SAR TEST REPORT

Test Report No. : 26CE0011-HO-5c

Applicant	:	**Panasonic Communications Co., Ltd.**
Type of Equipment	:	**Cordless Telephone**
Model No.	:	**KX-TGA560**
FCC ID	:	**ACJ96NKX-TG5631**
Test standard	:	**FCC47CFR 2.1093** **FCC OET Bulletin 65, Supplement C**
Test Result	:	**Complied**
Max. SAR Measured	:	**Head 0.395W/kg (5759.70240MHz)** **Body 0.412W/kg (5798.05084MHz)**

1. This test report shall not be reproduced except full or partial, without the written approval of UL Apex Co., Ltd.
2. The results in this report apply only to the sample tested.
3. This equipment is in compliance with the above standard. We hereby certify that the data contain a true representation of the SAR profile.
4. The test results in this test report are traceable to the national or international standards.

Date of test : October 24-25 ,2005

Tested by : M. Ikuta

Miyo Ikuta
EMC Services

Approved by : H. Shimoji

Hironobu Shimoji
Group Leader of EMC Services

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SECTION 1 : Client information

Company Name	Panasonic Communications Co., Ltd.
Brand name	Panasonic
Address	1-62, 4-chome, Minoshima, Hakata-ku, Fukuoka, 812-8531 Japan
Telephone Number	+81-92-477-1405
Facsimile Number	+81-92-477-1487
Contact Person	Kunihiko Nawata

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

2.1 Identification of E.U.T.

Type of Equipment		Cordless Telephone
Model No.		KX-TGA560
Serial No.		1
Country of Manufacture		Japan
Battery	Model Name :	HHR-P104
	Rating :	DC3.6V/830mAh
	Manufacture	Panasonic
Option Battery		N/A
Accessories		Belt-clip and Headset (Refer to Appendix1 (Photo))
Condition of EUT		Engineering prototype (Not for sale: This sample is equivalent to mass-produced items.)
Operation Clock		Main clock : 13.824 MHz
Receipt Date of Sample		October 22, 2005
Category Identified		Portable device

2.2 Product Description

Radio Specification

Equipment Type	Transceiver
Frequency band	Low Channel = 5759.70240MHz High Channel = 5838.18697MHz
Bandwidth & Channel spacing	Bandwidth:79MHz Channel spacing:891.87kHz
Type of Modulation	FHSS
Antenna Type	5/8 λ Pattern-Antenna
Antenna Connector Type	N/A
Antenna Gain	4dBi Typ.
Antenna location	Refer to Appendix 1
Max.Transmit Power tested (EIRP)	21.1dBm
Mode of Operation	Duplex
ITU code	F1E
Power Supply	DC 3.6V
Method of Frequency Generation	Synthesizer

SECTION 3 : Test standard information

3.1 Requirements for compliance testing defined by the FCC

The US Federal Communications Commission has released the report and order “Guidelines for Evaluating the Environmental Effects of RF Radiation", ET Docket No. 93-62 in August 1996. The order requires routine SAR evaluation prior to equipment authorization of portable transmitter devices, including portable telephones. For consumer products, the applicable limit is 1.6 mW/g for an uncontrolled environment and 8.0 mW/g for an occupational/controlled environment as recommended by the ANSI/IEEE standard C95.1-1992. According to the Supplement C of OET Bulletin 65 “Evaluating Compliance with FCC Guide-lines for Human Exposure to Radio frequency Electromagnetic Fields", released on Jun 29, 2001 by the FCC, the device should be evaluated at
maximum output power (radiated from the antenna) under “worst-case” conditions for normal or intended use, incorporating normal antenna operating positions, device peak performance frequencies and positions for maximum RF energy coupling.

1 Specific Absorption Rate (SAR) is a measure of the rate of energy absorption due to exposure to an RF transmitting source (wireless portable device).
2 IEEE/ANSI Std. C95.1-1992 limits are used to determine compliance with FCC ET Docket 93-62.

