HAC TEST REPORT

Test Report No. : 28FE0217-HO-I

Applicant	:	**SHARP CORPORATION**
Type of Equipment	:	**GSM Mobile Phone**
Model No.	:	**PV210**
FCC ID	:	**APYNAR0064**
Test regulation	:	**ANSI C63.19 : 2006**
Test Result	:	**Complied**
HAC M Category	:	**M3**

1. This test report shall not be reproduced in full or partial, without the written approval of UL Japan, Inc.
2. The results in this report apply only to the sample tested.
3. This sample tested is in compliance with the above regulation.
4. The test results in this report are traceable to the national or international standards.

Date of test: March 7, 2008

Tested by: Miyo Kishimoto
EMC Services

Approved by : Minoru Yamanaka
Assistant Manager of EMC Services

UL Japan, Inc.
Head Office EMC Lab.
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN
Telephone: +81 596 24 8116
Facsimile: +81 596 24 8124

SECTION 1: Customer information

Company Name	:	SHARP CORPORATION
Address	:	492 Minosho-cho, Yamatokoriyama-city, NARA 639-1186, JAPAN
Telephone Number	:	+81-743-55-4022
Facsimile Number	:	+81-743-55-2553
Contact Person	:	Juri Sugiyama

SECTION 2: Equipment under test (E.U.T.)

2.1 Identification of E.U.T.

Type of Equipment		:	GSM Mobile Phone
Model No.		:	PV210
Serial No.		:	172(GSM850,PCS1900)
Battery	Model Name	:	PV-BL41(Rechargeable Lithium-ion battery)
	Rating	:	DC3.7V / 1030mAh
	Manufacture	:	SHARP
Option Battery		:	N/A
Accessories		:	Earphone
Size		:	W: 120 mm D: 57.5mm H: 18.2mm
Receipt Date of Sample		:	February 22, 2008
Modification of EUT		:	No modification by the test lab
Country of Manufacture		:	Japan
Condition of EUT		:	Engineering prototype (Not for Sale: This sample is not mass-produced items.)

2.2 Product Description

Model No: PV210 (referred to as the EUT in this report) is the GSM Mobile Phone.

Radio Specification

	GSM850	**PCS1900**	**Bluetooth**
Equipment Type	Transceiver	Transceiver	Transceiver
Tx frequency	824.20 – 848.8MHz	1850.2MHz - 1909.8MHz	2402-2480MHz
Type of Modulation	GMSK,8PSK	GMSK,8PSK	FHSS
Bandwidth	340kHz	345kHz	79MHz
Channel Spacing	200kHz	200kHz	1MHz
Channel Number	124	299	79
Antenna Type	PIFA	PIFA	PIFA
Antenna Connector Type	Pin Contact	PinContact	Pin Contact
Antenna Gain	-4.3dBi max	-3.0dBi max	-2.71dBi
Power Supply	DC 3.7 – 4.2V	DC 3.7 – 4.2V	DC 1.8V

SECTION 3 : Test standard information

3.1 Requirements for compliance testing defined by the FCC

The Federal Communications Commission (FCC) has adopted specific hearing aid compatibility rules for digital wireless telephones.
The standard for compatibility of digital wireless phones with hearing aids is set forth in American National Standard Institute (ANSI) standard C63.19.
ANSI C63.19 contains two sets of standards: one for reduced radio frequency (RF) interference to enable acoustic coupling with hearing aids that do not operate in telecoil mode, and a separate standard to enable inductive coupling with hearing aids operating in telecoil mode. A digital wireless handset is considered hearing aid compatible for acoustic coupling if it meets a "U3" or "M3" rating under the ANSI standard. A digital wireless handset is considered hearing aid compatible for inductive coupling if it meets a "U3T" or "T3" rating under the ANSI standard.

The "M" rating indicates the amount of reduction of RF interference between telephones and hearing aids in acoustic coupling mode, while the "T" rating represents inductive coupling with hearing aids that are operating in telecoil mode.

