




# EMI TEST REPORT

Test Report No. : 23IE0101-HO-1

**Applicant** : DENSO WAVE INCORPORATED  
**Type of Equipment** : Bluetooth Board  
**Model No.** : DWBT001  
**Test standard** : FCC Part 15 Subpart C  
Section 15.207, Section 15.247  
**FCC ID** : PZWDWBT001  
**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 above regulation. We hereby certify that the data contain a true representation of the EMC profile.
4. The test results in this report are traceable to the national or international standards.
5. This test report does not constitute an endorsement by NIST/NVLAP or U.S. Government.

Date of test : May 18,19,20, and 23, 2003

Tested by :   
Yoshiaki Iwasa  
EMC Section

Approved by :   
Hironobu Shimoji  
Group Leader of EMC Section

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## **SECTION 1: Client information**

Company name : DENSO WAVE INCORPORATED  
Brand name : DENSO  
Address : 1-1, Showa-cho, Kariya-shi, Aichi-ken 448-8661 JAPAN  
Telephone Number : +81-566-61-3818  
Facsimile Number : +81-566-25-4741  
Contact Person : Akio Sugiura

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

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

Type of Equipment : Bluetooth Board  
Model No. : DWBT001  
Serial No. : 5496950048300027  
5496950048300053  
Rating : DC3.3V  
Country of Manufacture : Japan  
Receipt Date of Sample : May 14, 2003  
Condition of EUT : Production model

### **2.2 Product Description**

DENSO WAVE INCORPORATED, Model: DWBT001 (referred to as the EUT in this report) is the Bluetooth Board.  
The clock frequency used in EUT is 16 MHz.  
The specification is as follows;

Frequency band : from 2400 MHz to 2483.5 MHz  
Frequency of operation : 2402MHz – 2480MHz  
Bandwidth  
and channel spacing : 79MHz, 1MHz  
Type of Modulation : GFSK  
Antenna Type : Inverted-F type multi-layer Antenna  
Antenna Gain : 2.044 dBi  
Power Supply : DC 3.3V  
Operating temperature  
Range : -5 deg.C. to +50 deg.C.

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**Head Office EMC Lab.**

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FCC 15.31 (e)

The host device DWBT001 provide the stable power supply (DC:3.3V), and the Bluetooth Board complies power supply regulation.

FCC Part 15.203 Antenna requirement

Bluetooth Board and its antenna comply with this requirement since they are built in host device DWBT001 when they are pit up for sale and they are used with a particular antenna connector.

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

#### 3.1 Test Specification

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

#### 3.2 Procedures and results

No.	Item	Test Procedure	Specification	Remarks	Deviation	Worst margin	Results
1	Conducted emission	ANSI C63.4:2001	Section 15.207	-	N/A	14.7dB 0.6523MHz N (QP)	Complied
2	Carrier Frequency Separation	ANSI C63.4:2001	Section15.247(a)(1)	Conducted	N/A	N/A	Complied
3	20dB Bandwidth	ANSI C63.4:2001	Section15.247(a)(1)	Conducted	N/A	N/A	Complied
4	Number of Hopping Frequency	ANSI C63.4:2001	Section15.247(a)(1)(iii)	Conducted	N/A	N/A	Complied
5	Dwell time	ANSI C63.4:2001	Section15.247(a)(1)(iii)	Conducted	N/A	N/A	Complied
6	Maximum Peak Output Power	ANSI C63.4:2001	Section15.247(b)(1)	Conducted	N/A	N/A	Complied
7	Band Edge Compliance	ANSI C63.4:2001	Section15.247(c)	Conducted	N/A	N/A	Complied
8	Spurious Emission (Radiated)	ANSI C63.4:2001	Section15.247(c)	Conducted/ Radiated	N/A	2.7dB 235.921MHz Horizontal	Complied

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

\*These tests were also referred to FCC Public Notice DA 00-705 "filing and measurement Guidelines for Frequency Hopping Spread Spectrum Systems.

#### 3.3 Confirmation

UL Apex Co., Ltd. hereby confirms that E.U.T., in the configuration tested, complies with the specifications FCC Part 15 Subpart C Section 15.207 and 15.247.

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### 3.4 Uncertainty

#### Conducted Emission

The measurement uncertainty (with a 95% confidence level) for this test was  $\pm 1.3$ dB.

The result is within Head Office EMC lab's uncertainty.

The data listed in this test report has enough margin.

#### Spurious Emission (Radiated)

The measurement uncertainty (with a 95% confidence level) for this test using Biconical antenna is  $\pm 4.5$ dB.

The measurement uncertainty (with a 95% confidence level) for this test using Logperiodic antenna is  $\pm 5.2$ dB.

The measurement uncertainty (with a 95% confidence level) for this test using Horn antenna is  $\pm 6.6$ dB.

The result is within Head Office EMC lab's uncertainty.

The data listed in this test report has enough margin.

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

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

The result is within Head Office EMC lab's uncertainty.

The data listed in this test report has enough margin.

### 3.5 Test Location

UL Apex Co., Ltd. Head Office EMC Lab.

No. 1 and No.2 semi anechoic chamber.

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This semi anechoic chamber has been fully described in a report submitted to FCC office, and listed on February 01, and June 05, 2002. (Registration number: No. 1: 313583, No.2 :846015 Industry Canada: No. 1: IC4247, No.2 : IC4247-2)

\*NVLAP Lab. code: 200572-0

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

Refer to APPENDIX 1 to 3.

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

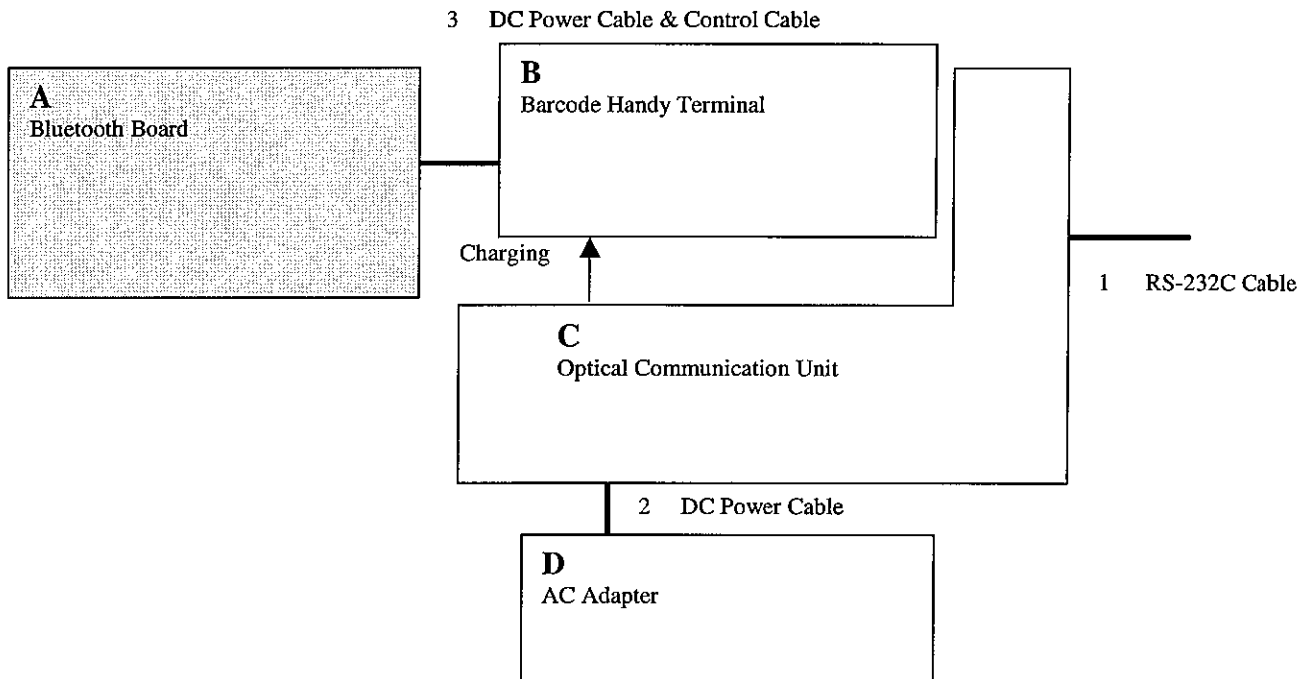
### 4.1 Operating Modes

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

The sequence is used : Bluetooth mode  
Emitting radio frequency.  
High : 2402MHz (Hopping Off)  
Middle : 2441MHz (Hopping Off)  
Low : 2480MHz (Hopping Off)

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

### 4.2 Configuration and peripherals



\* Cabling was taken into consideration and test data was taken under worst case conditions.

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**Description of EUT and Support equipment**

No.	Item	Model number	Serial number	Manufacturer	FCC ID
A	Bluetooth Board	DWBT001	5496950048300027 5496950048300053	DENSO WAVE INCORPORATED	PZWDWBT001
B	Barcode Handy Terminal	BHT-100BB	5496310206300010 5496310206300011	DENSO WAVE INCORPORATED	-
C	Optical Communication Unit	CU-7001	4963201160000007	DENSO WAVE INCORPORATED	-
D	AC Adaptor (120V)	-	-	DENSO WAVE INCORPORATED	-

**List of cables used**

No.	Name	Length (m)	Shield	Backshell Material
1	RS-232C Cable	1.5	Y	Polyvinyl chloride
2	DC Power Cable	1.9	N	Polyvinyl chloride
3	DC Power Cable & Control Cable	0.3	N	Polyvinyl chloride

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## **SECTION 5: Conducted Emission, Section 15.207**

### **Test Procedure**

EUT was placed on a platform 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 LISN and excess AC cable was 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. 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 50ohm when not connected to the measuring equipment.

The AC Mains Terminal Continuous disturbance Voltage has been measured with the EUT on a reference ground plane 7.0 x 6.0m in a No.1 semi Anechoic Chamber.

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

An overview sweep with peak detection has been performed.

The measurements have been performed with a CISPR quasi-peak detector (IF BW 9 kHz).

Measurement range: 0.15-30MHz

**Test data** : **APPENDIX 3**  
**Test result** : **Pass**  
**Test instruments** : **MCC-13, MLS-06, SA-07, MTR-02**

## **SECTION 6: Carrier Frequency Separation, Section 15.247(a)(1)**

### **Test Procedure**

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

**Test data** : **APPENDIX 2**  
**Test result** : **Pass**  
**Test instruments** : **MBTR10, MCC-05**

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### **SECTION 7: 20dB Bandwidth , Section 15.247(a)(1)**

#### **Test Procedure**

The 20dB bandwidth was measured with a spectrum analyzer connected to the antenna port.

Test data : APPENDIX 2  
Test result : Pass  
Test instruments : MBTR10, MCC-05

### **SECTION 8: Number of Hopping Frequency, Section 15.247(a)(1)(iii)**

#### **Test Procedure**

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

Test data : APPENDIX 2  
Test result : Pass  
Test instruments : MBTR10, MCC-05

### **SECTION 9: Dwell time, Section 15.247(a)(1)(iii)**

#### **Test Procedure**

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

Test data : APPENDIX 2  
Test result : Pass  
Test instruments : MBTR10, MCC-05

### **SECTION 10: Maximum Peak Output Power, Section 15.247(b)(1)**

#### **Test Procedure**

The Maximum Peak Output Power was measured with a spectrum analyzer connected to the antenna port.

Test data : APPENDIX 2  
Test result : Pass  
Test instruments : MBTR10, MCC-05

### **SECTION 11: Band Edge Compliance, Section 15.247(c)**

#### **Test Procedure**

The Band Edge Compliance was measured with a spectrum analyzer connected to the antenna port.

Test data : APPENDIX 2  
Test result : Pass  
Test instruments : MBTR10, MCC-05

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## **SECTION 12: Spurious Emission, Section 15.247(c)**

### **[Conducted] Test Procedure**

The Spurious Emission (Conducted) was measured with a spectrum analyzer connected to the antenna port.

Test data : APPENDIX 2  
Test result : Pass  
Test instruments : MBTR10, MCC-05

### **[Radiated] Test Procedure**

EUT was placed on a platform of nominal size, 1m by 1.5m, raised 80cm above the conducting ground plane. Test was made with the antenna positioned in both the horizontal and vertical planes of polarization.

The Radiated Electric Field Strength intensity has been measured in No.2 semi anechoic chamber (7.5x5.8x5.2m) with a ground plane and at a distance of 3m.

The measuring antenna height was varied between 1 to 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.

The maximum output power of EUT was confirmed as the worst case condition in the photo of APPENDIX.

Test data : APPENDIX 2  
Test result : Pass  
Test instruments : MTR-01, MCC-12, MCC-05, MCC-06, MHA-05, MPA-01  
MBA-03, MLA-03, MPA-04, MAT-07, MCC-11  
MBF-01, MHA-01, MRENT-02, MTR-02

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## **Contents of Appendixes**

### **APPENDIX 1: Photographs of test setup**

- Page 13 : Conducted Emission  
Page 14 : Spurious Emission (Radiated)  
Page 15 : Other test except Conducted Emission and Spurious Emission(Radiated)

### **APPENDIX 2: Test instruments**

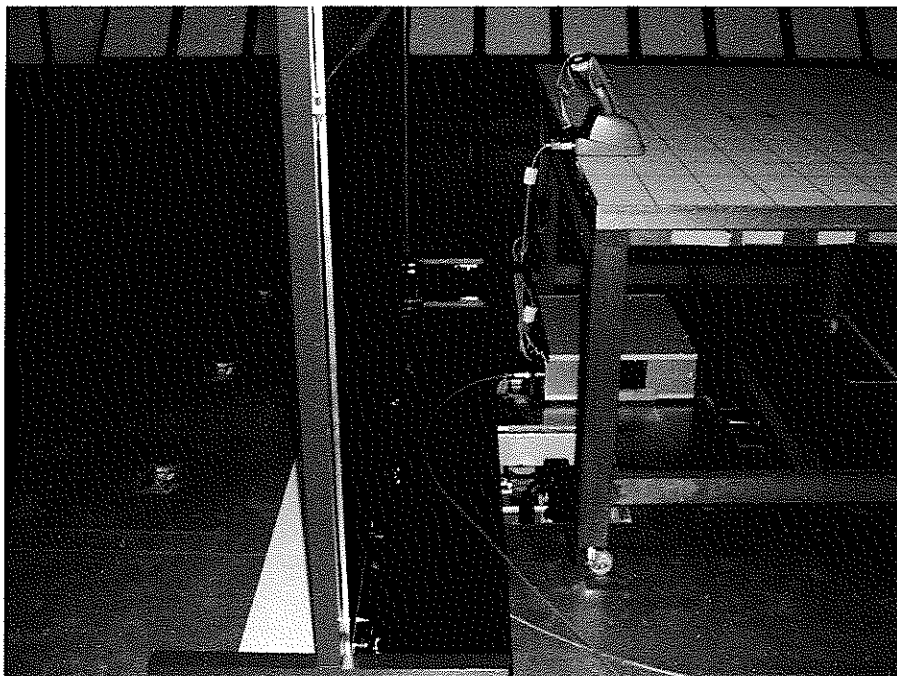
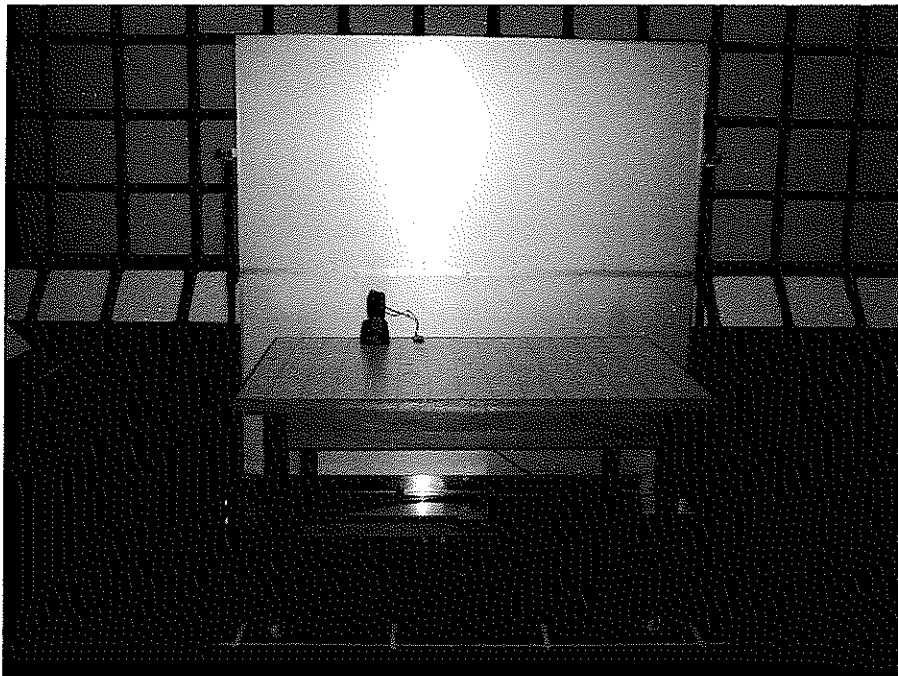
- Page 16 : Test instruments

