

HYUNDAI CALIBRATION & CERTIFICATION TECH. CO., LTD.

INT'L STANDARD CERTIFICATION TEAM
SAN 136-1, AMI-RI, BUBAL-EUP, ICHEON-SI, KYOUNKI-DO, 467-701, KOREA
TEL : +82 31 639 8518 FAX : +82 31 639 8525 www.hctec.co.kr

CERTIFICATION

Manufacturer;

GEMPACK CO., LTD.
324-18, Dangjung-Dong, Kunpo-Shi, Kyunggi-Do,
435-030, KOREA

Date of Issue: JUNE 13, 2001

Test Report No.: HCT-F01-0601

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

FCC ID : :

PFMTC7370
TC7370

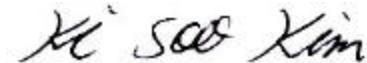
MODEL / TYPE :

FCC Rule Part(s): **Part 15 & 2; ET Docket 95-19**
Classification: **FCC Class B Computing Device (JBC)**
Standard(s): **FCC Class B: 1998 (CISPR 22)**
Equipment (EUT) Type: **15" WBT (Windows Based Terminal) with LCD Monitor**
CPU / Speed(s): **GX1™ / 300MHz**
Max Resolution: **1024X768 Non-interlaced (@60KHz/ 75Hz)**
Port/ Connector(s) **10 Mbps and 100 Mbps 8-pin LAN PORT,
15-pin D-sub VGA connector, DC-in, PS/2 Keyboard, PS/2 Mouse,
Printer/Parallel Port, USB Ports, Earphone, Microphone, Serial Port**

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



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1. GENERAL INFORMATION

1.1 Product Description

The GEMPACK CO., LTD. Model TC7370 (referred to as the EUT in this report) is a 15" WBT(Windows Based Terminal) with LCD Monitor. 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)	25MHz , 14.318MHz , 32.768KHz
CPU PROCESSOR SPEED(MHz)	National Semiconductor Geode GX1™ 300MHz
POWER REQUIREMENT	DC12V 4.58A
NUMBER OF LAYERS	MAIN BOARD 4 LAYER OSD BOARD 2 LAYER POWER BOARD 1 LAYER INVERTER BOARD 2 LAYER
MAX. RESOLUTION	1024X768 (@60KHz/ 75 Hz)
H-SYNC FREQUENCY RANGE	60KHz
V-SYNC FREQUENCY RANGE	75Hz
LCD TYPE	15" (LCD Type : LM151X2 LG. Philips LCD)

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
15" WBT with LCD Monitor (EUT)	GEMPACK CO., LTD.	TC7370	PFMTC7370	EUT(HOST)
PC (SERVER)	DELL	MMP	DoC	HOST
MONITOR	ImageQuest Co., Ltd.	V570	CKLV570	HOST
PRINTER	H/P	HP895C	DoC	HOST
MODEM	3COM CORPORATION	56K FAX MODEM	DoC	HOST
USB HDD	SOFT BANK	ThumbDrive64M	DoC	HOST
EAR PHONE/ MIC	HYUNDAI MULTI-CAV	-	-	HOST
KEY BOARD	MONTEREY	K290	EMJMUSJQ	HOST
MOUSE	MONTEREY	MUS9J	FKD46AK290	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	DT Research	200010-00
POWER BOARD	ILAN ELEC. LTD.	-
OSD BOARD	Neutron	010411-02
INVERTOR BOARD	HANKOOK TECH CO.	-
LCD BOARD	LG. Philips LCD	LM151X2

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, was uploaded from PC server through LAN cable . 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. 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.

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)
15" WBT with LCD Monitor (EUT)	N	N/A	1.8(P)
PC(SERVER)	N	N	1.8(P), 8.0(D)
MONITOR(EXTERNAL)	N	Y	1.8(P), 1.8(D)
EAR PHONR/ MIC	N/A	N	1.5(D)
PRINTER	N	Y	2.0(P),1.8(D)
KEYBOARD	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
PC(SERVER)	Y	BOTH END	N	N/A
MONITOR(EXTERNAL)	Y	EUT END	Y	BOTH END
EAR PHONR/ MIC	N	N/A	N	N/A
PRINTER	N	N/A	Y	BOTH END
KEYBOARD	Y	EUT END	N	N/A
MODEM	N	N/A	Y	BOTH END
MOUSE	N	N/A	N	N/A

