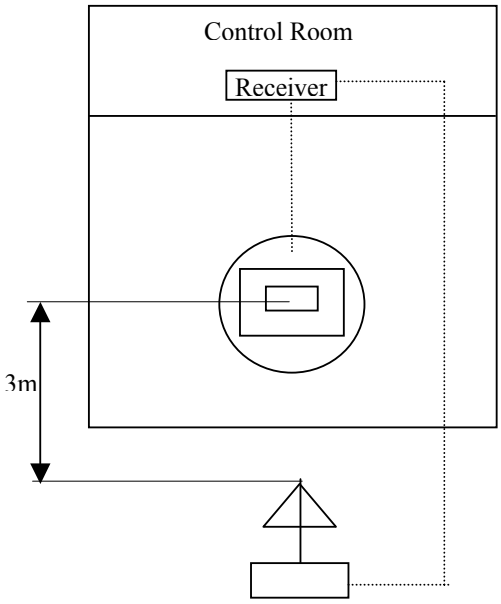
Radiated Emissions:

The measurement was performed over the frequency range of 30MHz to 1GHz 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 120KHz.

- **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 30MHz to 230MHz using bi-conical antenna and 230 to 1000MHz using log-periodic antenna. Above 1GHz, linearly polarized double ridge horn antennas were used. Final measurements were made at open site with 3 or 10 meters test distance using Bi-log antenna, Bi-conical antenna, Log-periodic antenna or horn antenna. The OATS have been verified in regular for its normalized site attenuations. 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 120kHz or 1MHz depending on the frequency of type of signal. The EUT, peripheral equipment and interconnecting cables were configured as same in chamber, 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.





SUMMARY

☒ Conducted Emission

The requirements are ● MET ○ Not MET

Minimum limit margin 6.2dB at 3.70MHz

Maximum limit exceeding

Remarks : With average detector/Live Phase

☒ Radiated Emission

The requirements are ● MET ○ Not MET

Minimum limit margin 5.3dB at 500.6MHz

Maximum limit exceeding

Remarks :

Reported By

H.C. Kim / EMC Engineer

Note :

☒ means the test is applicable, ☐ is not applicable.

TEST CONDITIONS AND DATA

Conducted Emissions

[Applicable]

◆ Test Equipment Used

Model Name	Manufacturer	Description	Next Cal. Date
ESH3	Rohde Schwarz	Receiver	Dec. 9, 2003
ESH2-Z5	Rohde Schwarz	LISN	Dec. 9, 2003
NMLK8121	Schwarzbeck	LISN	Dec. 9, 2003
ESH3-Z2	Rohde Schwarz	Pulse Limiter	Dec. 10, 2003

◆ Auxiliary Equipment Used

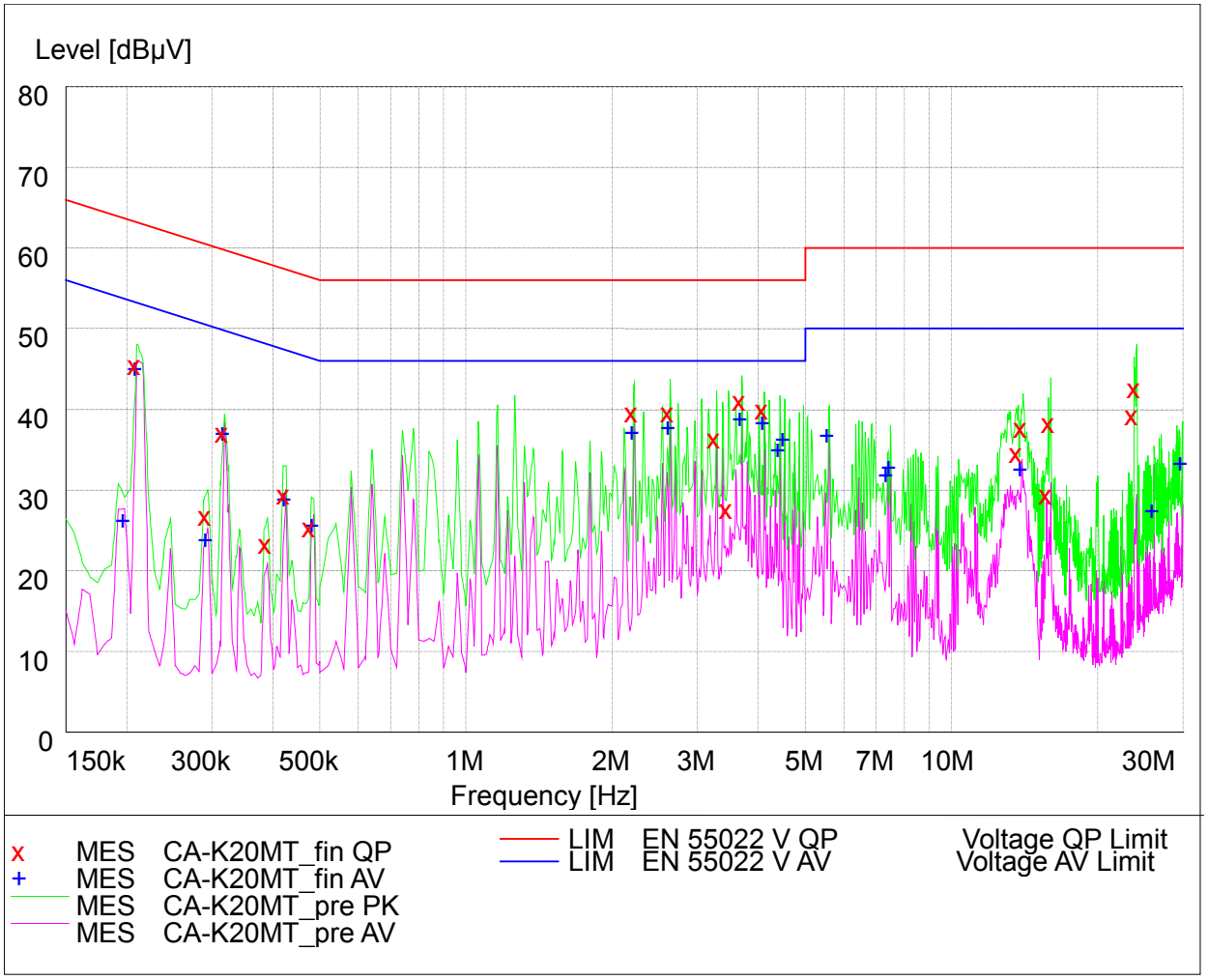
Model Name	Manufacturer	Descriptions	FCC Compliance information
Brio BA600/550	HP	Desktop PC	DoC
SK-2502C	HP	Keyboard (PS/2)	DoC
M-SAS51	HP	Mouse (PS/2)	FCC ID : LZA90401209
529B	Daewoo	Monitor	FCC ID : C5F7NFFCMC529B
A0302380	Northern Telecom	Printer	FCC ID : DSI6XU22225C-L
M-M28	Logitech	Mouse(RS-232C)	FCC ID : DZL210365
NM-V33	TOCO	Headphone/MIC	N/A

