Intertek Testing Services
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Specific Absorption Rate (SAR) Test Report
for
Shintom Co., Ltd.
on the
Dual Band Phone – GSM 900/1900
Model Number: GDU325

Test Report: 20407301
Date of Report: February 16, 2001

Job #: J20040730
Date of Test: February 14 & 15, 2001

Total No of Pages Contained in this Report: 24 + Data Sheets

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Accredited for testing to FCC Parts 15

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Review Date: 02/23/01

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6.0 DOCUMENT HISTORY **24**

1.0 Job description

1.1 Client Information

The Shinton GDU325 has been tested at the request of

Company: Shintom Co., Ltd
1-19-20 Shin-Yakoham, Kohoku-Ku
Yokohama 222-0033
Japan

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1.2 Equipment under test (EUT)

Product Descriptions:

Equipment	Dual Band Phone GSM 900/1900		
Trade Name	Shintom Co., Ltd	Model No	GDU325
FCC ID	BFYM5016	S/N No.	N/A
Category	Portable	RF Exposure	Uncontrolled Environment
Frequency Band	890- 915 MHz 1860 - 1910 MHz	System	GSM 900 GSM 1900 (PCS)

EUT Antenna Description			
Type	Monopole	Configuration	Fixed
Dimensions	23mm (L)	Gain	0 dBi
Location	Top, Right		

Use of Product : Voice Communication

Manufacturer: SAME as above.

Production is planned: [X] Yes, [ ] No

EUT receive date: February 14, 2001

EUT received condition: Good working condition prototype

Test end date: February 15, 2001

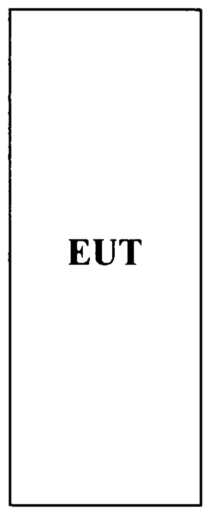
1.3 Test plan reference

FCC rule part 2.1093, FCC Docket 96-326 & Supplement C to OET Bulletin 65

1.4 System test configuration

1.4.1 System block diagram & Support equipment

The diagram shown below details test configuration of the equipment under test.



1.4.2 Test Position

The Shinton GDU325 was configured for testing in a typical fashion (as a customer would normally use it), and in the confines as outlined in C95.1 (1992) and Supplement C of OET 65 (1998). The EUT was placed in the intended use position, i.e. CENELEC 80° position. This position is defined by a reference plane and a line. The reference plane of the head is given by three points, the auditory canal opening of both ears and center of the closed mouth. The reference line of the EUT is defined by the line, which connects the center of the ear piece with the center of the bottom of the case and lies on the surface of the case facing the phantom. The reference line of the EUT lies in the reference plane of the head. The center of the ear-piece of the EUT is placed at the entry of the auditory canal. The angle between the reference line of the phone and the line connecting both auditory canal openings is 80°. Please refer to figure 1 below for the position details:

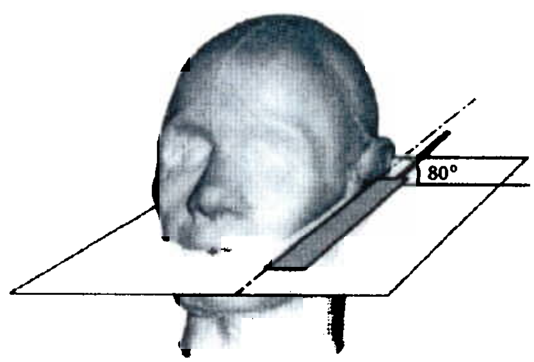


Figure 1: Intended use position

Additionally, the EUT was tested in a second position from the normal 80° angle between the reference line of the phone and the line connecting both auditory canal openings. The center of the ear piece of the EUT is placed at the entry of the auditory canal. The angle between the reference line of the phone and the line connecting both auditory canal openings was adjusted from 80 ° to the angle where two points of the phone were in contact with the phantom (ear hole and cheek).

Data pages indicate the position of the EUT during testing. The first position of 80 ° has data pages labeled '1 point touch'. The second position has data pages labeled '2 point touch'.

The left and right hand sections of the phantom were used for measuring the low, middle, and high channels in the 1 point touch and 2 point touch positions.

