# RADIO TEST REPORT

## Test Report No. : 29IE0192-HO-01-A

| | | |
|---|---|---|
| **Applicant** | : | **YAMAHA CORPORATION** |
| **Type of Equipment** | : | **Portable Player Dock** |
| **Model No.** | : | **PDX-60** |
| **FCC ID** | : | **A6RPDX60A** |
| **Test regulation** | : | **FCC Part 15 Subpart C 2009 Section 15.207, Section 15.247 (Permissive Change Class II Application)** |
| **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.

**Date of test:**

May 16 to 18, 2009

**Tested by:**

Kazufumi Nakai
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**Approved by :**

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NVLAP LAB CODE: 200572-0

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# SECTION 1: Customer information

| | | |
|---|---|---|
| Company Name | : | YAMAHA CORPORATION |
| Brand Name | : | YAMAHA |
| Address | : | 10-1 Nakazawa-cho, Naka-ku, Hamamatsu, Shizuoka 430-8650, Japan |
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# SECTION 2: Equipment under test (E.U.T.)

## 2.1 Identification of E.U.T.

| | | |
|---|---|---|
| Type of Equipment | : | Portable Player Dock |
| Model No. | : | PDX-60 |
| Serial No. | : | T023309ZP: used for Conducted Emission, Radiated Spurious Emission tests<br>T023029ZP: used for Antenna Terminal Conducted tests |
| Rating | : | AC 120V/60Hz (DC 15.0V from AC Adapter) |
| Receipt Date of Sample | : | May 16, 2009 |
| Country of Mass-production | : | China |
| Condition of EUT | : | Engineering 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

Model No: PDX-60 (referred to as the EUT in this report) is the Portable Player Dock.
Powered speaker system which enable wireless and wired communication with iPod & iPhone. It can play music in iPod & iPhone from bandled transmitter (PDX-50TX by wireless) or dock.

| | |
|---|---|
| Equipment Type | Transceiver |
| Clock Frequency | 10MHz (CPU) |
| Frequency of Operation | 2405.376MHz - 2473.984MHz |
| Type of Modulation | GFSK |
| Antenna Type | PCB Pattern antenna |
| Antenna Gain | 1.74dBi |
| Antenna Connector Type | N/A |
| Mathod of frequency generation | Crystal |
| Power Supply (inner) | DC 3.3V |

<Contents of the change from original model>
Original test report number of this report is 29EE0176-HO-01-A.
The EUT is changed the specification from original model as below. The RF part is not changed.
* The change of the location mounting the RF part board on EUT
* The form change of the metallic chassis mounted under the MAIN board

# SECTION 3: Test specification, procedures & results

### 3.1 Test Specification

| | | |
|---|---|---|
| Test Specification | : | FCC Part15 Subpart C: 2009, final revised on February 27, 2009 |
| Title | : | FCC 47CFR Part15 Radio Frequency Devices 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 |

**FCC 15.31 (e)**
This EUT is constantly provided with voltage (DC3.3V) from the regular circuit 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.

### 3.2 Procedures and results

| No. | Item | Test Procedure | Specification | Remarks | Deviation | Worst margin | Results |
|---|---|---|---|---|---|---|---|
| 1 | Conducted emission | **FCC:** ANSI C63.4:2003 7. AC powerline conducted emission measurements | **FCC:** Section 15.207 | Conducted | N/A | [QP] 23.5dB (0.16582MHz, N) (0.16524MHz, N) [AV] 24.1dB (0.55751MHz, N) (0.55714MHz, N) (0.55767MHz, N) (0.55792MHz, L) | Complied |
| | | **IC:** RSS-Gen 7.2.2 | **IC:** RSS-Gen 7.2.2 | | | | |
| 2 | 6dB Bandwidth | **FCC:** "Guidance on Measurement of Digital Transmission Systems Operating under Section15.247" | **FCC:** Section 15.247(a)(2) | Conducted | N/A | See data. | Complied |
| | | **IC:** RSS-Gen 4.6.2 | **IC:** RSS-210 A8.2(a) | | | | |
| 3 | Maximum Peak Output Power | **FCC:** "Guidance on Measurement of Digital Transmission Systems Operating under Section15.247" | **FCC:** Section 15.247(b)(3) | Conducted | N/A | | Complied |
| | | **IC:** RSS-Gen 4.8 | **IC:** RSS-210 A8.4(4) | | | | |
| 4 | Restricted Band Edges | **FCC:** "Guidance on Measurement of Digital Transmission Systems Operating under Section15.247" | **FCC:** Section 15.247 (d) | Conducted/ Radiated | N/A | | Complied |
| | | **IC:** - | **IC:** RSS-210 A8.5 | | | | |
| 5 | Power Density | **FCC:** "Guidance on Measurement of Digital Transmission Systems Operating under Section15.247" | **FCC:** Section 15.247 (e) | Conducted | N/A | | Complied |
| | | **IC:** - | **IC:** RSS-210 A8.2(b) | | | | |
| 6 | Spurious Emission | **FCC:** "Guidance on Measurement of Digital Transmission Systems Operating under Section15.247" | **FCC:** Section15.247(d) | Conducted/ Radiated | N/A | [Tx] 3.0dB 4872.2MHz, AV, Vertical [Rx] 11.2dB 589.803MHz, QP, Horizontal | Complied |
| | | **IC:** RSS-Gen 4.9 RSS-Gen 4.10 | **IC:** RSS-210 A8.5 RSS-Gen 7.2.1 and 7.2.3 | | | | |
| Note: UL Japan, Inc.'s EMI Work Procedures No.QPM05 and QPM15. | | | | | | | |

