



SAR TEST REPORT

Test Report No. : 28FE0222-HO-C

Applicant : Brother Industries, Ltd.
Type of Equipment : Digital Cordless Handset
Model No. : BCL-D60
FCC ID : B3QBCLD60
Test regulation : FCC47CFR 2.1093
FCC OET BULLETIN 65, SUPPLEMENT C
Test Result : Complied
Max. SAR Value : Head 0.075W/kg (5725.809328MHz)
Body 0.199W/ kg (5788.240269MHz)

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3. This sample tested is in compliance with the limits of the above regulation.
4. The test results in this test report are traceable to the national or international standards.
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Date of test:

April 3-4, 2008

Tested by:

H. Sato

Hisayoshi Sato
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Approved by :

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Site Manager of EMC Services



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MF060b (09.01.08)

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2.2 Product Description

Model No: BCL-D60 (referred to as the EUT in this report) is the Digital Cordless Handset.
It is an enhanced Digital Cordless Telecommunications.

Clock frequency(ies) in the system : 13.824MHz
Equipment Type : Transceiver
Frequency of Operation : 5725.809328MHz to 5848.889420MHz: 139ch*
Bandwidth : 1MHz
Type of Modulation : FHSS
Frequency generation : Synthesizer
Power Supply (inner) : DC 3.3V
Antenna Type : Patch antenna
Antenna Connector Type : none
Antenna Gain : Peak 6.1dBi
Max. power tested : Peak power : 18.35dBm (68.33mW)

* The channels for usage

	0	1	2	3	4	5	6	7	8	9
0	1	3	5	7	9	11	13	15	17	19
10	21	23	25	27	29	31	33	35	37	39
20	41	43	45	47	49	51	53	55	57	59
30	61	63	65	67	69	71	73	75	77	79
40	81	83	85	87	89	91	93	95	97	99
50	101	103	105	107	109	111	113	115	117	119
60	121	123	125	127	129	130	131	132	133	134
70	135	136	137	138	139					

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.

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3.2 Procedure and result

No.	Item	Test Procedure	Limit	Remarks	Exclusion	Result
1	Human Exposure	FCC OET BULLETIN 65, SUPPLEMENT C	FCC47CFR 2.1093	SAR Measurement	N/A	Complied Max.SAR = 0.199W/kg
Note: UL Japan, Inc. 's SAR Work Procedures QPM46 and QPM47						

Result of Max. SAR value

Max. SAR Value: Head 0.075W/kg (5725.809328MHz)
Body 0.199W/kg (5788.240269MHz)

3.3 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**

3.4 Test Location

*Shielded room for SAR testings

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3.5 Confirmation before SAR testing

Correlation of Output Power between EMC and SAR tests

It was checked that the antenna port power was correlated within 0~+5% (FCC requirements)

SAR power is equal to DATA of EMC test (tested on April 3, 2008) based on the following reason.

- EMC and SAR tests are performed with the same test sample (S/N: 0700138E) under the same condition.
 - EMC power (tested on April 3, 2008) was measured immediately before SAR test (tested on April 3 and 4, 2008).
 - 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 6.1.

3.6 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.

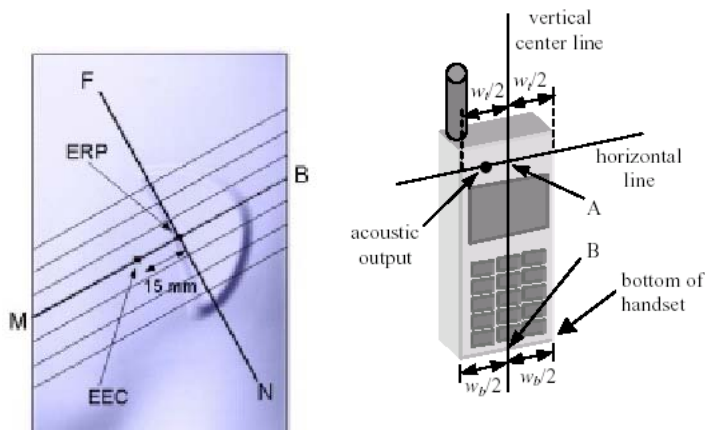
3.7 Description of the head test setup

According to the OET 65, 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.

