# RADIO TEST REPORT

## Test Report No. : 31HE0085-HO-01-C-R1

| | | |
|---|---|---|
| **Applicant** | : | **Sony Computer Entertainment Inc.** |
| **Type of Equipment** | : | **Computer Entertainment System** |
| **Model No.** | : | **CECH-3001A**<br>**CECH-3001B** |
| **FCC ID** | : | **AK8CBEH18C1** |
| **Test regulation** | : | **FCC Part 15 Subpart C: 2010** |
| **Test Result** | : | **Complied** |

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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.
6. This report is a revised version of 31HE0085-HO-01-C. 31HE0085-HO-01-C is replaced with this report.

**Date of test:** March 11 to 24, 2011

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NVLAP LAB CODE: 200572-0

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http://www.ul.com/japan/jpn/pages/services/emc/about/mark1/index.jsp#nvlap

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# SECTION 1: Customer information

| | |
|---|---|
| Company Name | Sony Computer Entertainment Inc. |
| Brand Name | SONY |
| Address | 1-7-1 Konan, Minato-ku, Tokyo 108-0075, Japan |
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| Facsimile Number | +81-3-6748-6383 |
| Contact Person | Akiko Tsukada |

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

## 2.1 Identification of E.U.T.

| | | |
|---|---|---|
| Type of Equipment | Computer Entertainment System | |
| Model No | CECH-3001A<br>CECH-3001B | |
| Serial No | CECH-3001A | 1200222 (Power Supply: DELTA)<br>1200223 (Power Supply: DELTA) |
| | CECH-3001B | 1200218 (Power Supply: SONY) |
| Rating | AC120V / 60Hz | |
| Country of Manufacture | JAPAN/CHINA | |
| Receipt Date of Sample | March 10, 2011 | |
| Condition of EUT | Production prototype<br>(Not for Sale: This sample is equivalent to mass-produced items.) | |
| Modification of EUT | No modification by the test lab. | |

## 2.2 Product Description

Models: CECH-3001A and CECH-3001B, 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.
The difference between CECH-3001A and CECH-3001B is HDD type.

List of Model No.:

| Model No. | Product Name | Note |
|---|---|---|
| CECH-3001A | Computer Entertainment System (PlayStation3) | Tested model |
| CECH-3001B | Computer Entertainment System (PlayStation3) | Tested model |
| DECH-3000A | Debugging Station (PlayStation3) | #1 |
| DECH-S3000A | Debugging Station (PlayStation3) | #1 |

Note:
#1 - DECH-3000A/DECH-S3000A are same as the tested model CECH-3001A except model names for different intended purpose.

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, π/4-DQPSK, 8DPSK) |
| Bandwidth & Channel spacing | 1MHz & 1MHz |
| Power Supply (inner) | DC3.3V/1.8V |
| 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: 31HE0085-HO-01-D-R1.

**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) | DC3.3V/1.8V | |
| Antenna Type | Antenna 0: IFA | Antenna 1: PIFA |
| Antenna Gain | Antenna 0: 4.3 dBi (max) | Antenna 1: 2.5 dBi (max) |
| Antenna Connector Type | Antenna 0: N/A | Antenna 1: U.FL |

# SECTION 3: Test specification, procedures & results

## 3.1 Test Specification

| | | |
|---|---|---|
| Test Specification | : | FCC Part 15 Subpart C: 2010, final revised on December 6, 2010 and effective January 5, 2011 |
| Title | : | FCC 47CFR Part15 Radio Frequency Device Subpart C Intentional Radiators<br>Section 15.207 Conducted limits<br>Section 15.247 Operation within the bands 902-928MHz, 2400-2483.5MHz, and 5725-5850MHz |

* The EUT complies with FCC Part 15 Subpart B: 2010, final revised on December 6, 2010.