3.2 Exposure limit

(A) Limits for Occupational/Controlled Exposure (W/kg)

Spatial Average (averaged over the whole body)	Spatial Peak (averaged over any 1g of tissue)	Spatial Peak (hands/wrists/feet/ankles averaged over 10g)
0.4	8.0	20.0

(B) Limits for General population/Uncontrolled Exposure (W/kg)

Spatial Average (averaged over the whole body	Spatial Peak (averaged over any 1g of tissue)	Spatial Peak (hands/wrists/feet/ankles averaged over 10g)
0.08	1.6	4.0

Occupational/Controlled Environments: are defined as locations where there is exposure that may be incurred by people who are aware of the potential for exposure, (i.e. as a result of employment or occupation).

General Population/Uncontrolled Environments: are defined as locations where there is the exposure of individuals who have no knowledge or control of their exposure.

NOTE:GENERAL POPULATION/UNCONTROLLED EXPOSURE
SPATIAL PEAK(averaged over any 1g of tissue) LIMIT
1.6 W/kg

SECTION 4 : Test result

4.1 Result of Max. SAR value

Max. SAR Measured : Head 0.395W/kg (5759.70240MHz)
Body 0.412 W/kg(5798.05084MHz)

4.2 Test Location

UL Apex Co., Ltd. Head Office EMC Lab.
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SECTION 5 : Operation of E.U.T. during testing

5.1 Operating modes

	The frequency band and the modulation used in this test are shown as a following. Frequency band : 5759.70240 – 5838.18697MHz Channel : 1ch(5759.70240MHz) 44ch(5798.05084MHz) 89ch(5838.18697MHz) Modulation : FHSS Crest factor : 5 * Remark* : Crest factor decision The EUT transmits 2slots (0.97ms*2) of on time (0.97ms) for 10ms. Therefore, Duty Cycle becomes 20% on an averaged and Crest factor becomes "5".

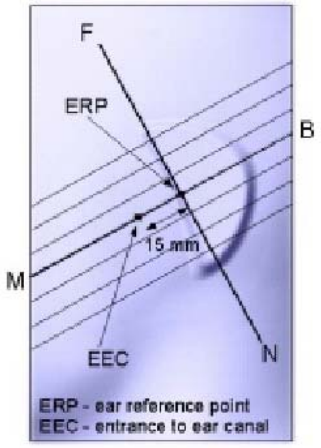
5.2 Description of the head test setup

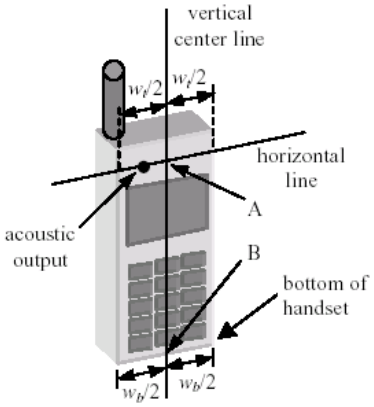
According to the OET 65 and IEEE1528, this EUT was tested on the "Cheek/Touch" and "Ear/Tilt" positions at the left head and right head section of the SAM phantom.

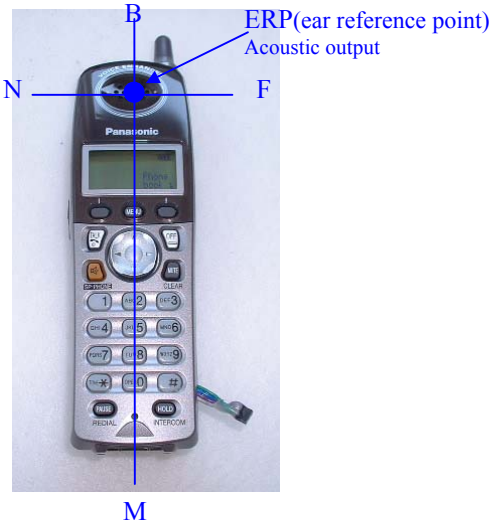
5.2.1 Initial ear position

A handset should be initially positioned with the earpiece region pressed against the ear spacerof a head phantom.