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”.

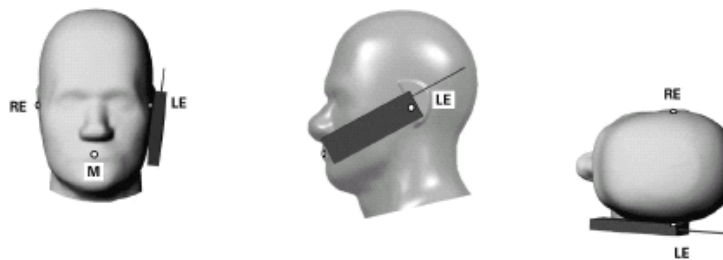


Cheek position

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.



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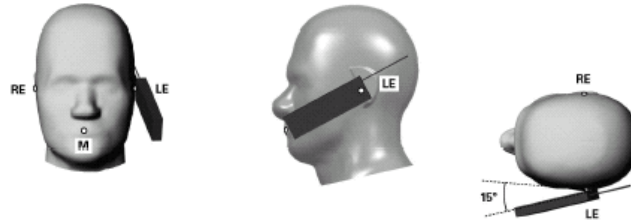
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Tilt position

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.



<Antenna position>

The antenna of this EUT was built-in antenna.

3.8 Method of measurement (Head SAR)

Step1. The searching for the worst position

Step2. The changing to the Low and High channels

The test was performed at the worst position of Step1.

3.9 Description of the Body-worn setup

The tests were performed in the EUT with the earphone. (Refer to the Appendix1)

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)

Front (Separation 15mm) :

The measurement separated 15mm distance between the front face of EUT and flat section of SAM Twin Phantom.

Rear (Separation 15mm) :

The measurement separated 15mm distance between the rear face of EUT and flat section of SAM Twin Phantom.

3.10 Method of measurement (Body-worn SAR)

Step1. The searching for the worst position

Step2. The changing to the Low and High channels

The test was performed at the worst position of Step1.

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

4.1 Operating modes for SAR testing

4.1.1 Setting of EUT

Frequency band	: 5725.809328 – 5848.889420 MHz
Channel	: 1ch(5725.809328 MHz) 71ch(5788.240269MHz) 139ch(5848.889420MHz)
Modulation	: FHSS
Crest factor	: 9.4 Duty Cycle: 10.6% (on time:1.06ms / 1cycle:9.964ms)

SECTION 5 : Test surrounding

5.1 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	± 4.8	Normal	1	1	± 4.8	∞
Axial isotropy of the probe	± 4.7	Rectangular	$\sqrt{3}$	$(1-cp)^{1/2}$	± 1.9	∞
Spherical isotropy of the probe	± 9.6	Rectangular	$\sqrt{3}$	$(cp)^{1/2}$	± 3.9	∞
Boundary effects	± 1.0	Rectangular	$\sqrt{3}$	1	± 0.6	∞
Probe linearity	± 4.7	Rectangular	$\sqrt{3}$	1	± 2.7	∞
Detection limit	± 1.0	Rectangular	$\sqrt{3}$	1	± 0.6	∞
Readout electronics	± 1.0	Normal	1	1	± 1.0	∞
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	± 0.4	Rectangular	$\sqrt{3}$	1	± 0.2	∞
Probe positioning	± 2.9	Rectangular	$\sqrt{3}$	1	± 1.7	∞
Max.SAR Eval.	± 1.0	Rectangular	$\sqrt{3}$	1	± 0.6	∞
Test Sample Related						
Device positioning	± 2.9	Normal	1	1	± 2.9	9
Device holder uncertainty	± 3.6	Normal	1	1	± 3.6	7
Power drift	± 5.0	Rectangular	$\sqrt{3}$	1	± 5.8	∞
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)	± 5.0	Rectangular	$\sqrt{3}$	0.6	± 1.7	∞
Liquid permittivity (meas.)	± 5.0	Rectangular	1	0.6	± 3.0	∞
Combined Standard Uncertainty					± 12.17	
Expanded Uncertainty (k=2)					± 24.34	

