



Underwriters
Laboratories

Test report No : 30HE0045-YW
Page : 1 of 35
Issued date : March 18, 2010
Revised date : March 19, 2010

EMI TEST REPORT

Test Report No. : 30HE0045-YW

Applicant: DENSO WAVE INCORPORATED

Type of Equipment: 2D Code Handy Terminal, Communication Unit, AC Adapter

Model No.: BHT-604QWB, CU-601, AD2-2005/3000

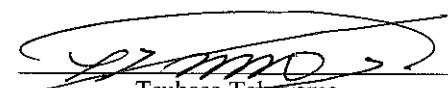
Test regulation: FCC Part 15 Subpart B:2010 Class A
ICES-003 Issue No. 4 Class A

Test result: Complied

1. This test report shall not be reproduced in full or partial, without the written approval of UL Japan, Inc.
2. The results in this report apply only to the sample tested.
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
5. This test report must not be used by the customer to claim product certification, approval, or endorsement by any agency of the Federal Government
6. The test was performed in accordance with FCC regulation, as an alternative arrangement of ICES-003

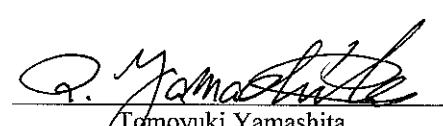
Date of test: March 7, 2010

Tested by:



Tsubasa Takayama
Engineer of EMC Service

Approved by:



Tomoyuki Yamashita
Assistant Manager of EMC Service

**UL Japan, Inc.
Yokowa EMC Lab.**

108 Yokowa-cho, Ise-shi, Mie-ken, 516-1106 JAPAN

Telephone: +81 596 39 1485

Facsimile: +81 596 39 0232

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**UL Japan, Inc.
Yokowa EMC Lab.**

108 Yokowa-cho, Ise-shi, Mie-ken, 516-1106 JAPAN
Telephone: +81 596 39 1485
Facsimile: +81 596 39 0232

SECTION 1 : Customer information

Company Name : DENSO WAVE INCORPORATED
Brand Name : DENSO WAVE
Address : 1 Yoshiike, Kusaki, Agui-cho, Chita-gun, Aichi 470-2297, Japan
Telephone Number : +81 569 49 5347
Facsimile Number : +81 569 49 5488
Contact Person : Yoshiro Asai

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

2.1 Identification of E.U.T.

Type of equipment : 2D Code Handy Terminal, Communication Unit, AC Adapter
Trade name : DENSO WAVE
Model No. : BHT-604QWB, CU-601, AD2-2005/3000
Serial No. : 5496900072700018/5496320101700014/-
Rating : DC 3.7 V (Battery, BHT-604QWB),
AC 100-240 V, 50-60 Hz (AC Adapter for CU-601)
Country of Mass-production : Japan (Without AC Adapter), China (AC Adapter only)
Condition of EUT : Production prototype
(Not for Sale: This sample is equivalent to mass-produced items.)
Size : 60 x 210 x 50 (Width x Depth x Height (mm): BHT-604QWB)
115 x 125 x 80 (Width x Depth x Height (mm): CU-601)
35 x 75 x 20 (Width x Depth x Height (mm): AD2-2005/3000)

*Without cables and protuberance
Modification of EUT : No modification by the test lab.
Receipt Date of Sample : March 7, 2010

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2.2 Product description

Model: BHT-604QWB, referred to as the EUT in this report, is 2D Code Handy Terminal.

Model: CU-601 also referred to as the EUT in this report, is Communication Unit.

Model: AD2-2005/3000, also referred to as the EUT in this report, is an AC Adapter.

BHT-604QWB: Code reading device, Communication function: RS232C, IrDA, IEEE802.11g radio, Bluetooth wireless

CU-601: Battery recharge function between BHT-604QWB and IrDA communication, PC, RS232C communication and BHT-604QWB

AD2-2005/3000: AC power changes DC power

The clock frequencies used in the EUT:

BHT-604QWB: 192 MHz (CPU), 32.768 kHz, 48 MHz, (Oscillator)

CU-601: 3.6864 MHz (Oscillator)

AD2-3005/3000: -

BHT-604Q Series:

	Radio module type	
	IEEE802.11g specifications	Bluetooth specifications
BHT-604QWB	○	○
BHT-604QW	○	-
BHT-604QB	-	○
BHT-604Q	-	-

Optical Communication Unit:

Model number	Interface and Charging Function	
	IrDA + RS232C Communication	Charging
CU-601	○	○
CH-651	-	○

CU-601 and CH-651 are used the same circuit board so that there is no electricity differences.

