



SAR TEST REPORT

Test Report No. : 27GE0058-HO-C-1

Applicant : Brother Industries, Ltd.
Type of Equipment : Digital Cordless Handset
Model No. : BCL-D10
FCC ID : B3QBCLD10A
Test standard : FCC47CFR 2.1093
FCC OET Bulletin 65, Supplement C
Test Result : Complied
Max. SAR Measured : Head 0.065W/kg (5725.809328MHz)
Body 0.197W/ kg (5725.809328MHz)

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 : February 15-16, 2007

Tested by : 
Miyo Ikuta
EMC Services

Approved by : 
Hironobu Shimoji
Assistant Manager of EMC Services



NVLAP LAB CODE: 200572-0

This laboratory is accredited by the NVLAP LAB CODE 200572-0, U.S.A. The tests reported herein have been performed in accordance with its terms of accreditation.
*As for the range of Accreditation in NVLAP, you may refer to the WEB address, <http://ulapex.jp/emc/nvlap.htm>

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2.2 Product description

Model No: BCL-D10 (referred to as the EUT in this report) is the Digital Cordless Handset.
It can be used as a cordless phone unit of facsimile. EUT has a function of connecting to inside and outside line.

2.2.1 Equipment specification

Clock frequency(ies) in the system : 13.824MHz

Equipment Type : Transceiver

Frequency band : Low Channel = 5725.809328 MHz
High Channel = 5848.889420 MHz

Bandwidth & Channel spacing : Bandwidth: 1MHz
Channel spacing: 891.871kHz

Type of Modulation : FHSS

Frequency generation : Synthesizer

Power Supply (inner) : C 3.4V to 4.2V

Antenna Type : Patch antenna

Antenna Connector Type : Soldering

Antenna Gain : Peak 6.1dBi

Antenna location : Refer to Appendix 1

Max. Transmit Power tested : 19.26dBm (84.33mW)

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.

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

SECTION 4 : Test result

4.1 Result of Max. SAR value

Max. SAR Measured : **Head 0.065W/kg (5725.809328MHz)**
Body 0.197W/ kg (5725.809328MHz)

4.2 Test Location

UL Apex Co., Ltd. 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 5 : Operation of E.U.T. during testing

5.1 Confirmation before SAR testing

Correlation of EMC power and SAR power

Peak Power test

It was checked that the antenna port power was correlated within 0~+5% (FCC requirements)
SAR power is equal to DATA of EMC test based on the following reason.

- The peak power of EUT was confirmed before SAR testing.(February 15, 2007)
- EMC and SAR tests were performed with the same test sample under the same condition.
- EMC and SAR tests were performed at the same laboratory.
- The test mode setting is simple, and there is no possibility that the power (value) is changed by the wrong setting.

The result is shown in Section 7.1.

5.2 Confirmation after SAR testing

It was checked that the power drift is within $\pm 5\%$ in the evaluation procedure of SAR testing.
The result is shown in APPENDIX 2.

5.3 Operating modes for SAR testing

5.3.1 Setting of EUT

Frequency band	: 5725.809328 – 5848.88942 MHz
Channel	: 1ch(5725.809328 MHz) 71ch(5788.240269MHz) 139ch(5848.889420MHz)
Modulation	: FHSS
Crest factor	: 9.5 Duty Cycle: 10.55% (on time:1.059ms / 1cycle:10.04ms)

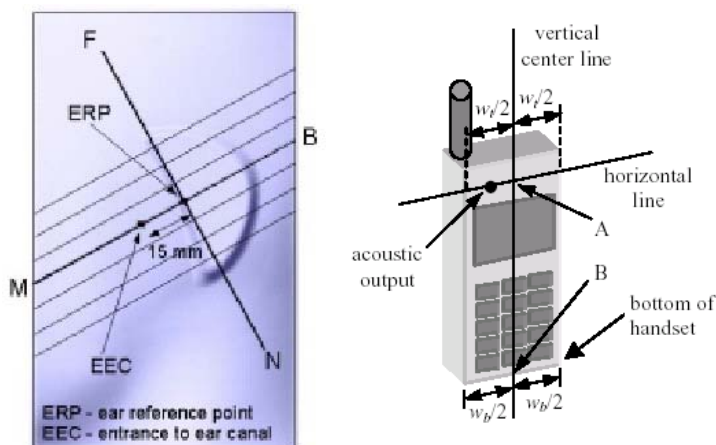
5.2 Description of the head test setup

According to the OET 65, IEEE1528, and IEC62209-1 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 spacer of 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”.

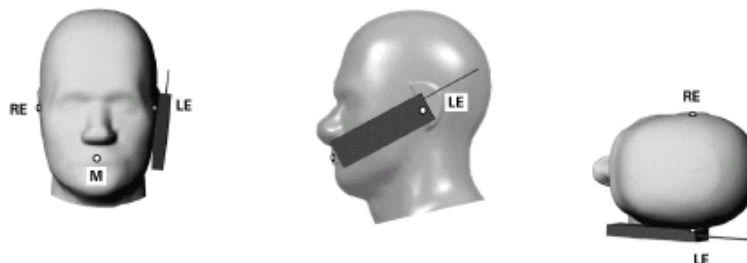


5.2.2 Cheek position

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:

- When any point on the display, keypad or mouthpiece portions of the handset is in contact with the phantom.
- (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 worst position was decided.

The test was performed with cheek and Tilt positions of the device and at a left and right position of the SAM Phantom and the device position.

Step2. The changing to the Low and High channels

The test was performed at the worst position of Step1.

5.4 Description of the Body-worn test setup and Method

This EUT was tested on a separation distance of 15mm between back of the EUT with the earphone and the flat section of SAM phantom. (Refer to the Appendix1)

The tests were performed in the Low, Mid, and the High channels.