## 3.2 Procedures and results

| Item | Test Procedure | Specification | Worst margin | Results | Remarks |
|---|---|---|---|---|---|
| Conducted Emission | **FCC:** ANSI C63.4:2003<br>7. AC powerline Conducted Emission measurements | **FCC:** Section 15.207 | **QP**<br>9.1dB, 0.15000MHz, N<br>**AV**<br>11.6dB, 0.37988MHz, L | Complied | - |
| | **IC:** RSS-Gen 7.2.4 | **IC:** RSS-Gen 7.2.4 | | | |
| 6dB Bandwidth | **FCC:** "Guidance on Measurement of Digital Transmission Systems Operating under Section15.247" | **FCC:** Section 15.247(a)(2) | See data. | Complied | Conducted |
| | **IC:** RSS-Gen 4.6.2 | **IC:** RSS-210 A8.2(a) | | | |
| Maximum Peak Output Power | **FCC:** "Guidance on Measurement of Digital Transmission Systems Operating under Section15.247" | **FCC:** Section 15.247(b)(3) | | Complied | Conducted |
| | **IC:** RSS-Gen 4.8 | **IC:** RSS-210 A8.4(4) | | | |
| Power Density | **FCC:** "Guidance on Measurement of Digital Transmission Systems Operating under Section15.247" | **FCC:** Section 15.247 (e) | | Complied | Conducted |
| | **IC:** - | **IC:** RSS-210 A8.2(b) | | | |
| Spurious Emission Restricted Band Edges | **FCC:** "Guidance on Measurement of Digital Transmission Systems Operating under Section15.247" | **FCC:** Section15.247(d) | 3.1dB<br>106.746MHz, QP, Vert. | Complied | Conducted/ Radiated |
| | **IC:** RSS-Gen 4.9 | **IC:** RSS-210 A8.5<br>RSS-Gen 7.2.3 | | | |
| Note: UL Japan, Inc.'s EMI Work Procedures No. 13-EM-W0420 and 13-EM-W0422. | | | | | |

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

**FCC 15.31 (e)**
This EUT provides stable voltage(DC3.3/1.8V) 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

| Item | Test Procedure | Specification | Worst margin | Results | Remarks |
|---|---|---|---|---|---|
| 99% Occupied Bandwidth | **IC:** RSS-Gen 4.6.1 | **IC:** RSS-Gen 4.6.1 | N/A | - | Conducted |

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 (±dB)** |
|---|---|
| | 150kHz-30MHz |
| No.1 | 3.1dB |
| No.2 | 3.3dB |
| No.3 | 3.7dB |
| No.4 | 3.2dB |

| **Test room** (semi-anechoic chamber) | **Radiated emission** | | | | | | |
|---|---|---|---|---|---|---|---|
| | **(3m*)(+dB)** | | | | **(1m*)(±dB)** | | **(0.5m*)(±dB)** |
| | 9kHz -30MHz | 30MHz -300MHz | 300MHz -1GHz | 1GHz -10GHz | 10GHz -18GHz | 18GHz -26.5GHz | 26.5GHz -40GHz |
| No.1 | 3.5dB | 5.1dB | 5.2dB | 4.8dB | 5.1dB | 4.4dB | 4.3dB |
| No.2 | 4.0dB | 5.1dB | 5.2dB | 4.8dB | 5.0dB | 4.3dB | 4.2dB |
| No.3 | 4.2dB | 4.7dB | 5.2dB | 4.8dB | 5.0dB | 4.5dB | 4.2dB |
| No.4 | 4.0dB | 5.0dB | 5.1dB | 4.8dB | 5.0dB | 5.1dB | 4.2dB |

*3m/1m/0.5m = Measurement distance

| **Power meter (±dB)** | |
|---|---|
| Below 1GHz | Above 1GHz |
| 1.0dB | 1.0dB |

| **Antenna terminal conducted emission and Power density (±dB)** | | | **Antenna terminal conducted emission (±dB)** | | **Channel power (±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)
The data listed in this report meets the limits unless the uncertainty is taken into consideration.