3.2 Procedure and result

No.	Item	Test Procedure	Limit	Remarks	Exclusion	Result
1	RF Emission GSM850 E-filed	ANSI C63.19	FCC47 CFR 20.19 ANSI C63.19	HAC Measurement	N/A	Complied M3
2	RF Emission GSM850 H-filed	ANSI C63.19	FCC47 CFR 20.19 ANSI C63.19	HAC Measurement	N/A	Complied M4
3	RF Emission PCS1900 E-filed	ANSI C63.19	FCC47 CFR 20.19 ANSI C63.19	HAC Measurement	N/A	Complied M3
4	RF Emission PCS1900 H-filed	ANSI C63.19	FCC47 CFR 20.19 ANSI C63.19	HAC Measurement	N/A	Complied M3

3.3 M Category limit

All digital transmission modes in all frequency bands contained in a HAC phone must meet M3 or M4 levels.

Category	AWF (dB)	Limits for E-Field Emissions (V/m) > 960MHz	Limits for H-Field Emissions (A/m) > 960MHz
M1	0	199.5 - 354.8	0.6 - 1.07
	-5	149.6 - 266.1	0.45 - 0.8
M2	0	112.2 - 199.5	0.34 - 0.6
	-5	84.1 - 149.6	0.25 - 0.45
M3	0	63.1 - 112.2	0.19 - 0.34
	-5	47.3 - 84.1	0.14 - 0.25
M4	0	<63.1	<0.19
	-5	<47.3	<0.14
Category	**AWF(dB)**	**Limits for E-Field Emissions (V/m) < 960MHz**	**Limits for H-Field Emissions (A/m) < 960MHz**
M1	0	631 - 1122	1.91 - 3.39
	-5	473.2 - 841.4	1.43 - 2.54
M2	0	354.8 - 631	1.07 - 1.91
	-5	266.1 - 473.2	0.8 - 1.43
M3	0	199.5 - 354.8	0.6 - 1.07
	-5	149.6 - 266.1	0.45 - 0.8
M4	0	<199.5	<0.6
	-5	<149.6	<0.45

3.4 Test Location

*Shielded room for SAR testings
UL Japan, Inc. Head Office EMC Lab. *NVLAP Lab. code: 200572-0
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN
Telephone : +81 596 24 8116 Facsimile : +81 596 24 8124

3.5 Confirmation before HAC testing

Correlation of Output Power between EMC and HAC tests
Maximum power is used and agrees with EMC/SAR reports and tune-up procedure.
Therefore, It was checked that the antenna port power was correlated within 0~+5% (FCC requirements)
The result is shown in Section 7.1.

3.6 Confirmation after HAC testing

It was checked that the power drift is within ±5% in the evaluation procedure of HAC testing.
The result is shown in APPENDIX 2.

SECTION 4 : Operation of E.U.T. during testing

4.1 Operating modes for HAC testing

4.1.1 Setting of EUT

1. GSM 850 mode
2. GSM 850 with Bluetooth active mode
3. PCS 1900 mode
4. PCS 1900 mode with Bluetooth active mode

<GSM 850 mode>

Tx frequency band	: 824.2MHz – 848.8MHz
Channel	: 128ch(824.2MHz) 190ch(836.6MHz) 251ch(848.8MHz)
Modulation	: GSM (GMSK)
Crest factor	: 8.3
AWF	: -5dB

<PCS 1900 mode>

Frequency band	: 1850.2MHz – 1909.8MHz
Channel	: 512ch(1850.2MHz) 661ch(1880.0MHz) 810ch(1909.8MHz)
Modulation	: GSM (GMSK)
Crest factor	: 8.3
AWF	: -5dB

Note: A communication link was set up with the Wireless Communications Test Set from Agilent.
The EUT was command to operate at maximum transmit power.
(Maximum transmit power :GSM850 <Power level : 5> / PCS1900 <Power level : 0>)

<GSM850 (or PCS1900) with Bluetooth active mode>

Frequency band	: 2402MHz – 2480MHz
Modulation	: FHSS

Note: A BT communication link was set up with the head mike with Bluetooh.