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

### 3.3 Addition to standard

| No. | Item | Test Procedure | Specification | Remarks | Deviation | Worst margin | Results |
|---|---|---|---|---|---|---|---|
| 1 | 99% Occupied Band Width | RSS-Gen 4.6.1 | RSS-Gen 4.6.1 | Conducted | N/A | N/A | N/A |

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 | Conducted emission | Radiated emission (10m*) | | | Radiated emission (3m*) | | | Radiated emission (3m*) | |
|---|---|---|---|---|---|---|---|---|---|
| | 150kHz-30MHz | 9kHz-30MHz | 30MHz-300MHz | 300MHz-1GHz | 9kHz-30MHz | 30MHz-300MHz | 300MHz-1GHz | 1GHz-18GHz | 18GHz-40GHz |
| No.1 semi-anechoic chamber (±) | 3.7dB | 3.1dB | 4.4dB | 4.2dB | 3.2dB | 3.8dB | 3.9dB | 5.9dB | 6.1dB |
| No.2 semi-anechoic chamber (±) | 3.7dB | - | - | - | 3.2dB | 4.4dB | 4.0dB | 5.9dB | 6.1dB |
| No.3 semi-anechoic chamber (±) | 3.7dB | - | - | - | 3.2dB | 4.6dB | 4.0dB | 5.9dB | 6.1dB |
| No.4 semi-anechoic chamber (±) | 3.7dB | - | - | - | 3.2dB | 3.9dB | 3.9dB | 5.9dB | 6.1dB |

*10m/3m = Measurement distance

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

Radiated emission test(3m)
[Tx] The data listed in this report meets the limits unless the uncertainty is taken into consideration.
[Rx] The data listed in this test report has enough margin, more than the site margin.

Other test except Conducted Emission and Spurious Emission (Radiated)
The measurement uncertainty for this test is 3.0dB.

### 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 1 to 3.

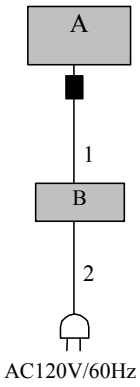
# SECTION 4: Operation of E.U.T. during testing

## 4.1 Operating Mode(s)

| Test Item | Operating Mode | Tested frequency |
|---|---|---|
| Conducted Emission,<br>Spurious Emission<br>(Radiated / Conducted) | Transmitting (Tx) *1) | 2405.376MHz(L)<br>2436.096MHz(M)<br>2473.984MHz(H) |
| | Receiving (Rx) | 2436.096MHz(M) |
| 6dB Bandwidth,<br>Maximum Peak Output Power,<br>Power Density,<br>99% Occupied Bandwidth | Transmitting (Tx) *1) | 2405.376MHz(L)<br>2436.096MHz(M)<br>2473.984MHz(H) |
| Band Edge Compliance<br>(Conducted) | Transmitting (Tx) *1) | 2405.376MHz(L)<br>2473.984MHz(H) |

*1) The EUT transmits with GFSK modulated and 100% Duty of Pulse.

## 4.2 Configuration and peripherals




■: Standard Ferrite Core

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

**Description of EUT**

| No. | Item | Model number | Serial number | Manufacturer | Remark |
|---|---|---|---|---|---|
| A | Portable Player Dock | PDX-60 | T023309ZP *1)<br>T023029ZP *2) | YAMAHA CORPORATION | EUT |
| B | AC Adapter | NU40-2150266-I3 | TP2-1 | YAMAHA CORPORATION | EUT |

*1) Used for Conducted Emission, Radiated Spurious Emission tests
*2) Used for Antenna Terminal Conducted tests

**List of cables used**

| No. | Name | Length (m) | Shield | | Remark |
|---|---|---|---|---|---|
| | | | Cable | Connector | |
| 1 | DC Cable | 1.8 | Unshielded | Unshielded | - |
| 2 | AC Cable | 1.7 | Unshielded | Unshielded | - |

## SECTION 5: Conducted Emission

**Test Procedure and conditions**

EUT was placed on a urethane platform of nominal size, 1.0m by 0.5m, 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 itself (as a stand alone equipment)
Each EUT current-carrying power lead, except the ground (safety) lead, was individually connected through a LISN /(AMN) to the input power source.

