



## **HYUNDAI CALIBRATION & CERTIFICATION TECH. CO., LTD.**

PRODUCT COMPLIANCE TEAM  
SAN 136-1, AMI-RI, BUBAL-EUP, ICHEON-SI, KYOUNGKI-DO, 467-701, KOREA  
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## **CERTIFICATION (Permissive change class )**

**Manufacture:**  
CORNEA TECHNOLOGY CO., Ltd.

Rm#201, Na Dong, Shilla-Technoville, 39-3 Dong-Dong,  
Kunpo-Shi, Kyunggi-Do, Korea

CORNEA : 0006-5809-55

**Date of Issue:** MARCH 8, 2002  
**Test Report No.:** HCT-F02-0302

**Test Site:** HYUNDAI CALIBRATION & CERTIFICATION  
TECHNOLOGIES CO., LTD.

**HCT FRN :** 0005-8664-21

**FCC ID** : **PL4CT1502**

**MODEL / TYPE :** **CT1502**

**FCC Rule Part(s):**

**Part 15 & 2; ET Docket 95-19**

**Classification:**

**FCC Class B Peripheral Device (JBP)**

**Standard(s):**

**FCC Class B: 1998 (CISPR 22)**

**Equipment(EUT) Type:**

**15" LCD Monitor**

**Max Resolution:**

**1024 X 768 Non-interlaced (@60KHz/ 75Hz)**

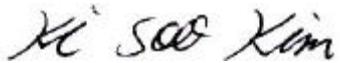
**Port/ Connector(s)**

**15-pin D-sub VGA connector**

The device bearing the trade name and model specified above, has been shown to comply 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.(See Test Report if any modifications were made for compliance)

I attest to the accuracy of data. All measurements reported herein were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

HYUNDAI C-Tech. certifies that no party to application has been denied the FCC benefits pursuant to Section 5301 of the Anti-Drug Abuse of 1988,21 U.S.C.853(a).



Report prepared by : Ki-Soo Kim  
Manager of EMC Tech. Part



**HYUNDAI CALIBRATION & CERTIFICATION TECH. CO., LTD. EMC LAB.**

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## 1. GENERAL INFORMATION

### 1.1 Product Description

The CORNEA TECHNOLOGY CO., LTD. Model CT1502 (referred to as the EUT in this report) is a 15"LCD Monitor with HOR. Freq. 60KHz (Max) and Resolution of 1024X768 (Non-Interlaced). Product specification information described herein was obtained from product data sheet or user's manual.

CHASSIS TYPE	PLASTIC
LIST OF EACH OSC. OR XTAL. FREQ.(FREQ. 1MHz)	12.46MHz , 32.0MHz
POWER REQUIREMENT	100 - 240 V~ 1.5A 60/50Hz
NUMBER OF LAYERS	MAIN BOARD 4 LAYER OSD BOARD 1 LAYER POWER BOARD 1 LAYER INVERTER BOARD 2 LAYER
MAX. RESOLUTION	1024 X 768 NON-INTERLACED(@60KHz/ 75Hz)
H-SYNC FREQUENCY RANGE	30KHz 60KHz
V-SYNC FREQUENCY RANGE	50Hz 75Hz
CRT TYPE	15" ( LCD Type :HM15X11-200, HYUNDAI)

### 1.2 Related Submittal(s) / Grant(s)

**ORIGINAL SUBMITTAL ONLY**

### 1.3 Tested System Details

**The Model names for all equipment, plus descriptions used in the tested system (including inserted cards) are:**

DEVICE TYPE	MANUFACTURER	MODEL NUMBER	FCC ID / DoC	CONNECTED TO
MONITOR (EUT)	CORNEA TECHNOLOGY CO., LTD.	CT1502	PL4CT1502	HOST
PC(HOST)	H/P	DTPC-17	DoC	N/A
KEY BOARD	H/P	SK-2501-2D-K	GYUR385K	HOST
PRINTER	H/P	HP 895C	DoC	HOST
MODEM	3COM CORPORATION	56K FAX MODEM	DoC	HOST
VIDEO CARD	DIAMOND	3D3000	DoC	HOST
MOUSE	H/P	M-S34	DZL211029	HOST

