



# RADIO TEST REPORT

**Test Report No. : 26KE0022-HO-A**

**Applicant** : **BROTHER INDUSTRIES, LTD.**  
**Type of Equipment** : **Digital Cordless Handset**  
**Model No.** : **BCL-D10**  
**FCC ID** : **B3QBCLD10**  
**Test standard** : **FCC Part 15 Subpart C**  
**Section 15.207, Section 15.247: 2006**  
**Test Result** : **Complied**

1. This test report shall not be reproduced in 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 regulation.
4. The test results in this report are traceable to the national or international standards.

**Date of test:**

June 30 to July 10, 2006

**Tested by:**

M. Kosaka

Makoto Kosaka  
EMC Services

M. Fujimura

Mitsuru Fujimura  
EMC Services

Y. Yoshida

Yutaka Yoshida  
EMC Services

**Approved by :**

T. Maeno

Tetsuo Maeno  
Site 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>

**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

MF060b(24.05.06)

<b>CONTENTS</b>	<b>PAGE</b>
SECTION 1: Client information .....	3
SECTION 2: Equipment under test (E.U.T.) .....	3
SECTION 3: Test specification, procedures & results .....	4
SECTION 4: Operation of E.U.T. during testing .....	7
SECTION 5: Conducted Emission .....	8
SECTION 6: Spurious Emission .....	9
SECTION 7: Bandwidth .....	9
SECTION 8: Maximum Peak Output Power .....	10
SECTION 9: Carrier Frequency Separation .....	10
SECTION 10: Number of Hopping Frequency .....	10
SECTION 11: Dwell time .....	10
APPENDIX 1: Photographs of test setup .....	11
Conducted emission .....	11
Spurious Emission (Radiated) .....	12
Worst Case Position (Horizontal: Z-axis/ Vertical:Y-axis) .....	13
APPENDIX 2: Test instruments .....	14
APPENDIX 3: Data of EMI test .....	15
Conducted Emission .....	15
Carrier Frequency Separation .....	16
20dB Bandwidth .....	18
Number of Hopping Frequency .....	20
Dwell time .....	22
Maximum Peak Output Power .....	24
Radiated Spurious Emission .....	25
Conducted Spurious Emission .....	31

## **SECTION 1: Client information**

Company Name	BROTHER INDUSTRIES,LTD.
Brand name	brother
Address	1-1-1, Kawagishi, Mizuho-ku, Nagoya 467-8562, Japan
Telephone Number	+81-52-824-2348
Facsimile Number	+81-52-824-2734
Contact Person	Katsuhiro Sato

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

### **2.1 Identification of E.U.T.**

Type of Equipment	Digital Cordless Handset
Model No.	BCL-D10
Serial No.	0001, 0002
Country of Manufacture	China
Rating	DC+3.6V
Condition of EUT	Engineering prototype (Not for sale: This sample is equivalent to mass-produced items.)
Receipt Date of Sample	May 29 and 30, 2006
Modification of EUT	No modification by the test lab.

### **2.2 Product Description**

#### **2.2.1 General Information**

Feature of EUT	It can be used as a cordless phone unit of facsimile. EUT has a function of connecting to inside and outside line.
Operation Clock	13.824MHz

#### **2.2.2 Radio Specification**

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
Antenna Type	Patch antenna
Antenna Connector Type	N/A
Antenna Gain	5.5dBi(Max)
Power Supply (inner/to RF Module)	DC +3.3V
Method of Frequency Generation	Synthesizer

---

**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

MF060b(24.05.06)

### **SECTION 3: Test specification, procedures & results**

#### **3.1 Test Specification**

Test Specification : FCC Part15 Subpart C : 2006

Title : FCC 47CFR Part15 Radio Frequency Device Subpart C Intentional Radiators  
Section 15.207 Conducted limits : 2006  
Section 15.247 Operation within the bands 902-928MHz,  
2400-2483.5MHz, and 5725-5850MHz : 2006

#### **FCC 15.31 (e)**

This EUT provides stable voltage(DC3.3V) constantly to RF Module regardless of input voltage. Therefore, this EUT complies with the requirement.

#### **FCC Part 15.203 Antenna requirement**

It is impossible for end users to replace the antenna, because the antenna is mounted inside of the EUT. Therefore, the equipment complies with the antenna requirement of Section 15.203.