◆ Test Program Read and Write

◆ Test Area Shielded Room

Note : It was employed the EN standard in lieu of CFR 47 Part 15 Sec. 15.107.

Conducted Emissions



Live Phase

MEASUREMENT RESULT: "CA-K20MT_fin QP"

6/24/03 3:16PM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Line	PE
0.210000	46.60	10.0	63	16.6	L1	GND
0.294000	27.90	10.0	60	32.5	L1	GND
0.318000	38.20	10.0	60	21.6	L1	GND
0.390000	24.40	10.0	58	33.7	L1	GND
0.426000	30.60	10.0	57	26.7	L1	GND
0.480000	26.40	10.0	56	29.9	L1	GND
2.220000	40.80	10.0	56	15.2	L1	GND
2.640000	40.70	10.0	56	15.3	L1	GND
3.280000	37.50	10.0	56	18.5	L1	GND
3.480000	28.70	10.0	56	27.3	L1	GND
3.700000	42.10	10.0	56	13.9	L1	GND
4.120000	41.10	10.0	56	14.9	L1	GND
13.750000	35.70	10.0	60	24.3	L1	GND
14.050000	38.80	10.0	60	21.2	L1	GND
15.850000	30.60	10.0	60	29.4	L1	GND
16.050000	39.40	10.0	60	20.6	L1	GND
23.800000	40.30	10.0	60	19.7	L1	GND
24.100000	43.70	10.0	60	16.3	L1	GND