SECTION 5 : Test surrounding

5.1 Measurement uncertainty

The uncertainty budget has been determined for the DASY4 measurement system according to the SPEAG documents[1]and is given in the following Table.

Error Description	Uncertainty value ± %	Probability distribution	divisor	(ci) E	(ci) H	Standard Uncertainty E	Standard Uncertainty H
Measurement System							
Probe calibration	±5.1	Normal	1	1	1	±5.1	±5.1
Axial isotropy of the probe	±4.7	Rectangular	√3	1	1	±2.7	±2.7
Sensor Displacement	±16.5	Rectangular	√3	1	0.145	±9.5	±1.4
Boundary effects	±2.4	Rectangular	√3	1	1	±1.4	±1.4
Probe linearity	±4.7	Rectangular	√3	1	1	±2.7	±2.7
Scaling to Peak Envelope Power	±2.0	Rectangular	√3	1	1	±1.2	±1.2
System Detection limit	±1.0	Rectangular	√3	1	1	±0.6	±0.6
Readout electronics	±0.3	Normal	1	1	1	±0.3	±0.3
Response time	±0.8	Rectangular	√3	1	1	±0.5	±0.5
Integration time	±2.6	Rectangular	√3	1	1	±1.5	±1.5
RF ambient Noise	±3.0	Rectangular	√3	1	1	±1.7	±1.7
RF ambient Reflections	±12.0	Rectangular	√3	1	1	±6.9	±6.9
Probe Positioner	±1.2	Rectangular	√3	1	0.67	±0.7	±0.5
Probe positioning	±4.7	Rectangular	√3	1	0.67	±2.7	±1.8
Extrap.and Interpolation	±1.0	Rectangular	√3	1	1	±0.6	±0.6
Test Sample Related							
Device positioning Vertical	±4.7	Rectangular	√3	1	0.67	±2.7	±1.8
Device positioning Lateral	±1.0	Rectangular	√3	1	1	±0.6	±0.6
Device holder and Phantom	±2.4	Rectangular	√3	1	1	±1.4	±1.4
Power drift	±5.0	Rectangular	√3	1	1	±2.9	±2.9
Phantom and Setup							
Phantom Thickness	±2.4	Rectangular	√3	1	0.67	±1.4	±0.9
							±4.8
Combined Standard Uncertainty						±14.7	±10.9
Expanded Std. Uncertainty on Power(k=2)						**±29.4**	**±21.8**
Expanded Std. Uncertainty on Filed(k=1)						**±14.7**	**±10.9**

Note: [1] SPEAG documents Chapter 28 Hearing Aid Compatibility (HAC) Extension

SECTION 6 : Confirmation before HAC testing

6.1 Output Power Measurement results

EMC Power

<GSM 850>

GSM850 GSM mode						
Ch	Frequency [MHz]	P/M Reading [dBm]	Atten. [dB]	Cable + Divider loss [dB]	Result [dBm]	Convert [mW]
Low	824.2	7.8	20.0	4.6	32.40	1737.8
Mid	836.6	8.0	20.0	4.6	32.60	1819.7
High	848.8	8.0	20.0	4.6	32.60	1819.7

<PCS1900>

PCS1900 GSM mode						
Ch	Frequency [MHz]	P/M Reading [dBm]	Atten. [dB]	Cable Loss [dB]	Result [dBm]	Convert [mW]
Low	1850.2	4.6	20.0	4.9	29.50	891.3
Mid	1880.0	4.6	20.0	4.9	29.50	891.3
High	1909.8	4.8	20.0	5.0	29.80	955.0

HAC Power

<GSM 850 mode>

GSM850 GSM mode						
Ch	Frequency [MHz]	P/M Reading [dBm]	Atten. [dB]	Cable + Divider loss [dB]	Result [dBm]	Convert [mW]
Low	824.2	6.16	19.94	6.41	32.51	1784.0
Mid	836.6	6.32	19.94	6.42	32.68	1855.2
High	848.8	6.42	19.94	6.42	32.78	1898.5