2.5 Equipment Modifications

N/A

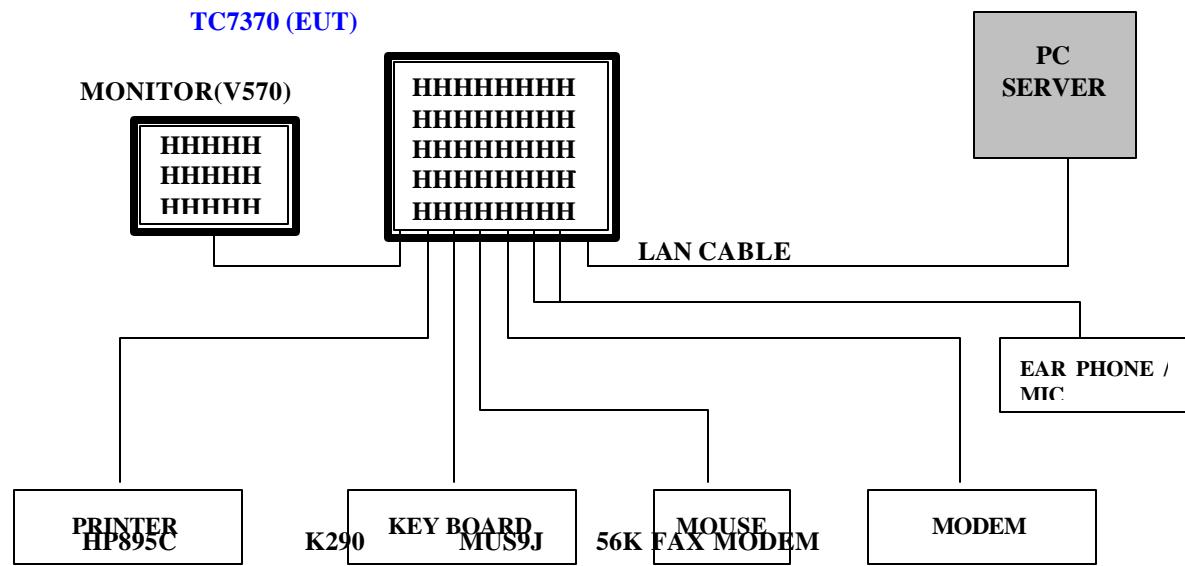
2.6 Configuration of Test system

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 (Default)
National Semiconductor Geode GX1™ 300MHz	1024X768 Non-Interlaced (60 KHz/75Hz)	X

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 (Default)
National Semiconductor Geode GX1™ 300MHz	1024X768 Non-Interlaced (60 KHz/75Hz)	X

Tested by Keun- Ho Park / Engineer

Date : JUNE 5, 2001

4. FINAL CONDUCETD 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 : 33% Temperature : 26
 Limit apply to : CISPR 22
 Type of Tests : CLASS B
 Date : JUNE 7, 2001
 Result : PASSED BY - 6.7 dB
 EUT : 15" WBT with LCD Monitor

Operating Condition : 1024X768 Non-Interlaced (Hf : 60 KHz, Vf : 75 Hz)

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
0.310	44.8	NEUTRAL	59.9	-15.1	Quasi-Peak
0.310	43.3	NEUTRAL	50.0	-6.7	Average
1.175	38.3	HOT	56.0	-17.7	Quasi-Peak
0.370	39.3	HOT	48.5	-9.2	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 : Keun-Ho Park / Engineer