1.4.3 Test Condition

During tests, the worst case data (max. RF coupling) was determined with following conditions:

EUT Antenna	Fixed length	Orientation	Two Touch
Usage	Left Hand & Right Hand	Distance between antenna axis at the joint and the liquid surface:	Two-Touch: 20.7mm 80°: 19.2mm
Simulating	Brain & Muscle	EUT Battery	Fully Charged battery
Power output - Maximum power at antenna port	32.4 dBm (890-915 MHz band) 29.5 dBm (1860-1910 MHz band)		

The spatial peak SAR values were accessed for lowest, middle and highest operating channels defined by the manufacturer.

Antenna port power measurement was performed by manufacturer.

1.5 Modifications required for compliance

No modifications were implemented by Intertek Testing Services.

1.6 Additions, deviations and exclusions from standards

No additions, deviations or exclusions have been made from standard.

2.0 SAR EVALUATION

2.1 SAR Limits

The following FCC limits for SAR apply to devices operate in General Population/Uncontrolled Exposure environment:

EXPOSURE (General Population/Uncontrolled Exposure environment)	**SAR (W/kg)**
Average over the whole body	0.08
Spatial Peak (1g)	1.60
Spatial Peak for hands, wrists, feet and ankles (10g)	4.00

2.2 Configuration Photographs

SAR measurement Test Setup

2.2 Configuration Photographs (Continued)

SAR measurement Test Setup

2.2 Configuration Photographs (Continued)

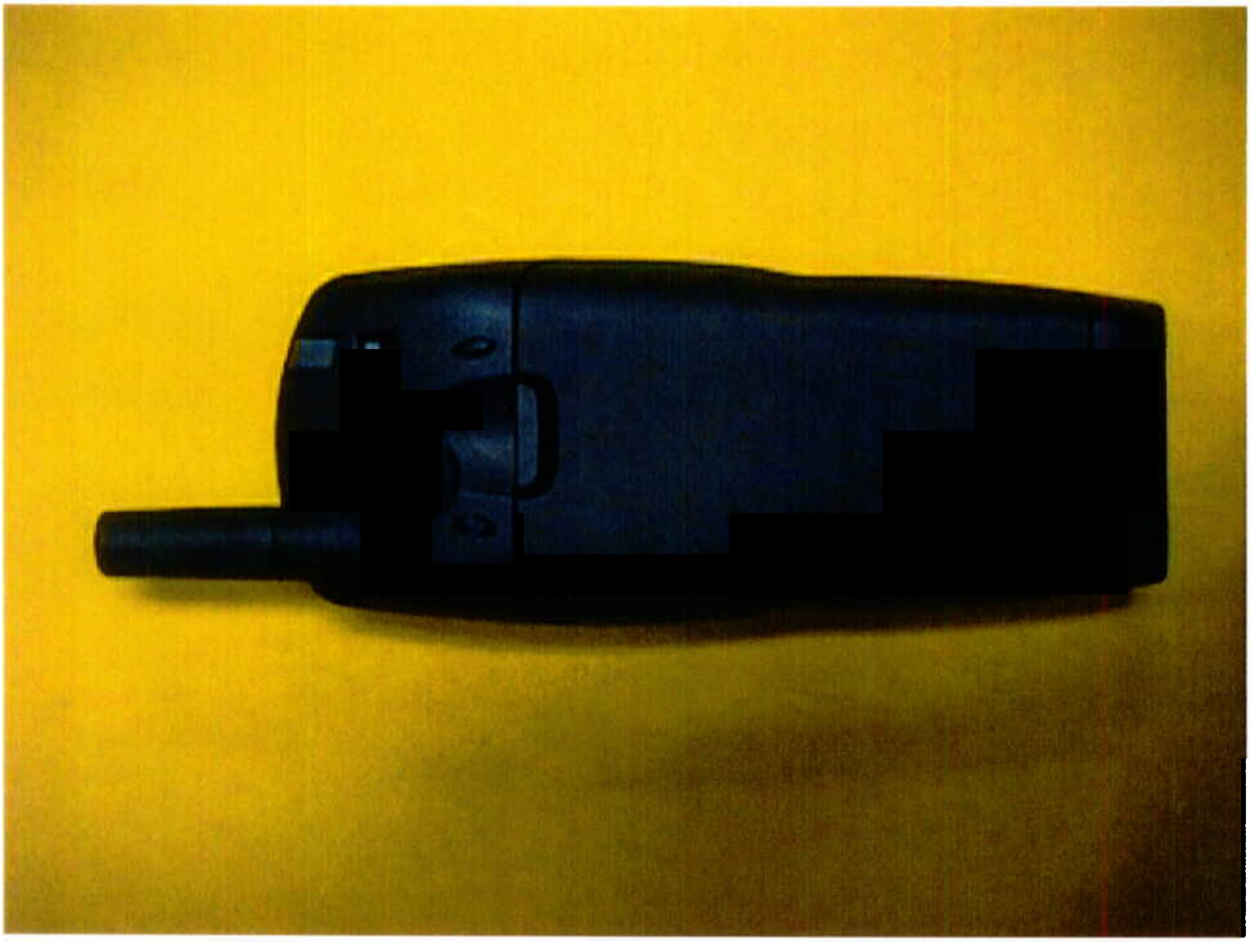
SAR measurement Test Setup

2.2 Configuration Photographs (Continued)

EUT Photo

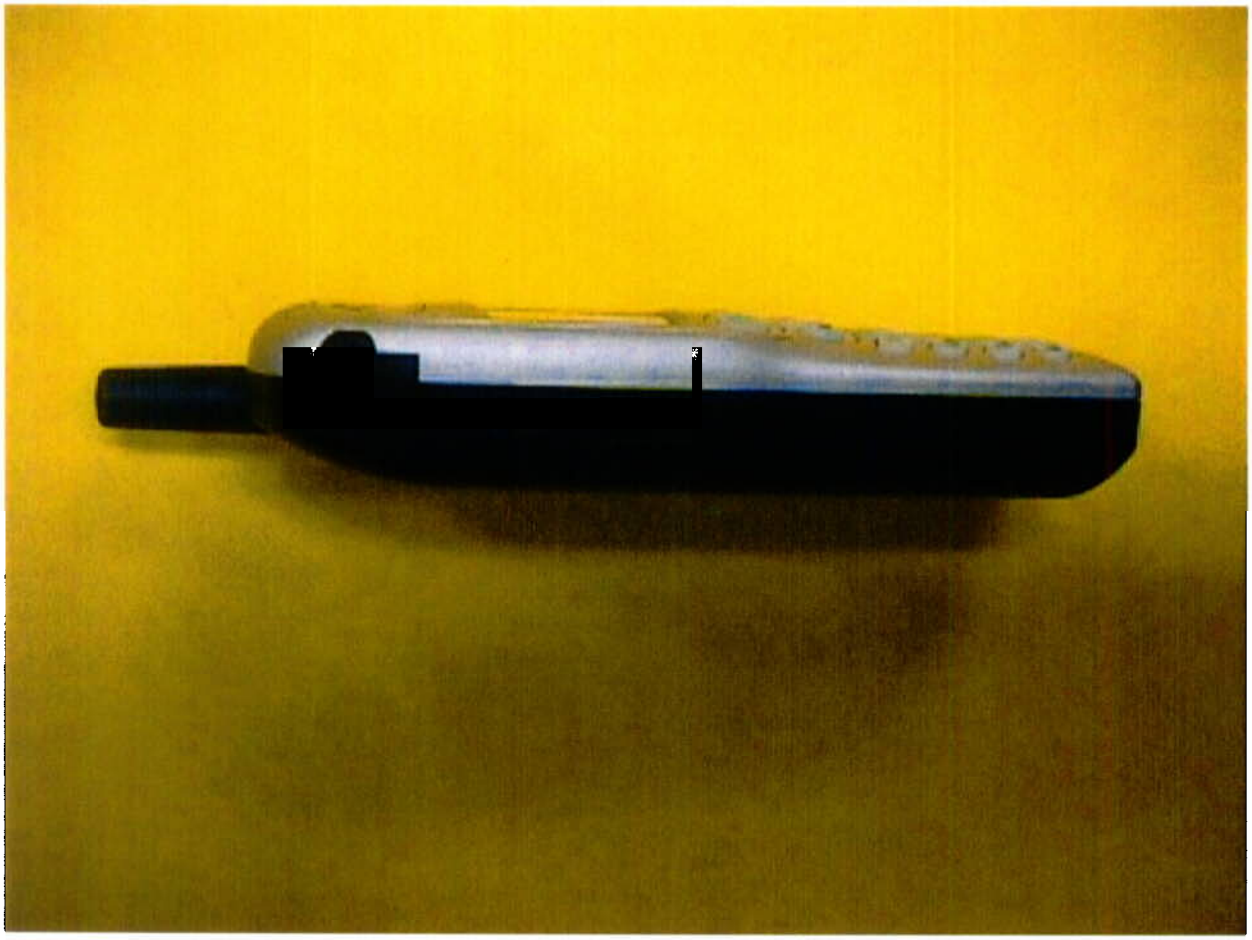
2.2 Configuration Photographs (Continued)

