



HYUNDAI CALIBRATION & CERTIFICATION TECH. CO., LTD.

PRODUCT COMPLIANCE DIVISION
SAN 136-1, AMI-RI, BUBAL-EUP, ICHEON-SI, KYOUNGKI-DO, 467-701, KOREA
TEL : +82 31 639 8518 FAX : +82 31 639 8525 www.hct.co.kr



VERIFICATION

HYUNDAI CURITEL INC.
SAN 136-1, AMI-RI, BUBAL-EUP, ICHEON-SI,
KYOUNGKI-DO, 467-701, KOREA

FRN: 0006278469

Date of Issue: February 23, 2005

Test Report No.: HCT-SAR05-0208

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

FRN: 0005866421

FCC ID :

MODEL :

PP4TX-230
TX-230

FCC Rule Part(s):	Part 15 & 2
Standard(s):	CISPR 22 CLASS B: 1998
FCC Classification:	Licensed Portable Transmitter Held to Ear (PCE)
Equipment (EUT) Type:	Dual-Mode CDMA Phone (CDMA/ PCS CDMA)
Trade Name/Model(s):	HYUNDAI / TX-230
Port/ Connector(s)	DC Input Port, Ear Phone 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 Product Compliance Team



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1. GENERAL INFORMATION

1.1 Product Description

The Hyundai Curitel TX-230 Dual Mode CDMA Phone (CDMA/ PCS CDMA) phone. Its basic purpose is used for communications. It transmits from CDMA (824.70~848.31), PCS CDMA (1851.25~1908.75) MHz and receives from CDMA (869.70~893.31), PCS CDMA (1931.25~1988.75) MHz. The RF power is rated at CDMA (0.371W), PCS CDMA (0.354W).

FCC ID	PP4TX-230
EUT Type	Dual Mode CDMA Phone (CDMA/ PCS CDMA)
Model	HYUNDAI
TX Frequency	824.70 — 848.31 MHz (CDMA) 1851.25 — 1908.75 MHz (PCS CDMA)
RX Frequency	869.70 — 893.31 MHz (CDMA) 1931.25 — 1988.75 MHz (PCS CDMA)
FCC Classification	Licensed Portable Transmitter Held to Ear (PCE)
Max RF. Output Power	0.371W ERP CDMA (25.7dBm) 0.354 EIRP PCS CDMA (25.5dBm)
Modulation	CDMA / PCS

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
Tri-Mode Dual-Band Phone (AMPS/CDMA/PCS CDMA)	HYUNDAI CURITEL INC.	TX-230	PP4TX-230	CHARGER
CHARGER	PANTECH & CURITEL	CTA-20	-	EUT
Head-Set	HYUNDAI CURITEL INC.	-	-	EUT
P.C	HP	7000	DoC	N/A
MONITOR	Cornea	CT1502	PL4CT1502	P.C
Adapter	Lishin international Enterprise Corp	LSE9901B1260	DoC	MONITOR
KEY BOARD	H.P	5181	DoC	P.C
MOUSE	H.P	M-S48a	DoC	P.C
PRINTER	H/P	C4569A	DoC	P.C

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 23, 2003(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 CURITEL INC.	TX-230

2.2 EUT exercise Software

The EUT was tested on the charging battery 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)
EUT	N/A	Y	1.5(D)
Charger	N	N/A	1.5(P)
MONITOR	N	Y	1.8(P), 1.5(D)
Adaptor	N	N/A	1.8(P)
PC	N	N/A	1.8(P)
KEY BOARD	N/A	Y	1.8(D)
Head-Set	N/A	N	1.5(D)
MOUSE	N/A	Y	1.8(D)
PRINTER	N	Y	1.8(P), 1.8(D)

2.4 Noise Suppression Parts on Cable.

	Ferrite Bead (Y/N)	Location	Metal Hood (Y/N)	Location
EUT	Y	P.C END	Y	PC END
Charger	N	N/A	N	EUT END
MONITOR	Y	P.C END	Y	P.C END
Adaptor	Y	Adaptor END	Y	MONITOR END
KEY BOARD	N	N/A	Y	P.C END
Head-Set	N	N/A	N	P.C END
MOUSE	N	N/A	Y	P.C END
PRINTER	N	N/A	Y	P.C END