The device should be positioned parallel to the "N-F" line defined along the base of the ear spacer that contains the "ear reference point". The "test device reference point" is aligned to the "ear reference point" on the head phantom and the "vertical centerline" is aligned to the "phantom reference plane".

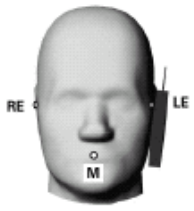


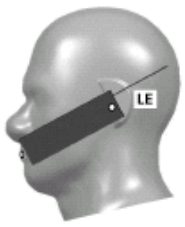


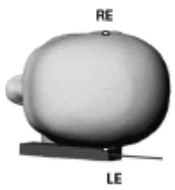


5.2.2 Cheek position

The device is brought toward the mouth of the head phantom by pivoting against the "ear reference point" or along the "N-F" line.
This test position is established:
i) When any point on the display, keypad or mouthpiece portions of the handset is in contact with the phantom.
ii) (or) When any portion of a foldout, sliding or similar keypad cover opened to its intended self-adjusting normal use position is in contact with the cheek or mouth of the phantom.

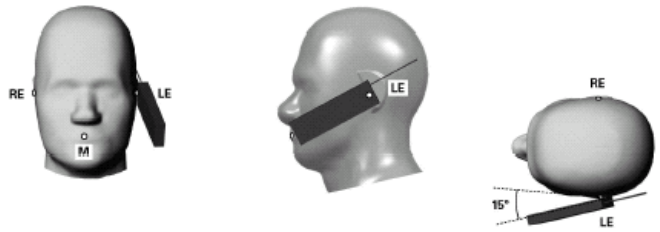






5.2.3 Tilt position

If the earpiece of the handset is not in full contact with the phantom's ear spacer and the peak SAR location for the "Cheek/Touch" position is located at the ear spacer region or corresponds to the earpiece region of the handset, the device should be returned to the "initial ear position" by rotating it away from the mouth until the earpiece is in full contact with the ear spacer.Otherwise the handset should be moved away from the cheek perpendicular to the line passes through both "ear reference points" for approximate 2-3 cm. While it is in this position, the handset is tilted away from the mouth with respect to the "test device reference point" by 15°. After the tilt, it is then moved back toward the head perpendicular to the line passes through both "ear reference points" until the device touches the phantom or the ear spacer. If the antenna touches the head first, the positioning process should be repeated with a tilt angle less than 15° so that the device and its antenna would touch the phantom simultaneously.



5.2.4 Antenna position

The antenna of this EUT was built-in antenna.

5.3 Method of measurement (Head SAR)

Step1. The searching for the worst position
This test was performed at the worst position.

Step2. The changing to the Low and High channels
The test was performed at the worst conditions of Step1.

5.4 Description of the Body-worn test setup and Method

This EUT was tested on the " Back" position at the flat section of SAM phantom.
The tested channel was performed in each Low, Mid and High channels.
The tests were performed in the EUT with the belt-clip and headset.(Refer to the Appendix1)

SECTION 6 : Test surrounding

6.1 Measurement uncertainty

The uncertainty budget has been determined for the DASY4 measurement system according to the SPEAG documents[6][7] and is given in the following Table.

