



# RADIO TEST REPORT

## Test Report No. : 30EE0055-HO-01-A

**Applicant** : Sand Dollar Enterprise, Inc.  
**Type of Equipment** : Computer Entertainment System  
**Model No.** : CECH-2101A  
**FCC ID** : XCET12NA28K  
**Test regulation** : FCC Part 15 Subpart C 2009  
Section 15.207, Section 15.247  
\*Conducted Emission, Maximum Peak Output  
Power, and Spurious Emission (Radiated) tests for  
Class II Permissive Change  
**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 above regulation.
4. The test results in this 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 NVLAP, NIST, or any agency of the Federal Government.

**Date of test:** December 7, 2009 to January 15, 2010

**Tested by:**

Takeshi Choda  
EMC Services

Takumi Shimada  
EMC Services

**Approved by :**

Mitsuru Fujimura  
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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.  
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## **SECTION 1: Customer information**

Company Name	Sand Dollar Enterprise, Inc.
Address	919 East Hillsdale Boulevard, Foster City, CA 94404
Telephone Number	1-650-655-8040
Contact Person	Riley Russell

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

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

Type of Equipment	Computer Entertainment System
Model No	CECH-2101A
Serial No	1000194 (Power Supply: SONY) 1000196 (Power Supply: DELTA) 1000202 Used for Antenna Terminal Conducted tests
Rating	AC120V / 60Hz
Country of Manufacture	JAPAN/CHINA
Receipt Date of Sample	December 7, 2009
Condition of EUT	Production prototype (Not for Sale: This sample is equivalent to mass-produced items.)
Modification of EUT	No modification by the test lab.

### **2.2 Product Description**

Model: CECH-2101A, referred to as the EUT in this report, is a Computer Entertainment System. The EUT contains Bluetooth (Ver. 2.0+EDR) module and IEEE802.11b/g WLAN module. Those modules do not transmit simultaneously.

Series model: CECH-2102B

Difference between the original model: CECH-2101A and CECH-2102B is HDD type only.

Factory:

1. Sony EMCS Corporation Kisarazu Tec  
8-4 Shiomi Kisarazu-shi Chiba-ken, 202-0834 Japan

2. Maintek Computer (Suzhou) Co., Ltd.  
Bldg. 2, 233 Jin Feng Rd Suzhou Jiangsu China

3. Hongfujin Precision Electronics (Yantai) Co., Ltd.  
B Sec Export Processing Zone, 50 Beijing Zhong RD,  
Yantai Economic & Technological Development Area, Yantai Shandong China

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The clock frequencies used in the EUT: Max clock frequency is 3.2GHz.

**Bluetooth (Ver. 2.0+EDR)**

Equipment Type	Transceiver
Frequency of Operation	2402-2480MHz
Type of Modulation	FHSS (GFSK, $\pi/4$ -DQPSK, 8DPSK)
Bandwidth & Channel spacing	1MHz & 1MHz
Power Supply (inner)	DC5.0V
Antenna Type	PIFA
Antenna Gain	2.5 dBi (max)
Antenna Connector Type	U.FL

For Bluetooth part, please see UL Japan, Inc. Test Report Number: 30EE0055-HO-01-B.

**IEEE802.11b/g WLAN**

Equipment Type	Transceiver	
Frequency of Operation	2412-2462MHz	
Type of Modulation	DSSS/OFDM	
Bandwidth & Channel spacing	20MHz & 5MHz	
Power Supply (inner)	DC5.0V	
Antenna Type	ANT 0: IFA	ANT 1: PIFA
Antenna Gain	ANT 0: 4.3 dBi (max)	ANT 1: 2.5 dBi (max)
Antenna Connector Type	ANT 0: N/A	ANT 1: U.FL

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

### **3.1 Test Specification**

Test Specification	:	FCC Part15 Subpart C: 2009, final revised on December 2, 2009
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

\*Conducted Emission, Maximum Peak Output Power, and Spurious Emission (Radiated) tests were only performed for Class II Permissive Change.