### 1.4 Test Methodology

**Both conducted and radiated testing were performed according to the procedures in ANSI C63.4/1992. Radiated testing was performed at an antenna to EUT distance of 10 meters.**

### 1.5 Test Facility

**The open area test site and conducted measurement facility used to collect the radiated data are located at the 254-1,MAEKOK-RI,HOBUP-MYUN,ICHON-SI,KYOUNGKI-DO, 467-701,KOREA. The site is constructed in conformance with the requirements of ANSI C63.4 and CISPR Publication 22. Detailed description of test facility was submitted to the Commission and accepted dated July 24,2000(Confirmation Number: EA90661)**

## 2.SYSTEM TEST CONFIGURATION

### 2.1 Justification

The device was configured for testing in a typical fashion (as a customer would normally use it). During the tests, the following components and I/O cards inside the E.U.T were used.

DEVICE TYPE	MANUFACTURE	MODEL/PART NUMBER
MAIN BOARD	HYUNDAI	HM15X-11
POWER BOARD	FSP GROUP INC.	-
OSD BOARD	CORNEA TECHNOLOGY CO., LTD.	150000018
INVERTOR BOARD	CORNEA TECHNOLOGY CO., LTD.	K04C0200
LCD BOARD	CORNEA TECHNOLOGY CO., LTD.	15X11062C5018131473

### 2.2 EUT exercise Software

The EUT exercise program used during radiated and conducted testing was designed to exercise the various system components in a manner similar to a typical use. The software, contained on a 3-1/2 inch disc, was inserted into drive A and is auto starting on power-up. Once loaded, the program sequentially exercises each system component in turn. The sequence used is :(1) Display test, (2) RS 232 test (3) Key board test,(4) Printer test,(5) FDD test,(6) HDD test. The complete cycle takes about 20 seconds and is repeated continuously. As the keyboard and mouse are strictly input devices, no data is transmitted to them during test. They are however, continuously scanned for data input activity. The video resolution modes setup and change program was used during the radiated and conducted emission testing.

## 2.3 Cable Description

The marked "(D)" means the Data Cable and "(P)" means the Power Cable.

	Power Cord Shielded (Y/N)	I/O Cable Shielded (Y/N)	Length (M)
MONITOR(EUT)	N	Y	1.8(P), 1.5(D)
PC(HOST)	N	N/A	1.8(P)
PRINTER	N	Y	2.0(P),1.8(D)
KEY BOARD	N/A	Y	2.0(D)
MODEM	N	Y	2.0(P),0.8(D)
MOUSE	N/A	Y	1.8(D)

## 2.4 Noise Suppression Parts on Cable. (I/O CABLE)

	Ferrite Bead (Y/N)	Location	Metal Hood (Y/N)	Location
MONITOR(EUT)	Y	PC END	Y	PC END
PRINTER	N	N/A	Y	BOTH END
KEY BOARD	Y	PC END	Y	PC END
MODEM	N	N/A	Y	BOTH END
MOUSE	N	N/A	Y	PC END