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SECTION 3 : Test specification, procedures and results

3.1 Test Specification

Test Specification : FCC Part 15 Subpart B:2010, final revised on January 22, 2010 and effective March 1, 2010

Title : FCC 47CFR Part15 Radio Frequency Device Subpart B Unintentional Radiators

Test Specification : * ICES-003 Issue No. 4

Title : Spectrum Management Interference-Causing Equipment Standard Digital Apparatus

* The test was performed in accordance with FCC regulation, as an alternative arrangement.

3.2 Procedures & results

Item	Test Procedure	Limits	Deviation	Worst margin	Result
Conducted emission	ANSI C63.4:2003 7. AC powerline conducted emission measurements	Class A	N/A	34.3 dB (0.5120 MHz, QP, N, Standby)	Complied
Radiated emission	ANSI C63.4:2003 8. Radiated emission measurements	Class A	N/A	7.5 dB (432.00 MHz, Horizontal, RS232C+Read)	Complied

Note: UL Japan's EMI Work Procedures No. QPM05

3.3 Addition to standard

No addition, exclusion nor deviation has been made from the standard.

3.4 Confirmation

UL Japan, Inc. hereby confirms that E.U.T., in the configuration tested, complies with the specifications FCC Part15 Subpart B:2010 Class A and ICES-003 Issue No. 4 Class A.

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3.5 Uncertainty

The following uncertainties have been calculated to provide a confidence level of 95% using a coverage factor k=2.

	Open area test site			Shielded room				
	No.1	No.2	No.3	No.1	No.2	No.3	No.7	
	(±)	(±)	(±)	(±)	(±)	(±)	(±)	
Conducted emission								
LISN (AMN)	9 kHz - 150 kHz	3.7 dB	-	-	3.7 dB	3.2 dB	3.6 dB	3.7 dB
	150 kHz - 30 MHz	3.1 dB	-	-	3.1 dB	2.7 dB	3.1 dB	3.1 dB
Radiated emission								
3 m	9 kHz - 30 MHz	3.2 dB	2.8 dB	3.4 dB	-	-	-	-
	30 MHz - 300 MHz	5.1 dB	4.8 dB	5.5 dB	-	-	-	-
	300 MHz - 1000 MHz	4.0 dB	4.9 dB	5.6 dB	-	-	-	-
	1 GHz - 18 GHz	4.2 dB	4.7 dB	4.7 dB	-	-	-	-
10 m	9 kHz - 30 MHz	3.0 dB	2.5 dB	2.1 dB	-	-	-	-
	30 MHz - 300 MHz	5.1 dB	4.8 dB	5.1 dB	-	-	-	-
	300 MHz - 1000 MHz	5.0 dB	4.8 dB	5.0 dB	-	-	-	-

Conducted emission test

The data listed in this test report has enough margin, more than the site margin.

Radiated emission test

The data listed in this test report has enough margin, more than the site margin.

3.6 Test Location

UL Japan, Inc. Yokowa EMC Lab.

108 Yokowa-cho, Ise-shi, Mie-ken, 516-1106 JAPAN

Telephone : +81 596 39 1485

Facsimile : +81 596 39 0232

Test room	Width x Depth x Height (m)	Test room	Width x Depth x Height (m)
No.1 shielded room	5.5 x 6.4 x 2.7	No.3 shielded room	3.6 x 7.2 x 2.4
No.2 shielded room	4.5 x 3.6 x 2.7	No.7 shielded room	9.3 x 3.4 x 2.7

No.1 and No.3 sites have been fully described in a report submitted to FCC office, and listed on August 13, 2009. (Registration number: 90412)

No.2 site has been fully described in a report submitted to FCC office, and listed on June 3, 2009. (Registration number: 90411)

IC Registration No.:

No.1 site: IC 2973A-1, No.2 site: IC 2973A-2, No.3 site: IC 2973A-3

3.7 Test setup, Data of EMI & Test instruments

Refer to Appendix 1 to 3.

UL Japan, Inc. Yokowa EMC Lab.