### **APPENDIX 3: Data of EMI test**

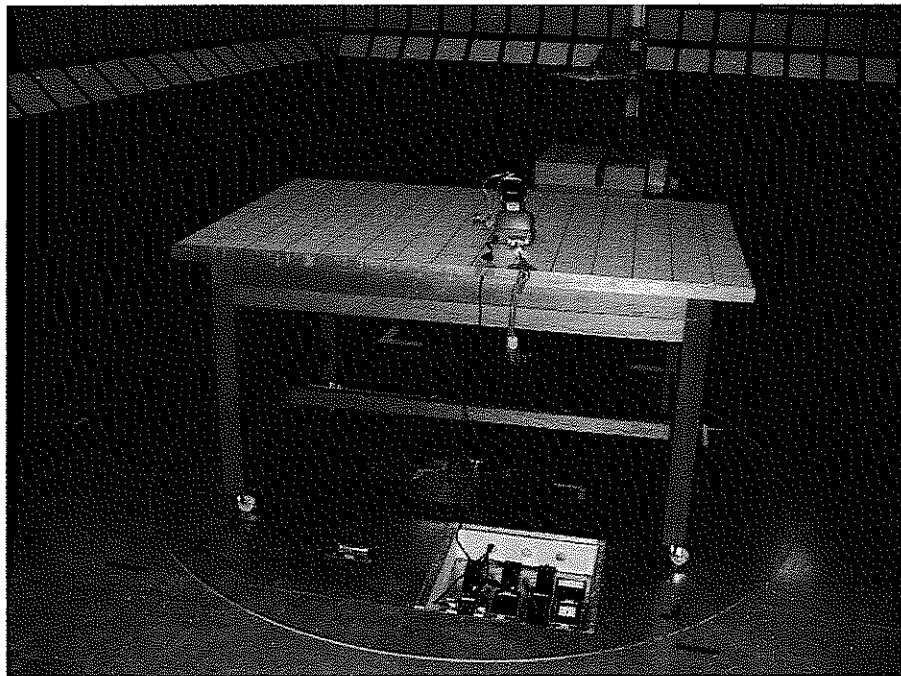
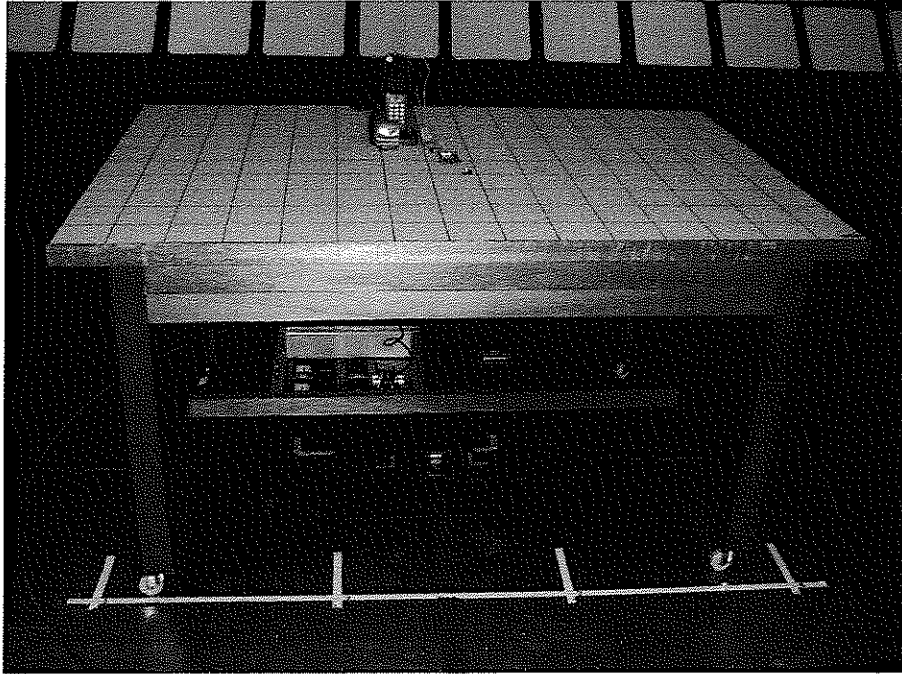
- Page 17-20 : Conducted Emission  
Page 21 : Carrier Frequency Separation (Conducted)  
Page 22 : 20dB Bandwidth (Conducted)  
Page 23 : Number of Hopping Frequency (Conducted)  
Page 24-25 : Dwell time (Conducted)  
Page 26 : Maximum Peak Output Power (Conducted)  
Page 27 : Band Edge Compliance (Conducted)  
Page 28-39 : Spurious Emission  
Page 40 : 99% Occupied Bandwidth

**APPENDIX 1: Photographs of test setup**

**Conducted Emission**



Spurious Emission (Radiated)



**Other test except Conducted Emission and Spurious Emission (Radiated)**



**APPENDIX 2**  
**Test Instruments**

**EMI test equipment**

Control No.	Instrument	Manufacturer	Model No	Test Item	Calibration Date * Interval(month)
MCC-13	Coaxial Cable	Fujikura/Agilent	-	RE	2003/05/08 * 12
MLS-06	LISN(AMN)	Schwarzbeck	NSLK8127	RE	2003/03/18 * 12
SA-07	Spectrum Analyzer	Advantest	R3273	RE	2002/12/10 * 12
MTR-02	Test Receiver	Rohde & Schwarz	ESCS30	RE	2003/01/31 * 12
MBTR10	Spectrum Analyzer	Rohde & Schwarz	FSP30	RE	2002/11/13 * 12
MCC-05	Microwave Cable	Storm	421-011	RE	2003/01/14 * 12
MTR-01	Test Receiver	Rohde & Schwarz	ESI40	RE	2002/11/01 * 12
MCC-12	Coaxial Cable	Fujikura/Agilent	MCC-12-01(8D-2W15m),MCC-12-02(5D-2W-0.7),MCC-12-03(5D-2W-0.8),MCC-12-04(5D-2W-1m),MCC-12-05(RF SW),MCC-12-06(RF SW), ※ MCC-12-07(5D-2W-0.4m)5/8追加	RE	2003/05/08 * 12
MCC-05	Microwave Cable	Storm	421-011	RE	2003/01/14 * 12
MCC-06	Microwave Cable	Storm	421-011	RE	2003/01/14 * 12
MHA-05	Horn Antenna	Schwarzbeck	BBHA9120D	RE	2003/01/11 * 12
MPA-01	Pre Amplifier	Agilent	8449B	RE	2003/02/08 * 12
MBA-03	Biconical Antenna	Schwarzbeck	BBA9106	RE	2003/04/28 * 12
MLA-03	Logperiodic Antenna	Schwarzbeck	USLP9143	RE	2003/04/28 * 12
MPA-04	Pre Amplifier	Agilent	8447D	RE	2003/03/13 * 12
MAT-07	Attenuator(6dB)	Weinschel Corp	2	RE	2002/12/24 * 12
MCC-11	Microwave coaxial cable	Suhner	SUCOFLEX 104	RE	2003/03/27 * 12
MBF-01	SHF Bandpass Filter	M-City	5GHz BPF	RE	2003/04/24 * 12
MHA-01	Horn Antenna	EMCO	3160-09	RE	2003/01/11 * 12
MRENT-02	Spectrum Analyzer	Advantest	R3265	RE	2002/12/24 * 12
MTR-02	Test Receiver	Rohde & Schwarz	ESCS30	RE	2003/01/31 * 12

All equipment is calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.

Test Item:

RE: Radiated emission,

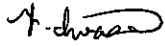


# DATA OF CONDUCTED EMISSION TEST

UL Apex Co., Ltd. Head Office EMC Lab. No.1 Semi Anechoic Chamber  
Date : 2003/05/18 21:20:32

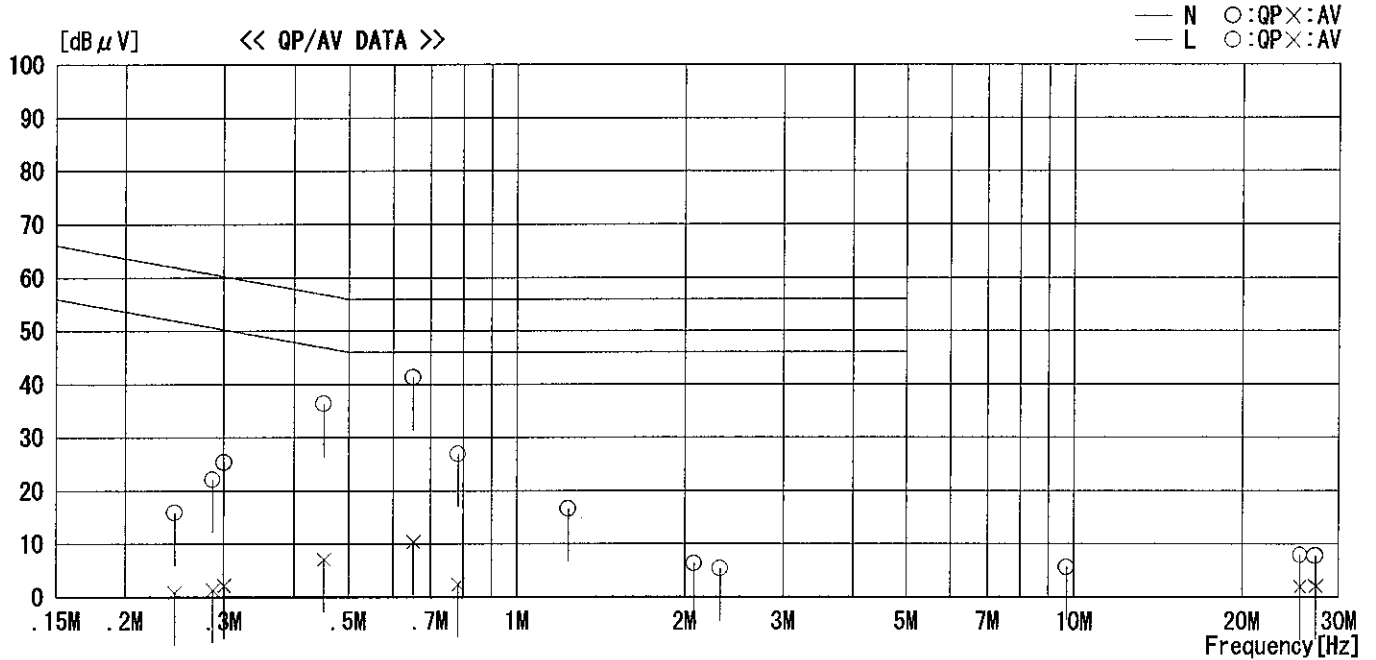
Applicant : DENSO WAVE INCORPORATED  
Kind of EUT : Bluetooth Board  
Model No. : DWBT001  
Serial No. : 5496950048300027

Report No. : 231E0101-H0 - 1  
Power : AC120V / 60Hz  
Temp°C/Humi% : 24 / 54  
Operator : Yoshiaki Iwasa



Mode / Remarks : Bluetooth Mode 2441MHz Hopping Off / FCC ID: PZWDWBT001 / IC Number: 1551C-DWBT001

LIMIT : FCC15C § 15.207 (QP)  
FCC15C § 15.207 (AV)



NO	FREQ [MHz]	READING		C. F [dB]	RESULT		LIMIT		MARGIN		PHASE
		QP [dB μV]	AV [dB μV]		QP [dB μV]	AV [dB μV]	QP [dB μV]	AV [dB μV]	QP [dB]	AV [dB]	
1	0.3005	15.3	-7.9	10.1	25.4	2.2	60.2	50.2	34.8	48.0	N
2	0.6523	30.8	0.0	10.5	41.3	10.5	56.0	46.0	14.7	35.5	N
3	1.2369	5.9	-10.8	10.7	16.6	-0.1	56.0	46.0	39.4	46.1	N
4	2.0805	-4.5	-11.0	10.8	6.3	-0.2	56.0	46.0	49.7	46.2	N
5	9.7080	-5.8	-11.7	11.5	5.7	-0.2	60.0	50.0	54.3	50.2	N
6	27.2353	-5.1	-10.8	12.9	7.8	2.1	60.0	50.0	52.2	47.9	N
7	0.2450	5.8	-9.1	10.0	15.8	0.9	61.9	51.9	46.1	51.0	L
8	0.2867	12.2	-8.6	10.0	22.2	1.4	60.6	50.6	38.4	49.2	L
9	0.4520	25.9	-3.3	10.4	36.3	7.1	56.8	46.8	20.5	39.7	L
10	0.7845	16.4	-8.1	10.5	26.9	2.4	56.0	46.0	29.1	43.6	L
11	2.3163	-5.5	-11.3	10.9	5.4	-0.4	56.0	46.0	50.6	46.4	L
12	25.5076	-5.0	-10.9	12.9	7.9	2.0	60.0	50.0	52.1	48.0	L

CHART:WITHOUT FACTOR,Peak hold data.Data is uncorrected. CALCURATION:RESULT=READING+C. F (LISN+CABLE+Limiter)  
Except for the above table : adequate margin data below the limits.

# DATA OF CONDUCTED EMISSION TEST

UL Apex Co., Ltd. Head Office EMC Lab. No.1 Semi Anechoic Chamber  
Date : 2003/05/18 19:51:38

Applicant : DENSO WAVE INCORPORATED  
Kind of EUT : Bluetooth Board  
Model No. : DWBT001  
Serial No. : 5496950048300027

Report No. : 231E0101-H0 - 1  
Power : AC120V / 60Hz  
Temp°C/Humi% : 24 / 54  
Operator : Yoshiaki Iwasa *J. Iwasa*

Mode / Remarks : Bluetooth Mode 2402MHz Hopping Off / FCC ID: PZWDWBT001 / IC Number: 1551C-DWBT001

LIMIT : FCC15C § 15.207 (QP)  
FCC15C § 15.207 (AV)

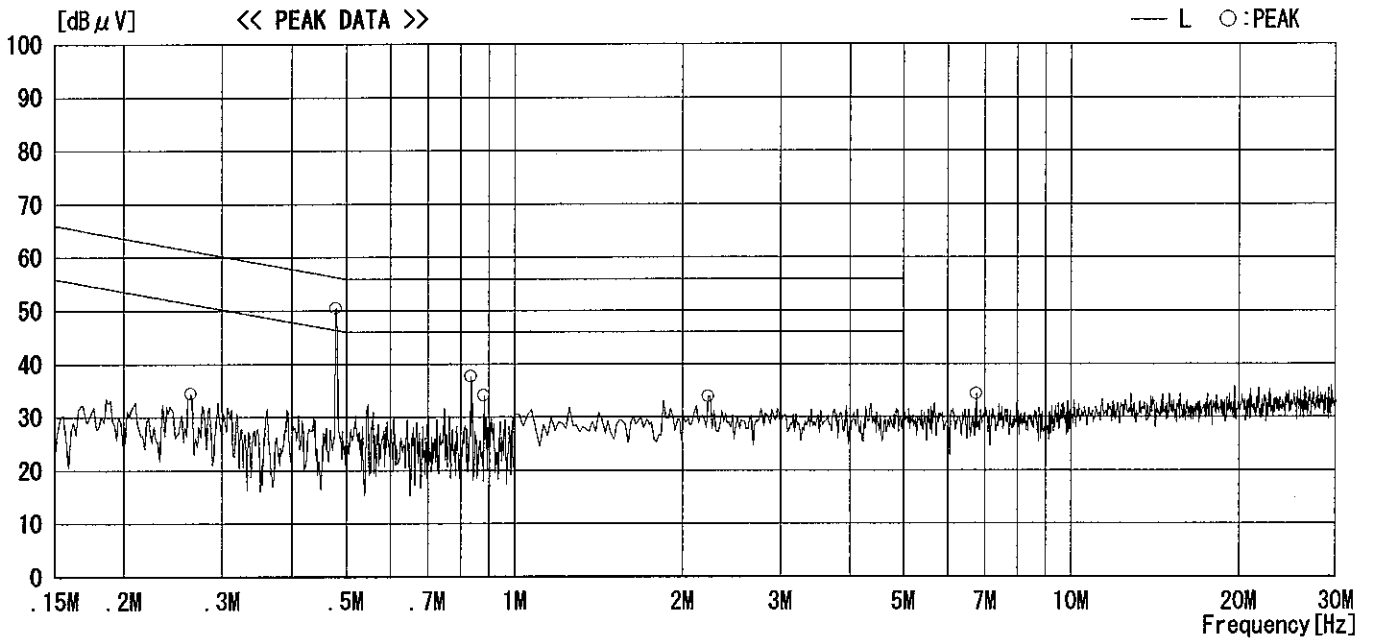
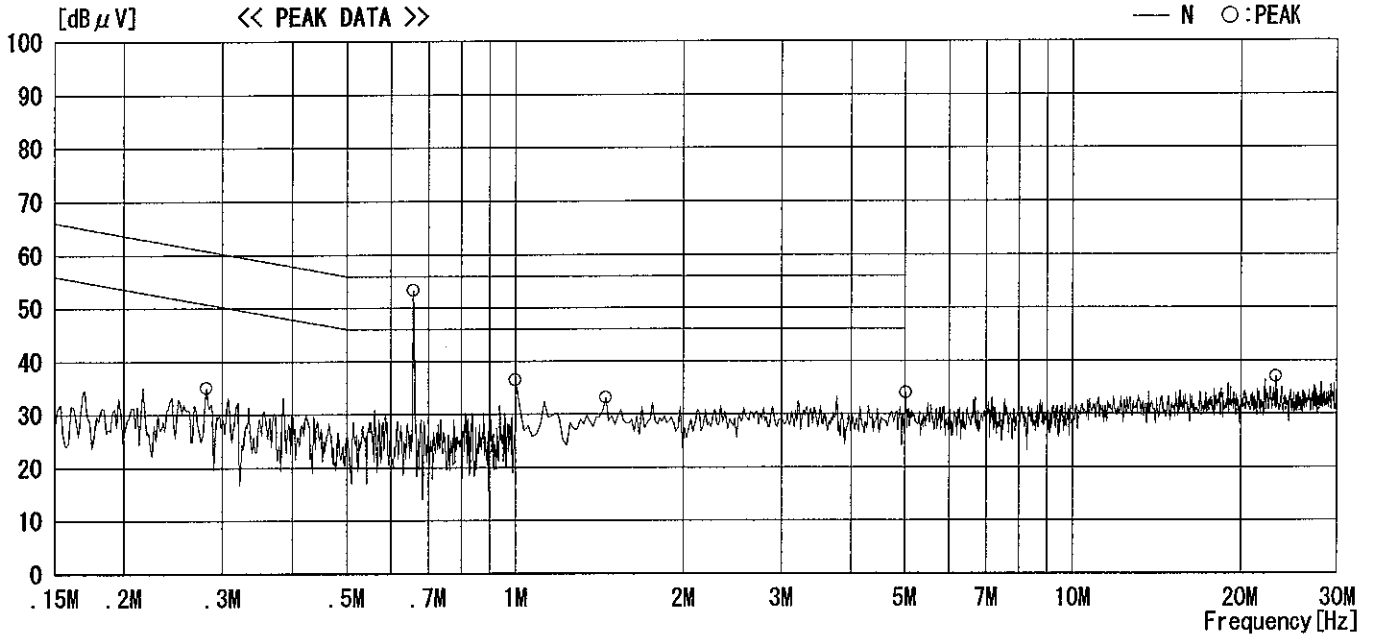


CHART:WITHOUT FACTOR, Peak hold data. Data is uncorrected. CALCURATION:RESULT=READING+C. F (LISN+CABLE+Limiter)  
Except for the above table : adequate margin data below the limits.