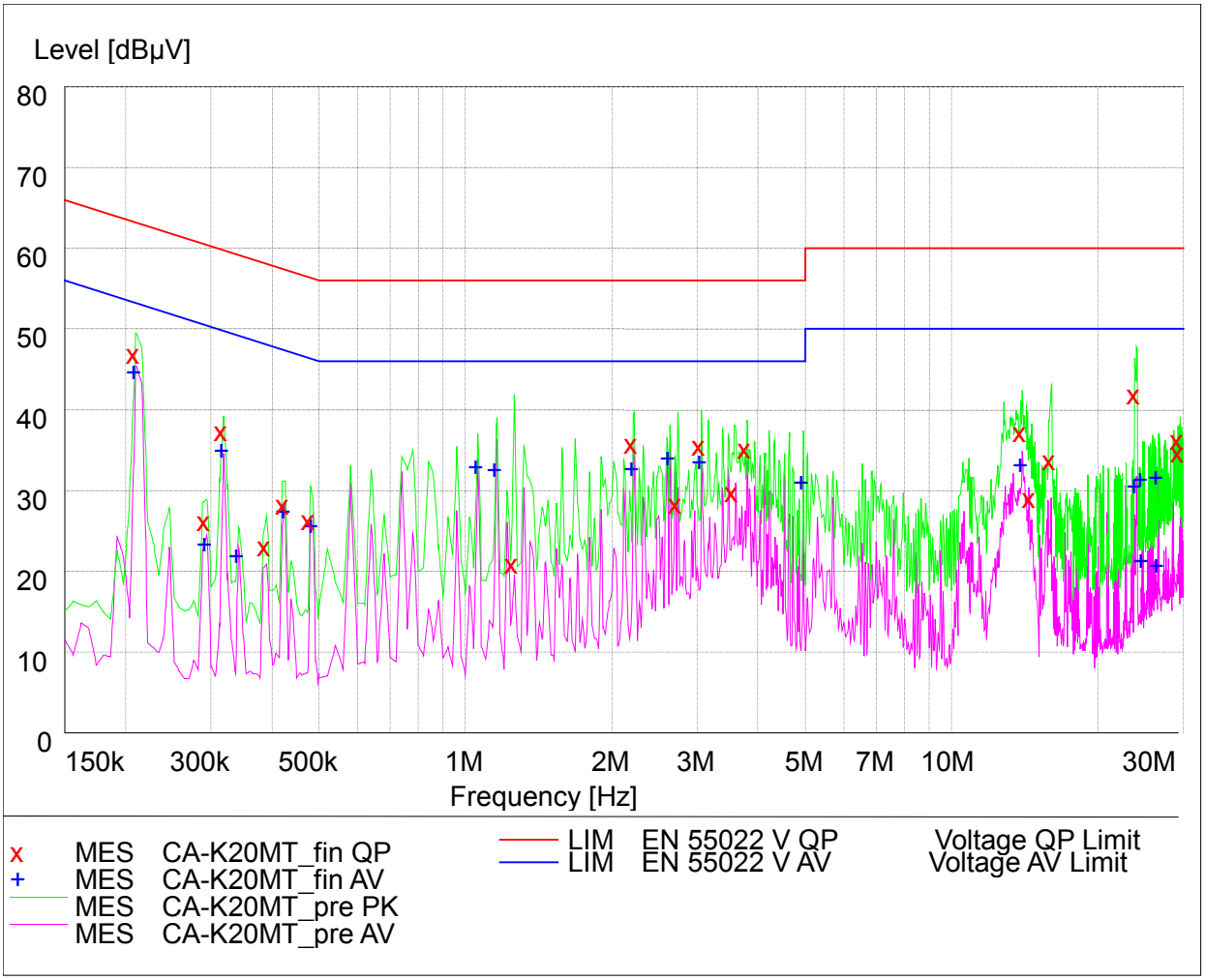
MEASUREMENT RESULT: "CA-K20MT_fin AV"

6/24/03 3:16PM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Line	PE
0.198000	27.20	10.0	54	26.5	L1	GND
0.210000	46.10	10.0	53	7.1	L1	GND
0.294000	24.90	10.0	50	25.5	L1	GND
0.318000	38.10	10.0	50	11.7	L1	GND
0.426000	30.00	10.0	47	17.3	L1	GND
0.486000	26.70	10.0	46	19.5	L1	GND
2.220000	38.20	10.0	46	7.8	L1	GND
2.640000	38.80	10.0	46	7.2	L1	GND
3.700000	39.80	10.0	46	6.2	L1	GND
4.120000	39.40	10.0	46	6.6	L1	GND
4.440000	36.10	10.0	46	9.9	L1	GND
4.540000	37.40	10.0	46	8.6	L1	GND
5.600000	37.80	10.0	50	12.2	L1	GND
7.400000	32.90	10.0	50	17.1	L1	GND
7.500000	33.90	10.0	50	16.1	L1	GND
14.000000	33.60	10.0	50	16.4	L1	GND
26.200000	28.50	10.0	50	21.5	L1	GND
29.900000	34.40	10.0	50	15.6	L1	GND

Note : The insertion loss of LISN is enough small compare with test result.
The maximum insertion loss is 2.07dB at phase L1.

Conducted Emissions



Neutral

MEASUREMENT RESULT: "CA-K20MT_fin QP"

6/24/03 3:04PM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Line	PE
0.210000	48.10	10.0	63	15.1	N	GND
0.294000	27.20	10.0	60	33.2	N	GND
0.318000	38.40	10.0	60	21.4	N	GND
0.390000	24.20	10.0	58	33.9	N	GND
0.426000	29.40	10.0	57	27.9	N	GND
0.480000	27.40	10.0	56	28.9	N	GND
1.260000	22.00	10.0	56	34.0	N	GND
2.220000	36.80	10.0	56	19.2	N	GND
2.740000	29.50	10.0	56	26.5	N	GND
3.060000	36.70	10.0	56	19.3	N	GND
3.580000	30.90	10.0	56	25.1	N	GND
3.800000	36.30	10.0	56	19.7	N	GND
14.000000	38.30	10.0	60	21.7	N	GND
14.650000	30.20	10.0	60	29.8	N	GND
16.100000	34.90	10.0	60	25.1	N	GND
24.050000	43.00	10.0	60	17.0	N	GND
29.450000	37.40	10.0	60	22.6	N	GND
29.550000	35.80	10.0	60	24.2	N	GND