## **2.5 Equipment Modifications**

**N/A**

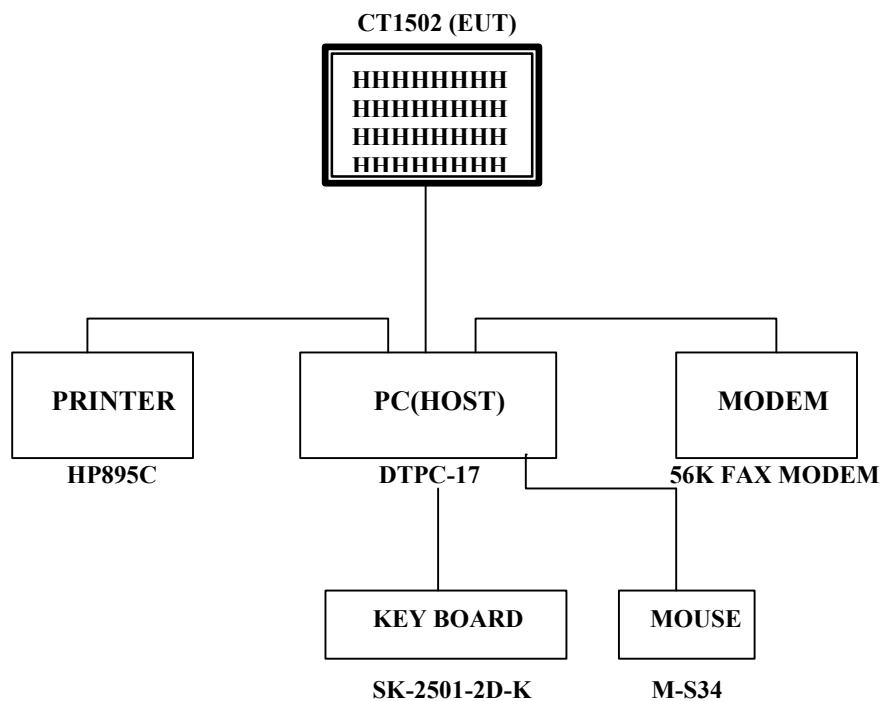
## 2.6 Configuration of Test system

**Line Conducted Test** : EUT was connected to LISN, all other supporting equipment were connected to another LISN.

Preliminary Power line Conducted Emission tests were performed by using the procedure in ANSI C63.4/1992 7.2.3 to determine the worse operating conditions.

**Radiated Emission Test** : Preliminary Radiated Emissions tests were conducted using the procedure in ANSI C63.4/1992 8.3.1.1 to determine the worse operating condition. Final Radiated Emission tests were conducted at 10 meter open area test site.

### [Configuration of Tested System]



### 3. PRELIMINARY TESTS

#### 3.1 AC Power line Conducted Emission Tests

During Preliminary Tests, the following operating mode were investigated

Processor Speed (MHz)	Video Resolution (w/max)	The worst operating condition
Pentium 350 MHz	1024 x 768 Non-Interlaced (60KHz/75Hz)	X
	1024 x 768 Non-Interlaced (56.6KHz/70Hz)	
	800 x 600 Non-Interlaced (46.9KHz/75Hz)	
	800 x 600 Non-Interlaced (37.9KHz/60Hz)	
	640 x 480 Non-Interlaced (31.5KHz/60Hz)	

#### 4.2 Radiated Emission Tests

During Preliminary Tests, the following operating mode were investigated

Processor Speed (MHz)	Video Resolution (w/max)	The worst operating condition
Pentium 350 MHz	1024 x 768 Non-Interlaced (60KHz/75Hz)	X
	1024 x 768 Non-Interlaced (56.6KHz/70Hz)	
	800 x 600 Non-Interlaced (46.9KHz/75Hz)	
	800 x 600 Non-Interlaced (37.9KHz/60Hz)	
	640 x 480 Non-Interlaced (31.5KHz/60Hz)	

Measured by : Kyoung-Hee Yoon / Engineer

Date : DECEMBER 10, 2001

## 4. FINAL CONDUCTED AND RADIATED EMISSION TESTS SUMMARY

### 4.1 Conducted Emission Test

The following table shows the highest levels of conducted emissions on both polarization of hot and neutral line.