Error Description	Uncertainty value ± %	Probability distribution	divisor	(ci) 1g	Standard Uncertainty (1g)	vi or veff
Measurement System						
Probe calibration	±6.8	Normal	1	1	±6.8	∞
Axial isotropy of the probe	±4.7	Rectangular	√3	$(1-c_p)^{1/2}$	±1.9	∞
Spherical isotropy of the probe	±9.6	Rectangular	√3	$(c_p)^{1/2}$	±3.9	∞
Boundary effects	±2.0	Rectangular	√3	1	±1.2	∞
Probe linearity	±4.7	Rectangular	√3	1	±2.7	∞
Detection limit	±1.0	Rectangular	√3	1	±0.6	∞
Readout electronics	±1.0	Normal	1	1	±1.0	∞
Response time	±0.8	Rectangular	√3	1	±0.5	∞
Integration time	±2.6	Rectangular	√3	1	±1.5	∞
RF ambient conditions	±3.0	Rectangular	√3	1	±1.7	∞
Mech. constraints of robot	±0.8	Rectangular	√3	1	±0.5	∞
Probe positioning	±5.7	Rectangular	1	1	±5.7	∞
Extrap. and integration	±4.0	Rectangular	√3	1	±2.3	∞
Test Sample Related						
Device positioning	±2.9	Rectangular	√3	1	±2.9	8
Device holder uncertainty	±3.6	Rectangular	√3	1	±3.6	4
Power drift	±5.0	Rectangular	√3	1	±2.9	∞
Phantom and Setup						
Phantom uncertainty	±4.0	Rectangular	√3	1	±2.3	∞
Liquid conductivity (target)	±5.0	Rectangular	√3	0.64	±1.8	∞
Liquid conductivity (meas.)	±5.0	Rectangular	1	0.64	±3.2	∞
Liquid permittivity (target)	±5.0	Rectangular	√3	0.6	±1.7	∞
Liquid permittivity (meas.)	±5.0	Rectangular	1	0.6	±3.0	∞
Combined Standard Uncertainty					**±13.398**	
Expanded Uncertainty (k=2)					**±26.8**	

SECTION 7 : Confirmation before testing

7.1 Output Power Measurement results

Output power measurement method

1) EUT was placed on a platform of nominal size, 0.5m by 1.0m, raised 1.5m above the conducting ground plane. Test was made with the antenna positioned in both the horizontal and vertical planes of polarization. The Radiated Electric Field Strength intensity has been measured in semi anechoic chamber with absorbent materials lined (Type VHP 12) on a ground plane and at a distance of 3m.
The measuring antenna height was varied between 1 to 4m and EUT was rotated a full revolution in order to obtain the maximum value of the electric field intensity.
The measurements were performed for both vertical and horizontal antenna polarization.

2) Exchanged the EUT to the Substitution Antenna, the measurement was set for the same height 1.5m as the EUT. The frequency below 1GHz of the Substitution Antenna was used as the Half wave dipole Antenna, which is harmonized with the measured frequency in 1).
The frequency above 1GHz of the Substitution Antenna was used with Horn Antenna.
The Substitution Antenna was connected with the Signal Generator, and the polarized electromagnetic radiation of the Substitution Antenna was matched with the one of the measuring Antenna, which was set with the Signal Generator to the measured frequency in 1). Then, we set with the Output power (CW) of the Signal Generator where the measuring electromagnetic field is equal to the measured value in 1).
The measuring antenna height was varied between 1 to 4m to obtain the maximum receiving level.
Its Output power of Signal Generator was recorded.

3) Effective radiated power was calculated by subtracting the cable loss and the attenuator loss connected between the Signal Generator and the Substitution Antenna from the Output power of the Signal Generator recorded in 2).
For the usage of the Antenna (Horn Antenna) except for the Half wave dipole Antenna (2.15dBi) for the Substitution Antenna, the Effective radiated power was calculated by compensating the finite difference in the Antenna gain of the Half wave dipole Antenna, and Substitution Antenna.

Spectrum Analyzer setting

Resolution bandwidth set to 1MHz and Video bandwidth to 3MHz.

EIRP			
Ch	Freq. [MHz]	E-field [dBμV/m]	EIRP [dBm]
Low	5759.70240	125.110	21.1
Mid.	5798.05084	124.561	20.5
High	5838.18697	124.668	20.6

SECTION 8 : Measurement results

8.1 Head 5800MHz SAR

Liquid Depth (cm)	:	**15.0**	Model	:	**KX-TGA560**
Parameters	:	ε_r =**36.3**, σ =**5.51**	Serial No.	:	**1**
Ambient temperature (deg.c.)	:	**24.8**	Modulation	:	**FHSS**
Relative Humidity (%)	:	**36**	Crest factor	:	**5**
Date	:	**October 25,2005**	Measured By	:	**Miyo Ikuta**