\*The EUT complies with FCC Part 15 Subpart B: 2009, final revised on December 2, 2009. Please refer to UL Japan, Inc., Test Report No.: 30EE0100-YW.

### **3.2 Procedures and results**

Item	Test Procedure	Specification	Worst margin	Results	Remarks
Conducted Emission	<b>FCC:</b> ANSI C63.4:2003 7. AC powerline Conducted Emission measurements  <b>IC:</b> RSS-Gen 7.2.2	<b>FCC:</b> Section 15.207  <b>IC:</b> RSS-Gen 7.2.2	<b>Tx:</b> [QP] 5.2dB  0.15000MHz, L, 11b/g, ANT0 0.15000MHz, L, 11b, ANT1 <b>[AV]</b> 9.3dB  0.38641MHz, N, 11b, ANT0 0.38654MHz, N, 11b, ANT1 0.38658MHz, N, 11g, ANT0 0.77317MHz, N, 11g, ANT0  <b>Rx:</b> [QP] 5.3dB, 0.15000MHz, L, ANT0, ANT1 <b>[AV]</b> 9.2dB, 0.38664MHz, N, ANT0	Complied	-
6dB Bandwidth	<b>FCC:</b> "Guidance on Measurement of Digital Transmission Systems Operating under Section15.247"  <b>IC:</b> RSS-Gen 4.6.2	<b>FCC:</b> Section 15.247(a)(2)  <b>IC:</b> RSS-210 A8.2(a)	N/A	N/A *1)	-
Maximum Peak Output Power	<b>FCC:</b> "Guidance on Measurement of Digital Transmission Systems Operating under Section15.247"  <b>IC:</b> RSS-Gen 4.8	<b>FCC:</b> Section 15.247(b)(3)  <b>IC:</b> RSS-210 A8.4(4)	See data.	Complied	Conducted
Power Density	<b>FCC:</b> "Guidance on Measurement of Digital Transmission Systems Operating under Section15.247"  <b>IC:</b> -	<b>FCC:</b> Section 15.247 (e)  <b>IC:</b> RSS-210 A8.2(b)	N/A	N/A*1)	-
Spurious Emission Restricted Band Edges	<b>FCC:</b> "Guidance on Measurement of Digital Transmission Systems Operating under Section15.247"  <b>IC:</b> RSS-Gen 4.9 RSS-Gen 4.10	<b>FCC:</b> Section15.247(d)  <b>IC:</b> RSS-210 A8.5 RSS-Gen 7.2.1 and 7.2.3	[Tx] 3.3dB 46.198MHz, QP, Vert., ANT0  [Rx] 3.8dB 46.208MHz, QP, Vert., ANT0	Complied	Radiated Conducted *1)

Note: UL Japan, Inc.'s EMI Work Procedures No.QPM05 and QPM15.

\*1) The test was not performed, because this report is for Class II Permissive change and the tests was not required.

\* In case any questions arise about test procedure, ANSI C63.4: 2003 is also referred.

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

This EUT provides stable voltage(DC5.0V) constantly to RF part 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.

### **3.3 Addition to standard**

Other than above, no addition, exclusion nor deviation has been made from the standard.

### **3.4 Uncertainty**

#### **EMI**

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

Test room (semi- anechoic chamber)	Conducted emission ( $\pm$ dB)	
	150kHz-30MHz	
No.1	3.7dB	
No.2	3.7dB	
No.3	3.7dB	
No.4	3.7dB	

Test room (semi- anechoic chamber)	Radiated emission (10m*)( $\pm$ dB)			Radiated emission (3m*)( $\pm$ dB)					
	9kHz- 30MHz	30MHz- 300MHz	300MHz- 1GHz	9kHz- 30MHz	30MHz- 300MHz	300MHz- 1GHz	1GHz- 18GHz	18GHz- 26.5GHz	26.5GHz- 40GHz
No.1	3.1dB	4.4dB	3.9dB	3.2dB	3.8dB	3.9dB	5.0dB	5.0dB	5.4dB
No.2	-	-	-	3.2dB	4.4dB	4.0dB	5.0dB	5.2dB	5.4dB
No.3	-	-	-	3.2dB	4.2dB	3.8dB	5.0dB	5.3dB	5.3dB
No.4	-	-	-	3.2dB	4.0dB	3.8dB	5.0dB	5.3dB	5.3dB