# DATA OF CONDUCTED EMISSION TEST

UL Apex Co., Ltd. Head Office EMC Lab. No.1 Semi Anechoic Chamber  
Date : 2003/05/18 21:20:32

Applicant : DENSO WAVE INCORPORATED  
Kind of EUT : Bluetooth Board  
Model No. : DWBT001  
Serial No. : 5496950048300027

Report No. : 231E0101-H0 - I  
Power : AC120V / 60Hz  
Temp°C/Humi% : 24 / 54  
Operator : Yoshiaki Iwasa *J. Iwasa*

Mode / Remarks : Bluetooth Mode 2441MHz Hopping Off / FCC ID: PZWDWBT001 / IC Number: 1551C-DWBT001

LIMIT : FCC15C § 15.207 (QP)  
FCC15C § 15.207 (AV)

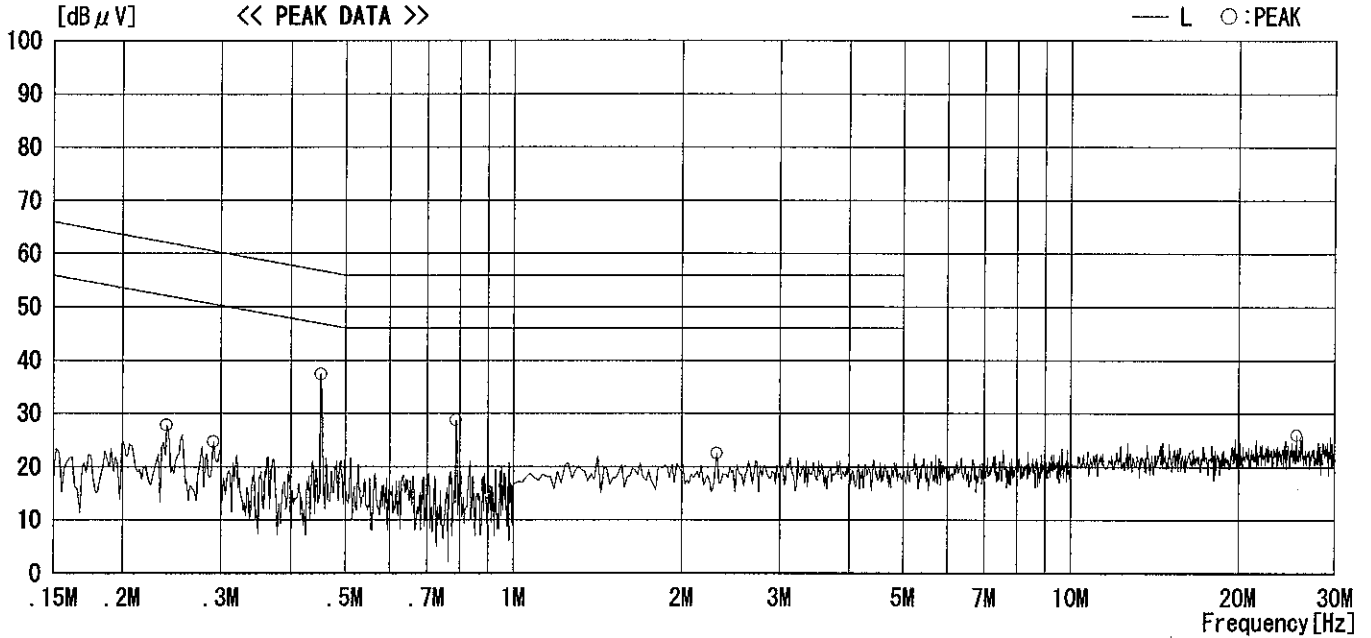
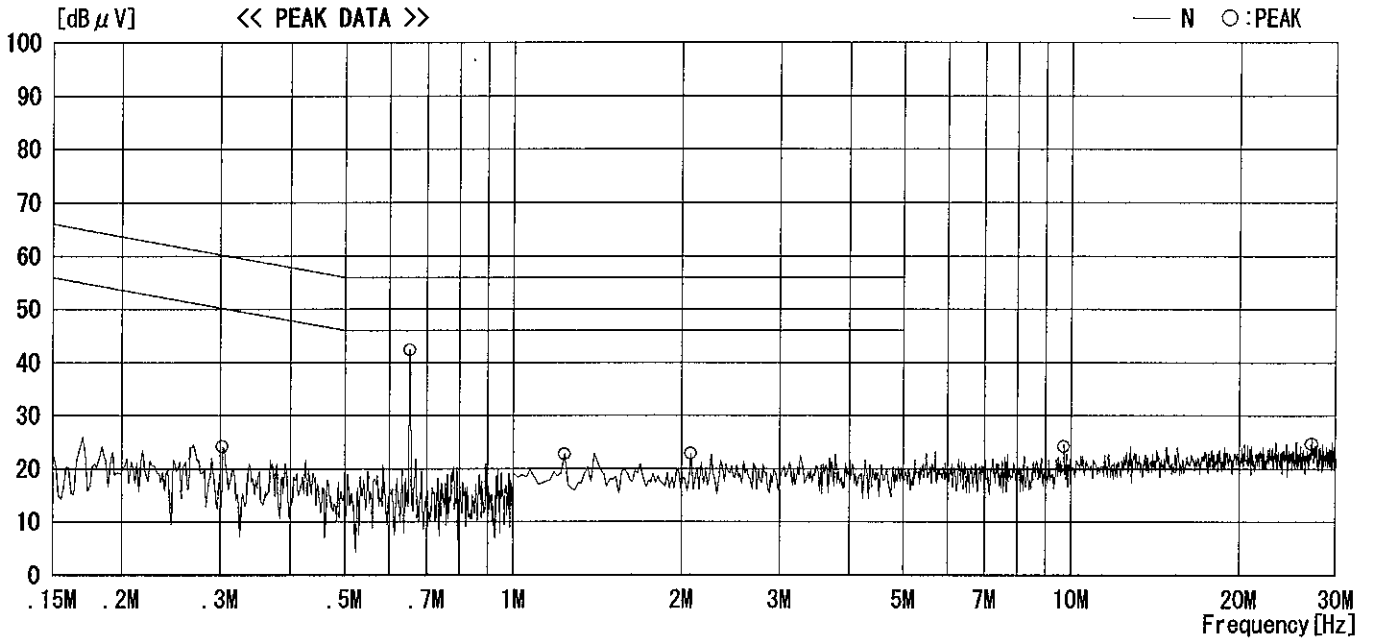


CHART:WITHOUT FACTOR, Peak hold data. Data is uncorrected. CALCURATION:RESULT=READING+C. F (LISN+CABLE+Limiter)  
Except for the above table : adequate margin data below the limits.

# DATA OF CONDUCTED EMISSION TEST

UL Apex Co., Ltd. Head Office EMC Lab. No.1 Semi Anechoic Chamber  
Date : 2003/05/18 20:38:43

Applicant : DENSO WAVE INCORPORATED  
Kind of EUT : Bluetooth Board  
Model No. : DWBT001  
Serial No. : 5496950048300027

Report No. : 231E0101-H0 - 1  
Power : AC120V / 60Hz  
Temp°C/Humi% : 24 / 54  
Operator : Yoshiaki Iwasa *J. Iwasa*

Mode / Remarks : Bluetooth Mode 2480MHz Hopping Off / FCC ID: PZWDWBT001 / IC Number: 1551C-DWBT001

LIMIT : FCC15C § 15.207 (QP)  
FCC15C § 15.207 (AV)

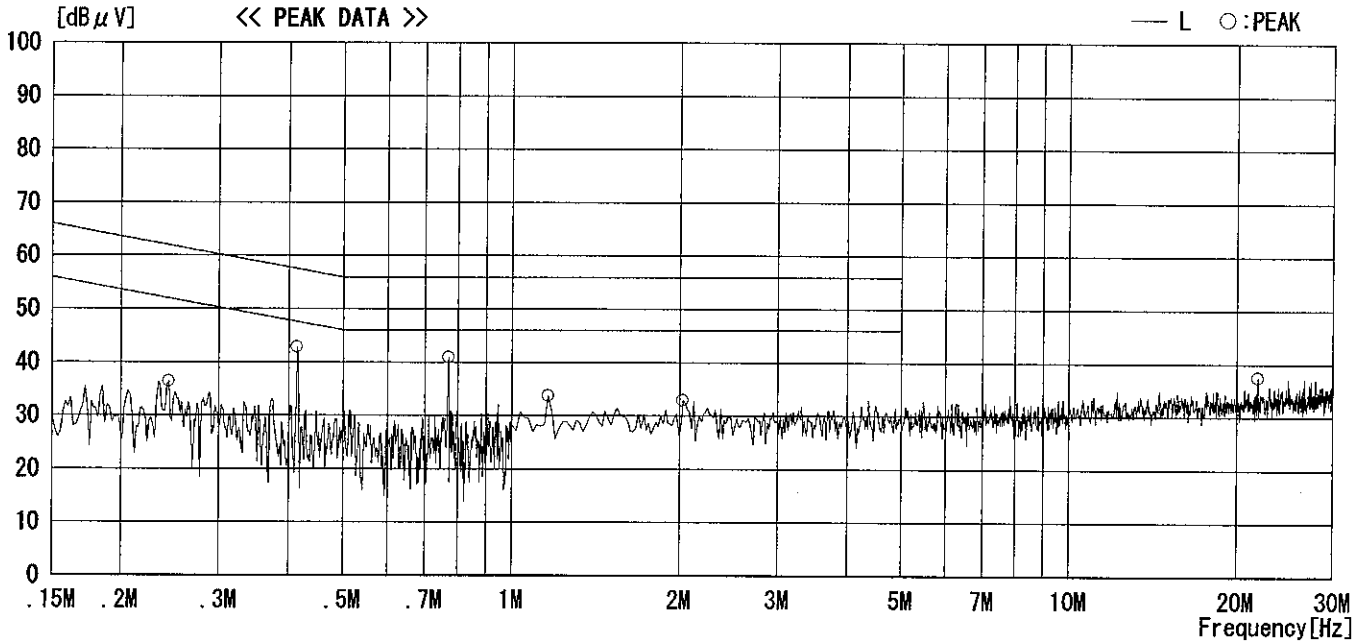
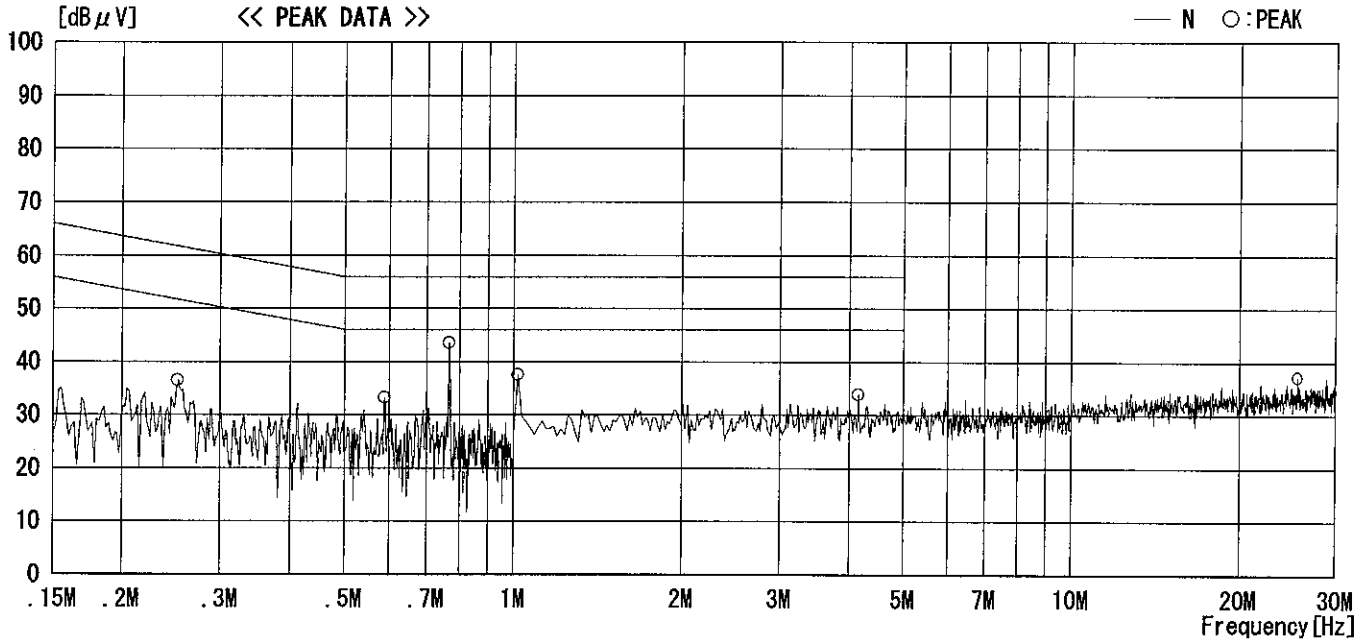


CHART:WITHOUT FACTOR, Peak hold data. Data is uncorrected. CALCURATION: RESULT=READING+C.F(LISN+CABLE+Limiter)  
Except for the above table : adequate margin data below the limits.

Page:

# DATA OF CARRIER FREQUENCY SEPARATION (CONDUCTED)

UL Apex Co., Ltd.  
Head Office EMC Lab. No.2 Semi Anechoic Chamber

COMPANY : DENSO WAVE INCORPORATED  
EQUIPMENT : Bluetooth Board  
MODEL : DWBT001 (+ BHT-100BB)  
S/ N : 5496950048300053 (+ 5496310206300011)  
FCC ID : PZWDWBT001  
IC Number : 1551C-DWBT001  
POWER : DC 3V  
MODE : Tx (Hopping on) / Inquiry

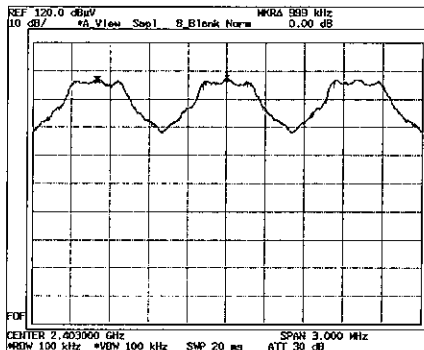
REPORT NO : 23IE0101-HO - 1  
REGULATION : Fcc Part15 Subpart C 15.247(a)(1)  
TEST DISTANCE : -  
DATE : 05/18/2003  
TEMPERATURE : 26°C  
HUMIDITY : 52%

*Y. Iwasa*  
Engineer : Yoshiaki Iwasa

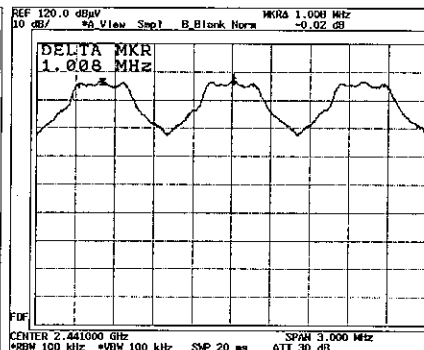
**PK DETECT (S/A :span 3MHz, RBW 100kHz, VBW 100kHz, sweep time AUTO)**

CH	FREQ [MHz]	Channel separation [kHz]	Limit
Low	2402.0	999.0	>20dB Bandwidth and 25[kHz]
Mid	2441.0	1008.0	>20dB Bandwidth and 25[kHz]
High	2480.0	1005.0	>20dB Bandwidth and 25[kHz]
Inquiry	2441.0	2004.0	>20dB Bandwidth and 25[kHz]
Inquiry scan	2441.0	2011.0	>20dB Bandwidth and 25[kHz]