EUT Photo



2.2 Configuration Photographs (Continued)

EUT Photo



2.3 System Verification

Prior to the assessment, the system was verified to the ±5% of the specifications by using the system validation kit. The validation was performed at 900 MHz.

Validation kit	Targeted SAR_{1g} (mW/g)	Measured SAR_{1g} (mW/g)
D900V2, S/N #: 0013	4.03	3.9

2.4 Evaluation Procedures

The SAR evaluation was performed with the following procedures:

a. SAR was measured at a fixed location above the reference point and used as a reference value for the assessing the power drop.

b. The SAR distribution at the exposed side of the flat Phantom was measured at a distance of 30 mm from the inner surface of the shell. The area covered the entire dimension of the head and the horizontal grid spacing was 20 mm x 20 mm. Based on this data, the area of the maximum absorption was determined by spline interpolation.

c. Around this point, a volume of 32 mm x 32 mm x 34 mm was assessed by measuring 5 x 5 x 7 points. On the basis of this data set, the spatial peak SAR value was evaluated with the following procedure:

   i) The data at the surface were extrapolated, since the center of the dipoles is 2.7 mm away from the tip of the probe and the distance between the surface and the lowest measurement point is 1.6 mm. The extrapolation was based on a least square algorithm. A polynomial of the fourth order was calculated through the points in Z-axes. This polynomial was then used to evaluate the points between the surface and the probe tip.

   ii) The maximum interpolated value was searched with a straight-forward algorithm. Around this maximum, the SAR values averaged over the spatial volumes (1g or 10g) were computed using the 3-D spline interpolation algorithm. The 3-D spline is composed of three one-dimensional splines with the "Not a knot" condition (in x, y and z directions). The volume was integrated with the trapezoidal algorithm. 1000 points (10 x 10 x 10) were interpolated to calculate the average.

   iii) All neighboring volumes were evaluated until no neighboring volume with a higher average value was found.

d. Re-measurement of the SAR value at the same location as in step a. above. If the value changed by more than 5 %, the evaluation was repeated.

2.5 Test Results

The results on the following page(s) were obtained when the device was tested in the condition described in this report. Detail measurement data and plots, which reveal information about the location of the maximum SAR with respect to the device, are reported in Appendix A.

Measurement Results

Trade Name:	Shinton Co., Ltd.	**Model No.:**	Shinton GDU325
Serial No.:	Not Labeled	**Test Engineer:**	Xi-Ming Yang

TEST CONDITIONS			
Ambient Temperature	22.1 °C	Relative Humidity	52 %
Test Signal Source	Test Mode	Signal Modulation	GSM
Output Power Before SAR Test	32.4 dBm in 900 MHz band 29.5 dBm in 1800 MHz band	Output Power After SAR Test	The Same
Test Duration	23 Min. each test	Number of Battery Change	Every Scan

EUT Position: Left Hand 80°

Channel MHz	Operating Mode	Duty Cycle ratio	Measured SAR_{1g} (mW/g)	Plot Number
1850	GSM	8	0.731	1
1880	GSM	8	0.684	3
1910	GSM	8	0.670	4
890	GSM	8	0.786	6

EUT Position: Left Hand, 2 Points Touching Phamtom 80°

Channel MHz	Operating Mode	Duty Cycle ratio	Measured SAR_{1g} (mW/g)	Plot Number
1850	GSM	8	0.588	2
890	GSM	8	0.937	7
902.4	GSM	8	0.826	8
914.8	GSM	8	0.733	9

EUT Position: Right Hand 80°

Channel MHz	Operating Mode	Duty Cycle ratio	Measured SAR_{1g} (mW/g)	Plot Number
1850	GSM	8	0.731	5

EUT Position: Right Hand Two Touch				
Channel MHz	**Operating Mode**	**Duty Cycle ratio**	**Measured SAR_{1g} (mW/g)**	**Plot Number**
890	GSM	8	0.910	10

Note:
a) Worst case data were reported
b) Duty cycle factor included in the measured SAR data
c) Uncertainty of the system is not included
d.) Belt Clip – 23.5mm thick
e.) 80° antenna to hand 17.5mm
f.) Two-Touch antenna to hand 20.5mm

3.0 TEST EQUIPMENT

3.1 Equipment List

The Specific Absorption Rate (SAR) tests were performed with the SPEAG model DASY 3 automated near-field scanning system which is package optimized for dosimetric evaluation of mobile radios [3].