MEASUREMENT RESULT: "CA-K20MT_fin AV"

6/24/03 3:04PM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Line	PE
0.210000	45.70	10.0	53	7.5	N	GND
0.294000	24.40	10.0	50	26.0	N	GND
0.318000	36.00	10.0	50	13.8	N	GND
0.342000	23.00	10.0	49	26.2	N	GND
0.426000	28.50	10.0	47	18.8	N	GND
0.486000	26.70	10.0	46	19.5	N	GND
1.060000	34.00	10.0	46	12.0	N	GND
1.160000	33.60	10.0	46	12.4	N	GND
2.220000	33.70	10.0	46	12.3	N	GND
2.640000	35.10	10.0	46	10.9	N	GND
3.060000	34.60	10.0	46	11.4	N	GND
4.960000	32.10	10.0	46	13.9	N	GND
14.000000	34.20	10.0	50	15.8	N	GND
24.050000	31.50	10.0	50	18.5	N	GND
24.700000	32.40	10.0	50	17.6	N	GND
24.800000	22.30	10.0	50	27.7	N	GND
26.600000	32.70	10.0	50	17.3	N	GND
26.700000	21.80	10.0	50	28.2	N	GND

Note : The insertion loss of LISN is enough small compare with test result.
The maximum insertion loss is 2.07dB at phase L1.

TEST CONDITIONS AND DATA

Radiated Emission

[Applicable]

◆ Test Equipment Used

Model Name	Manufacturer	Description	Next Cal. Date
ESVP	Rohde & Schwarz	Receiver	Aug. 16, 2003
VULB9160	Schwarzbeck	Bi-log Antenna	Jul. 10, 2004

◆ Auxiliary Equipment Used

Model Name	Manufacturer	Descriptions	FCC Compliance information
Brio BA600/550	HP	Desktop PC	DoC
SK-2502C	HP	Keyboard (PS/2)	DoC
M-SAS51	HP	Mouse (PS/2)	FCC ID : LZA90401209
529B	Daewoo	Monitor	FCC ID : C5F7NFFCMC529B
A0302380	Northern Telecom	Printer	FCC ID : DSI6XU22225C-L
M-M28	Logitech	Mouse(RS-232C)	FCC ID : DZL210365
NM-V33	TOCO	Headphone/MIC	N/A

◆ Test Program Read and Write / FM Receiving

◆ Test Area Open Area Test Site #1

Note :

Radiated Emissions

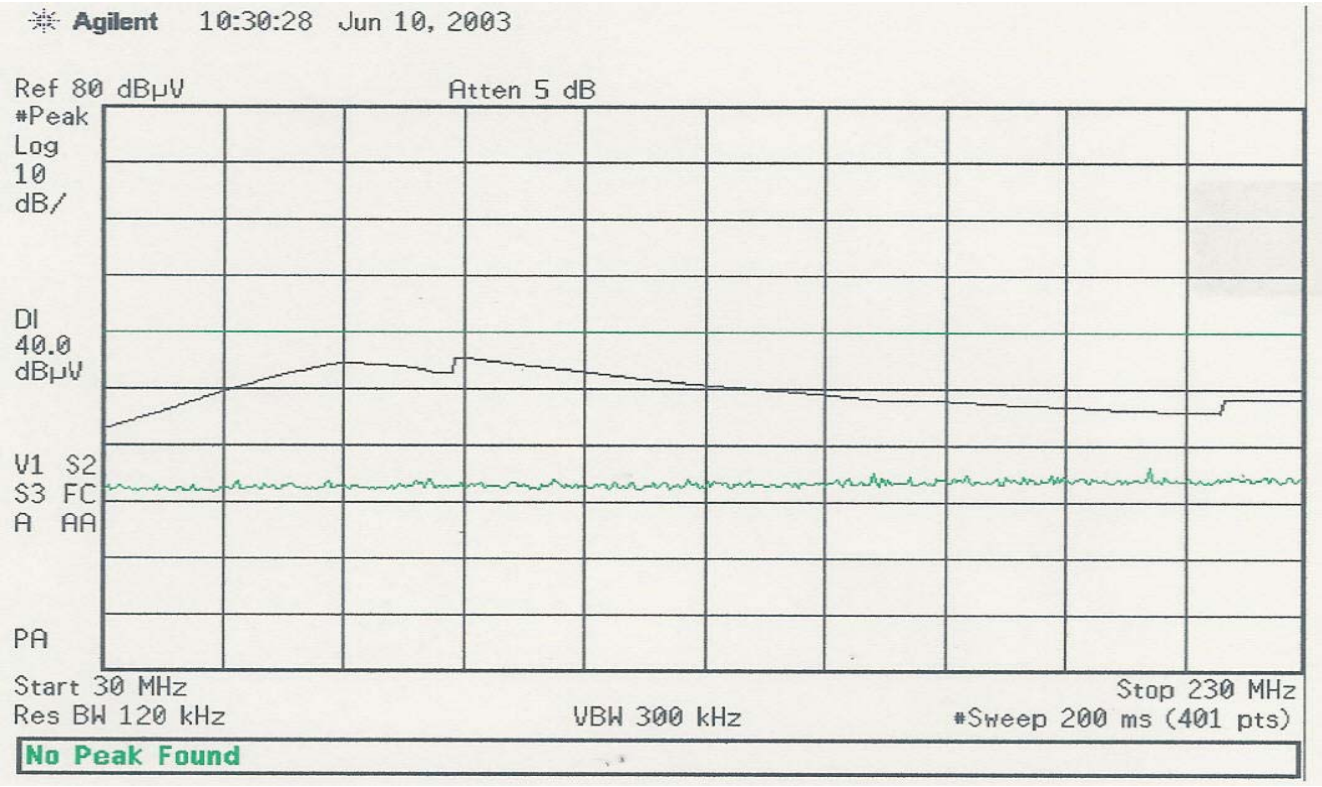
(Disturbance Radiation)