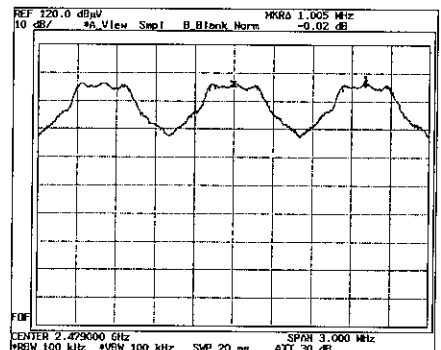
2402MHz



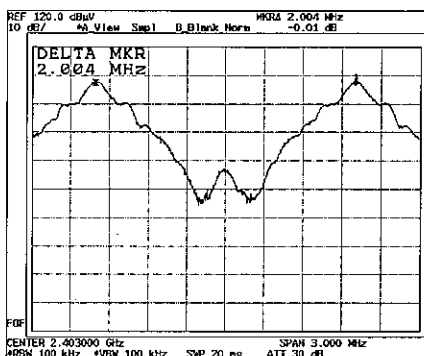
2441MHz



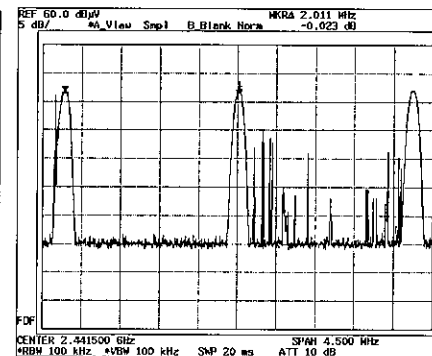
2480MHz



Inquiry



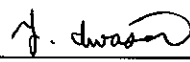
Inquiry Scan



# DATA OF -20dB BANDWIDTH (CONDUCTED)

UL Apex Co., Ltd.  
Head Office EMC Lab. No.2 Semi Anechoic Chamber

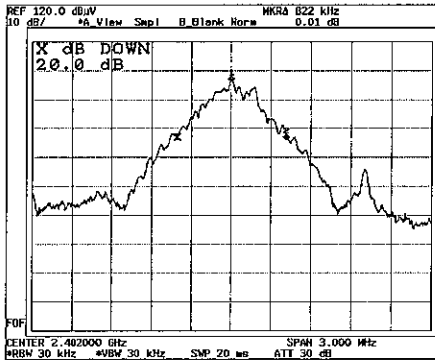
COMPANY : DENSO WAVE INCORPORATED	REPORT NO. : 23IE0101-HO - 1
EQUIPMENT : Bluetooth Board	REGULATION : Fcc Part15 Subpart C 15.247(a)(1)
MODEL : DWBT001 (+ BHT-100BB)	TEST DISTANCE : -
S/N : 5496950048300053 (+ 5496310206300011)	DATE : 05/18/2003
FCC ID : PZWDWBT001	TEMPERATURE : 26°C
IC Number : 1551C-DWBT001	HUMIDITY : 52%
POWER : DC 3V	
MODE : Tx (Hopping off) /Inquiry	

  
 \_\_\_\_\_  
 Engineer : Yoshiaki Iwasa

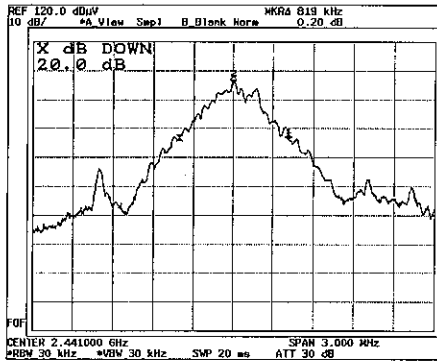
**PK DETECT(S/A: span 3MHz, RBW 30kHz, VBW 30kHz, sweep time AUTO)**

CH	FREQ	-20dB Bandwidth	Limit
	[MHz]	[MHz]	[MHz]
Low	2402.0	0.822	1.0
Mid	2441.0	0.819	1.0
High	2480.0	0.819	1.0
Inquiry	2441.0	0.672	1.0
Inquiry Scan	2441.0	0.102	1.0

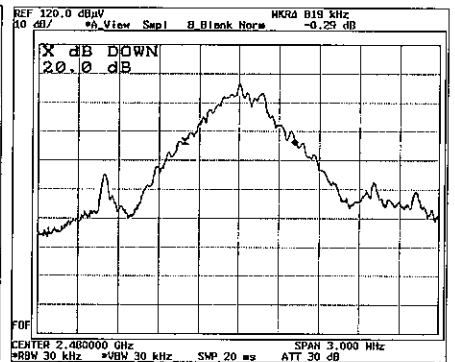
2402MHz



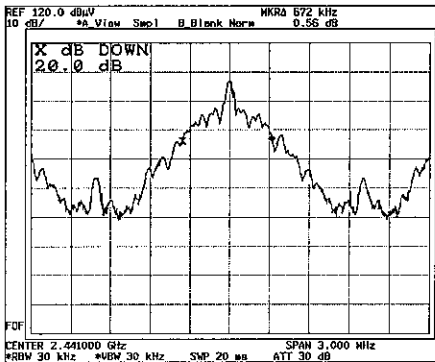
2441MHz



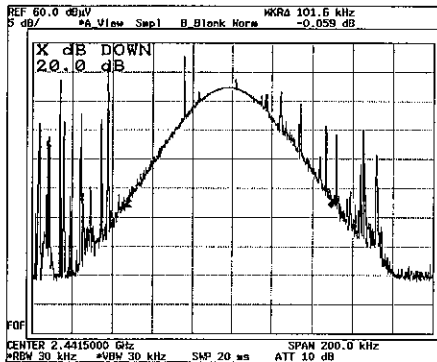
2480MHz



Inquiry



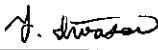
Inquiry Scan



# DATA OF NUMBER OF HOPPING FREQUENCY (CONDUCTED)

UL Apex Co., Ltd.  
Head Office EMC Lab. No.2 Semi Anechoic Chamber

COMPANY : DENSO WAVE INCORPORATED	REPORT NO : 23IE0101-HO - 1
EQUIPMENT : Bluetooth Board	REGULATION : Fcc Part15 Subpart C 15.247(a)(1)
MODEL : DWBT001 (+ BHT-100BB)	TEST DISTANCE : -
S/N : 5496950048300053 (+ 5496310206300011)	DATE : 05/18/2003
FCC ID : PZWDWB001	TEMPERATURE : 26°C
IC Number : 1551C-DWBT001	HUMIDITY : 52%
POWER : DC 3V	
MODE : Tx (Hopping on) / Inquiry	

  
 Engineer : Yoshiaki Iwasa

**PK DETECT(S/A : RBW 300kHz ,VBW 300kHz, sweep time AUTO )**

Mode	Number of channel [time]	Limit [time]
Tx(Hopping on)	79	≥ 15

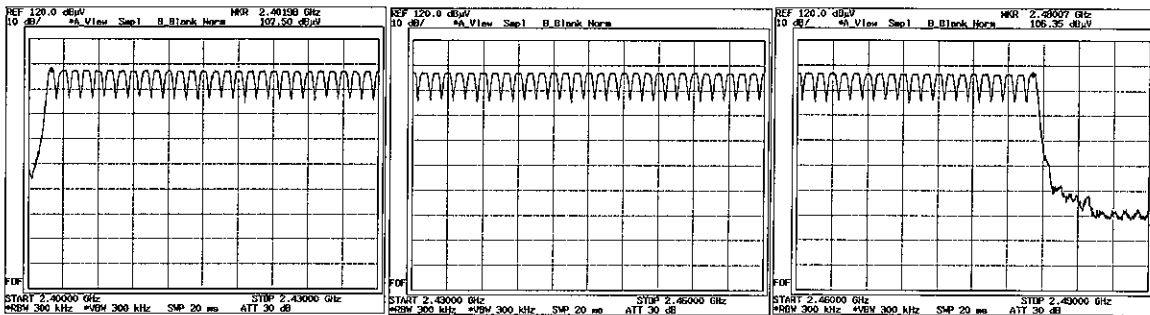
**PK DETECT(S/A : RBW 300kHz ,VBW 300kHz, sweep time AUTO )**

Mode	Number of channel [time]	Limit [time]
Inquiry	32	≥ 15

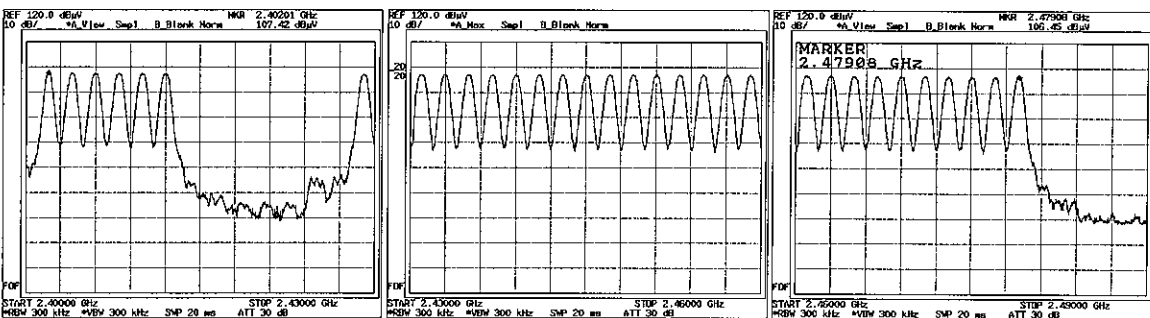
**PK DETECT(S/A : RBW 300kHz ,VBW 300kHz, sweep time AUTO )**

Mode	Number of channel [time]	Limit [time]
Inquiry scan	32	≥ 15

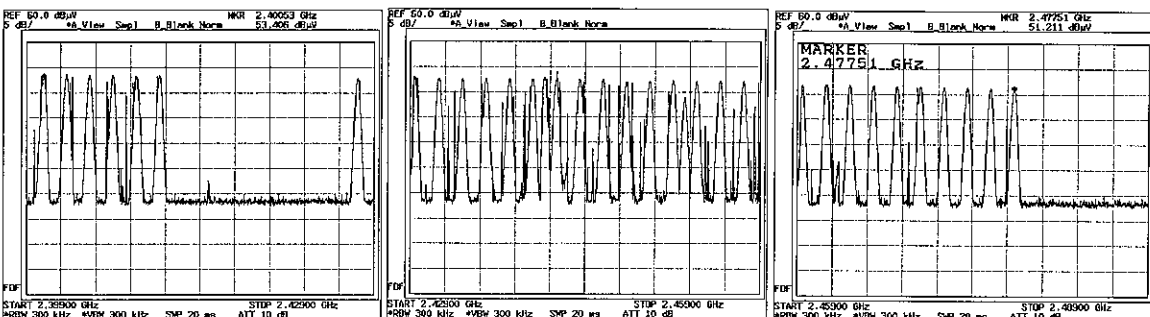
**Hopping on**



**Inquiry**



**Inquiry scan**



# DATA OF DWELL TIME (CONDUCTED)

UL Apex Co., Ltd.  
Head Office EMC Lab. No.2 Semi Anechoic Chamber

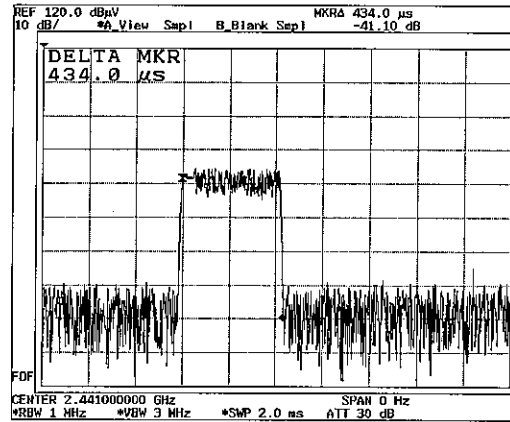
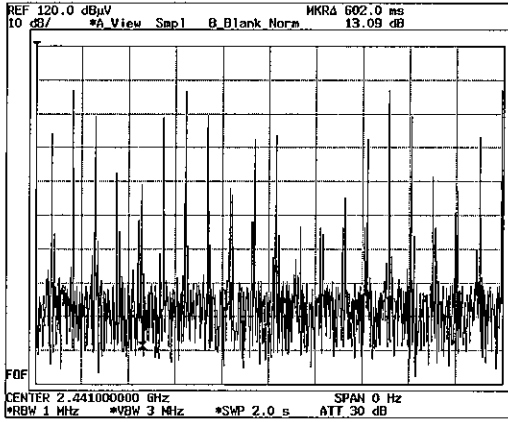
COMPANY : DENSO WAVE INCORPORATED	REPORT NO : 23IE0101-HO - 1
EQUIPMENT : Bluetooth Board	REGULATION : Fcc Part15 Subpart C 15.247(a)(1)(iii)
MODEL : DWBT001	TEST DISTANCE : -
S/N : 5496950048300053 (+BHT-100BB)	DATE : 05/18/2003
FCC ID : PZWDWBT001 (+5496310206300011)	TEMPERATURE : 26°C
IC Number : 1551C-DWBT001	HUMIDITY : 52%
POWER : DC 3V	
MODE : Tx (Hopping on) / Inquiry	

*Y. Iwasa*  
Engineer : Yoshiaki Iwasa

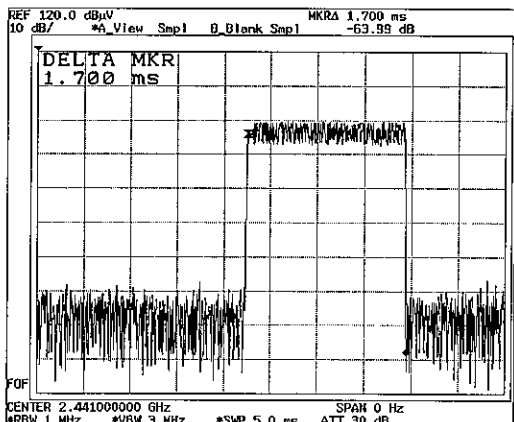
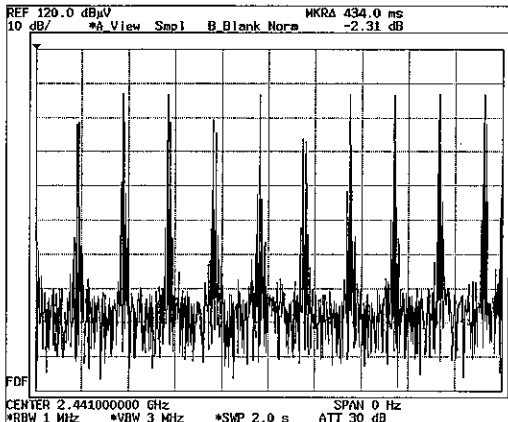
**PK DETECT (S/A :span ZERO, RBW 1MHz,VBW 3MHz, sweep time 0.5ms-100ms)**

Mode	Number of transmission in a 31.6(79 Hopping x 0.4) / 12.8(32 Hopping x 0.4)second period	Length of transmission time [msec]	Result [msec]	Limit [msec]
DH1	21 times / 2 sec. x 31.6 = 332 times	0.434	144.00	400
DH3	10 times / 2 sec. x 31.6 = 158 times	1.700	268.60	400
DH5	7 times / 2 sec. x 31.6 = 111 times	2.940	325.16	400
Inquiry	62 times / 2 sec. x 12.8 = 397 times	0.136	53.77	400
Inquiry Scan	28 times / 200 sec. x 12.8 = 2 times	11.60	20.79	400

**DH1**



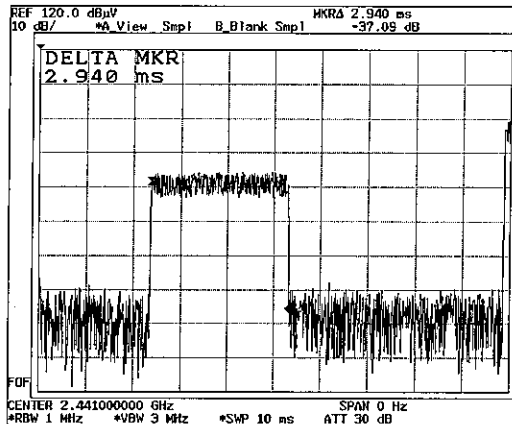
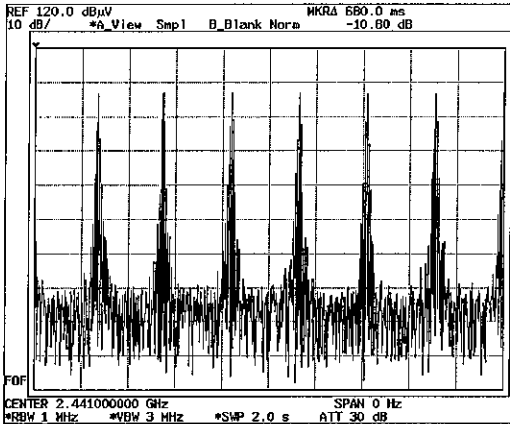
**DH3**



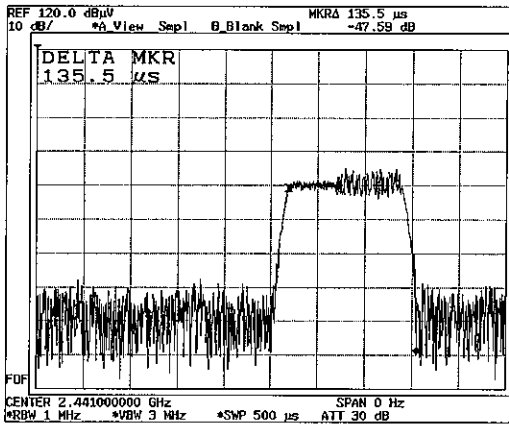
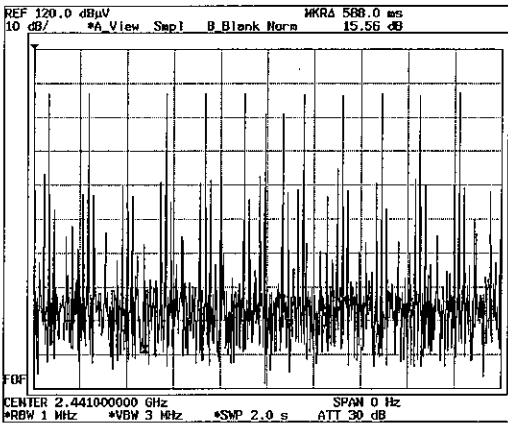