108 Yokowa-cho, Ise-shi, Mie-ken, 516-1106 JAPAN

Telephone: +81 596 39 1485

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

4.1 Operating modes

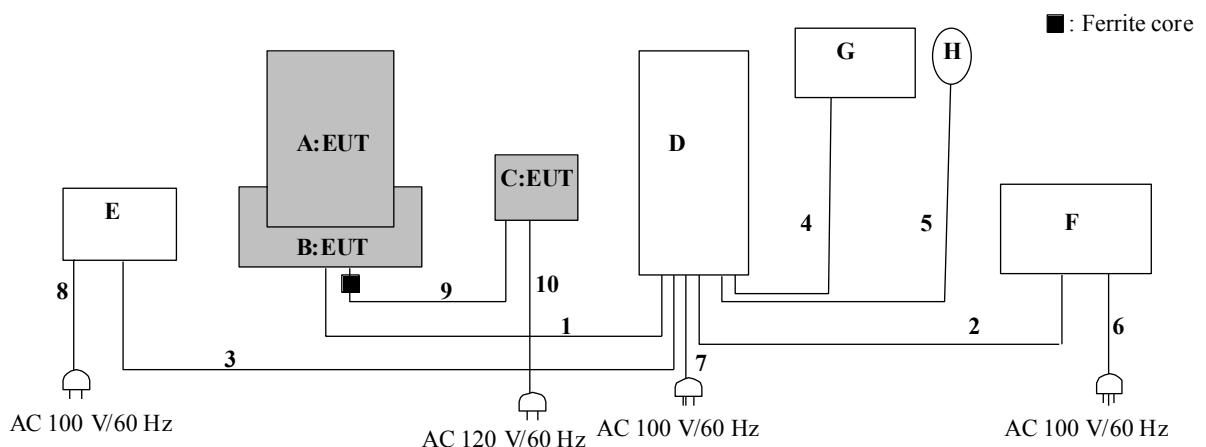
The EUT exercise program used during testing was designed to exercise the various system components in a manner similar to typical use.

Test sequence is used: RS232C communication+Read
 IrDA+RS232C communication +Charge+Read

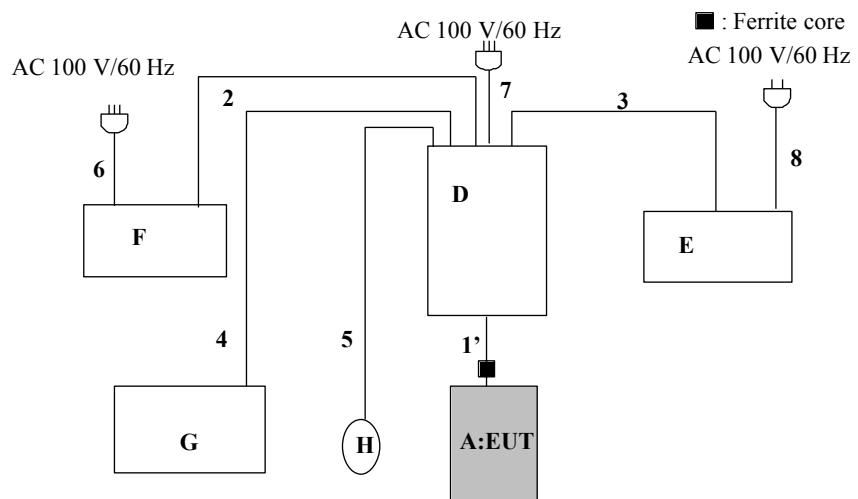
Justification: The system was configured in typical fashion (as a customer would normally use it) for testing.

4.2 Configuration and peripherals

[IrDA+RS232C communication+Charge+Read]



[RS232C communication+Read]



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

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Description of EUT and Support equipment

No.	Item	Model number	Serial number	Manufacturer	Remark
A	2D Code Handy Terminal	BHT-604QWB	5496900072700018	DENSO WAVE INCORPORATED	EUT
B	Communication Unit	CU-601	5496320101700014	DENSO WAVE INCORPORATED	EUT
C	AC Adapter	AD2-2005/3000	-	DENSO WAVE INCORPORATED	EUT
D	Desktop PC	Compaq6000	JPA94609GZ	Hewlett Packard	-
E	Printer	PIXUS550i	-	Canon	-
F	Monitor	1503FP	KR0413DP47602224B 2YS	DELL	-
G	Keyboard	KB-0316	BAUEF0HVBY07RX	Hewlett Packard	-
H	Mouse	M-UAE96	2965986-011	Hewlett Packard	-