### 3.2 Procedures and results

No.	Item	Test Procedure	Specification	Remarks	Deviation	Worst Margin*0)	Results
1	Conducted emission	ANSI C63.4:2003 7. AC powerline conducted emission measurements	Section 15.207	-	N/A	9.6dB, 0.54300MHz, N 0.54420MHz, L AV	Complied
2	Carrier Frequency Separation	ANSI C63.4:2003 13. Measurement of intentional radiators	Section15.247(a)(1)	Conducted	N/A	See data.	Complied
3	20dB Bandwidth	ANSI C63.4:2003 13. Measurement of intentional radiators	Section15.247(a)(1)(ii)	Conducted	N/A		Complied
4	Number of Hopping Frequency	ANSI C63.4:2003 13. Measurement of intentional radiators	Section15.247(a)(1)(ii)	Conducted	N/A		Complied
5	Dwell time	ANSI C63.4:2003 13. Measurement of intentional radiators	Section15.247(a)(1)(ii)	Conducted	N/A		Complied
6	Maximum Peak Output Power	ANSI C63.4:2003 13. Measurement of intentional radiators	Section15.247(b)(1)	Conducted	N/A		Complied
7	Band Edge Compliance	ANSI C63.4:2003 13. Measurement of intentional radiators	Section15.247(d)	Conducted	N/A		Complied
8	Spurious Emission	ANSI C63.4:2003 13. Measurement of intentional radiators	Section15.247(d)	Conducted/ Radiated	N/A	4.9dB 4978.58MHz, AV, Horizontal	Complied

Note: UL Apex's EMI Work Procedures No.QPM05 and QPM15.

\*0) The result is rounded off to the second decimal place. Therefore, there may be 0.1 difference for the result.

\*These tests were also referred to FCC Public Notice DA 00-705 "Guidance on Measurement for Frequency Hopping Spread Spectrum Systems".

\*These tests were performed without any deviations from test procedure except for additions or exclusions.

**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

MF060b(24.05.06)

### 3.3 Uncertainty

#### Conducted Emission

The measurement uncertainty (with a 95% confidence level) for this test is  $\pm 2.6\text{dB}$ .  
The data listed in this test report has enough margin, more than the site margin.

#### Spurious Emission (Radiated)

The measurement uncertainty (with a 95% confidence level) for this test using Biconical antenna is  $\pm 4.59\text{dB}(3\text{m})/\pm 4.58\text{dB}(10\text{m})$ .

The measurement uncertainty (with a 95% confidence level) for this test using Logperiodic antenna is  $\pm 4.62\text{dB}(3\text{m})/\pm 4.60\text{dB}(10\text{m})$ .

The measurement uncertainty (with a 95% confidence level) for this test using Horn antenna is  $\pm 5.27\text{dB}$ .

The data listed in this report meets the limits unless the uncertainty is taken into consideration.

#### Other test except Spurious Emission (Radiated)

The measurement uncertainty (with a 95% confidence level) for this test is  $\pm 3.0\text{dB}$ .

### 3.4 Test Location

UL Apex Co., Ltd. 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

	FCC Registration Number	IC Registration Number	Width x Depth x Height (m)	Size of reference ground plane (m) / horizontal conducting plane	Other rooms
No.1 semi-anechoic chamber	313583	IC4247A	19.2 x 11.2 x 7.7m	7.0 x 6.0m	Preparation room
No.2 semi-anechoic chamber	655103	IC4247A-2	7.5 x 5.8 x 5.2m	4.0 x 4.0m	-
No.3 semi-anechoic chamber	148738	IC4247A-3	12.0 x 8.5 x 5.9m	6.8 x 5.75m	
No.3 shielded room	-	-	4.0 x 6.0 x 2.7m	N/A	-
No.4 semi-anechoic chamber	134570	IC4247A-4	12.0 x 8.5 x 5.9m	6.8 x 5.75m	-
No.4 shielded room	-	-	4.0 x 6.0 x 2.7m	N/A	-
No.5 shielded room	-	-	6.0 x 6.0 x 3.9m	N/A	-
No.6 shielded room	-	-	4.0 x 4.5 x 2.7m	N/A	-
No.6 measurement room	-	-	4.75 x 5.4 x 3.0m	N/A	-
No.7 shielded room	-	-	4.7 x 7.5 x 2.7m	4.7 x 7.5m	-
No.8 measurement room	-	-	3.1 x 5.0 x 2.7m	N/A	-

\* Size of vertical conducting plane (for Conducted Emission test) : 2.0 x 2.0m for No.1, No.2, No.3 and No.4 semi-anechoic chambers and No.7 shielded room.

### 3.5 Test set up, Test instruments and Data of EMI

Refer to APPENDIX 1 to 3.

**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

MF060b(24.05.06)

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

### 4.1 Operating Modes

The mode used for test : **[For Conducted emission test]**

Communication \*1)

\*1) Facsimile communicates with Digital Cordless Handset.

**[For Radiated emission test]**

-Hopping OFF

Transmitting mode

Low Channel (ch 1) : 5725.809328MHz

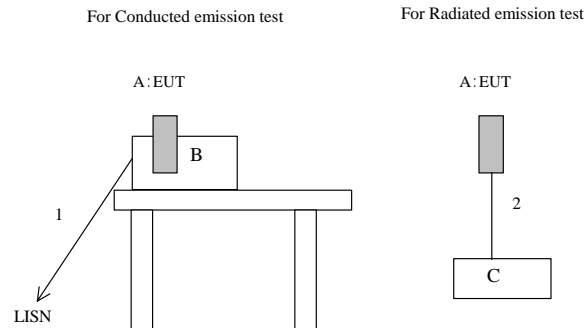
Mid Channel (ch 71) : 5788.240269MHz

High Channel (ch 139) : 5848.889420MHz

-Hopping ON

(Communication mode)

### 4.2 Configuration and peripherals



\* Cabling and setup were taken into consideration and test data was taken under worse case conditions.