DATA OF DWELL TIME (Conducted)

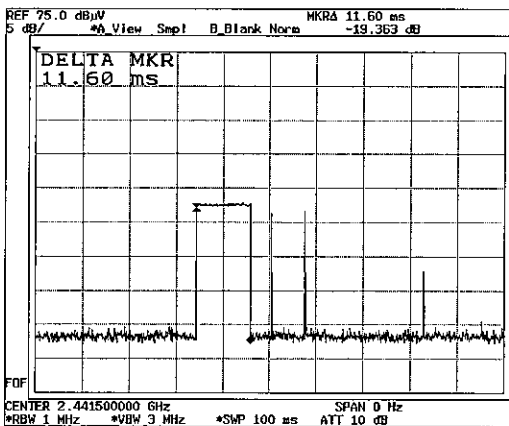
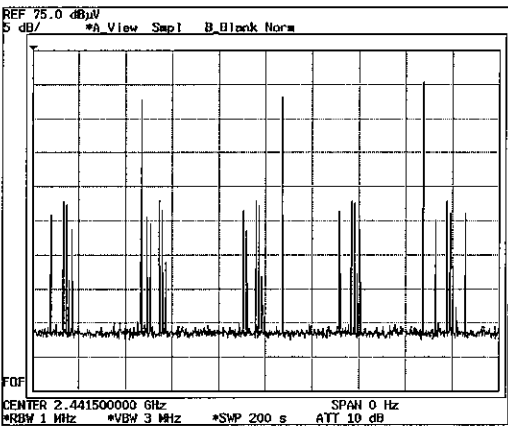
DH5



Inquiry




Inquiry Scan



# DATA OF PEAK OUTPUT POWER(CONDUCTED)

UL Apex Co., Ltd.  
Head Office EMC Lab. No.2 Semi Anechoic Chamber

COMPANY : DENSO WAVE INCORPORATED	REPORT NO : 23IE0101-HO - 1
EQUIPMENT : Bluetooth Board	REGULATION : Fcc Part15 Subpart C 15.247(b)(1)
MODEL : DWBT001 (+BHT-100BB)	TEST DISTANCE : -
S/N : 5496950048300053 (+5496310206300011)	DATE : 05/18/2003
FCC ID : PZWDWBT001	TEMPERATURE : 26°C
IC Number : 1551C-DWBT001	HUMIDITY : 52%
POWER : DC 3V	
MODE : Tx (Hopping off) / Inquiry	

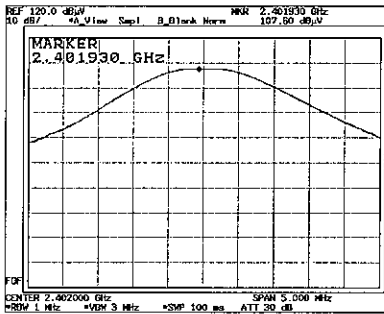
  
 Engineer : Yoshiaki Iwasa

(SPAN: 5MHz/3MHz/2MHz , RBW: 1MHz , VBW: 3MHz , Sweep: AUTO)

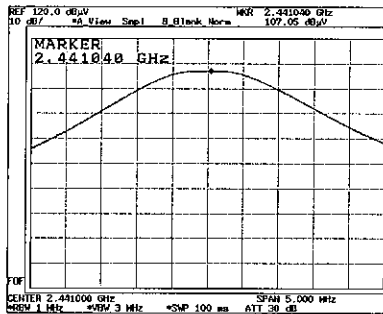
CH	FREQ [MHz]	S/A Reading [dBuV]	Cable loss [dB]	Result [dBm]	Limit (1W) [dBuV]	Margin [dBm]
Low	2402.0	107.6	0.5	1.1	30.0	29.0
Mid	2441.0	107.1	0.5	0.5	30.0	29.5
High	2480.0	106.6	0.5	0.0	30.0	30.0
Inquiry	2441.0	107.0	0.5	0.4	21.0	20.6
Inquiry scan	2441.0	53.2	0.5	-53.4	21.0	74.4

Sample Calculation:  
Result=S/A Reading + Cable Loss

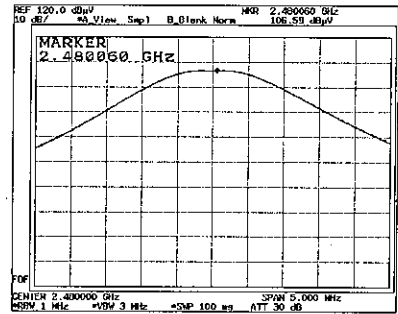
Tx: 2402MHz



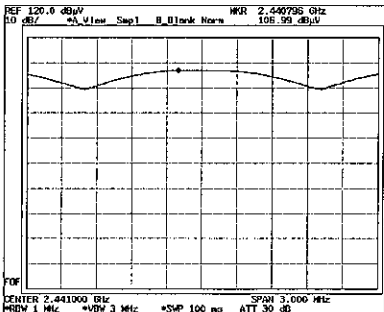
Tx: 2441MHz



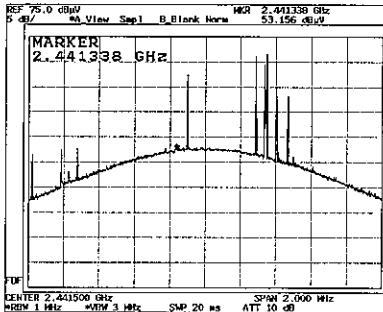
Tx: 2480MHz



Inquiry



Inquiry scan



# DATA OF BAND EDGE (CONDUCTED)

UL Apex Co., Ltd.  
Head Office EMC Lab. No.1 Semi Anechoic Chamber

COMPANY : DENSO WAVE INCORPORATED	REPORT NO. : 231E0101-HO - 1	
EQUIPMENT : Bluetooth Board	REGULATION : Fcc Part15 Subpart C 15.247(c)	
MODEL : DWBT001 (+ BHT-100BB)	TEST DISTANCE : -	
S/N : 5496950048300027 (+ 5496310206300010)	DATE : 06/06/2003	
FCC ID : PZWDWBT001	TEMPERATURE : 26°C	
IC Number : 1551C-DWBT001	HUMIDITY : 41%	
POWER : DC 3V		
MODE : Tx (Hopping on/off)		

*J. Iwasa*  
Engineer : Yoshiaki Iwasa

**PK DETECT (S/A :SPAN 10MHz, RBW 100kHz, VBW 100kHz, sweep time AUTO)**

Frequency [MHz]	Reading [dBuV]	Cable Loss [dB]	E [dBuV]	P [nW]	Difference of level [dB]	Field Strength [dBuV/m]	Limit
2381.0	48.4	2.3	50.7	2.37	-	41.0	<74[dBuV/m]
2400.0	62.9	2.3	65.2	-	42.3	-	>20[dB]
2484.8	52.7	2.3	55.0	6.27	-	45.2	<74[dBuV/m]

\* Reference : Reading (105.2[dBuV]) + Cable Loss (2.3[dB]) = 107.5 [dBuV](at 2402MHz)

**AV DETECT (S/A :SPAN 10MHz, RBW 10Hz, VBW 10Hz, sweep time AUTO)**

Frequency [MHz]	Reading [dBuV]	Cable Loss [dB]	E [dBuV]	P [nW]	Difference of level [dB]	Field Strength [dBuV/m]	Limit
2381.0	18.0	2.3	20.3	0.00	-	10.5	<54[dBuV/m]
2484.8	18.8	2.3	21.1	0.00	-	11.4	<54[dBuV/m]

**PK DETECT (S/A :SPAN 10MHz, RBW 100kHz, VBW 100kHz, sweep time AUTO)**

Frequency [MHz]	Reading [dBuV]	Cable Loss [dB]	E [dBuV]	P [nW]	Difference of level [dB]	Field Strength [dBuV/m]	Limit
2370.1	49.0	2.3	51.3	2.70	-	41.6	<74[dBuV/m]
2400.0	65.1	2.3	67.4	-	40.1	-	>20[dB]
2484.8	55.1	2.3	57.4	10.89	-	47.6	<74[dBuV/m]

\* Reference : Reading (105.2[dBuV]) + Cable Loss (2.3[dB]) = 107.5 [dBuV](at 2402MHz)

**AV DETECT (S/A :SPAN 10MHz, RBW 10Hz, VBW 10Hz, sweep time AUTO)**

Frequency [MHz]	Reading [dBuV]	Cable Loss [dB]	E [dBuV]	P [nW]	Difference of level [dB]	Field Strength [dBuV/m]	Limit
2370.1	38.3	2.3	40.6	0.23	-	30.9	<54[dBuV/m]
2484.8	39.2	2.3	41.5	0.28	-	31.8	<54[dBuV/m]

**Sample Calculation:**

Field Strength =  $20 \log(\sqrt{30 \cdot P \cdot 10^{-9} \cdot G} / d \cdot 10^{-6})$

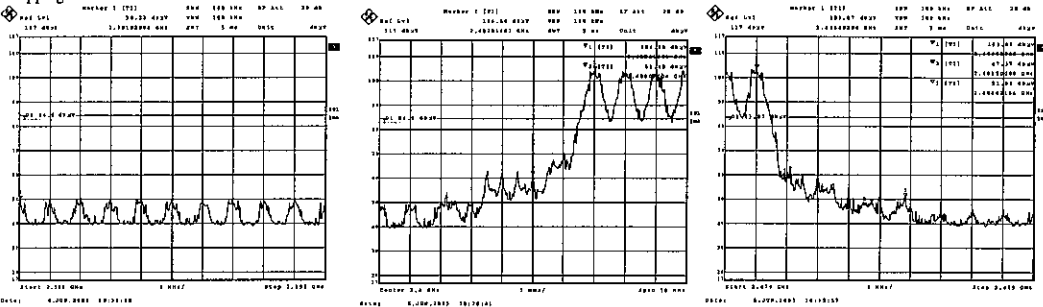
E : Reading + Cable Loss

P : Converted to nW

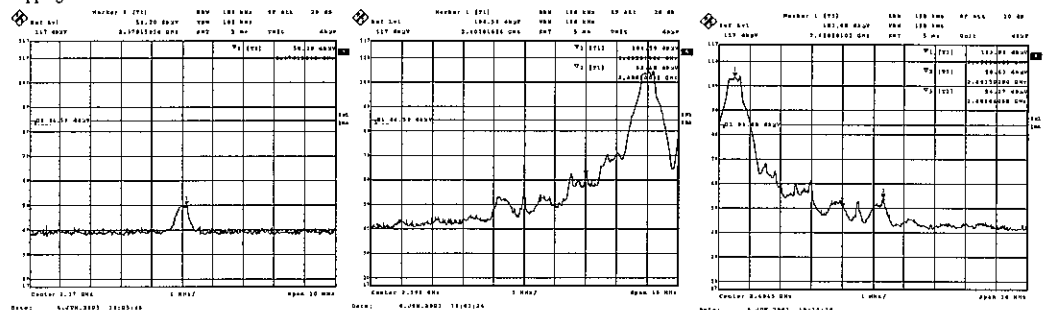
d : Test distance(3.0m)

G : Numeric Antenna G      1.60 (antenna gain      2.044 dB)

**Hopping on**



**Hopping off**




# DATA OF RADIATED EMISSION TEST

UL Apex Co., Ltd. Head Office EMC Lab. No.1 Semi Anechoic Chamber  
Date : 2003/05/23 22:10:03

Applicant : DENSO WAVE INCORPORATED  
Kind of EUT : Bluetooth Board  
Model No. : DWBT001  
Serial No. : 5496950048300053

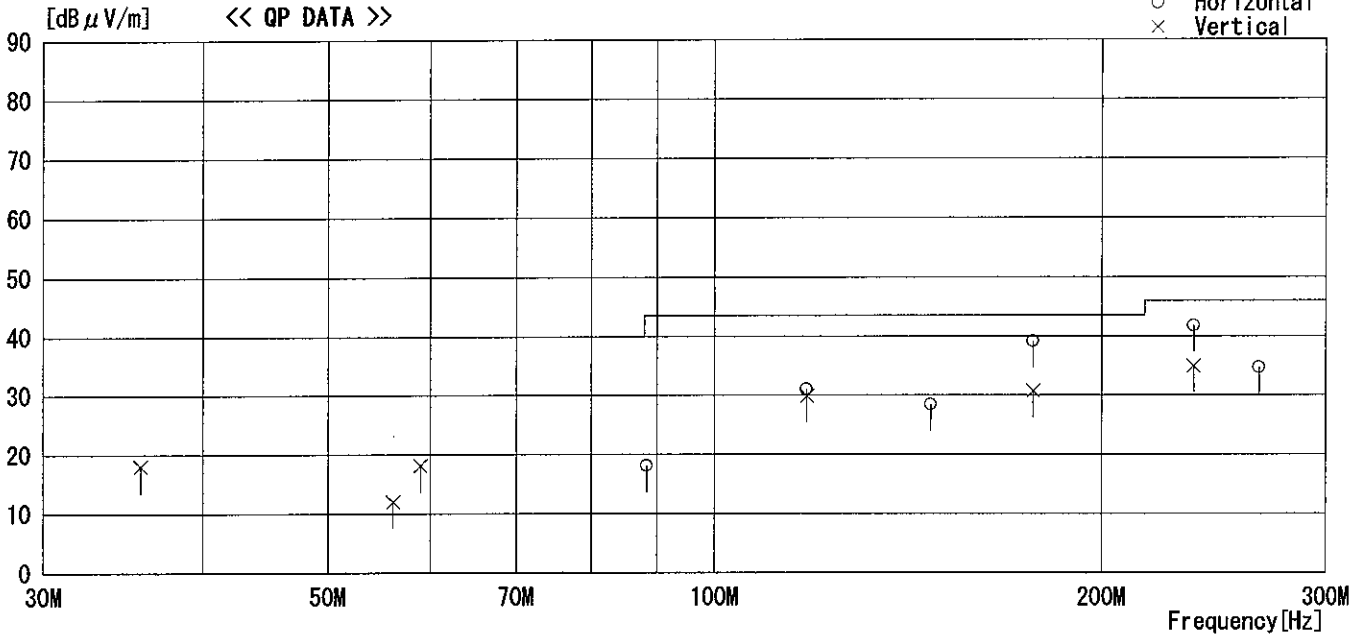
Report No. : 231E0101-H0-1  
Power : DC 3.3V  
Temp°C/Humi% : 23 / 60  
Operator : Yoshiaki Iwasa



Mode / Remarks : MAXSEND, Hopping-off, 2402MHz, MAX-axis / FCC ID: PZWDWBT001 / IC Number: 1551C-DWBT001

LIMIT : FCC15C §15.247(c) 3m  
Except for the data below : adequate margin data below the limits.

— Horizontal  
— Vertical  
○ Horizontal  
× Vertical



No.	FREQ [MHz]	READING QP [dB μV]	ANT FACTOR [dB/m]	LOSS [dB]	GAIN [dB]	RESULT [dB μV/m]	LIMIT [dB μV/m]	MARGIN [dB]	ANTENNA [cm]	TABLE [DEG]
----- Horizontal -----										
1	88.454	26.1	7.4	8.0	23.4	18.1	43.5	25.4	190	245
2	117.946	32.8	13.1	8.4	23.3	31.0	43.5	12.5	266	112
3	147.436	28.5	14.5	8.6	23.2	28.4	43.5	15.1	222	95
4	176.925	37.8	15.6	8.9	23.2	39.1	43.5	4.4	100	129
5	235.902	38.4	16.8	9.4	22.9	41.7	46.0	4.3	135	131
6	265.390	30.3	17.8	9.6	23.0	34.7	46.0	11.3	123	120
----- Vertical -----										
7	35.746	18.4	16.2	7.1	23.7	18.0	40.0	22.0	100	0
8	56.177	18.9	9.3	7.5	23.7	12.0	40.0	28.0	100	0
9	58.972	25.5	8.6	7.5	23.5	18.1	40.0	21.9	100	89
10	117.948	31.7	13.1	8.4	23.3	29.9	43.5	13.6	100	205
11	176.924	29.4	15.6	8.9	23.2	30.7	43.5	12.8	143	220
12	235.903	31.6	16.8	9.4	22.9	34.9	46.0	11.1	171	206

CHART: WITHOUT FACTOR ANT TYPE : -30MHz LOOP, 30-300MHz BICONICAL, 300MHz-1000MHz LOGPERIODIC, 1000MHz- HORN  
CALCULATION : READING + ANT FACTOR + LOSS (CABLE+ATTEN.) - AMP. GAIN

# DATA OF RADIATED EMISSION TEST

UL Apex Co., Ltd. Head Office EMC Lab. No.1 Semi Anechoic Chamber  
Date : 2003/05/23 20:37:07

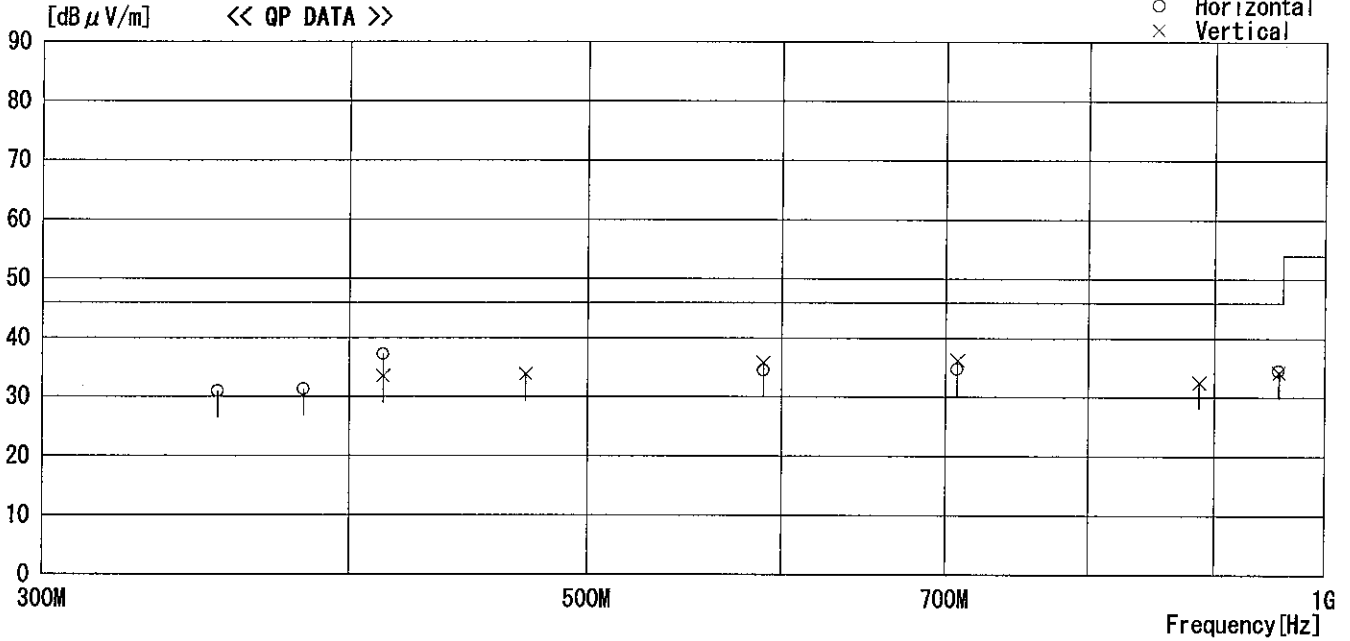
Applicant : DENSO WAVE INCORPORATED  
Kind of EUT : Bluetooth Board  
Model No. : DWBT001  
Serial No. : 5496950048300053

Report No. : 231E0101-H0 - I  
Power : DC 3.3V  
Temp°C/Humi% : 23 / 60  
Operator : Yoshiaki Iwasa *J. Iwasa*

Mode / Remarks : MAXSEND, Hopping-off, 2402MHz, MAX-axis / FCC ID: PZWDWBT001 / IC Number: 1551C-DWBT001

LIMIT : FCC15C §15.247(c) 3m  
Except for the data below : adequate margin data below the limits.