The following major equipment/components were used for the SAR evaluations:

SAR Measurement System			
EQUIPMENT	SPECIFICATIONS	S/N #	CAL. DATE
Robot	**Stäubi RX60L** Repeatability: ± 0.025mm Accuracy: 0.806×10^{-3} degree Number of Axes: 6	597412-01	N/A
E-Field Probe	**ET3DV5** Frequency Range: 10 MHz to 6 GHz Linearity: ± 0.2 dB Directivity: ± 0.1 dB in brain tissue	1334	4/10/00
Data Acquisition	**DAE3** Measurement Range: 1μV to >200mV Input offset Voltage: < 1μV (with auto zero) Input Resistance: 200 M	317	N/A
Phantom	**Generic Twin V3.0** Type: Generic Twin, Homogenous Shell Material: Fiberglass Thickness: 2 ± 0.1 mm Capacity: 20 liter Ear spacer: 4 mm (between EUT ear piece and tissue simulating liquid)	N/A	N/A
Simulated Tissue	**Mixture** Please see section 6.2 for details	N/A	1/26/01
Power Meter	**HP** 8900D w/ 84811A sensor Frequency Range: 100kHz to 18 GHz Power Range: 300μW to 3W	1312A01255	8/01/00

3.2 Tissue Simulating Liquid

Brain	
Ingredient	**Frequency** (900 MHz)
Water	40.47 %
Cellulose	0.25 %
Salt	0.7 %
Preservative	0.1 %
Sugar	58.48 %

The dielectric parameters were verified prior to assessment using the HP 85070A dielectric probe kit and the HP 8753C network Analyzer. The dielectric parameters were:

Frequency (MHz)	$_r$ *	*(mho/m)	**(kg/m$^{3)}$
900	45.5 ± 5%	0.81 ± 10%	1000

* *worst case uncertainty of the HP 85070A dielectric probe kit*
** *worst case assumption*

Brain	
Ingredient	**Frequency** (1900 MHz)
Water	45.32 %
Cellulose	0.25%
Salt	0 %
Preservative	0.1%
Sugar	54.33 %

The dielectric parameters were verified prior to assessment using the HP 85070A dielectric probe kit and the HP 8753C network Analyzer. The dielectric parameters were:

Frequency (MHz)	$_r$ *	*(mho/m)	**(kg/m$^{3)}$
1900	42.78 ± 5%	1.77 ± 10%	1000

* *worst case uncertainty of the HP 85070A dielectric probe kit*
** *worst case assumption*

Muscle	
Ingredient	**Frequency** (900 MHz)
Water	54.05 %
Sugar	45.75 %
Salt	0.1 %
Preservative	0.1 %

The dielectric parameters were verified prior to assessment using the HP 85070A dielectric probe kit and the HP 8753C network Analyzer. The dielectric parameters were:

Frequency (MHz)	$_r$ *	*(mho/m)	**(kg/m^3)
835	56.5 ± 5%	0.97 ± 10%	1000

* *worst case uncertainty of the HP 85070A dielectric probe kit*
** *worst case assumption*

Muscle	
Ingredient	**Frequency** (1900 MHz)
Water	54.5 %
Cellulose	0.1 %
Salt	0 %
Preservative	0.1 %
Sugar	45.3 %

The dielectric parameters were verified prior to assessment using the HP 85070A dielectric probe kit and the HP 8753C network Analyzer. The dielectric parameters were:

Frequency (MHz)	$_r$ *	*(mho/m)	**(kg/m^3)
1900	52.2 ± 5%	1.65 ± 10%	1000

* *worst case uncertainty of the HP 85070A dielectric probe kit*
** *worst case assumption*

Note: The amount of each ingredient specified in the tables are not the exact amounts of the final test solution. The final test solution was adjusted by adding small amounts of either water, sugar, and/or salt to calibrate the solution to meet the proper dielectric parameters.