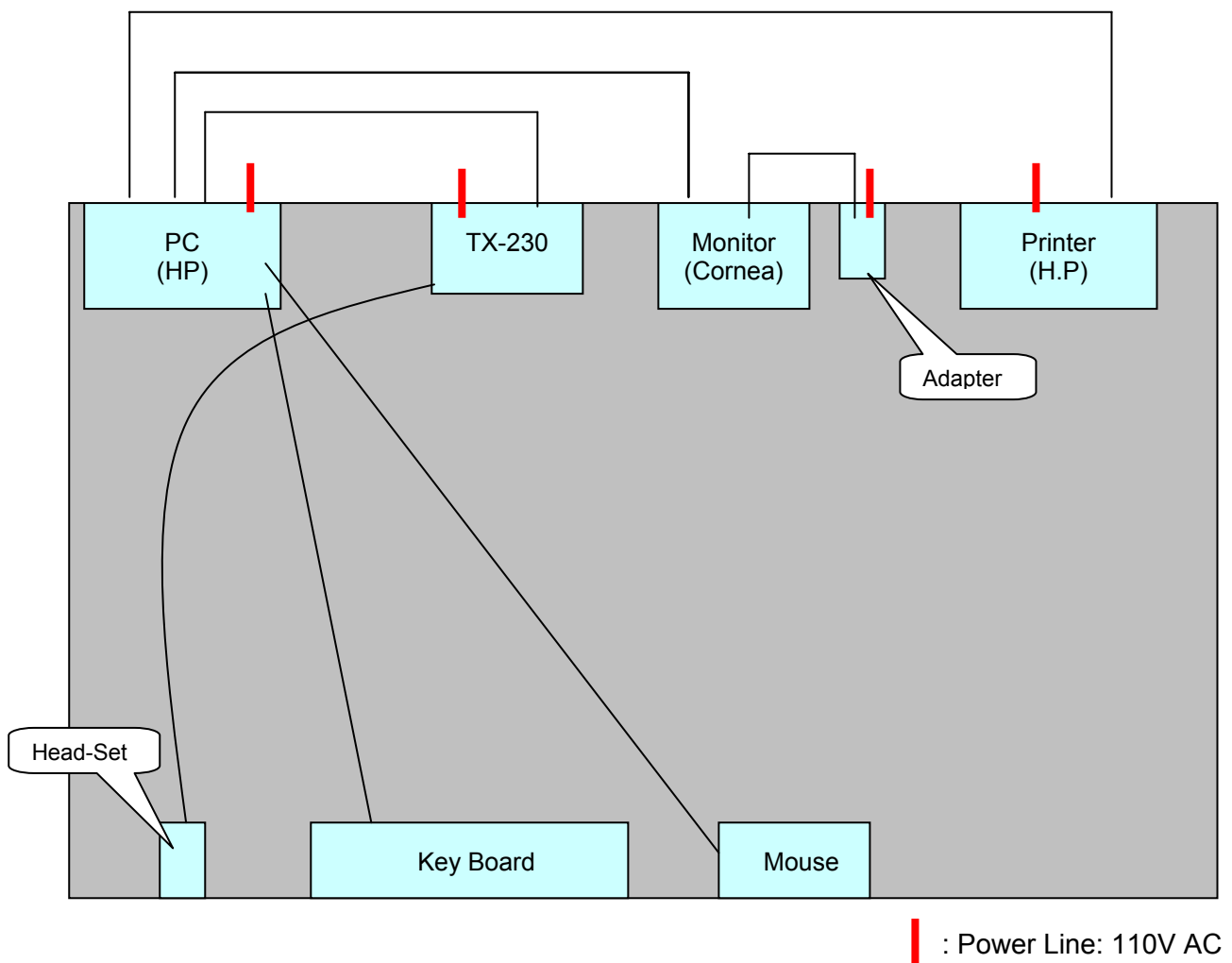
2.5 Equipment Modifications

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 perating 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

Model	Operating Mode	The worst operating condition
TX-230	Charging	X
	Camera operating	
	Camera download	

3.2 Radiated Emission Tests

During Preliminary Tests, Charging battery mode were investigated.