HEAD SAR MEASUREMENT RESULTS								
Frequency		Modulation (Duty 20%)	Phantom Section	EUT Set-up Conditions		Liquid Temp.[deg.c]		SAR(1g) [W/kg]
Channel	[MHz]			Antenna	Position	Before	After	Maximum value of multi-peak
Step1. Position search								
Mid	5798.05084	FHSS	Left head	Fixed	Cheek	24.8	24.8	**0.235**
Mid	5798.05084	FHSS	Left head	Fixed	Tilt	24.8	24.8	**0.279**
Mid	5798.05084	FHSS	Right head	Fixed	Cheek	24.5	24.5	**0.301**
Mid	5798.05084	FHSS	Right head	Fixed	Tilt	24.8	24.8	**0.332**
Step2. Frequency Change								
Low	5759.70240	FHSS	Right head	Fixed	Tilt	24.8	24.9	**0.395**
High	5838.18697	FHSS	Right head	Fixed	Tilt	24.9	24.9	**0.320**
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure / General Population						**Body SAR: 1.6 W/kg (averaged over 1 gram)**		

*See Appendix 3 for measurement data plots.

8.2 Body-worn 5800MHz SAR

Liquid Depth (cm)	:	**15.0**	Model	:	**KX-TGA560**
Parameters	:	ε_r =**45.9**, σ =**6.3**	Serial No.	:	**1**
Ambient temperature (deg.c.)	:	**24.8**	Modulation	:	**FHSS**
Relative Humidity (%)	:	**45**	Crest factor	:	**5**
Date	:	**October 24,2005**	Measured By	:	**Miyo Ikuta**

BODY-WORN SAR MEASUREMENT RESULTS

Frequency		Modulation Duty 20%	Phantom Section	EUT Set-up Conditions			Liquid Temp.[deg.c]		SAR(1g) [W/kg]
Channel	[MHz]			Antenna	Position	Separation [mm]	Before	After	Maximum value of multi-peak
Low	5759.70240	FHSS	Flat	Fixed	Back	0	24.5	24.5	**0.366**
Mid	5798.05084	FHSS	Flat	Fixed	Back	0	24.3	24.3	**0.412**
High	5838.18697	FHSS	Flat	Fixed	Back	0	24.8	24.8	**0.342**
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure / General Population							**Body SAR: 1.6 W/kg (averaged over 1 gram)**		

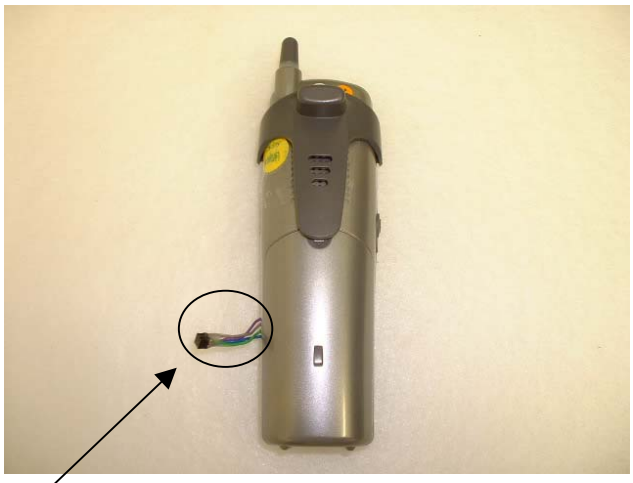
* See Appendix 3 for measurement data plots.