#### Description of Support equipment

No.	Item	Model number	Serial number	Manufacturer	Remarks
A	Digital Cordless Handset	BCL-D10	0001 *1), 0002 *2)	brother	EUT
B	Facsimile	FAX-1960C	0001	brother	-
C	DC power supply	PW8-3ATP	09067054	KENWOOD TMI	-

\*1) Used for Antenna Terminal tests and Spurious emission (tested on June 30 and July 1, 2006)

\*2) Used for Antenna Terminal tests only (tested on July 3, 2006)

#### List of cables used

No.	Name	Length (m)	Shield	
			Cable	Connector
1	AC Cable	2.3	Unshielded	Unshielded
2	DC Cable	0.5	Unshielded	Unshielded

**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

MF060b(24.05.06)

## **SECTION 5: Conducted Emission**

### **Test Procedure and conditions**

EUT was placed on a wooden table of nominal size, 1m by 1.5m, raised 80cm above the conducting ground plane. The rear of tabletop was located 40cm to the vertical conducting plane. The rear of EUT, including peripherals aligned and flushed with rear of tabletop. All other surfaces of tabletop were at least 80cm from any other grounded conducting surface. EUT was located 80cm from a Line Impedance Stabilization Network (LISN)/ Artificial mains Network (AMN) and excess AC cable was bundled in center.

For the tests on EUT with other peripherals (as a whole system)

I/O cable and AC cables that were connected to the peripherals were bundled in center. They were folded back and forth forming a bundle 30cm to 40cm long and were hanged at a 40cm height to the ground plane.

The AC Mains Terminal Continuous disturbance Voltage has been measured with the EUT in a Semi Anechoic Chamber or a Measurement Room.

The EUT was connected to a LISN (AMN).

An overview sweep with peak detection has been performed.

<b>Detector</b>	<b>: CISPR quasi-peak and average detector (IF BW 9 kHz)</b>
<b>Measurement range</b>	<b>: 0.15-30MHz</b>
<b>Test data</b>	<b>: APPENDIX 3</b>
<b>Test result</b>	<b>: Pass</b>

---

**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

MF060b(24.05.06)



## **SECTION 6: Spurious Emission**

### **[Conducted]**

#### **Test Procedure**

The Out of Band Emission was measured with a spectrum analyzer connected to the antenna port.

**Test data : APPENDIX 3**

**Test result : Pass**

### **[Radiated]**

#### **Test Procedure**

EUT was placed on a urethane platform of nominal size, 1.0m by 0.5m, raised 80cm above the conducting ground plane. The Radiated Electric Field Strength intensity has been measured in a Semi Anechoic Chamber with a ground plane and at a distance of 3m(Below 10GHz) and 1m(Upper 10GHz).

The height of the measuring varied between 1 and 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 with the Test Receiver, or the Spectrum Analyzer (in linear mode).

The test was made with the detector (RBW/VBW) in the following table.

When using Spectrum analyzer, the test was made with adjusting span to zero by using peak hold.

In any 100kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator confirmed 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on a radiated measurement.

20dBc was applied to the frequency over the limit of FCC 15.209 and outside the restricted band of 15.205. (FCC)

Frequency	Below 1GHz	Above 1GHz
Instrument used	Test Receiver / Spectrum Analyzer	Spectrum Analyzer
Detector	QP: BW 120kHz(T/R)	PK: RBW:1MHz/VBW: 1MHz
IF Bandwidth	20dBc : RBW: 100kHz VBW: 300kHz (S/A)	AV: RBW:1MHz/VBW:10Hz 20dBc : RBW:100kHz/VBW:300kHz

**Test data : APPENDIX 3**

**Test result : Pass**

- The carrier level and noise levels were confirmed at each position of X, Y and Z axes of EUT to see the position of maximum noise, and the test was made at the position that has the maximum noise.

## **SECTION 7: Bandwidth**

### **Test Procedure**

The bandwidth was measured with a spectrum analyzer connected to the antenna port.

**Test data : APPENDIX 3**

**Test result : Pass**

---

**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

MF060b(24.05.06)

## **SECTION 8: Maximum Peak Output Power**

### **Test Procedure**

The Maximum Peak Output Power was measured with a power meter connected to the antenna port.

Test data : APPENDIX 3  
Test result : Pass

## **SECTION 9: Carrier Frequency Separation**

### **Test Procedure**

The carrier frequency separation was measured with a spectrum analyzer connected to the antenna port.

Test data : APPENDIX 3  
Test result : Pass

## **SECTION 10: Number of Hopping Frequency**

### **Test Procedure**

The Number of Hopping Frequency was measured with a spectrum analyzer connected to the antenna port.

Test data : APPENDIX 3  
Test result : Pass

## **SECTION 11: Dwell time**

### **Test Procedure**

The Dwell time was measured with a spectrum analyzer connected to the antenna port.

Test data : APPENDIX 3  
Test result : Pass