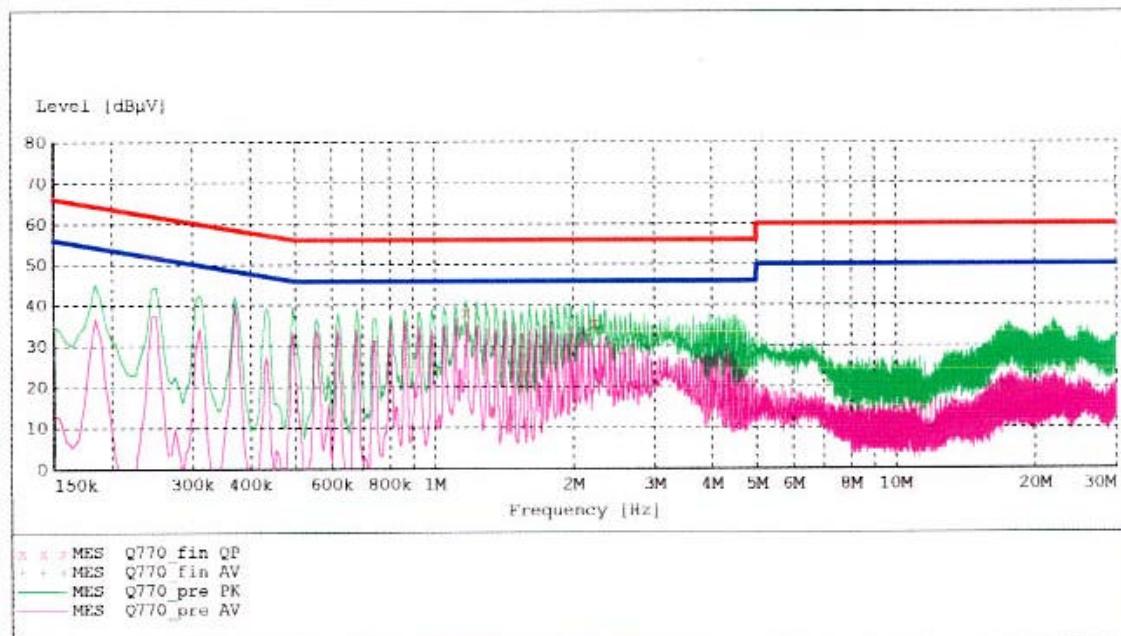
Date : JUNE 7, 2001

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

EUT: TC7370
 Manufacturer: GEMPACK CO., LTD.
 Operating Condition: NORMAL(H-PATTERN)
 Test Site: Shield Room
 Operator: Keun-Ho Park
 Test Specification: CISPR 22 Class B
 Comment: H

SCAN TABLE: "EN 55022 Voltage"

EN 55022 Voltage						
Start Frequency	Stop Frequency	Step Width	Detector	Meas.	IF Time	Transducer
150.0 kHz	2.0 MHz	5.0 kHz	MaxPeak	100.0 ms	9 kHz	CABLE LOSS (NEW)
2.0 MHz	30.0 MHz	5.0 kHz	Average			
			MaxPeak	10.0 ms	9 kHz	CABLE LOSS (NEW)
			Average			



MEASUREMENT RESULT: "Q770_fin_QP"

Frequency MHz	Level dB μ V	Transd dB	Limit dB μ V	Margin dB	Line	PE
1.175000	38.30	0.5	56	17.7	1	---
2.225000	35.50	0.6	56	20.5	1	---

MEASUREMENT RESULT: "Q770_fin_AV"

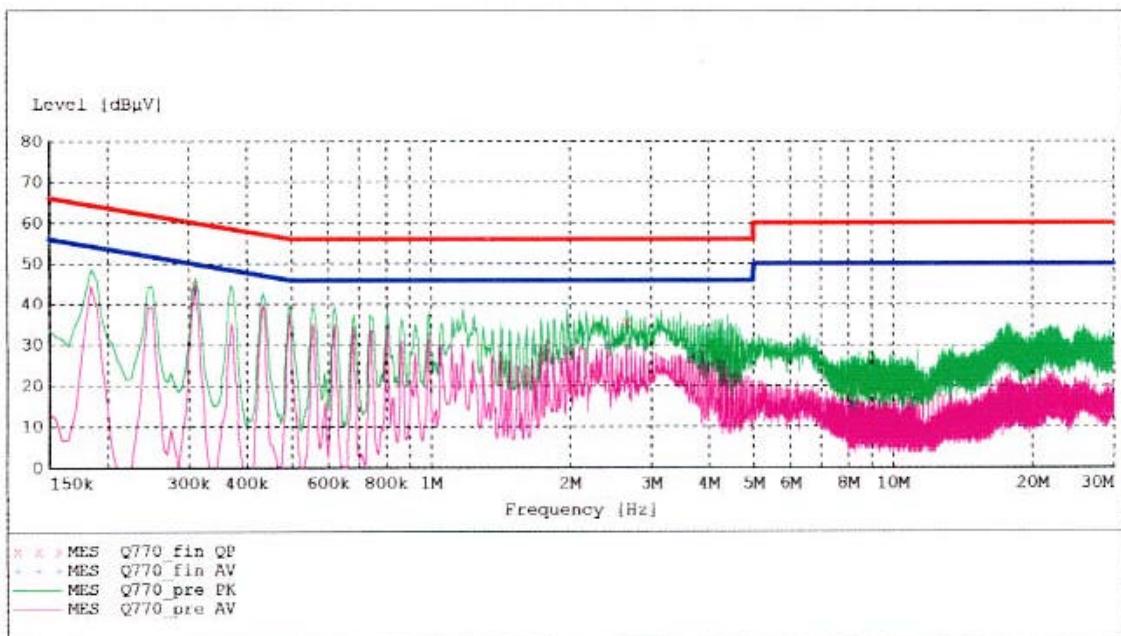
Frequency MHz	Level dB μ V	Transd dB	Limit dB μ V	Margin dB	Line	PE
0.370000	39.30	0.5	49	9.2	1	---
2.105000	33.50	0.6	46	12.5	1	---