- The measured values are as following

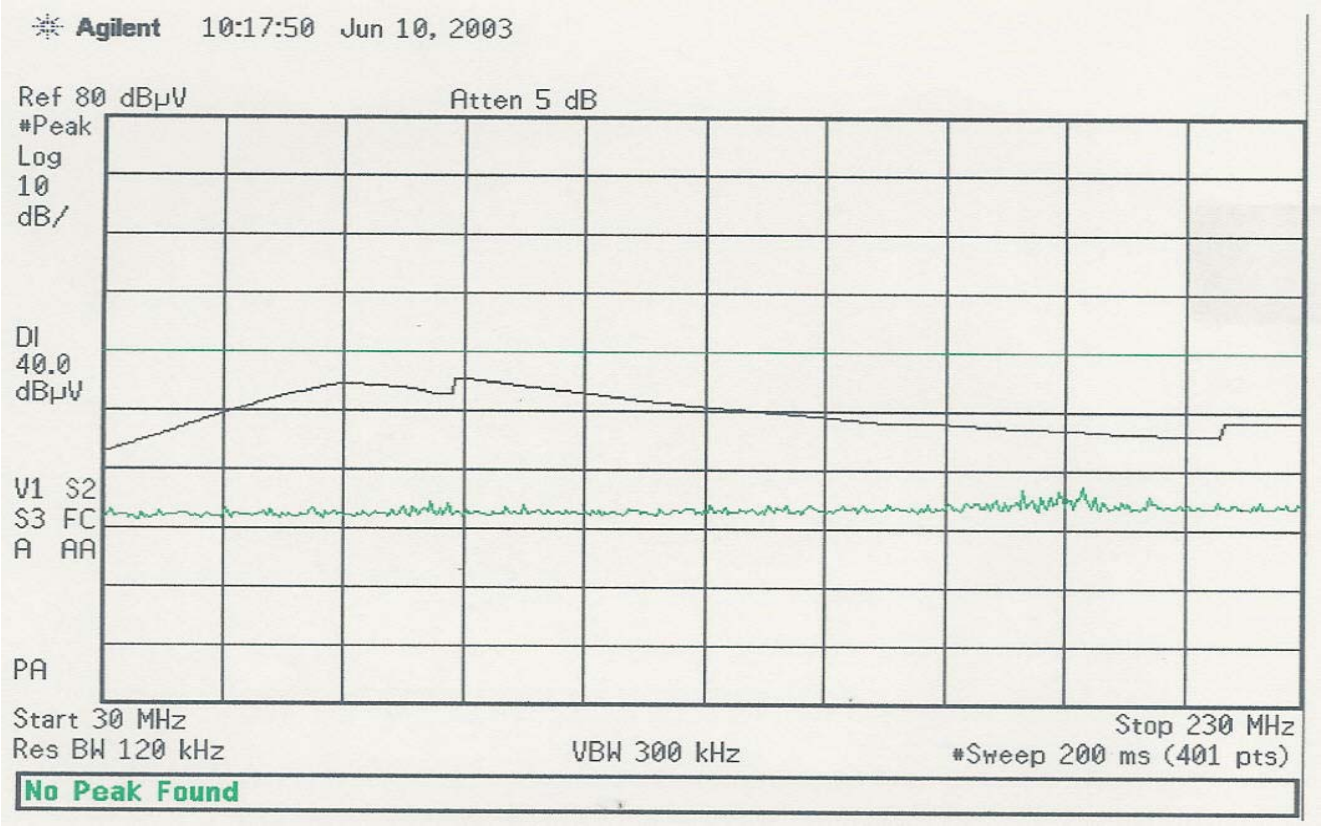
Freq. (MHz)	Reading (dBuV/m)	C.Loss (dB)	Ant. Factor (dBuV/m)	Azimuth (°)	Ant. Height (cm)	Pol. (H/V)	Limits (dBuV/m)	Result (dB)	Margin [dB]
35.1	19.8	1.0	13.4	108	100	V	40.0	34.2	5.8
96.6	22.4	1.8	7.8	180	102	V	43.5	32.0	11.5
124.3	19.5	2.1	10.3	25	100	V	43.5	31.9	11.6
132.0	19.0	2.1	10.6	300	110	V	43.5	31.7	11.8
144.0	20.0	2.2	11.8	356	400	H	43.5	34.0	9.5
162.5	18.1	2.3	12.3	300	115	V	43.5	32.8	10.7
177.6	19.4	2.4	10.9	104	289	H	43.5	32.7	10.8
187.2	20.2	2.5	9.6	312	109	V	43.5	32.3	11.2
195.0	18.0	2.5	8.8	210	256	H	43.5	29.3	14.2
244.3	22.3	2.9	10.4	300	260	H	46.0	35.6	10.4
249.1	23.4	2.8	10.7	160	260	H	46.0	36.9	9.1
300.3	21.9	3.3	11.7	181	300	H	46.0	36.9	9.1
328.0	21.3	3.4	11.7	350	110	V	46.0	36.4	9.6
401.2	23.0	4.3	13.3	100	103	V	46.0	40.6	5.4
500.6	20.8	4.8	15.1	295	124	V	46.0	40.7	5.3