\*10m/3m = Measurement distance

Power meter ( $\pm$ dB)	
Below 1GHz	Above 1GHz
1.0dB	1.0dB

Antenna terminal conducted emission and Power density ( $\pm$ dB)			Antenna terminal conducted emission ( $\pm$ dB)		Channel power ( $\pm$ dB)
Below 1GHz	1GHz-3GHz	3GHz-18GHz	18GHz-26.5GHz	26.5GHz-40GHz	
1.0dB	1.1dB	2.7dB	3.2dB	3.3dB	1.5dB

#### **Conducted Emission test**

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

#### **Radiated emission test(3m and/or 10m)**

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

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### 3.5 Test Location

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	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	2973C-1	19.2 x 11.2 x 7.7m	7.0 x 6.0m	No.1 Power source room
No.2 semi-anechoic chamber	655103	2973C-2	7.5 x 5.8 x 5.2m	4.0 x 4.0m	-
No.3 semi-anechoic chamber	148738	2973C-3	12.0 x 8.5 x 5.9m	6.8 x 5.75m	No.3 Preparation room
No.3 shielded room	-	-	4.0 x 6.0 x 2.7m	N/A	-
No.4 semi-anechoic chamber	134570	2973C-4	12.0 x 8.5 x 5.9m	6.8 x 5.75m	No.4 Preparation room
No.4 shielded room	-	-	4.0 x 6.0 x 2.7m	N/A	-
No.5 semi-anechoic chamber	-	-	6.0 x 6.0 x 3.9m	6.0 x 6.0m	-
No.6 shielded room	-	-	4.0 x 4.5 x 2.7m	4.75 x 5.4 m	-
No.6 measurement room	-	-	4.75 x 5.4 x 3.0m	4.75 x 4.15 m	-
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	-
No.9 measurement room	-	-	8.0 x 4.5 x 2.8m	2.0 x 2.0m	-
No.10 measurement room	-	-	2.6 x 2.8 x 2.5m	2.4 x 2.4m	-
No.11 measurement room	-	-	3.1 x 3.4 x 3.0m	2.4 x 3.4m	-

\* 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.3 and No.4 shielded rooms.

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

Refer to APPENDIX.

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

### 4.1 Operating Mode(s)

The mode used for test : [IEEE 802.11b / IEEE 802.11g : DSSS / OFDM]

Test	Mode	Tested frequency	Tested antenna
Conducted Emission *1)	IEEE802.11b Transmitting (Tx), 11Mbps	2412MHz(L)	ANT 0
	IEEE802.11g Transmitting (Tx), 24Mbps	2437MHz(M) 2462MHz(H)	ANT 1
Spurious Emission (Radiated)	IEEE802.11b/g Receiving (Rx)	2437MHz(M)	ANT 0 ANT 1
	IEEE802.11b Transmitting (Tx), 11Mbps	2412MHz(L)	ANT 0
Maximum Peak Output Power	IEEE802.11g Transmitting (Tx), 24Mbps	2437MHz(M)*2) 2462MHz(H)	ANT 1
	IEEE802.11b/g Receiving (Rx)	2437MHz(M)	ANT 0 ANT 1
Restricted Band Edge (Radiated)	IEEE802.11b Transmitting (Tx), 11Mbps	2412MHz(L)	ANT 0
	IEEE802.11g Transmitting (Tx), 24Mbps	2462MHz(H)	ANT 1

\*Transmitting duty was 100% on all tests.

\*As a result of preliminary check for two antennas (ANT 0 and ANT 1), the formal test was performed as above-mentioned table. In addition, ANT 1 has two kinds of manufacturer's antennas (TYCO and HITACHI), the test was performed with TYCO antenna according to the customer's request because they have identical antenna characteristics.