Humidity Level	: 42%	Temperature : 20
Limit apply to	: CISPR 22	
Type of Tests	: CLASS B	
Date	: DECEMBER 26, 2001	
Result	: PASSED BY -7.8 dB	

EUT	: 15" LCD MONITOR(CT1502 with D-Tech Adapter)
Operating Condition	: 1024 X 768 Non-Interlaced (Hf : 60.0KHz, Vf : 75Hz)
Detector	: CISPR Quasi-Peak (6 dB Bandwidth : 9 KHz) CISPR Average(6 dB Bandwidth : 9 KHz)

#### Line Conducted Emission Tabulated Data

Power Line Conducted Emissions			CISPR 22		
Frequency (MHz)	Amplitude (dBuV)	Conductor	Limit (dBuV)	Margin (dB)	Detector Mode
0.495	38.30	HOT	46.0	-7.8	Average
2.465	37.5	NEUTRAL	46.0	-8.5	Average
2.835	37.2	NEUTRAL	46.0	-8.8	Average
2.525	37.0	NEUTRAL	46.0	-9.0	Average

#### NOET:

1. All video modes and resolutions were investigated and the worst-case emissions are reported  
Other video modes & resolution were tested and found to be in compliance.

Measured by : Kyoung-Hee Yoon / Engineer

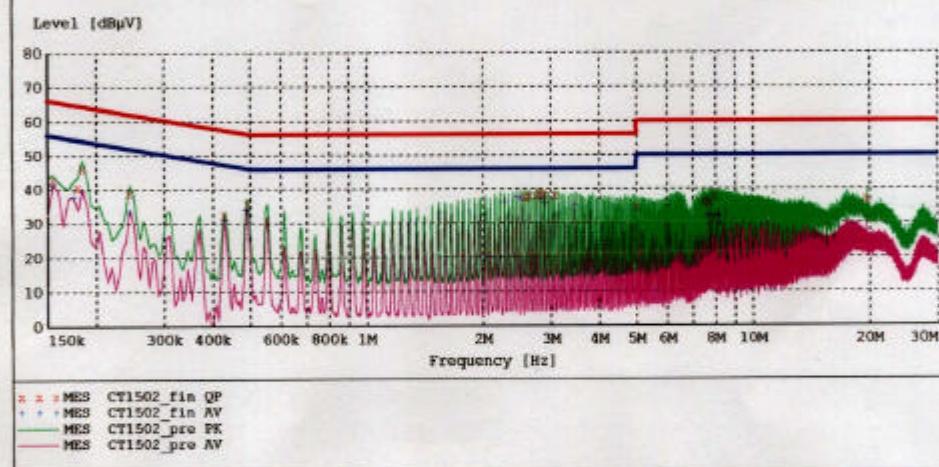
Date : DECEMBER 26, 2001

**HYUNDAI C-TECH. CO., LTD.**  
**EMC TEST LAB.**

EUT: CT1502  
 Manufacturer: CORNEA  
 Operating Condition: 1024 X 768 60K 75Hz  
 Test Site: Shield Room  
 Operator: SJ.LEE  
 Test Specification: MIC CLASS B  
 Comment: N  
 Start of Test: 12/26/01 / 9:10:33PM

**SCAN TABLE: "EN 55022 V (PKH)"**

EN 55022 Voltage						
Start	Stop	Step	Detector	Meas.	IF	Transducer
150.0 kHz	500.0 kHz	5.0 kHz	MaxPeak	100.0 ms	9 kHz	CABLE LOSS (NEW)
500.0 kHz	5.0 MHz	5.0 kHz	Average			
			MaxPeak	10.0 ms	9 kHz	CABLE LOSS (NEW)
			Average			



**MEASUREMENT RESULT: "CT1502\_fin QP"**

12/26/01 9:14PM

Frequency MHz	Level dB $\mu$ V	Transd dB	Limit dB $\mu$ V	Margin dB	Line	PE
0.155000	43.00	0.5	66	22.8	1	---
0.180000	40.60	0.5	65	23.9	1	---
0.185000	46.30	0.5	64	17.9	1	---
0.245000	38.90	0.5	62	23.0	1	---
0.430000	32.40	0.5	57	24.8	1	---
0.495000	35.70	0.5	56	20.4	1	---
2.585000	37.50	0.6	56	18.5	1	---
2.650000	37.90	0.6	56	18.1	1	---
2.770000	38.10	0.6	56	17.9	1	---
2.835000	38.80	0.6	56	17.2	1	---
2.895000	38.30	0.6	56	17.7	1	---
3.080000	37.90	0.6	56	18.1	1	---
5.000000	34.80	0.9	56	21.2	1	---
7.455000	36.30	1.1	60	23.7	1	---