End of data

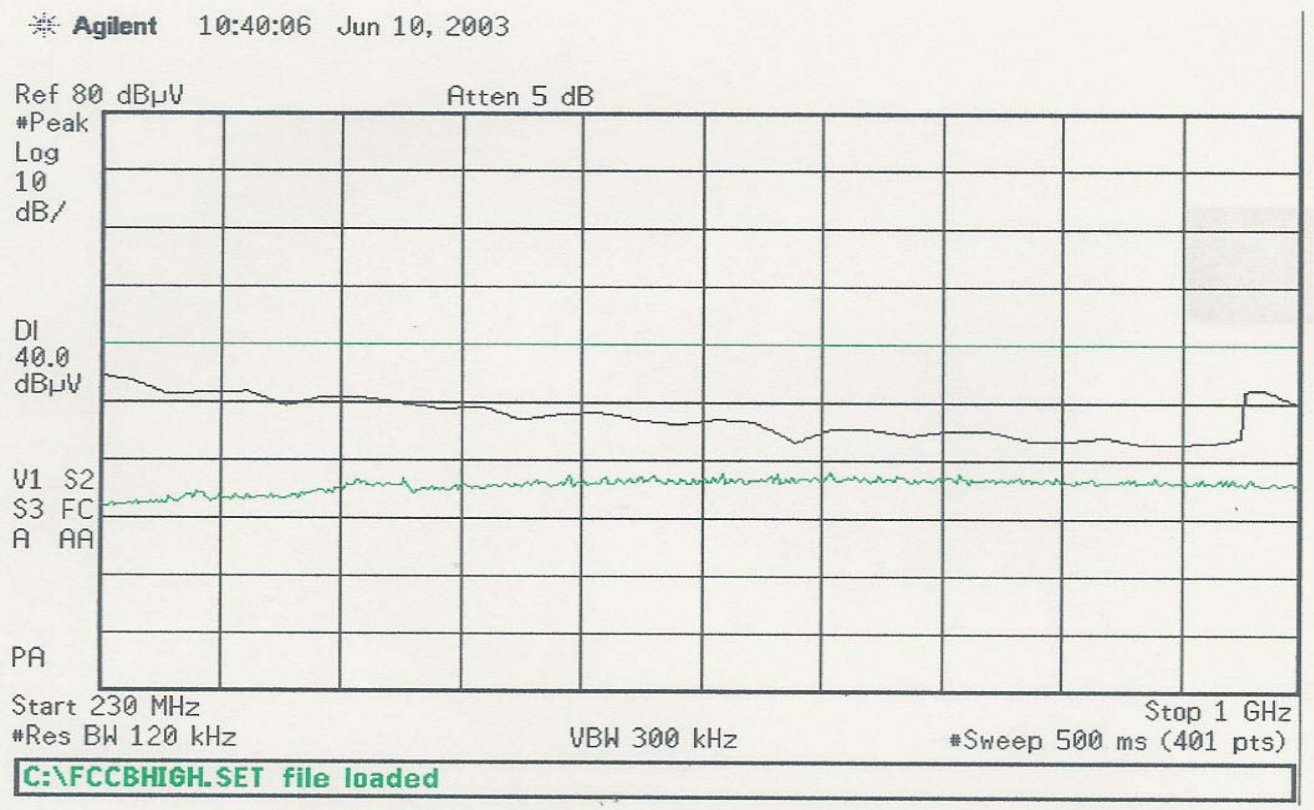
Note : Please refer to following pages for FM receiving mode test result.
It couldn't be measured at open area test site for FM mode. The preliminary test results of FM mode are attached in following pages.