Model	Operating Mode	The worst operating condition
TX-230	Charging	
	Camera operating	X
	Camera download	

4. FINAL CONDUCTED AND RADIATED EMISSION TESTS SUMMARY

4.1 Conducted Emissions Tests

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

=====

Humidity Level	: 32 %	Temperature: 19.5°C
Type of Tests	: CISPR 22 CLASS B	
Result	: PASSED BY -11.8 dB	
EUT	: TX-230	
Operating Condition:	CHARGING BATTERY	
Detector	: CISPR Quasi-Peak (6 dB Bandwidth: 9 KHz)	

Power Line Conducted Emissions				CISPR 22 CLASS B	
Frequency (MHz)	Amplitude (dBuV)	Conductor	Result	Limit (dBuV)	Margin (dB)
0.410	42.4	NEUTRAL	Quasi-Peak	58	-15.3
0.350	37.2	NEUTRAL	Average	49	-11.8
0.375	44.5	HOT	Quasi-Peak	58	-13.9
0.350	33.5	HOT	Average	49	-15.5

Line Conducted Emissions Tabulated Data



Measured by: Keun-Ho Park / Engineer

Date : February 15, 2004

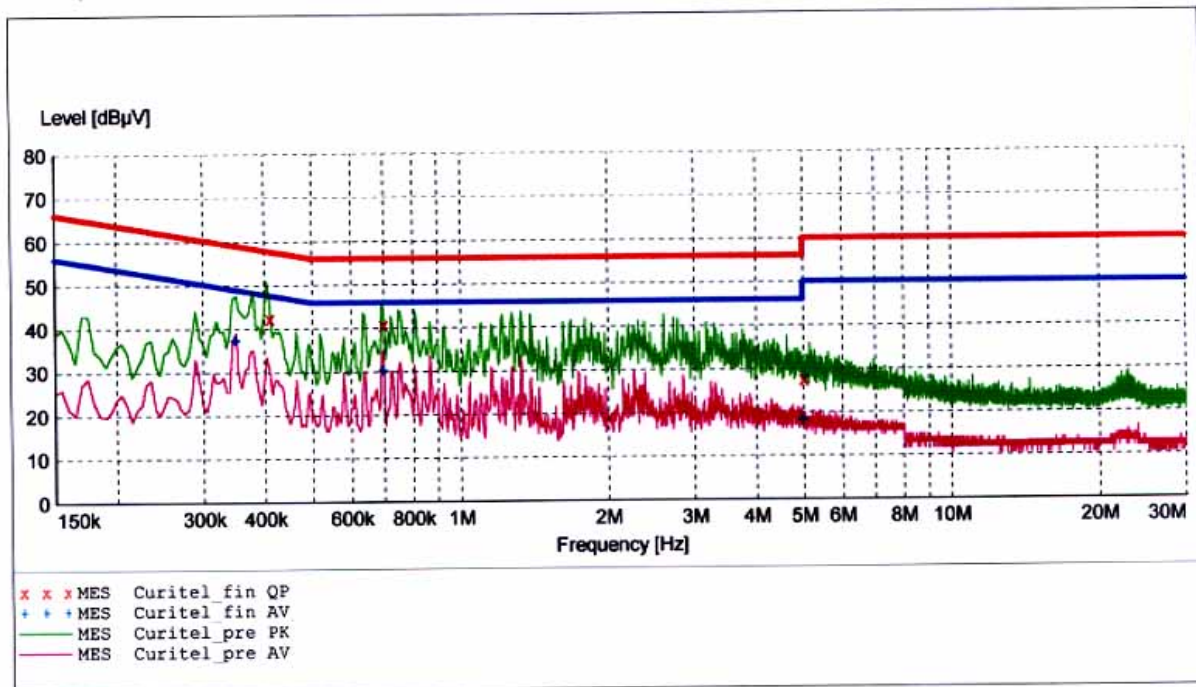
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EMC TESTING Laboratory

EUT: TX-230
Manufacturer: Hyundai Curitel Inc.