Page 1/2 12/26/01 9:14PM CT1502

**MEASUREMENT RESULT: "CT1502\_fin QP"**  
(continued)

Frequency MHz	Level dB <sub>p</sub> V	Transd dB	Limit dB <sub>p</sub> V	Margin dB	Line	PE
7.640000	36.70	1.1	60	23.3	1	---
7.700000	35.80	1.1	60	24.2	1	---
7.950000	37.70	1.2	60	22.3	1	---
19.690000	36.80	1.8	60	23.2	1	---

**MEASUREMENT RESULT: "CT1502\_fin AV"**  
12/26/01 9:14PM

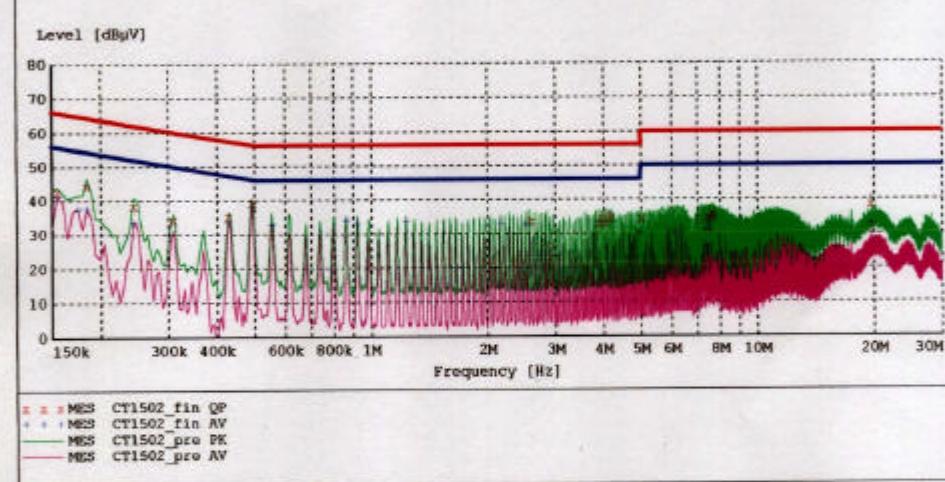
Frequency MHz	Level dB <sub>p</sub> V	Transd dB	Limit dB <sub>p</sub> V	Margin dB	Line	PE
0.155000	41.40	0.5	56	14.4	1	---
0.175000	37.70	0.5	55	17.1	1	---
0.185000	39.50	0.5	54	14.7	1	---
0.245000	33.40	0.5	52	18.5	1	---
0.430000	30.90	0.5	47	16.3	1	---
0.490000	34.00	0.5	46	12.2	1	---
2.280000	36.20	0.6	46	9.8	1	---
2.465000	37.50	0.6	46	8.5	1	---
2.525000	37.00	0.6	46	9.0	1	---
2.835000	37.20	0.6	46	8.8	1	---
2.895000	35.80	0.6	46	10.2	1	---
3.450000	35.40	0.7	46	10.6	1	---
7.640000	32.00	1.1	50	18.0	1	---
7.825000	32.20	1.1	50	17.8	1	---
7.885000	30.20	1.1	50	19.8	1	---
8.010000	31.90	1.2	50	18.1	1	---
8.195000	32.10	1.2	50	17.9	1	---
8.255000	29.80	1.2	50	20.2	1	---

**HYUNDAI C-TECH. CO., LTD.**  
**EMC TEST LAB.**

EUT: CT1502  
 Manufacturer: CORNEA  
 Operating Condition: 1024 X 768 60K 75Hz  
 Test Site: Shield Room  
 Operator: SJ.LEE  
 Test Specification: MIC CLASS B  
 Comment: H  
 Start of Test: 12/26/01 / 9:15:44PM