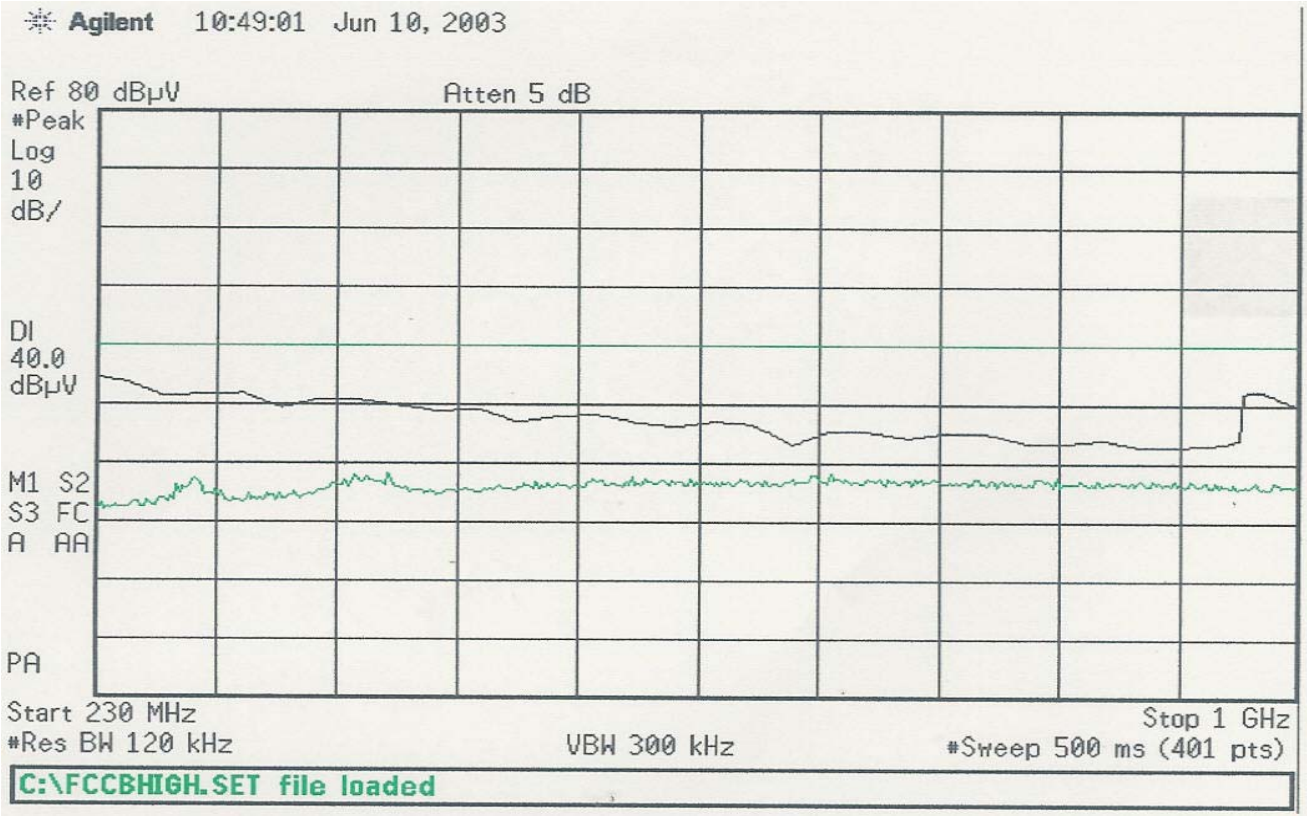
LOW(Vertical)



LOW(Horizontal)



HIGH(Vertical)



HIGH(Horizontal)