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

EUT: TC7370
 Manufacturer: GEMPACK CO., LTD.
 Operating Condition: NORMAL(H-PATTERN)
 Test Site: Shield Room
 Operator: Keun-Ho Park
 Test Specification: CISPR 22 Class B
 Comment: N

SCAN TABLE: "EN 55022 Voltage"

EN 55022 Voltage						
Start Frequency	Stop Frequency	Step Width	Detector	Meas.	IF Time	Transducer
150.0 kHz	2.0 MHz	5.0 kHz	MaxPeak	100.0 ms	9 kHz	CABLE LOSS (NEW)
2.0 MHz	30.0 MHz	5.0 kHz	Average			
			MaxPeak	10.0 ms	9 kHz	CABLE LOSS (NEW)
			Average			



MEASUREMENT RESULT: "Q770_fin_QP"

Frequency MHz	Level dB μ V	Transd dB	Limit dB μ V	Margin dB	Line	PE
0.310000	44.80	0.5	60	15.1	1	---
2.660000	35.70	0.6	56	20.3	1	---

MEASUREMENT RESULT: "Q770_fin_AV"

Frequency MHz	Level dB μ V	Transd dB	Limit dB μ V	Margin dB	Line	PE
0.310000	43.30	0.5	50	6.7	1	---
2.415000	29.90	0.6	46	16.1	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 : 35 % Temperature : 27

Limit apply to : CISPR 22

Type of Tests : CLASS B

Date : JUNE 8, 2001

Result : PASSED BY -3.1 dB

EUT : 15" WBT with LCD Monitor

Operating Condition : 1024X768 Non-Interlaced (Hf : 60 kHz, Vf : 75 Hz)

Detector : CISPR Quasi-Peak (6 dB Bandwidth : 120 KHz)

Frequency MHz	Reading dBuV	Ant. Factor dB	Cable Loss dB	ANT POL (H/V)	Total dBuV/m	Limit dB	Margin dB
71.2	17.69	5.71	1.80	V	25.2	30.0	-4.8
77.9	17.05	6.05	1.80	V	24.9	30.0	-5.1
125.9	6.98	13.72	2.40	V	23.1	30.0	-6.9
156.2	6.53	14.77	2.60	V	23.9	30.0	-6.1
167.0	8.21	14.89	2.70	H	25.8	30.0	-4.2
189.7	8.32	15.28	2.80	H	26.4	30.0	-3.6
202.6	6.03	15.87	3.00	V	24.9	30.0	-5.1
202.6	6.03	15.87	3.00	H	24.9	30.0	-5.1
207.0	7.88	16.02	3.00	V	26.9	30.0	-3.1
207.0	7.08	16.02	3.00	H	26.1	30.0	-3.9
238.6	10.17	17.43	3.40	V	31.0	37.0	-6.0
457.1	7.20	17.80	4.70	V	29.7	37.0	-7.3

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.
3. The EUT was test up to 2GHz and no significant emission was found.

Measured by : Keun-Ho Park / Engineer

Date : JUNE 8, 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

TYPE	MANUFACTURE	MODEL	CAL. DATE
EMI Test Receiver	Rohde & Schwarz	ESH3	2000.6.29
EMI Test Receiver	Rohde & Schwarz	ESVP	2001.2.14
EMI Test Receiver	Rohde & Schwarz	ESI40	2001.1.18
EMI Test Receiver	Rohde & Schwarz	ESVS30	2000.6.29
Monitor	Rohde & Schwarz	EZM	N.A
Graphic Plotter	Rohde & Schwarz	DOP2	N.A
Printer	Rohde & Schwarz	PDN	N.A
Spectrum Analyzer	H.P	8591EM	2000.7.11
LISN	EMCO	3825/2	2000.10.13
LISN	Rohde & Schwarz	ESH2-Z5	2000.7.14
Amplifier	Hewlett-Packard	8447E	2001.3.2
Dipole Antennas	Rohde & Schwarz	VHAP	2000.6.29
Dipole Antennas	Rohde & Schwarz	UHAP	2000.6.29
Biconical Antenna	Rohde & Schwarz	BBA-9106	2000.6.29
Log-Periodic Antenna	Rohde & Schwarz	UHALP-9107	2000.6.29
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	2000.12.20
Reference Network Impedance	Voltech	IEC 555	N.A
AC Power Source	PACIFIC	Magnetic Module	N.A
AC Power Source	PACIFIC	360AMX	N.A