## 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.

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

## 4.1 Operating Mode(s)

| Mode | Remarks* |
|---|---|
| IEEE 802.11b (11b) | 11Mbps, PN9 |
| IEEE 802.11g (11g) | 24Mbps, PN9 |
| *Transmitting duty was 100% on all tests.<br>*The worst condition was determined based on the test result of Maximum Peak Output Power (Mid Channel) | |
| *Power of the EUT was set by the software as follows;<br>Power settings: 12 (dBm)<br>Software/Version: LABTOOL_LV2DIAG_20100402_for_356<br>*This setting of software is the worst case.<br>Any conditions under the normal use do not exceed the condition of setting.<br>In addition, end users cannot change the settings of the output power of the product. | |

| Test Item | Operating Mode | Tested model | Tested antenna | Tested frequency |
|---|---|---|---|---|
| Conducted Emission *1) | 11b Tx<br>11g Tx | CECH-3001A<br>CECH-3001B | Antenna 0<br>Antenna 1 | 2412MHz<br>2437MHz<br>2462MHz |
| Spurious Emission(Radiated) | 11b Tx<br>11g Tx | CECH-3001B | Antenna 0<br>Antenna 1 | 2412MHz<br>2437MHz *2)<br>2462MHz |
| | 11b Tx | CECH-3001A | Antenna 0 | 2437MHz *2) |
| 6dB Bandwidth<br>Maximum Peak Output Power<br>Power Density<br>99% Occupied Bandwidth<br>Spurious Emission (Conducted) | 11b Tx<br>11g Tx | CECH-3001A | Antenna 0<br>Antenna 1 | 2412MHz<br>2437MHz<br>2462MHz |

*Antenna 1 has two kinds of manufacturer's antennas (TYCO and HITACHI) and the test was performed only with TYCO antenna according to the customer's request, because these have similar antenna characteristics and equal maximum gain.

*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 CECH-3001A (Power Supply: DELTA) and CECH-3001B (Power Supply: SONY). Radiated Spurious Emission was performed with CECH-3001B (Power Supply: SONY) as a representative.

*2) The difference between CECH-3001A (Power Supply: DELTA) and CECH-3001B (Power Supply: SONY) was confirmed by the IEEE802.11b Transmitting (Tx), 11Mbps mode.

## 4.2 Configuration and peripherals

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**This page has been submitted for a separate exhibit.**

# 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.

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. 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.

**Detector : QP and AV**
**Measurement range : 0.15-30MHz**
**Test data : APPENDIX**
**Test result : Pass**

## 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, 1.5m by 1.0m, 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 5 of RSS-Gen 7.2.5(IC) and outside the restricted band of FCC15.205 / Table 3 of RSS-Gen 7.2.2 (IC).**

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

*1) Distance Factor: 20 x log (3.0m/1.0m) = 9.5dB

- 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.

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 |
|---|---|---|---|---|---|---|---|
| 6dB Bandwidth | 20MHz | 100kHz | 300kHz | Auto | Peak | Max Hold | Spectrum Analyzer |
| 99% Occupied Bandwidth | Enough width to display 20dB Bandwidth | 1 to 3% of Span | Three times of RBW | Auto | Peak | Max Hold | Spectrum Analyzer |
| Maximum Peak Output Power | - | - | - | Auto | Peak | - | Power Meter (Sensor: 50MHz BW) |
| Peak Power Density | 18MHz | 30kHz | 100kHz | 600sec | Peak | Max Hold | Spectrum Analyzer *1) *2) |
| Conducted Spurious Emission *3) | 9kHz to 150kHz | 200Hz | 620Hz | Auto | Peak | Max Hold | Spectrum Analyzer |
| | 150kHz to 30MHz | 10kHz | 30kHz | | | | |
| | 30MHz to 25GHz (Less or equal to 5GHz) | 100kHz | 300kHz | | | | |

*1) PSD Option 1 of "Guidance on Measurement of Digital Transmission Systems Operating under Section15.247 ".
*2) The test was not performed at RBW:3kHz however the measurement is to be performed with RBW:3kHz in the regulation, because the measurement value with RBW:3kHz is less than the value of RBW:30kHz and the test data met the limit with RBW:30kHz.
*3) In the frequency range below 30MHz, RBW was narrowed to separate the noise contents. Then, wide-band noise near the limit was checked separately, however the noise was low enough as shown in the chart. (9kHz-150kHz:RBW=200Hz, 150kHz-30MHz:RBW=10kHz). It was confirmed that there was enough margin to the limit of FCC15.209 at Radiated Spurious emission test.

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

**Test data : APPENDIX**
**Test result : Pass**