— Horizontal  
— Vertical  
○ Horizontal  
× Vertical



No.	FREQ [MHz]	READING QP [dB μV]	ANT FACTOR [dB/m]	LOSS [dB]	GAIN [dB]	RESULT [dB μV/m]	LIMIT [dB μV/m]	MARGIN [dB]	ANTENNA [cm]	TABLE [DEG]
—— Horizontal ——										
1	353.858	27.4	16.3	10.2	23.0	30.9	46.0	15.1	100	137
2	383.345	26.7	17.3	10.4	23.2	31.2	46.0	14.8	100	36
3	412.834	31.6	18.0	10.6	23.0	37.2	46.0	8.8	100	68
4	589.767	26.6	19.5	11.5	23.1	34.5	46.0	11.5	127	190
5	707.723	25.3	20.6	12.0	23.2	34.7	46.0	11.3	120	108
6	955.712	20.6	23.6	13.0	22.8	34.4	46.0	11.6	100	0
—— Vertical ——										
7	412.831	27.9	18.0	10.6	23.0	33.5	46.0	12.5	117	123
8	471.809	27.7	18.3	10.8	23.0	33.8	46.0	12.2	117	232
9	589.764	27.9	19.5	11.5	23.1	35.8	46.0	10.2	100	0
10	707.723	26.8	20.6	12.0	23.2	36.2	46.0	9.8	100	298
11	887.542	20.3	22.3	12.8	22.9	32.5	46.0	13.5	100	0
12	956.436	20.4	23.6	13.1	22.9	34.2	46.0	11.8	100	0

CHART: WITHOUT FACTOR    ANT TYPE : -30MHz LOOP, 30-300MHz BICONICAL, 300MHz-1000MHz LOGPERIODIC, 1000MHz- HORN  
CALCULATION : READING + ANT FACTOR + LOSS (CABLE+ATTEN.) - AMP. GAIN

# DATA OF RADIATED EMISSION TEST

UL Apex Co., Ltd. Head Office EMC Lab. No.1 Semi Anechoic Chamber  
Date : 2003/05/19 15:34:59

Applicant : DENSO WAVE INCORPORATED  
Kind of EUT : Bluetooth Board  
Model No. : DWBT001  
Serial No. : 5496950048300053

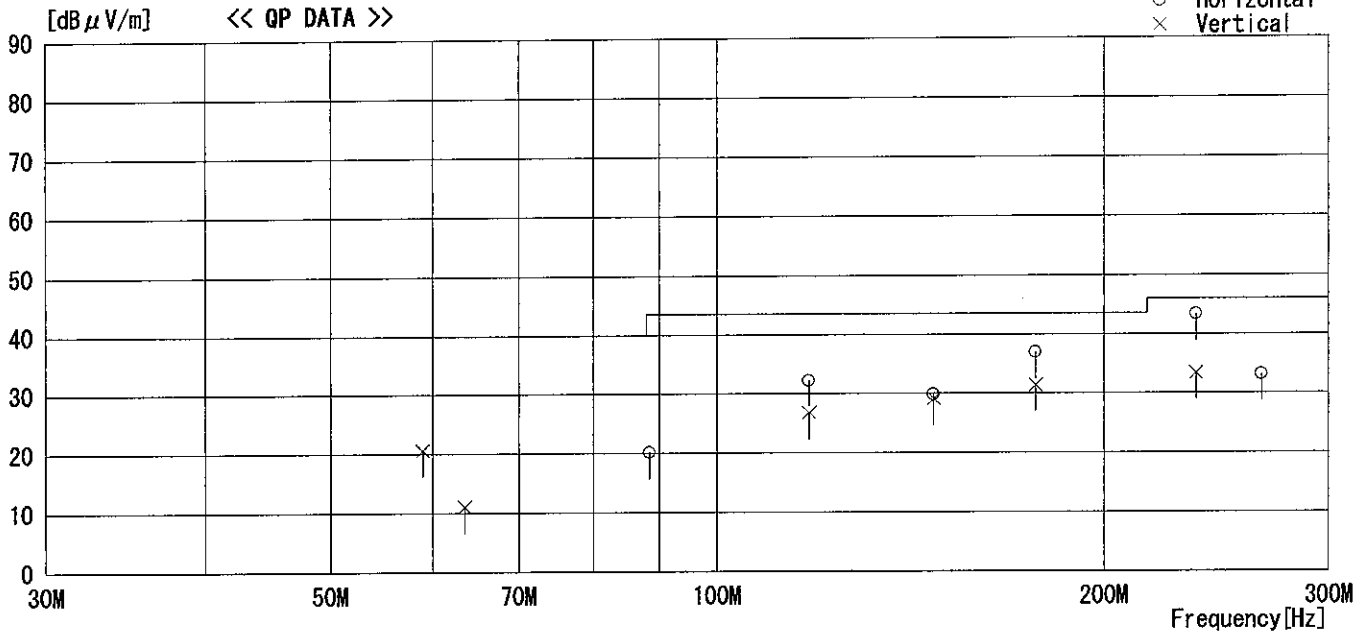
Report No. : 231E0101-H0 - 1  
Power : DC 3.3V  
Temp°C/Humi% : 23 / 60  
Operator : Yoshiaki Iwasa

*J. Iwasa*

Mode / Remarks : MAX-SEND, Hopping-off, 2441MHz, MAX-axis / FCC ID: PZWDWBT001 / IC Number: 1551C-DWBT001

LIMIT : FCC15C §15.247(c) 3m  
Except for the data below : adequate margin data below the limits.

— Horizontal  
— Vertical  
○ Horizontal  
× Vertical



No.	FREQ [MHz]	READING QP [dB μV]	ANT FACTOR [dB/m]	LOSS [dB]	GAIN [dB]	RESULT [dB μV/m]	LIMIT [dB μV/m]	MARGIN [dB]	ANTENNA [cm]	TABLE [DEG]
----- Horizontal -----										
1	88.475	28.1	7.4	8.0	23.4	20.1	43.5	23.4	188	119
2	117.958	34.0	13.1	8.4	23.3	32.2	43.5	11.3	263	279
3	147.449	30.0	14.5	8.6	23.2	29.9	43.5	13.6	120	256
4	176.945	35.6	15.6	8.9	23.2	36.9	43.5	6.6	106	250
5	235.921	40.0	16.8	9.4	22.9	43.3	46.0	2.7	119	260
6	265.411	28.8	17.8	9.6	23.0	33.2	46.0	12.8	129	285
----- Vertical -----										
7	58.992	28.0	8.6	7.5	23.5	20.6	40.0	19.4	100	355
8	63.547	19.4	7.6	7.6	23.6	11.0	40.0	29.0	100	355
9	117.966	28.6	13.1	8.4	23.3	26.8	43.5	16.7	100	171
10	147.449	29.2	14.5	8.6	23.2	29.1	43.5	14.4	100	199
11	176.939	30.1	15.6	8.9	23.2	31.4	43.5	12.1	103	133
12	235.913	30.1	16.8	9.4	22.9	33.4	46.0	12.6	100	279

CHART: WITHOUT FACTOR ANT TYPE : -30MHz LOOP, 30-300MHz BICONICAL, 300MHz-1000MHz LOGPERIODIC, 1000MHz- HORN  
CALCULATION : READING + ANT FACTOR + LOSS (CABLE+ATTEN.) - AMP. GAIN

# DATA OF RADIATED EMISSION TEST

UL Apex Co., Ltd. Head Office EMC Lab. No.1 Semi Anechoic Chamber  
Date : 2003/05/19 17:00:21

Applicant : DENSO WAVE INCORPORATED  
Kind of EUT : Bluetooth Board  
Model No. : DWBT001  
Serial No. : 5496950048300053

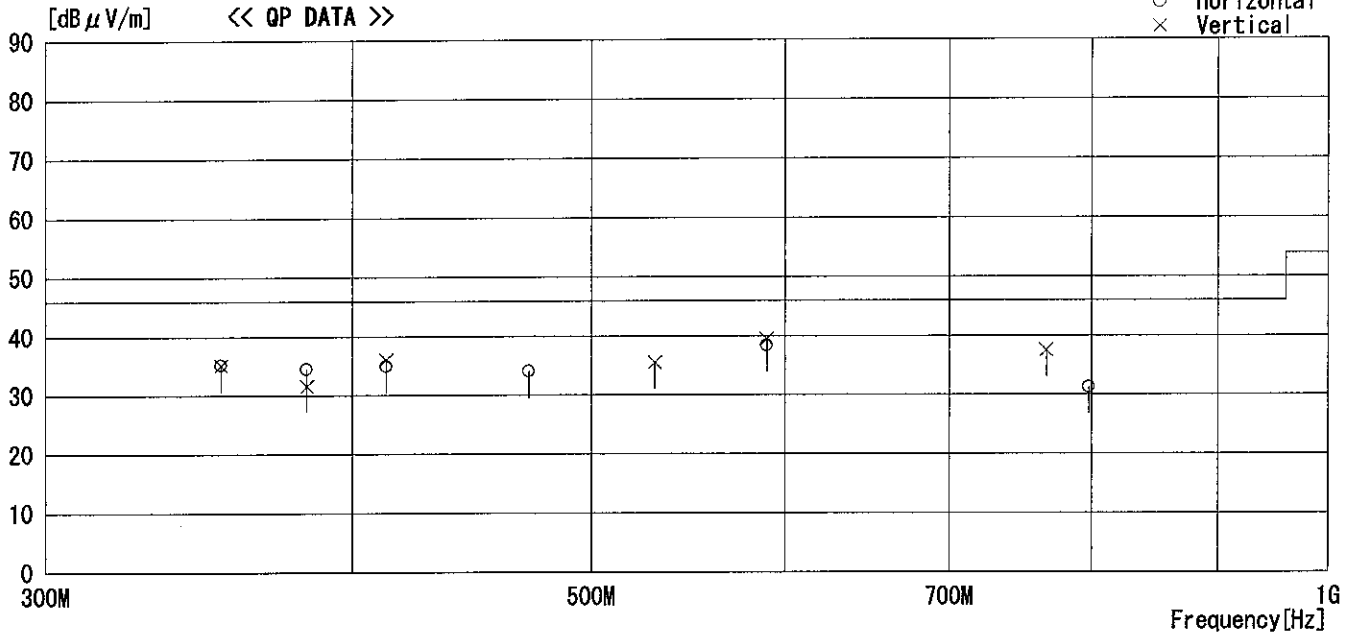
Report No. : 231E0101-H0 - 1  
Power : DC 3.3V  
Temp°C/Humi% : 23 / 60  
Operator : Yoshiaki Iwasa *J. Iwasa*

Mode / Remarks : MAX-SEND, Hopping-off, 2441MHz, MAX-axis / FCC ID: PZWDWBT001 / IC Number: 1551C-DWBT001

LIMIT : FCC15C §15.247(c) 3m

Except for the data below : adequate margin data below the limits.

— Horizontal  
— Vertical  
○ Horizontal  
× Vertical



No.	FREQ [MHz]	READING QP [dB μV]	ANT FACTOR [dB/m]	LOSS [dB]	GAIN [dB]	RESULT [dB μV/m]	LIMIT [dB μV/m]	MARGIN [dB]	ANTENNA [cm]	TABLE [DEG]
----- Horizontal -----										
1	353.871	31.6	16.3	10.2	23.0	35.1	46.0	10.9	100	359
2	383.362	30.0	17.3	10.4	23.2	34.5	46.0	11.5	100	146
3	412.847	29.2	18.0	10.6	23.0	34.8	46.0	11.2	100	21
4	471.818	27.9	18.3	10.8	23.0	34.0	46.0	12.0	197	310
5	589.776	30.4	19.5	11.5	23.1	38.3	46.0	7.7	144	248
6	797.923	20.1	21.8	12.5	23.2	31.2	46.0	14.8	100	0
----- Vertical -----										
7	353.870	31.6	16.3	10.2	23.0	35.1	46.0	10.9	199	300
8	383.359	27.1	17.3	10.4	23.2	31.6	46.0	14.4	153	49
9	412.849	30.4	18.0	10.6	23.0	36.0	46.0	10.0	140	285
10	530.801	28.8	18.8	11.1	23.2	35.5	46.0	10.5	100	251
11	589.783	31.6	19.5	11.5	23.1	39.5	46.0	6.5	100	251
12	766.712	27.0	21.4	12.3	23.2	37.5	46.0	8.5	127	295

CHART: WITHOUT FACTOR    ANT TYPE : ~30MHz LOOP, 30-300MHz BICONICAL, 300MHz-1000MHz LOGPERIODIC, 1000MHz- HORN  
CALCULATION : READING + ANT FACTOR + LOSS (CABLE+ATTEN.) - AMP. GAIN

# DATA OF RADIATED EMISSION TEST

UL Apex Co., Ltd. Head Office EMC Lab. No.1 Semi Anechoic Chamber  
Date : 2003/05/23 22:44:28

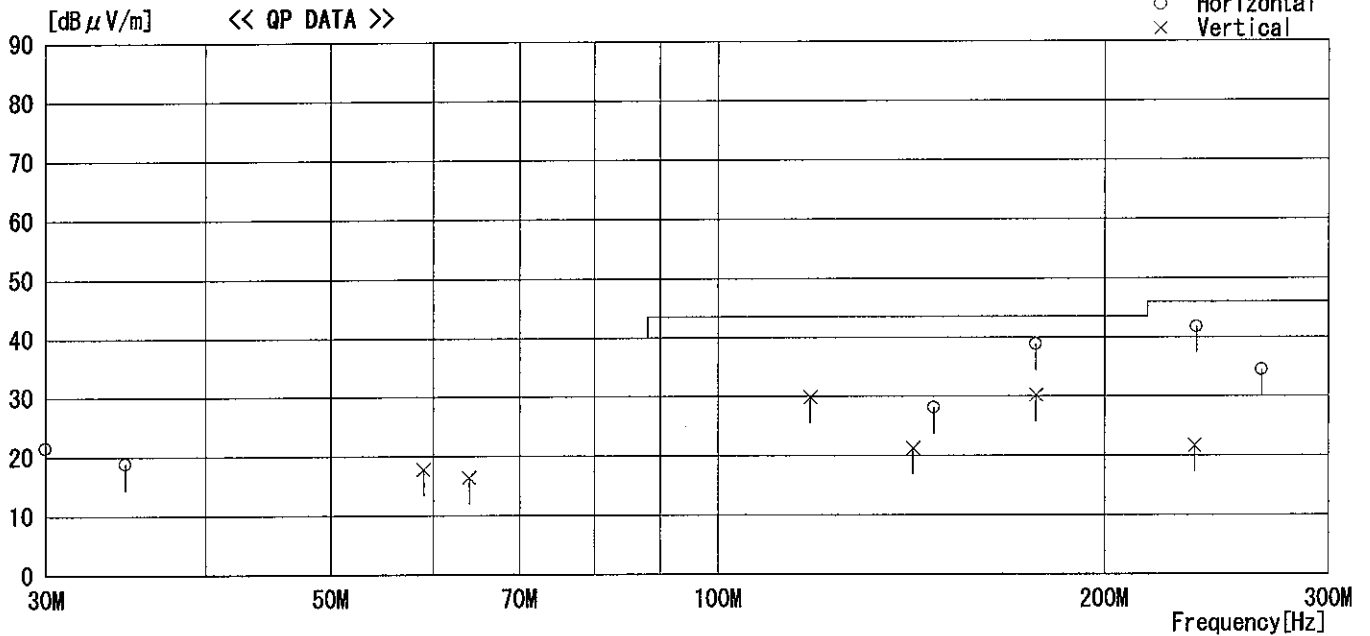
Applicant : DENSO WAVE INCORPORATED  
Kind of EUT : Bluetooth Board  
Model No. : DWBT001  
Serial No. : 5496950048300053

Report No. : 231E0101-HO - 1  
Power : DC 3.3V  
Temp°C/Humi% : 26 / 45  
Operator : Yoshiaki Iwasa *f. iwasa*

Mode / Remarks : MAX-SEND, Hopping-off, 2480MHz, MAX-axis / FCC ID: PZWDWB001 / IC Number: 1551C-DWBT001

LIMIT : FCC15C §15.247(c) 3m  
Except for the data below : adequate margin data below the limits.