\*The transmitting data shall be scrambled with the following scramblers and it was transmitted continuously.

[11b]

11Mbps: IEEE Std 802.11b(1999) Section 18.2.4

[11g]

24Mbps: IEEE Std 802.11a(1999) Section 17.3.5.4

\*1) The test was performed for both of Power Supply: SONY and Power Supply: DELTA. Other tests besides Conducted Emission test were performed with Power Supply: SONY as a representative.

\*2) The difference of between Power Supply: SONY and Power Supply: DELTA was confirmed by the IEEE802.11b Transmitting (Tx), 11Mbps mode.

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#### 4.2 Configuration and peripherals

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## **SECTION 5: Conducted Emission**

### **Test Procedure and conditions**

EUT was placed on a urethane platform of nominal size, 1.0m by 1.5m, raised 0.8m 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.

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

I/O 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. All unused 50ohm connectors of the LISN(AMN) were resistivity terminated in 50ohm when not connected to the measuring equipment.

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.

The test results and limit are rounded off to one decimal place, so some differences might be observed.

<b>Detector</b>	<b>: QP and AV</b>
<b>Measurement range</b>	<b>: 0.15-30MHz</b>
<b>Test data</b>	<b>: APPENDIX</b>
<b>Test result</b>	<b>: Pass</b>

## **SECTION 6: Radiated Spurious Emission**

### **Test Procedure**

It was measured based on "2. Radiated emission test" of "Guidance on Measurement of Digital Transmission Systems Operating under Section15.247".

EUT was placed on a urethane platform of nominal size, 1.0m by 1.5m, raised 0.8m above the conducting ground plane.

The Radiated Electric Field Strength has been measured in a Semi Anechoic Chamber with a ground plane.

The height of the measuring antenna varied between 1 and 4m and EUT was rotated a full revolution in order to obtain the maximum value of the electric field strength.

The measurements were performed for both vertical and horizontal antenna polarization with the Test Receiver, or the Spectrum Analyzer.

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

### **Test Antennas are used as below:**

Frequency	Below 30MHz	30MHz to 300MHz	300MHz to 1GHz	Above 1GHz
Antenna Type	Loop	Biconical	Logperiodic	Horn

In any 100kHz bandwidth outside the restricted 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 / Table 2 of RSS-210 2.7 (IC) and outside the restricted band of FCC15.205 / Table 1 of RSS-210 2.7 (IC).**

Frequency	Below 1GHz	Above 1GHz	
Instrument used	Test Receiver / Spectrum Analyzer	Spectrum Analyzer *1)	
Detector	QP	PK	AV
IF Bandwidth	BW 120kHz(T/R)	RBW: 1MHz VBW: 1MHz	RBW: 1MHz VBW: 10Hz
	20dBc : RBW: 100kHz VBW: 300kHz (S/A)	20dBc : RBW:100kHz/VBW:300kHz	
Test Distance	3m	3m (below 10GHz), 1m*2) (above 10GHz), 0.5m*3) (above 26.5GHz)	

\*1) The Spectrum Analyzer was used in 3dB resolution bandwidth.

\*2) Distance Factor:  $20 \times \log (3.0m/1.0m) = 9.5dB$

\*3) Distance Factor:  $20 \times \log (3.0m/0.5m) = 15.6dB$

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

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The test results and limit are rounded off to one decimal place, so some differences might be observed.

Measurement range	: 30M-25GHz
Test data	: APPENDIX
Test result	: Pass

## **SECTION 7: Antenna Terminal Conducted Tests**

### **Test Procedure**

The tests were made with below setting connected to the antenna port.

Test	Span	RBW	VBW	Sweep time	Detector	Trace	Instrument used
Maximum Peak Output Power	-	-	-	Auto	Peak	-	Power Meter (Sensor: 50MHz BW)

The test results and limit are rounded off to two decimals place, so some differences might be observed.

Test data	: APPENDIX
Test result	: Pass