APPENDIX 1 : Photographs of test setup

Photograph EUT

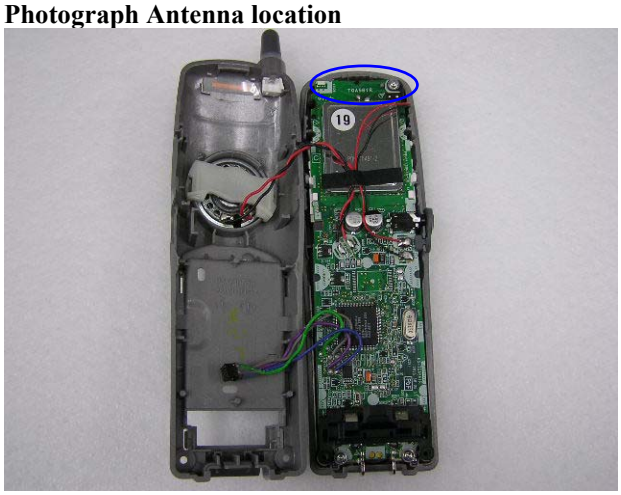
Front

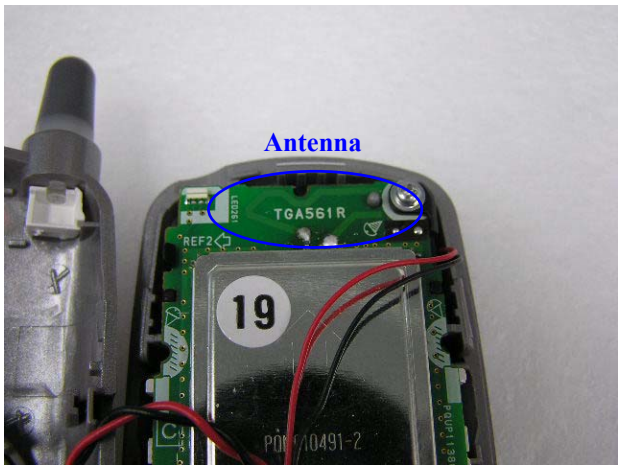
Back



The cable is attached to the EUT just for testing.
It is connected with PC in order to make the EUT test operation mode first, but is disconnected from the PC during test.
The cable is not attached to the production model.

Photograph Antenna location





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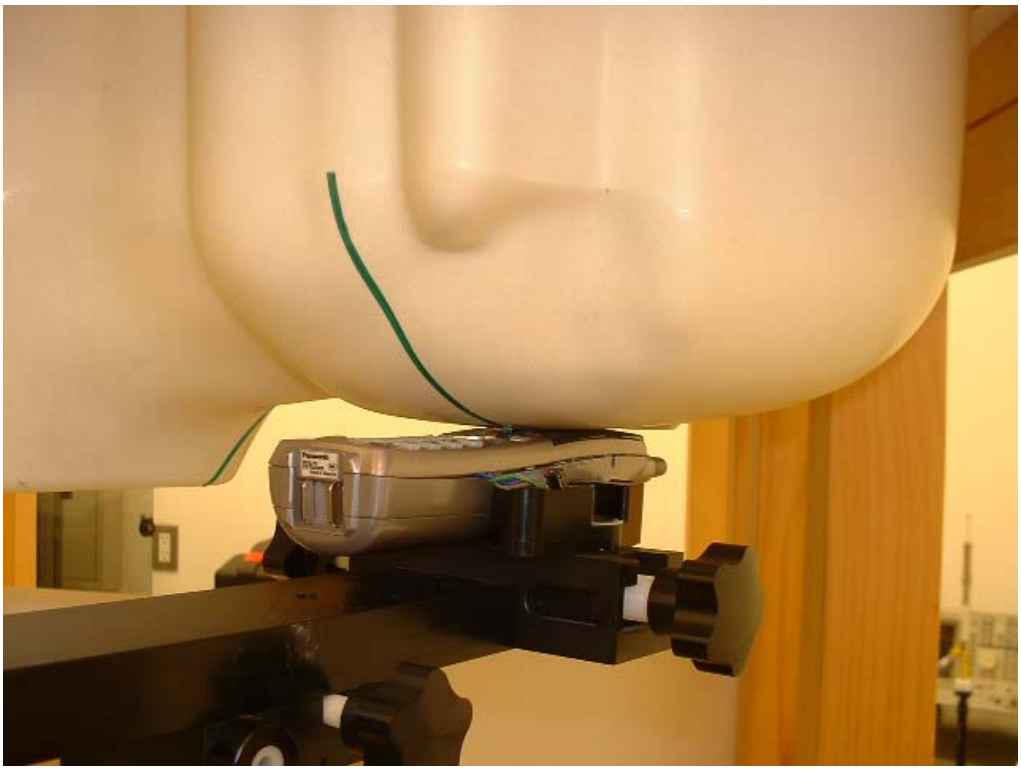
Photograph Accessary