— Horizontal  
— Vertical  
○ Horizontal  
× Vertical



No.	FREQ [MHz]	READING QP [dB μV]	ANT FACTOR [dB/m]	LOSS [dB]	GAIN [dB]	RESULT [dB μV/m]	LIMIT [dB μV/m]	MARGIN [dB]	ANTENNA [cm]	TABLE [DEG]
—— Horizontal ——										
1	34.642	18.8	16.6	7.1	23.7	18.8	40.0	21.2	100	359
2	30.000	20.1	18.3	6.9	23.8	21.5	40.0	18.5	148	117
3	147.434	28.2	14.5	8.6	23.2	28.1	43.5	15.4	121	238
4	176.923	37.5	15.6	8.9	23.2	38.8	43.5	4.7	100	135
5	235.899	38.4	16.8	9.4	22.9	41.7	46.0	4.3	123	129
6	265.389	30.0	17.8	9.6	23.0	34.4	46.0	11.6	116	131
—— Vertical ——										
7	58.972	25.2	8.6	7.5	23.5	17.8	40.0	22.2	100	0
8	63.993	25.0	7.5	7.6	23.7	16.4	40.0	23.6	100	0
9	117.947	31.7	13.1	8.4	23.3	29.9	43.5	13.6	100	210
10	141.927	21.0	14.3	8.5	22.5	21.3	43.5	22.2	100	0
11	176.925	28.9	15.6	8.9	23.2	30.2	43.5	13.3	121	232
12	235.151	18.4	16.8	9.4	22.9	21.7	46.0	24.3	100	359

CHART: WITHOUT FACTOR    ANT TYPE : -30MHz LOOP, 30-300MHz BICONICAL, 300MHz-1000MHz LOGPERIODIC, 1000MHz- HORN  
CALCULATION : READING + ANT FACTOR + LOSS(CABLE+ATTEN.) - AMP. GAIN



# DATA OF RADIATED EMISSION TEST

UL Apex Co., Ltd. Head Office EMC Lab. No.1 Semi Anechoic Chamber  
Date : 2003/05/23 21:31:05

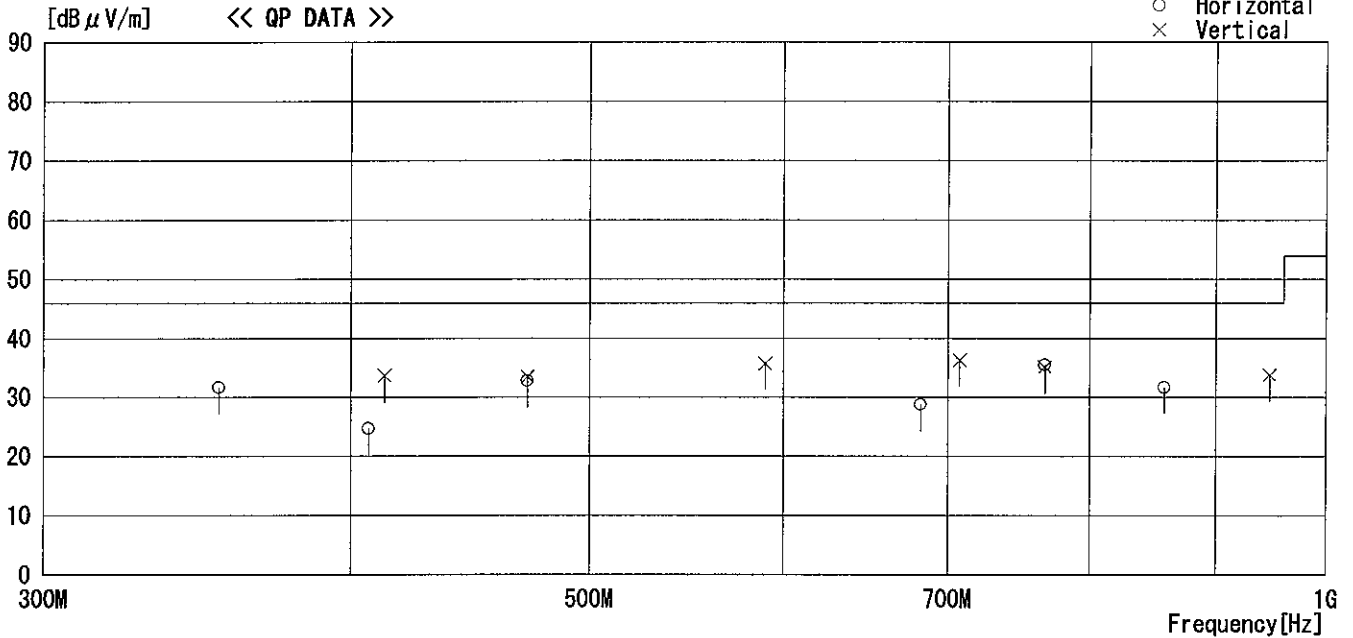
Applicant : DENSO WAVE INCORPORATED  
Kind of EUT : Bluetooth Board  
Model No. : DWBT001  
Serial No. : 5496950048300053

Report No. : 231E0101-H0 - 1  
Power : DC 3.3V  
Temp°C/Humi% : 27 / 46  
Operator : Yoshiaki Iwasa *f. iwasa*

Mode / Remarks : MAX-SEND, Hopping-off, 2480MHz, MAX-axis / FCC ID: PZWDWBT001 / IC Number: 1551C-DWBT001

LIMIT : FCC15C §15.247(c) 3m  
Except for the data below : adequate margin data below the limits.

— Horizontal  
— Vertical  
○ Horizontal  
× Vertical




No.	FREQ [MHz]	READING QP [dB μV]	ANT FACTOR [dB/m]	LOSS [dB]	GAIN [dB]	RESULT [dB μV/m]	LIMIT [dB μV/m]	MARGIN [dB]	ANTENNA [cm]	TABLE [DEG]
—— Horizontal ——										
1	353.856	28.1	16.3	10.2	23.0	31.6	46.0	14.4	254	111
2	406.845	19.4	17.9	10.5	23.1	24.7	46.0	21.3	100	0
3	471.812	26.6	18.3	10.8	23.0	32.7	46.0	13.3	205	51
4	682.514	19.7	20.3	11.9	23.2	28.7	46.0	17.3	239	321
5	766.699	24.9	21.4	12.3	23.2	35.4	46.0	10.6	100	112
6	858.011	20.0	22.1	12.7	23.1	31.7	46.0	14.3	100	0
—— Vertical ——										
7	412.836	28.0	18.0	10.6	23.0	33.6	46.0	12.4	117	135
8	471.813	27.4	18.3	10.8	23.0	33.5	46.0	12.5	126	232
9	589.769	27.8	19.5	11.5	23.1	35.7	46.0	10.3	100	0
10	707.724	26.8	20.6	12.0	23.2	36.2	46.0	9.8	100	299
11	766.692	24.6	21.4	12.3	23.2	35.1	46.0	10.9	159	5
12	946.623	20.3	23.4	13.0	22.9	33.8	46.0	12.2	100	359

CHART: WITHOUT FACTOR    ANT TYPE : -30MHz LOOP, 30-300MHz BICONICAL, 300MHz-1000MHz LOGPERIODIC, 1000MHz- HORN  
CALCULATION : READING + ANT FACTOR + LOSS (CABLE+ATTEN.) - AMP. GAIN

# DATA OF SPURIOUS EMISSIONS(1GHz to 26.5GHz)

UL Apex Co., Ltd.  
Head Office EMC Lab. No.2 Semi Anechoic Chamber

COMPANY : DENSO WAVE INCORPORATED	REPORT NO : 23IE00101-HO - 1
EQUIPMENT : Bluetooth Board	REGULATION : FCC Part 15 Subpart C 15.247(c)
MODEL : DWBT001 (+ BHT-100BB)	TEST DISTANCE : 3 and 1m
S/N : 5496950048300053 (+ 5496310206300011)	DATE : 2003/5/20
FCC ID : PZWDWBT001	TEMPERATURE : 26°C
IC Number : 1551C-DWBT001	HUMIDITY : 60%
POWER : DC 3V	
MODE : Bluetooth Mode Tx (2402MHz)	
AXIS : Horizontal/X-axis, Vertical/Z-axis	ENGINEER : Yoshiaki Iwasa

**PK DETECT** (RBW: 1MHz, VBW:1MHz)

No.	FREQ [MHz]	S/A READING		ANT Factor [dB/m]	AMP GAIN [dB]	CABLE LOSS [dB]	Band-Pass Filter [dB]	RESULT		Limit PK [dBuV/m]	MARGIN	
		HOR [dBuV/m]	VER [dBuV/m]					HOR [dB]	VER [dB]			
<b>Test distance 3meters RESULT=Reading + ANT Factor - Amp Gain + CABLE LOSS + Band Pass.</b>												
1	1061.8	37.8	36.7	22.8	27.3	4.5	0.0	37.8	36.7	74.0	36.2	37.3
2	1201.5	43.8	45.7	23.3	27.3	4.6	0.0	44.4	46.3	74.0	29.6	27.7
3	2390.0	37.5	37.2	30.7	26.9	6.3	0.0	47.7	47.4	74.0	26.3	26.6
4	4804.0	36.9	36.6	35.1	25.8	8.7	0.0	54.9	54.6	74.0	19.1	19.4
5	7206.0	37.0	36.5	37.5	25.0	10.9	0.0	60.3	59.8	74.0	13.7	14.2
6	9608.0	37.8	37.3	37.3	25.1	4.1	0.0	54.1	53.6	74.0	19.9	20.4
<b>Test distance 1meters RESULT=Reading + ANT Factor - Amp Gain + CABLE LOSS + Band Pass - Dfac</b>												
7	12010.0	36.3	36.8	40.1	25.1	4.5	0.0	46.3	46.8	74.0	27.7	27.2
8	14412.0	36.4	36.7	43.0	24.8	5.1	0.0	50.3	50.6	90.2	39.9	39.6
9	16814.0	39.3	40.3	44.7	24.7	5.6	0.0	55.5	56.5	90.2	34.7	33.7
10	19216.0	40.2	39.3	41.0	24.5	6.1	0.0	53.2	52.3	74.0	20.8	21.7
11	21618.0	40.1	39.8	40.5	24.4	7.1	0.0	53.7	53.4	90.2	36.5	36.8
12	24020.0	41.5	41.1	40.2	25.3	7.2	0.0	54.1	53.7	90.2	36.1	36.5

**AV DETECT** (RBW: 1MHz, VBW:10Hz)

No.	FREQ [MHz]	S/A READING		ANT Factor [dB/m]	AMP GAIN [dB]	CABLE LOSS [dB]	Band-Pass Filter [dB]	RESULT		Limit AV [dBuV/m]	MARGIN	
		HOR [dBuV/m]	VER [dBuV/m]					HOR [dB]	VER [dB]			
<b>Test distance 3meters RESULT=Reading + ANT Factor - Amp Gain + CABLE LOSS + Band Pass.</b>												
1	1061.8	26.2	26.2	22.8	27.3	4.5	0.0	26.2	26.2	54.0	27.8	27.8
2	1201.5	40.0	41.4	23.3	27.3	4.6	0.0	40.6	42.0	54.0	13.4	12.0
3	2390.0	26.3	26.4	30.7	26.9	6.3	0.0	36.5	36.6	54.0	17.5	17.4
4	4804.0	26.4	26.2	35.1	25.8	8.7	0.0	44.4	44.2	54.0	9.6	9.8
5	7206.0	25.8	25.8	37.5	25.0	10.9	0.0	49.1	49.1	54.0	4.9	4.9
6	9608.0	26.9	26.8	37.3	25.1	4.1	0.0	43.2	43.1	54.0	10.8	10.9
<b>Test distance 1meters RESULT=Reading + ANT Factor - Amp Gain + CABLE LOSS + Band Pass - Dfac</b>												
7	12010.0	25.9	25.5	40.1	25.1	4.5	0.0	35.9	35.5	54.0	18.1	18.5
8	14412.0	25.5	25.6	43.0	24.8	5.1	0.0	39.4	39.5	70.2	30.8	30.7
9	16814.0	29.7	29.5	44.7	24.7	5.6	0.0	45.9	45.7	70.2	24.3	24.5
10	19216.0	28.7	28.7	41.0	24.5	6.1	0.0	41.7	41.7	54.0	12.3	12.3
11	21618.0	29.6	29.4	40.5	24.4	7.1	0.0	43.2	43.0	70.2	27.0	27.2
12	24020.0	30.2	30.1	40.2	25.3	7.2	0.0	42.8	42.7	70.2	27.4	27.5

Test Distance 1.0m : Distance Factor(Dfac) = 20log(3/1.0) =

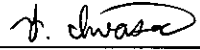
9.5 dB

\*1: Except for the above table : All other spurious emissions were less than 20dB for the limit.

\*2: In the frequency over the fifth harmonic, the noise from the EUT was not seen. The data above is its base noise.

# DATA OF SPURIOUS EMISSIONS(1GHz to 26.5GHz)

UL Apex Co., Ltd.  
Head Office EMC Lab. No.2 Semi Anechoic Chamber

COMPANY : DENSO WAVE INCORPORATED	REPORT NO : 23IE00101-HO - 1
EQUIPMENT : Bluetooth Board	REGULATION : FCC Part 15 Subpart C 15.247(c)
MODEL : DWBT001 (+ BHT-100BB)	TEST DISTANCE : 3 and 1m
S/ N : 5496950048300053 (+ 5496310206300011)	DATE : 2003/5/20
FCC ID : PZWDWBT001	TEMPERATURE : 26°C
IC Number : 1551C-DWBT001	HUMIDITY : 60%
POWER : DC 3V	
MODE : Bluetooth Mode Tx (2441MHz)	
AXIS : Horizontal/X-axis, Vertical/Z-axis	ENGINEER : Yoshiaki Iwasa

## PK DETECT (RBW: 1MHz, VBW:1MHz)

No.	FREQ [MHz]	S/A READING		ANT Factor [dB/m]	AMP GAIN [dB]	CABLE LOSS [dB]	Band-Pass Filter [dB]	RESULT		Limit PK [dBuV/m]	MARGIN	
		HOR [dBuV/m]	VER [dBuV/m]					HOR [dB]	VER [dB]			
<b>Test distance 3meters RESULT=Reading + ANT Factor - Amp Gain + CABLE LOSS + Band Pass.</b>												
1	1061.6	37.5	36.9	22.8	27.3	4.4	0.0	37.4	36.8	74.0	36.6	37.2
2	1220.1	45.5	44.9	23.3	27.3	4.6	0.0	46.2	45.6	74.0	27.8	28.4
3	2390.0	36.8	36.8	30.7	26.9	6.3	0.0	47.0	47.0	74.0	27.0	27.0
4	4882.0	37.7	37.1	35.5	25.8	8.8	0.0	56.2	55.6	74.0	17.8	18.4
5	7329.3	37.8	37.9	37.8	25.0	11.0	0.0	61.5	61.6	74.0	12.5	12.4
6	9764.0	38.4	37.7	36.9	25.2	4.2	0.0	54.3	53.6	74.0	19.7	20.4
<b>Test distance 1meters RESULT=Reading + ANT Factor - Amp Gain + CABLE LOSS + Band Pass - Dfac</b>												
7	12205.0	36.3	35.6	41.1	25.0	4.6	0.0	47.4	46.7	74.0	26.6	27.3
8	14646.0	36.5	36.1	43.2	24.8	5.2	0.0	50.6	50.2	90.2	39.6	40.0
9	17087.0	39.9	39.0	44.9	24.6	5.7	0.0	56.4	55.5	90.2	33.8	34.7
10	19528.0	40.7	39.6	40.5	24.5	6.1	0.0	53.4	52.3	74.0	20.6	21.7
11	21969.0	39.9	39.4	40.6	24.4	7.2	0.0	53.8	53.3	90.2	36.4	36.9
12	24410.0	41.5	40.1	40.4	25.5	7.4	0.0	54.3	52.9	90.2	35.9	37.3

## AV DETECT (RBW: 1MHz, VBW:10Hz)

No.	FREQ [MHz]	S/A READING		ANT Factor [dB/m]	AMP GAIN [dB]	CABLE LOSS [dB]	Band-Pass Filter [dB]	RESULT		Limit AV [dBuV/m]	MARGIN	
		HOR [dBuV/m]	VER [dBuV/m]					HOR [dB]	VER [dB]			
<b>Test distance 3meters RESULT=Reading + ANT Factor - Amp Gain + CABLE LOSS + Band Pass.</b>												
1	1061.6	26.2	26.3	22.8	27.3	4.4	0.0	26.1	26.2	54.0	27.9	27.8
2	1220.1	37.3	41.0	23.3	27.3	4.6	0.0	38.0	41.7	54.0	16.0	12.3
3	2390.0	26.0	26.1	30.7	26.9	6.3	0.0	36.2	36.3	54.0	17.8	17.7
4	4882.0	26.2	26.1	35.5	25.8	8.8	0.0	44.7	44.6	54.0	9.3	9.4
5	7329.3	26.7	26.7	37.8	25.0	11.0	0.0	50.4	50.4	54.0	3.6	3.6
6	9764.0	26.5	26.6	36.9	25.2	4.2	0.0	42.4	42.5	54.0	11.6	11.5
<b>Test distance 1meters RESULT=Reading + ANT Factor - Amp Gain + CABLE LOSS + Band Pass - Dfac</b>												
7	12205.0	25.4	25.1	41.1	25.0	4.6	0.0	36.5	36.2	54.0	17.5	17.8
8	14646.0	25.3	25.1	43.2	24.8	5.2	0.0	39.4	39.2	70.2	30.8	31.0
9	17087.0	29.2	29.1	44.9	24.6	5.7	0.0	45.7	45.6	70.2	24.5	24.6
10	19528.0	29.5	29.1	40.5	24.5	6.1	0.0	42.2	41.8	54.0	11.8	12.2
11	21969.0	28.9	28.5	40.6	24.4	7.2	0.0	42.8	42.4	70.2	27.4	27.8
12	24410.0	29.8	29.7	40.4	25.5	7.4	0.0	42.6	42.5	70.2	27.6	27.7

Test Distance 1.0m : Distance Factor(Dfac) = 20log(3/1.0) =


9.5 dB

\*1: Except for the above table : All other spurious emissions were less than 20dB for the limit.