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.

**Detector : quasi-peak and average detector (IF BW 9 kHz)**
**Measurement range : 0.15-30MHz**
**Test data : APPENDIX 2**
**Test result : Pass**

## SECTION 6: Spurious Emission

**[Conducted]**
**Test Procedure**
The Out of Band Emission was measured with a spectrum analyzer connected to the antenna port.
It was measured based on "1. RF antenna conducted test" of "Guidance on Measurement of Digital Transmission Systems Operating under Section15.247 ".
The following spectrum analyzer setting was used:

- RBW: 100kHz
- VBW: 300kHz
- Sweep: Auto
- Detector: Peak
- Trace: Max Hold

**Test data : APPENDIX 2**
**Test result : Pass**

**[Radiated]**
**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 0.5m, raised 0.8m above the conducting ground plane.
The Radiated Electric Field Strength intensity has been measured in a Semi Anechoic Chamber with a ground plane and at a distance of 3m(Below 10GHz) and 1m(Upper 10GHz).
The height of the measuring varied between 1 and 4m and EUT was rotated a full revolution in order to obtain the maximum value of the electric field intensity.
The measurements were performed for both vertical and horizontal antenna polarization with the Test Receiver, or the Spectrum Analyzer.
The radiated emission measurements were made with the following detector function of the test receiver and the Spectrum analyzer.

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 |
| Detector<br>IF Bandwidth | QP: BW 120kHz(T/R)<br>20dBc : RBW: 100kHz<br>VBW: 300kHz (S/A) | PK: RBW: 1MHz/VBW: 1MHz<br>AV *1): RBW: 1MHz/VBW: 10Hz *2)<br>20dBc: RBW: 100kHz/VBW: 300kHz |

*1) When using Spectrum analyzer, the test was made with adjusting span to zero by using peak hold.
*2) The test was performed by VBW 10Hz for Average measurement according to DA00-705, since the duty cycle on the transmitting mode for Spurious Emission test was 100%.

The test was made on EUT at the normal use position.

**Test data : APPENDIX 2**
**Test result : Pass**

# SECTION 7: Bandwidth

## 6dB Bandwidth

**Test Procedure**

The bandwidth was measured with a spectrum analyzer connected to the antenna port.
It was measured based on "Guidance on Measurement of Digital Transmission Systems Operating under Section15.247 ".
The following spectrum analyzer setting was used:

- Span: 20MHz
- RBW: 100kHz
- VBW: 300kHz
- Sweep: Auto
- Detector: Peak
- Trace: Max Hold

**Test data : APPENDIX 2**
**Test result : Pass**

## 99% Occupied Bandwidth

**Test Procedure**

The bandwidth was measured with a spectrum analyzer connected to the antenna port.
The following spectrum analyzer setting was used:

- Span: Enough width to display 20dB Bandwidth
- RBW: as close to 1% of the Span as is possible without being below 1%
- VBW: Three times of RBW
- Sweep: Auto
- Detector: Peak
- Trace: Max Hold

**Test data : APPENDIX 2**
**Test result : Pass**

## SECTION 8: Maximum Peak Output Power

**Test Procedure**

The Maximum Peak Output Power was measured with a power meter (tested bandwidth: 50MHz) connected to the antenna port.
It was measured based on "Power Output Option 1" of "Guidance on Measurement of Digital Transmission Systems Operating under Section15.247 ".

**Test data : APPENDIX 2**
**Test result : Pass**

## SECTION 9: Peak Power Density

**[Conducted]**
**Test Procedure**
The Peak Power Density was measured with a spectrum analyzer connected to the antenna port.
It was measured based on "PSD Option 1" of "Guidance on Measurement of Digital Transmission Systems Operating under Section15.247 ".

- Span: 1.5MHz
- RBW: 3kHz
- VBW: 100kHz
- Sweep: 500sec
- Detector: Peak
- Trace: Clear Write

*) The test was not performed at RBW: 3kHz that was stated in the Regulation.
However, the measurement value with RBW:3kHz is less than the value of RBW:30kHz and the test data met the limit with RBW:3kHz.

**Test data : APPENDIX 2**
**Test result : Pass**