List of cables used

No.	Name	Length (m)	Shield	Remark
1	232C Cable	2.0	Shielded	-
1'	232C Cable	1.0	Shielded	-
2	RGB Cable	1.8	Shielded	-
3	Printer Cable	1.8	Shielded	-
4	Keyboard Cable	1.8	Shielded	-
5	Mouse Cable	1.8	Shielded	-
6	AC Power Cable	1.8	Unshielded	3 wire
7	AC Power Cable	1.8	Unshielded	3 wire
8	AC Power Cable	1.5	Unshielded	2 wire
9	DC Power Cable	1.2	Unshielded	-
10	AC Power Cable	1.8	Unshielded	2 wire

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SECTION 5 : Conducted emission

5.1 Operating environment

The test was carried out in shielded room.

Temperature : See data

Humidity : See data

5.2 Test configuration

EUT was placed on a wooden platform of nominal size, 1m by 1.8m raised 80cm above the conducting ground plane. The rear of tabletop was located 40cm to the vertical conducting plane. The rear of EUT and its peripherals was 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 the LISN and excess AC cable was bundled in center. I/O cables that were connected to the peripherals were bundled in center. They were folded back and forth forming a bundle and were hanged at a 40cm height to the ground plane. Each EUT current-carrying power lead, except the ground (safety) lead, was individually connected through a LISN to the input power source. All unused 50ohm connectors of the LISN were resistively terminated in 50 ohm when not connected to the measuring equipment.

Photographs of the set up are shown in Appendix 1.

5.3 Test conditions

Frequency range : 0.15 - 30 MHz

EUT position : Table top

5.4 Test procedure

The AC Mains Terminal Continuous disturbance Voltage had been measured with the EUT in shielded room.

The EUT was connected to a Line Impedance Stabilization Network (LISN).

An overview sweep with peak detection has been performed.

The measurements had been performed with a quasi-peak detector and if required, with an average detector.

The conducted emission measurements were made with the following detector function of the test receiver.

Detector Type : QP

IF Band width : 9 kHz

5.5 Results

Summary of the test results: Pass

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SECTION 6 : Radiated emission

6.1 Operating environment

This test was carried out in open area test site.

Temperature : See data

Humidity : See data

6.2 Test configuration

EUT was placed on a table which was consisted by wooden, polyethylene foam and polycarbonate of nominal size, 1m by 2.33m raised 80cm above the conducting ground plane.

The rear of EUT and its peripherals was aligned and flushed with rear of tabletop.

I/O cables that were connected to the peripherals were bundled in center. They were folded back and forth forming a bundle and were hanged 40cm height to the ground plane. The measurements were performed for vertical or horizontal antenna polarization or both as necessary. The measurement antenna was varied in height above the conducting ground plane to obtain the maximum signal strength.

Photographs of the set up are shown in Appendix 1.

6.3 Test conditions

Frequency range : 30 - 2000 MHz

Test distance : 10m

EUT position : Table top

6.4 Test procedure

The Radiated Electric Field Strength intensity has been measured on an open test site with a ground plane at a distance of 3m. Pre check measurements were performed in shielded room with a search coil at 30-2000MHz to distinguish disturbances of EUT from the ambient noise.

Measurements were performed with quasi-peak detector.

The measuring antenna height was 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 vertical or horizontal antenna polarization or both as necessary.

The radiated emission measurements were made with the following detector function of the test receiver and spectrum analyzer.

	<u>30-1000 MHz (Test receiver)</u>	<u>1000-2000 MHz (Spectrum analyzer) *2)</u>
Detector Type:	: QP	: AV *1) PK
IF Band width:	: 120 kHz	: RBW 1MHz/ VBW 10 Hz RBW 1MHz/ VBW 1 MHz

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

*2) The measurement was conducted at 3 dB bandwidth.

6.5 Results

Summary of the test results: Pass

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108 Yokowa-cho, Ise-shi, Mie-ken, 516-1106 JAPAN

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Faxsimile: +81 596 39 0232

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APPENDIX 5: Declaration of conformity

UL Japan, Inc.

Yokowa EMC Lab.

108 Yokowa-cho, Ise-shi, Mie-ken, 516-1106 JAPAN

Telephone: +81 596 39 1485

Faxsimile: +81 596 39 0232