\*2: In the frequency over the fifth harmonic, the noise from the EUT was not seen. The data above is its base noise.

# DATA OF SPURIOUS EMISSIONS(1GHz to 26.5GHz)

UL Apex Co., Ltd.  
Head Office EMC Lab. No.2 Semi Anechoic Chamber

COMPANY : DENSO WAVE INCORPORATED	REPORT NO : 23IE00101-HO - 1
EQUIPMENT : Bluetooth Board	REGULATION : FCC Part 15 Subpart C 15.247(c)
MODEL : DWBT001 (+ BHT-100BB)	TEST DISTANCE : 3 and 1m
S/N : 5496950048300053 (+ 5496310206300011)	DATE : 2003/5/20
FCC ID : PZWDWBT001	TEMPERATURE : 26°C
IC Number : 1551C-DWBT001	HUMIDITY : 60%
POWER : DC 3V	
MODE : Bluetooth Mode Tx (2480MHz)	
AXIS : Horizontal/X-axis, Vertical/Z-axis	ENGINEER : Yoshiaki Iwasa

## PK DETECT (RBW: 1MHz, VBW:1MHz)

No.	FREQ [MHz]	S/A READING		ANT Factor [dB/m]	AMP GAIN [dB]	CABLE LOSS [dB]	Band-Pass Filter [dB]	RESULT		Limit PK [dBuV/m]	MARGIN	
		HOR [dBuV/m]	VER [dBuV/m]					HOR [dBuV/m]	VER [dBuV/m]		HOR [dB]	VER [dB]
<b>Test distance 3meters RESULT=Reading + ANT Factor - Amp Gain + CABLE LOSS + Band Pass.</b>												
1	1061.9	37.6	36.4	22.8	27.3	4.4	0.0	37.5	36.3	74.0	36.5	37.7
2	1239.5	44.3	43.3	23.4	27.3	4.7	0.0	45.1	44.1	74.0	28.9	29.9
3	2390.0	37.0	37.2	30.7	26.9	6.3	0.0	47.2	47.4	74.0	26.8	26.6
4	4960.0	37.2	36.6	36.0	25.8	8.9	0.0	56.3	55.7	74.0	17.7	18.3
5	7440.0	36.5	37.6	38.1	25.0	11.0	0.0	60.6	61.7	74.0	13.4	12.3
6	9920.0	38.3	37.6	36.4	25.2	4.2	0.0	53.8	53.1	90.2	36.4	37.1
<b>Test distance 1meters RESULT=Reading + ANT Factor - Amp Gain + CABLE LOSS + Band Pass - Dfac</b>												
7	12400.0	36.8	37.8	42.1	25.0	4.6	0.0	49.0	50.0	74.0	25.0	24.0
8	14880.0	37.3	36.5	43.4	24.8	5.2	0.0	51.7	50.9	90.2	38.5	39.3
9	17360.0	40.1	39.7	45.9	24.6	5.8	0.0	57.6	57.2	90.2	32.6	33.0
10	19840.0	39.7	40.3	40.7	24.5	6.2	0.0	52.6	53.2	74.0	21.4	20.8
11	22320.0	41.1	40.1	40.7	24.6	7.2	0.0	54.9	53.9	74.0	19.1	20.1
12	24800.0	40.3	41.0	40.4	25.6	7.6	0.0	53.1	53.8	90.2	37.1	36.4

## AV DETECT (RBW: 1MHz, VBW:10Hz)

No.	FREQ [MHz]	S/A READING		ANT Factor [dB/m]	AMP GAIN [dB]	CABLE LOSS [dB]	Band-Pass Filter [dB]	RESULT		Limit AV [dBuV/m]	MARGIN	
		HOR [dBuV/m]	VER [dBuV/m]					HOR [dBuV/m]	VER [dBuV/m]		HOR [dB]	VER [dB]
<b>Test distance 3meters RESULT=Reading + ANT Factor - Amp Gain + CABLE LOSS + Band Pass.</b>												
1	1061.9	26.1	26.2	22.8	27.3	4.4	0.0	26.0	26.1	54.0	28.0	27.9
2	1239.5	40.6	38.8	23.4	27.3	4.7	0.0	41.4	39.6	54.0	12.6	14.4
3	2390.0	26.0	26.0	30.7	26.9	6.3	0.0	36.2	36.2	54.0	17.8	17.8
4	4960.0	25.9	25.9	36.0	25.8	8.9	0.0	45.0	45.0	54.0	9.0	9.0
5	7440.0	26.0	25.9	38.1	25.0	11.0	0.0	50.1	50.0	54.0	3.9	4.0
6	9920.0	27.0	27.0	36.4	25.2	4.2	0.0	42.5	42.5	70.2	27.7	27.7
<b>Test distance 1meters RESULT=Reading + ANT Factor - Amp Gain + CABLE LOSS + Band Pass - Dfac</b>												
7	12400.0	25.7	26.2	42.1	25.0	4.6	0.0	37.9	38.4	54.0	16.1	15.6
8	14880.0	25.8	25.4	43.4	24.8	5.2	0.0	40.2	39.8	70.2	30.0	30.4
9	17360.0	29.2	29.3	45.9	24.6	5.8	0.0	46.7	46.8	70.2	23.5	23.4
10	19840.0	28.8	28.6	40.7	24.5	6.2	0.0	41.7	41.5	54.0	12.3	12.5
11	22320.0	28.9	28.9	40.7	24.6	7.2	0.0	42.7	42.7	54.0	11.3	11.3
12	24800.0	29.7	29.7	40.4	25.6	7.6	0.0	42.5	42.5	70.2	27.7	27.7

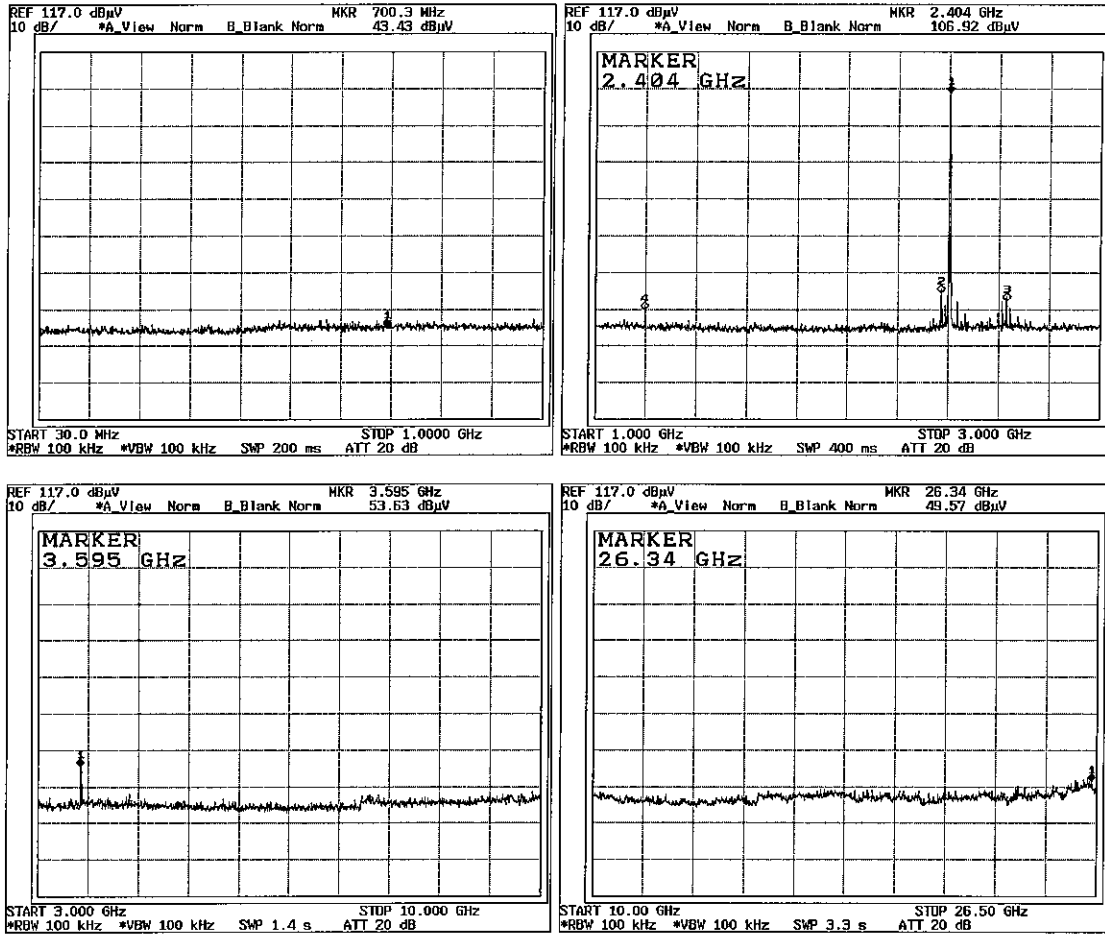
Test Distance 1.0m : Distance Factor(Dfac) =  $20\log(3/1.0) = 9.5$  dB

\*1: Except for the above table : All other spurious emissions were less than 20dB for the limit.

\*2: In the frequency over the fifth harmonic, the noise from the EUT was not seen. The data above is its base noise.

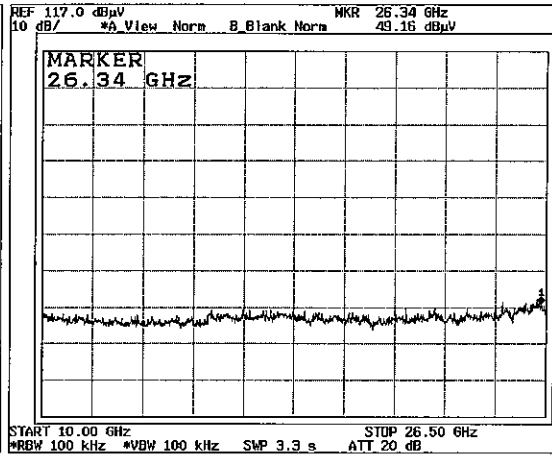
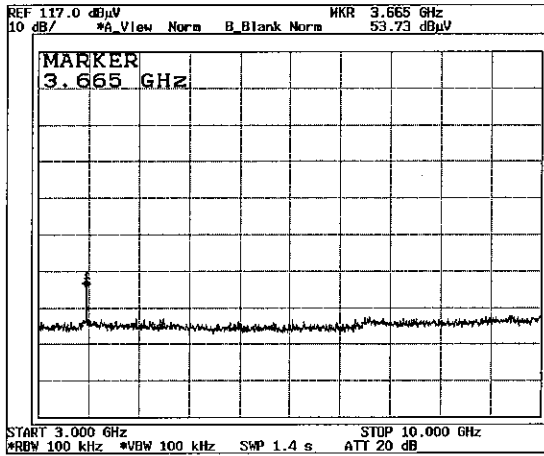
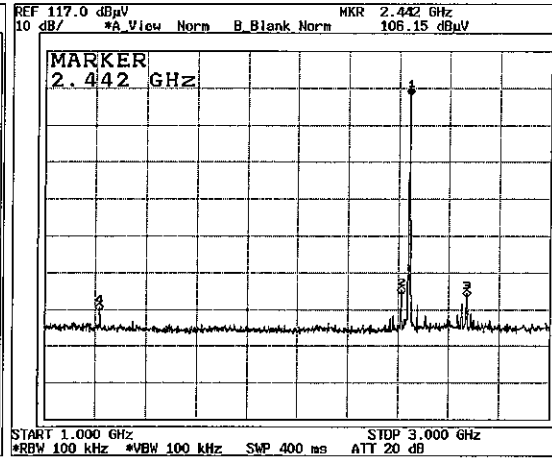
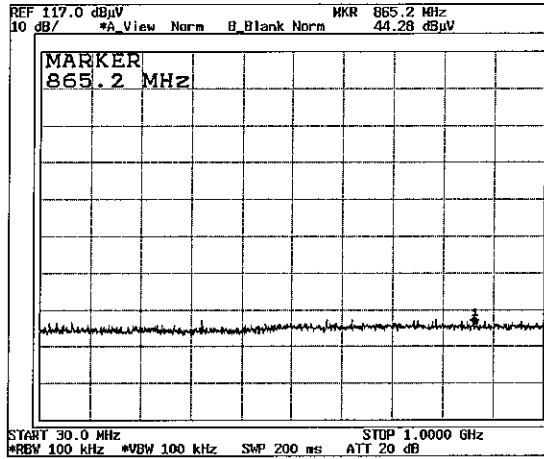
### Spurious emission (Conducted)

Tx: 2402MHz

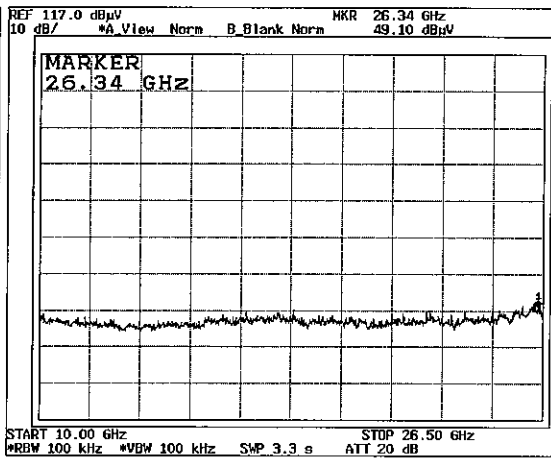
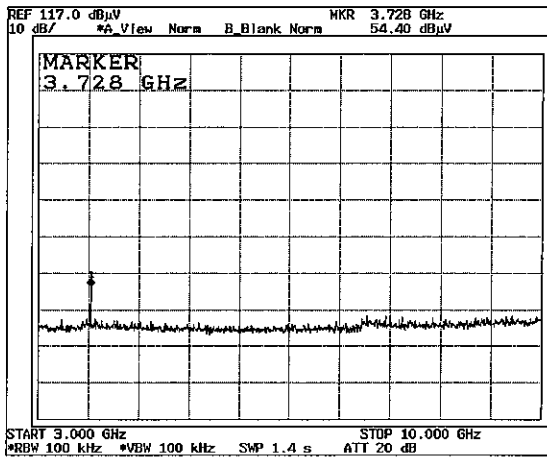
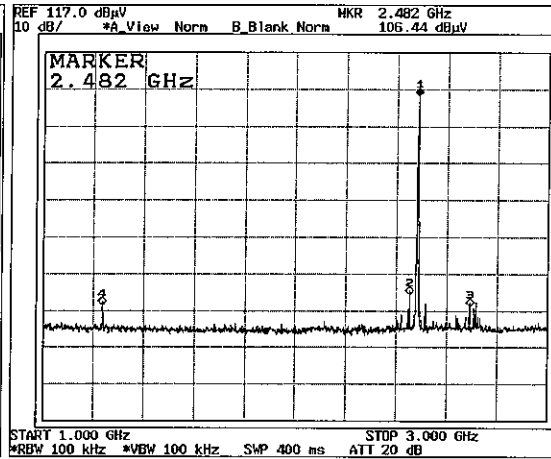
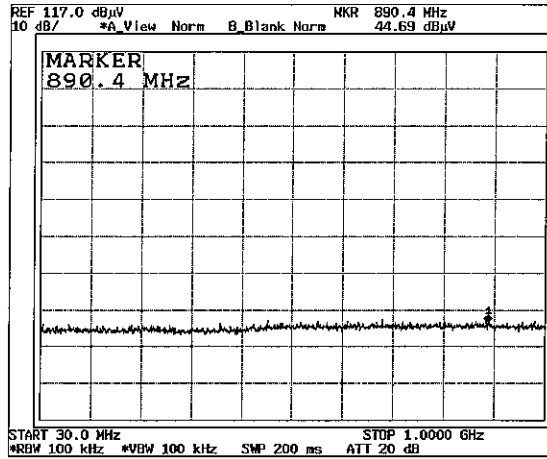


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Tx: 2441MHz



Tx: 2480MHz



99% Occupied Bandwidth