Belt Clip

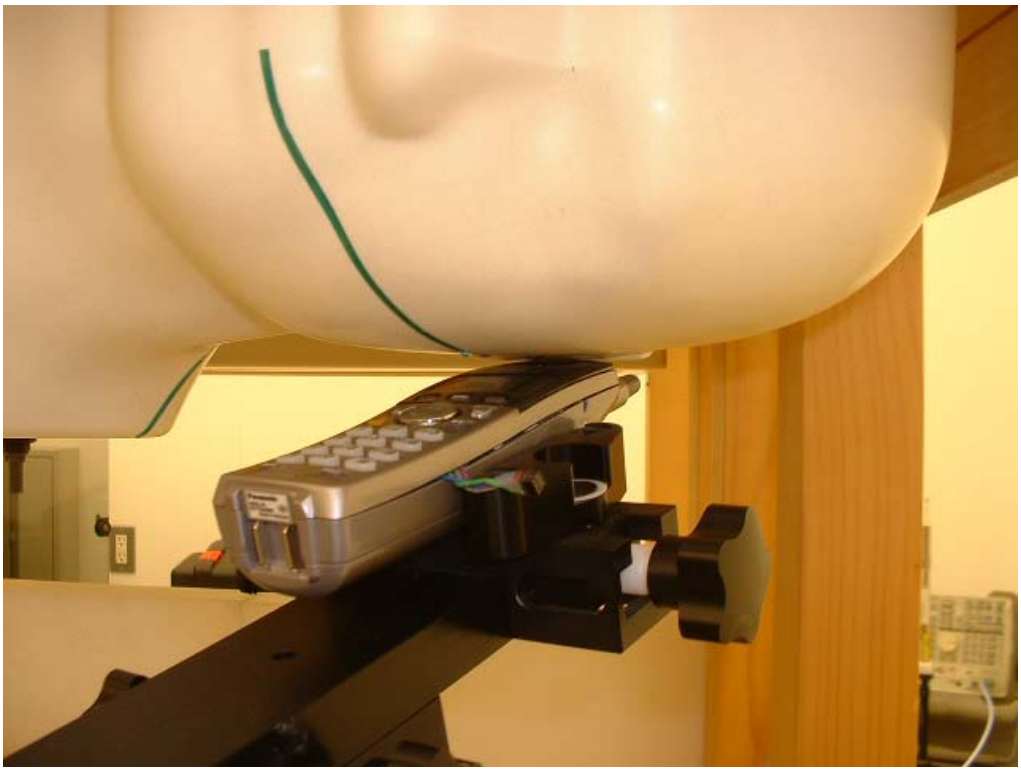
Headphone

Photograph EUT with accessories(Body-worn setup)