SCAN TABLE: "CISPR 22 Voltage"

Short Description:			CISPR 22 Voltage			
Start	Stop	Step	Detector	Meas. Time	IF Bandw.	Transducer
150.0 kHz	500.0 kHz	5.0 kHz	MaxPeak	10.0 ms	9 kHz	None
			Average			
500.0 kHz	5.0 MHz	5.0 kHz	MaxPeak	10.0 ms	9 kHz	None
			Average			



MEASUREMENT RESULT: "Curitel_fin QP"

2/24/05 7:18PM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
0.410000	42.40	10.1	58	15.3	1	---
0.700000	40.70	10.2	56	15.3	1	---
5.000000	27.60	10.3	56	28.4	1	---

MEASUREMENT RESULT: "Curitel_fin AV"

2/24/05 7:18PM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
0.350000	37.20	10.1	49	11.8	1	---
0.700000	30.00	10.2	46	16.0	1	---
5.000000	18.20	10.3	46	27.8	1	---

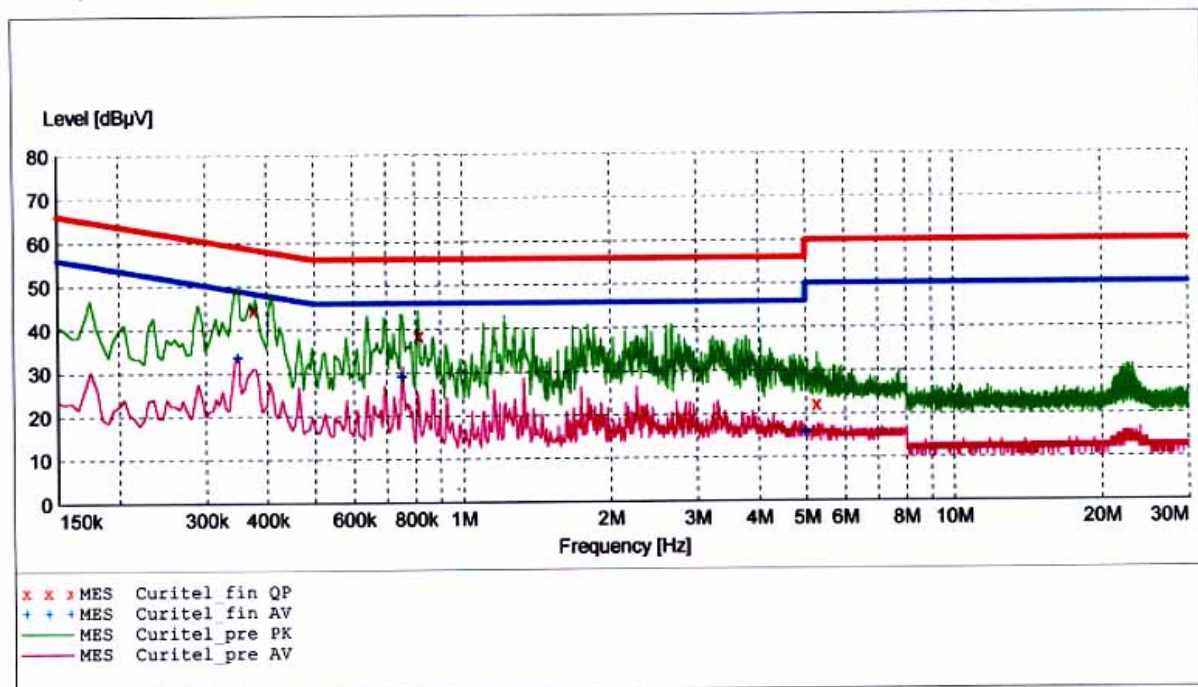
HCT

EMC TESTING Laboratory

EUT: TX-230
Manufacturer: Hyundai Curitel Inc.

SCAN TABLE: "CISPR 22 Voltage"

Short Description:			CISPR 22 Voltage			
Start	Stop	Step	Detector	Meas. Time	IF Bandw.	Transducer
Frequency	Frequency	Width				
150.0 kHz	500.0 kHz	5.0 kHz	MaxPeak	10.0 ms	9 kHz	None
			Average			
500.0 kHz	5.0 MHz	5.0 kHz	MaxPeak	10.0 ms	9 kHz	None
			Average			



MEASUREMENT RESULT: "Curitel_fin QP"

2/24/05 7:15PM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
0.375000	44.50	10.1	58	13.9	1	---
0.815000	38.50	10.2	56	17.5	1	---
5.250000	22.30	10.3	60	37.7	1	---

MEASUREMENT RESULT: "Curitel_fin AV"

2/24/05 7:15PM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
0.350000	33.50	10.1	49	15.5	1	---
0.755000	29.00	10.2	46	17.0	1	---
5.000000	15.80	10.3	46	30.2	1	---

4.3 Test Setup Photos

4.3.1 Conducted Radiated Emission



4.3.2 Radiated Emission



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.

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

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