Appendix A. The DUT Photos

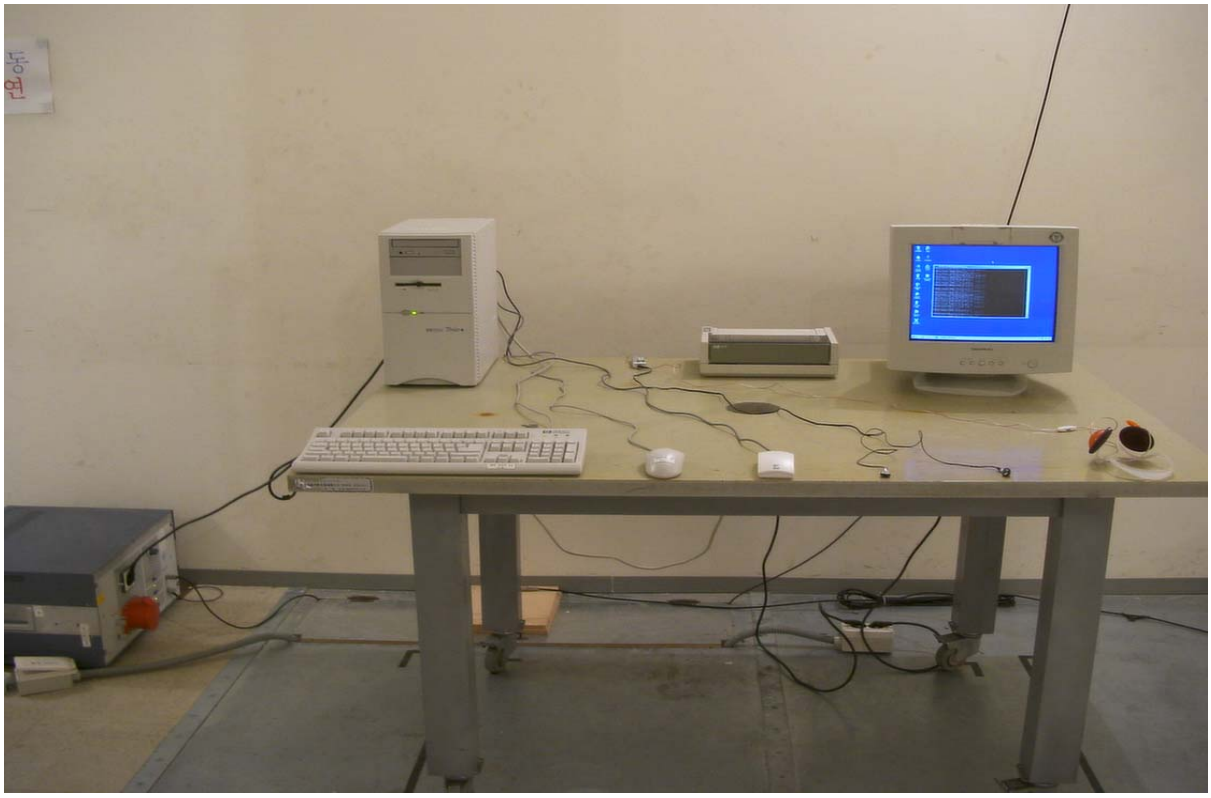
Front View

Rear View

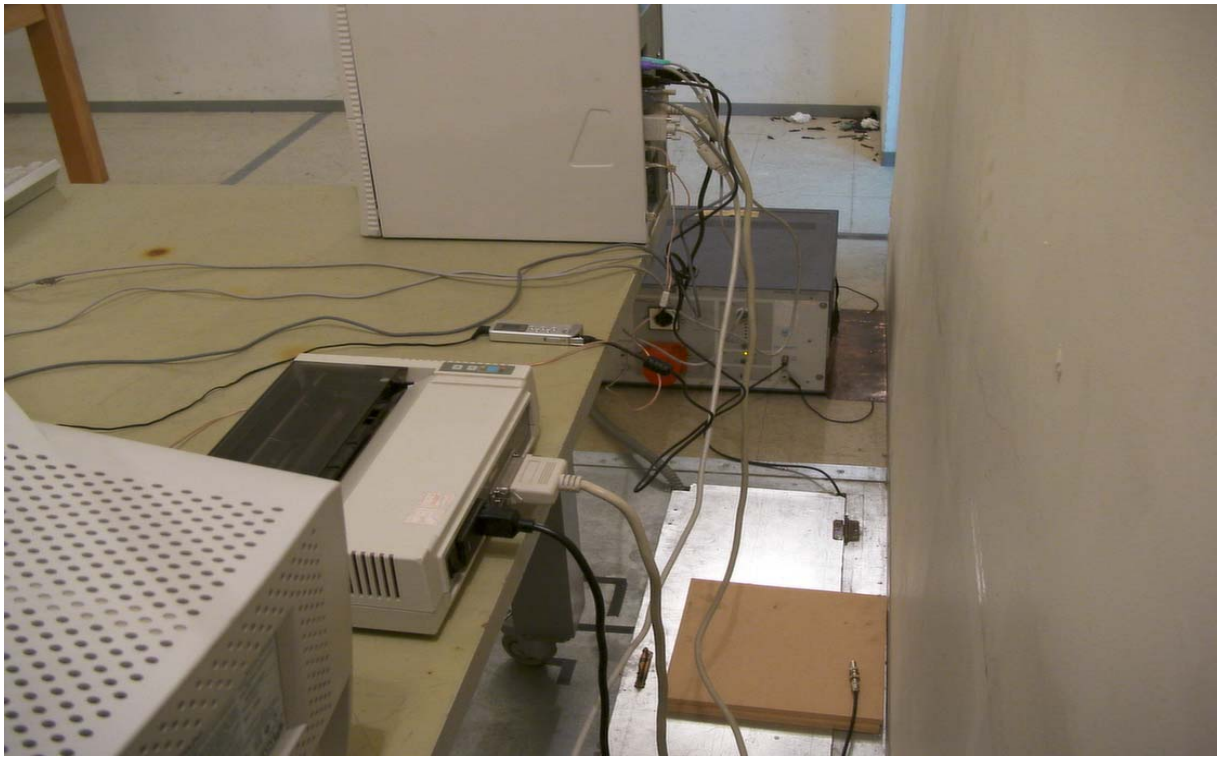
USB Cable

Earphone

Appendix B. The Test Setup Photos



Conducted Emissions-Front View



Conducted Emissions-Rear View

Radiated Emissions-Front View

Radiated Emissions-Rear View