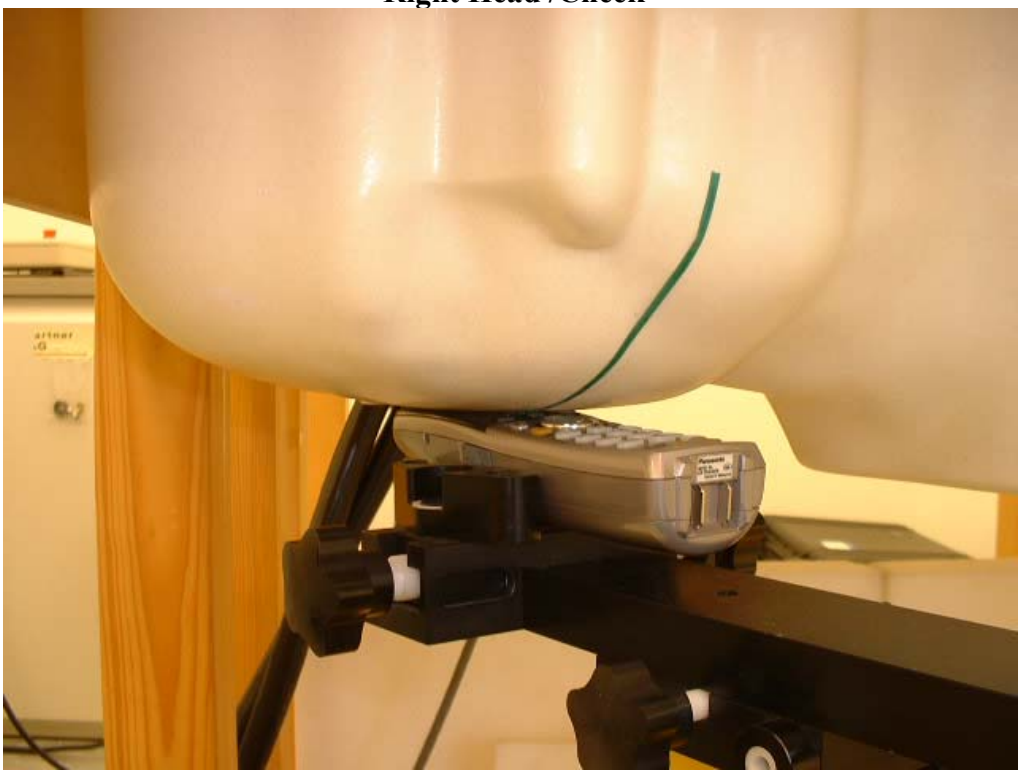
Left Head / Cheek



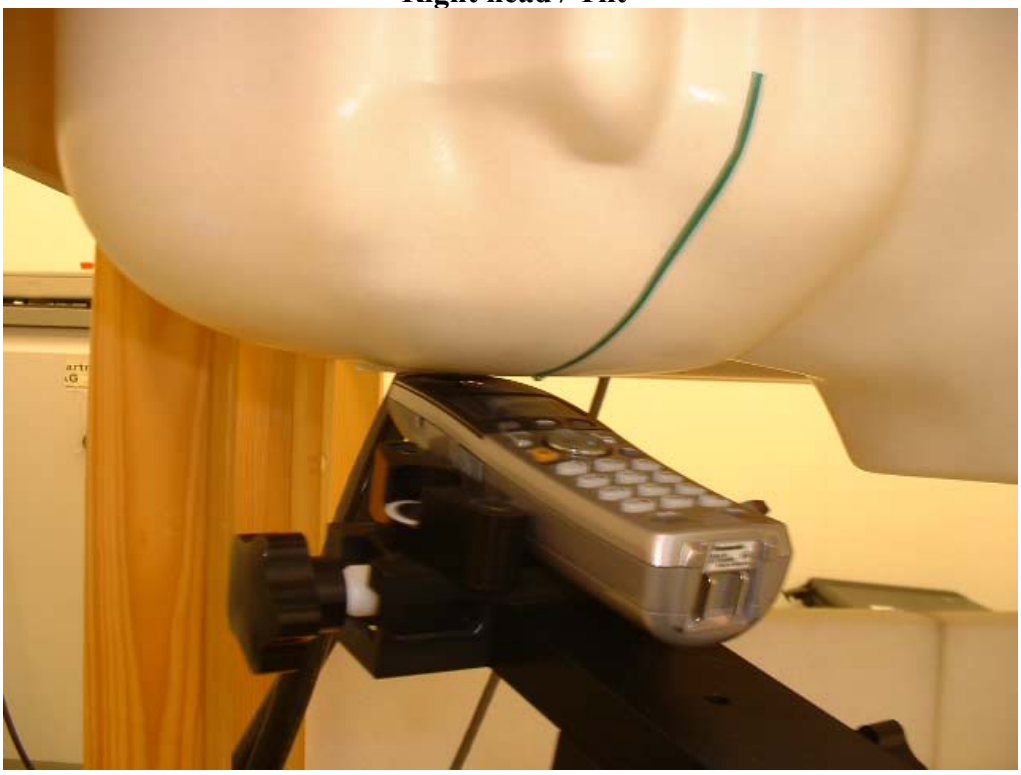
Left Head / Tilt



Right Head /Cheek



Right head / Tilt



Body-worn set up / Back