**SCAN TABLE: "EN 55022 V (PKH)"**

EN 55022 Voltage						
Start Frequency	Stop Frequency	Step Width	Detector	Meas.	IF Time	Transducer
150.0 kHz	500.0 kHz	5.0 kHz	MaxPeak	100.0 ms	9 kHz	CABLE LOSS (NEW)
			Average			
500.0 kHz	5.0 MHz	5.0 kHz	MaxPeak	10.0 ms	9 kHz	CABLE LOSS (NEW)
			Average			



**MEASUREMENT RESULT: "CT1502\_fin\_QP"**

12/26/01 9:20PM

Frequency MHz	Level dB <sub>u</sub> V	Transd dB	Limit dB <sub>u</sub> V	Margin dB	Line	PE
0.155000	42.60	0.5	66	23.2	1	---
0.185000	44.40	0.5	64	19.8	1	---
0.245000	38.40	0.5	62	23.5	1	---
0.310000	34.40	0.5	60	25.6	1	---
0.430000	35.20	0.5	57	22.1	1	---
0.495000	39.20	0.5	56	16.9	1	---
2.590000	33.60	0.6	56	22.4	1	---
3.885000	33.00	0.7	56	23.0	1	---
3.950000	34.50	0.8	56	21.5	1	---
4.070000	33.10	0.8	56	22.9	1	---
4.135000	35.40	0.8	56	20.6	1	---
4.200000	34.70	0.8	56	21.3	1	---
5.000000	34.40	0.9	56	21.6	1	---
7.405000	34.60	1.1	60	25.4	1	---

**MEASUREMENT RESULT: "CT1502\_fin\_QP"**

(continued)

Frequency MHz	Level dB $\mu$ V	Transd dB	Limit dB $\mu$ V	Margin dB	Line	PE
7.590000	34.30	1.1	60	25.7	1	---
7.655000	36.00	1.1	60	24.0	1	---
7.715000	35.10	1.1	60	24.9	1	---
19.690000	38.40	1.8	60	21.6	1	---

**MEASUREMENT RESULT: "CT1502\_fin\_AV"**

12/26/01 9:20PM

Frequency MHz	Level dB $\mu$ V	Transd dB	Limit dB $\mu$ V	Margin dB	Line	PE
0.155000	41.20	0.5	56	14.6	1	---
0.175000	37.40	0.5	55	17.3	1	---
0.185000	37.60	0.5	54	16.7	1	---
0.245000	33.50	0.5	52	18.4	1	---
0.430000	33.80	0.5	47	13.5	1	---
0.495000	38.30	0.5	46	7.8	1	---
0.555000	32.90	0.5	46	13.1	1	---
0.865000	34.10	0.5	46	11.9	1	---
0.925000	33.30	0.5	46	12.7	1	---
1.235000	33.60	0.5	46	12.4	1	---
2.160000	33.10	0.6	46	12.9	1	---
2.530000	32.70	0.6	46	13.3	1	---
5.000000	30.20	0.9	46	15.8	1	---
6.110000	30.60	1.0	50	19.4	1	---
7.345000	31.00	1.1	50	19.0	1	---
7.470000	32.20	1.1	50	17.8	1	---
7.530000	30.80	1.1	50	19.2	1	---
19.690000	32.70	1.8	50	17.3	1	---

## 4.2 Radiated Emissions Tests

The following table shows the highest levels of Radiated Emissions on both polarization of horizontal and vertical.