Sample Calculation:
Result = Reading + Cable Loss (client's cable)+Power Divider Loss + Attenuator Loss

<PCS 1900>

PCS1900 GSM mode						
Ch	Frequency [MHz]	P/M Reading [dBm]	Atten. [dB]	Cable + Divider loss [dB]	Result [dBm]	Convert [mW]
Low	1850.2	3.10	19.94	6.66	29.70	932.4
Mid	1880.0	3.09	19.94	6.66	29.69	930.3
High	1909.8	3.21	19.94	6.68	29.83	960.7

Sample Calculation:
Result = Reading + Cable Loss (client's cable)+Power Divider Loss + Attenuator Loss

SECTION 7 : Measurement results

7.1 E-Filed (GSM850 / PCS1900)

Ambient temperature (deg.c.)	:	**23.0**	Model	:	**PV210**
Relative Humidity (%)	:	**35**	Serial No.	:	**172**
Atmospheric Pressure	:	**101.9 kPa**	Crest factor	:	**8.3**
Date	:	**March 7, 2008**	Measured By	:	**Miyo Kishimoto**

HAC Result E-Field					
Mode	Channel	AWF	PMF	Max.[v/m]	Result
GSM 850	128	-5	2.95	**150.6**	**M3**
GSM 850	190	-5	2.98	**220.7**	**M3**
GSM 850	251	-5	2.98	**215.3**	**M3**
GSM 850 + BT	128	-5	2.98	**130.7**	**M3**
GSM 850 + BT	190	-5	2.98	**191.8**	**M3**
GSM 850 + BT	251	-5	2.98	**215.7**	**M3**

HAC Result （PV210） E-Field					
Band	Channel	AWF	PMF	PK-Field [V/m]	Result
PCS 1900	512	-5	2.87	**80.7**	**M4**
PCS 1900	661	-5	2.87	**71.5**	**M4**
PCS 1900	810	-5	2.87	**75.7**	**M4**
PCS 1900 + BT	512	-5	2.87	**82.2**	**M3**
PCS 1900 + BT	661	-5	2.87	**67.5**	**M3**
PCS 1900 + BT	810	-5	2.87	**66.5**	**M3**

*See Appendix 3 for measurement data plots.

7.2 H-Filed (GSM850 / PCS1900)

Ambient temperature (deg.c.)	:	**23.0**	Model	:	**PV210**
Relative Humidity (%)	:	**35**	Serial No.	:	**172**
Atmospheric Pressure	:	**101.9 kPa**	Crest factor	:	**8.3**
Date	:	**March 7, 2008**	Measured By	:	**Miyo Kishimoto**

HAC Result H-Field					
Mode	Channel	AWF	PMF	PK-Field [A/m]	Result
GSM 850	128	-5	2.94	**0.259**	**M4**
GSM 850	190	-5	2.81	**0.337**	**M4**
GSM 850	251	-5	2.81	**0.322**	**M4**
GSM 850 + BT	128	-5	2.94	**0.225**	**M4**
GSM 850 + BT	190	-5	2.81	**0.353**	**M4**
GSM 850 + BT	251	-5	2.81	**0.365**	**M4**
HAC Result （PV210 ）H-Field					
Band	Channel	AWF	PMF	PK-Field [A/m]	Result
PCS 1900	512	-5	2.92	**0.237**	**M3**
PCS 1900	661	-5	2.92	**0.224**	**M3**
PCS 1900	810	-5	2.92	**0.214**	**M3**
PCS 1900 + BT	512	-5	2.92	**0.251**	**M3**
PCS 1900 + BT	661	-5	2.92	**0.203**	**M3**
PCS 1900 + BT	810	-5	2.92	**0.191**	**M3**

*See Appendix 3 for measurement data plots.