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 \pm %	Probability distribution	divisor	(ci) 1g	Standard Uncertainty (1g)	vi or v _{eff}
Measurement System						
Probe calibration	± 6.8	Normal	1	1	± 6.8	∞
Axial isotropy of the probe	± 4.7	Rectangular	$\sqrt{3}$	$(1-c_p)^{1/2}$	± 1.9	∞
Spherical isotropy of the probe	± 9.6	Rectangular	$\sqrt{3}$	$(c_p)^{1/2}$	± 3.9	∞
Boundary effects	± 2.0	Rectangular	$\sqrt{3}$	1	± 1.2	∞
Probe linearity	± 4.7	Rectangular	$\sqrt{3}$	1	± 2.7	∞
Detection limit	± 1.0	Rectangular	$\sqrt{3}$	1	± 0.6	∞
Readout electronics	± 0.3	Normal	1	1	± 0.3	∞
Response time	± 0.8	Rectangular	$\sqrt{3}$	1	± 0.5	∞
Integration time	± 2.6	Rectangular	$\sqrt{3}$	1	± 1.5	∞
RF ambient Noise	± 3.0	Rectangular	$\sqrt{3}$	1	± 1.7	∞
RF ambient Reflections	± 3.0	Rectangular	$\sqrt{3}$	1	± 1.7	∞
Probe Positioner	± 0.8	Rectangular	$\sqrt{3}$	1	± 0.5	∞
Probe positioning	± 9.9	Rectangular	$\sqrt{3}$	1	± 5.7	∞
Max.SAR Eval.	± 4.0	Rectangular	$\sqrt{3}$	1	± 2.3	∞
Test Sample Related						
Device positioning	± 2.9	Normal	1	1	± 2.9	28
Device holder uncertainty	± 3.6	Normal	1	1	± 3.6	5
Power drift	± 5.0	Rectangular	$\sqrt{3}$	1	± 2.9	∞
Phantom and Setup						
Phantom uncertainty	± 4.0	Rectangular	$\sqrt{3}$	1	± 2.3	∞
Liquid conductivity (target)	± 5.0	Rectangular	$\sqrt{3}$	0.64	± 1.8	∞
Liquid conductivity (meas.)	± 5.0	Rectangular	1	0.64	± 3.2	∞
Liquid permittivity (target)	± 10.0	Rectangular	$\sqrt{3}$	0.6	± 3.5	∞
Liquid permittivity (meas.)	± 10.0	Rectangular	1	0.6	± 6.0	∞
Combined Standard Uncertainty					± 14.74	
Expanded Uncertainty (k=2)					± 29.5	

SECTION 7 : Confirmation before/after testing

7.1 Conducted power before

Correlation of EMC power and SAR power

These datas are reference data of EMC test. (Report No. 27GE0058-HO-A-1)

Date of test: February 15, 2007

FCC 15.247 Peak power						
Ch	Freq. [MHz]	P/M Reading [dBm]	Cable Loss [dB]	Atten. [dB]	Result	
					[dBm]	[mW]
Low (ch1)	5725.809328	8.70	0.66	9.90	19.26	84.33
Mid (ch71)	5788.240269	8.66	0.68	9.89	19.23	83.75
High (ch139)	5848.889420	7.04	0.68	9.89	17.61	57.68

Sample Calculation:

Result = Reading + Cable Loss (supplied by customer)+ Attenuator

SECTION 8 : Measurement results

8.1 Head 5800MHz SAR

Liquid Depth (cm) : 15.0 Model : BCL-D10
Parameters : $\epsilon_r = 32.1, \sigma = 5.20$ Serial No. : 0003
Ambient temperature (deg.c.) : 24.5 Modulation : FHSS
Relative Humidity (%) : 32 Crest factor : 9.5
Date : February 15, 2007 Measured By : Miyo Ikuta

HEAD SAR MEASUREMENT RESULTS								
Frequency		Modulation	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.Decision of the worst position								
Mid	5788.240269	FHSS	Left head	Fixed	Cheek	22.8	22.8	0.048
Mid	5788.240269	FHSS	Left head	Fixed	Tilt	22.8	22.8	0.047
Mid	5788.240269	FHSS	Right head	Fixed	Cheek	22.8	22.8	0.037
Mid	5788.240269	FHSS	Right head	Fixed	Tilt	22.8	23.0	0.046
Step2. Change of the channels								
Low	5725.809328	FHSS	Left head	Fixed	Cheek	23.0	23.2	0.065
High	5848.889420	FHSS	Left head	Fixed	Cheek	23.2	23.2	0.033
FCC47CFR 2.1093 Spatial Peak Uncontrolled Exposure / General Population						Head 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) : 15.1 Model : BCL-D10
Parameters : $\epsilon_r = 45.2$, $\sigma = 6.14$ Serial No. : 0003
Ambient temperature (deg.c.) : 24.5 Modulation : FHSS
Relative Humidity (%) : 35 Crest factor : 9.5
Date : February 16, 2007 Measured By : Miyo Ikuta

BODY-WORN SAR MEASUREMENT RESULTS									
Frequency		Modulation	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	5725.809328	FHSS	Flat	Fixed	Back	15	24.2	24.2	0.197
Mid	5788.240269	FHSS	Flat	Fixed	Back	15	24.2	24.2	0.167
High	5848.889420	FHSS	Flat	Fixed	Back	15	24.2	24.2	0.107
FCC47CFR 2.1093 Spatial Peak Uncontrolled Exposure / General Population							Body SAR: 1.6 W/kg (averaged over 1 gram)		

* See Appendix 3 for measurement data plots.