Humidity Level	: 40 %	Temperature : 16
Limit apply to	: CISPR 22	
Type of Tests	: CLASS B	
Date	: DECEMBER 20, 2001	
Result	: PASSED BY -3.0 dB	

EUT : 15" LCD MONITOR(CT1502 with D-Tech Adapter)  
 Operating Condition : 1024 X 768 Non-Interlaced (Hf : 60.0 kHz, Vf : 75 Hz)  
 Detector : CISPR Quasi-Peak (6 dB Bandwidth : 120 KHz)

Frequency MHz	Reading dBuV/m	Ant. Factor dB	Cable Loss dB	ANT POL (H/V)	Total dBuV/m	Limit dBuV/m	Margin dB
39.5	7.27	16.83	1.00	V	25.1	30.0	-4.9
88.1	14.04	7.66	1.90	V	23.6	30.0	-6.4
123.8	9.88	13.62	2.40	V	25.9	30.0	-4.1
138.7	9.91	14.39	2.50	H	26.8	30.0	-3.2
158.3	9.63	14.77	2.60	V	27	30.0	-3.0
178.5	6.81	15.09	2.70	V	24.6	30.0	-5.4
210.9	6.10	16.20	3.20	H	25.5	30.0	-4.5
315.8	12.73	15.87	3.80	H	32.4	37.0	-4.6
415.5	11.10	16.80	4.20	V	32.1	37.0	-4.9
532.8	9.47	19.03	5.20	V	33.7	37.0	-3.3
592.3	8.00	20.20	5.70	V	33.9	37.0	-3.1
651.8	2.90	22.10	6.00	V	31	37.0	-6.0

### NOTE:

1. All video modes and resolutions were investigated and the worst-case emissions are reported.
2. Other video modes & resolution were tested and found to be in compliance.

Measured by : Kyoung-Hee Yoon / Engineer

Date : DECEMBER 20, 2001

## 5. Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor.

The basic equation with a sample calculation is as follows:

$$FS = RA + AF + CF$$

where FS = Field Strength

RA = Receiver Amplitude

AF = Antenna Factor

CF = Cable Attenuation Factor

Assume a receiver reading of 21.5 dBuV is obtained. The Antenna Factor of 7.4 and a Cable Factor of 1.1 is added. The 30 dBuV/m value was mathematically converted to its corresponding level in uV/m.

$$FS = 21.5 + 7.4 + 1.1 = 30 \text{ dBuV/m}$$

$$\text{Level in uV/m} = \text{Common Antilogarithm} [(30 \text{ dBuV/m})/20] = 31.6 \text{ uV/m}$$

## 6. LIST OF TEST EQUIPMENT

<u>TYPE</u>	<u>MANUFACTURE</u>	<u>MODEL</u>	<u>CAL.</u>
<u>DATE</u>			
EMI Test Receiver	Rohde & Schwarz	ESH3	2001.6.29
EMI Test Receiver	Rohde & Schwarz	ESVP	2002.2.14
EMI Test Receiver	Rohde & Schwarz	ESI40	2001.11.5
EMI Test Receiver	Rohde & Schwarz	ESVS30	2002.3.6
Spectrum Monitor	Rohde & Schwarz	EZM	N.A
Graphic Plotter	Rohde & Schwarz	DOP2	N.A
Printer	Rohde & Schwarz	PDN	N.A
Spectrum Analyzer	H.P	8591EM	2001.7.11
LISN	EMCO	3825/2	2002.2.7
LISN	Rohde & Schwarz	ESH2-Z5	2001.8.12
Amplifier	Hewlett-Packard	8447E	2002.3.2
Dipole Antennas	Rohde & Schwarz	VHAP	2001.6.28
Dipole Antennas	Rohde & Schwarz	UHAP	2001.6.28
Biconical Antenna	Rohde & Schwarz	BBA-9106	2001.6.28
Log-Periodic Antenna	Rohde & Schwarz	UHALP-9107	2001.6.26
Antenna Position Tower	EMCO	1051-12	N.A
Turn Table	EMCO	1060-06	N.A
Line Filter	KEENE	ULW 2X30-60	N.A
Power Analyzer	Voltech	PM 3300	2002.2.20
Reference Network Impedance	Voltech	IEC 555	N.A
AC Power Source	PACIFIC	Magnetic Module	N.A
AC Power Source	PACIFIC	360AMX	N.A