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SECTION 6 : Confirmation before/after testing

6.1 Conducted power before

6.1.1 Correlation of EMC power and SAR power

These datas are reference data of EMC test. (Report No. 28FE0222-HO-B)

Date of test: April 3, 2008

FCC 15.247 Peak power						
Ch	Freq.	P/M	Cable	Atten.	Result	
	[MHz]	Reading [dBm]	Loss [dB]	[dB]	[dBm]	[mW]
Low (ch1)	5725.809328	6.80	0.34	10.22	17.36	54.48
Mid (ch71)	5788.240269	7.48	0.35	10.23	18.06	64.03
High (ch139)	5848.889420	7.74	0.37	10.24	18.35	68.33

Sample Calculation:

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

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SECTION 7 : Measurement results

7.1 Head 5800MHz SAR

Liquid Depth (cm) : 15.0
Parameters : $\epsilon_r = 33.8$, $\sigma = 5.44$
Ambient temperature (deg.c.) : 24.6
Relative Humidity (%) : 42
Date : April 3, 2008

Model : BCL-D60
Serial No. : 0700138E
Modulation : FHSS
Crest factor : 9.4
Measured By : Hisayoshi Sato

HEAD SAR MEASUREMENT RESULTS										
Frequency			Modulation	Phantom Section	EUT Set-up Conditions			Liquid Temp.[deg.c]		SAR(1g) [W/kg]
Mode	Channel	[MHz]			Antenna	Position	Separation [mm]	Before	After	Maximum value of multi-peak
Step1.Decision of the worst position										
Transmitting	71	5788.240269	FHSS	Left head	Fixed	Cheek	0	24.0	24.0	0.051
	71	5788.240269	FHSS	Left head	Fixed	Tilt	0	24.0	24.0	0.038
	71	5788.240269	FHSS	Right head	Fixed	Cheek	0	23.8	23.8	0.043
	71	5788.240269	FHSS	Right head	Fixed	Tilt	0	23.8	23.8	0.041
Step2. Change of the channels										
Transmitting	1	5725.809328	FHSS	Left head	Fixed	Cheek	0	23.8	23.8	0.075
	139	5848.889420	FHSS	Left head	Fixed	Cheek	0	23.8	23.8	0.045
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.

7.2 Body-worn 5800MHz SAR

Liquid Depth (cm) : 15.0
Parameters : $\epsilon_r = 46.0$, $\sigma = 6.14$
Ambient temperature (deg.c.) : 23.9
Relative Humidity (%) : 35
Date : April 4, 2008

Model : BCL-D60
Serial No. : 0700138E
Modulation : FHSS
Crest factor : 9.4
Measured By : Hisayoshi Sato

BODY SAR MEASUREMENT RESULTS										
Frequency			Modulation	Phantom Section	EUT Set-up Conditions			Liquid Temp.[deg.c]		SAR(1g) [W/kg]
							Separation			Maximum value of multi-peak
Mode	Channel	[MHz]			Antenna	Position	[mm]	Before	After	
Step1.Decision of the worst position										
Transmitting	71	5788.240269	FHSS	Flat	Fixed	Front	15	23.4	23,4	0.00718
	71	5788.240269	FHSS	Flat	Fixed	Rear	15	23.4	23.4	0.199
Step2. Change of the channels										
Transmitting	1	5725.809328	FHSS	Flat	Fixed	Rear	15	23.4	23,4	0.190
	139	5848.889420	FHSS	Flat	Fixed	Rear	15	23.4	23.4	0.166
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.