

# RADIO TEST REPORT

**Test Report No. : 30GE0004-HO-01-A-R1**

**Applicant** : **Panasonic Corporation of North America**  
**Type of Equipment** : **Electronic Pen**  
**Model No.** : **UE-608026**  
**FCC ID** : **ACJ5Z6UE-608026**  
**Test regulation** : **FCC Part 15 Subpart C 2010  
Section 15.247**  
**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.
6. This report is a revised version of 30GE0004-HO-01-A. 30GE0004-HO-01-A is replaced with this report.

**Date of test:**

February 4 and 6, 2010

**Tested by:**



Satofumi Matsuyama  
Representative test engineer of  
EMC Service

**Approved by:**



Takahiro Hatakeda  
Leader of EMC Services



NVLAP LAB CODE: 200572-0

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MF060b (06.08.09)

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## **SECTION 1: Customer information**

Company Name : Panasonic System Networks Co., Ltd.  
Address : 1-62, 4-chome Minoshima, Hakata-ku, Fukuoka 812-8531 Japan  
Telephone Number : +81-92-477-1405  
Facsimile Number : +81-92-477-1487  
Contact Person : Hidemori Shimojo

\*Panasonic System Networks Co., Ltd. is on behalf of the applicant: Panasonic Corporation of North America.

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

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

Type of Equipment : Electronic Pen  
Model No. : UE-608026  
Serial No. : Refer to Section 4, Clause 4.2  
Rating : DC1.5V  
Receipt Date of Sample : February 4, 2010  
Country of Mass-production : Japan, Malaysia  
Condition of EUT : Engineering 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**

The EUT UE-608026 is a Electronic pen for electronic white board. The user writes on the board and the pen status data is then transmitted from the pen to the PC via a 2.4GHz Wireless frequency.

### **General Specification**

Clock frequency in the system : CPU: 16MHz

### **Radio Specification**

Radio Type : Transceiver  
Frequency of Operation : 2402-2481MHz  
Modulation : GFSK  
Power Supply (radio part input) : DC 1.8V  
Antenna type : 1/4λ MonoPole PCB Antenna  
Antenna Gain : 0dBi (Max)  
Operating Temperature : +10 deg. C. to +35 deg. C.

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

### **3.1 Test Specification**

Test Specification : FCC Part 15 Subpart C: 2010, final revised on January 22, 2010 and effective March 1, 2010  
Title : FCC 47CFR Part15 Radio Frequency Device Subpart C Intentional Radiators  
Section 15.247 Operation within the bands 902-928MHz,  
2400-2483.5MHz, and 5725-5850MHz

\*The revision on January 22, 2010 does not affect the test specification applied to the EUT.

### **3.2 Procedures and results**

Item	Test Procedure	Specification	Worst margin	Results	Remarks
Conducted Emission	FCC: ANSI C63.4:2003 7. AC powerline Conducted Emission measurements ----- IC: RSS-Gen 7.2.2	FCC: Section 15.207 ----- IC: RSS-Gen 7.2.2	N/A	N/A *1)	-
6dB Bandwidth	FCC: "Guidance on Measurement of Digital Transmission Systems Operating under Section15.247" ----- IC: RSS-Gen 4.6.2	FCC: Section 15.247(a)(2) ----- IC: RSS-210 A8.2(a)	See data.	Complied	Conducted
Maximum Peak Output Power	FCC: "Guidance on Measurement of Digital Transmission Systems Operating under Section15.247" ----- IC: RSS-Gen 4.8	FCC: Section 15.247(b)(3) ----- IC: RSS-210 A8.4(4)		Complied	Conducted
Power Density	FCC: "Guidance on Measurement of Digital Transmission Systems Operating under Section15.247" ----- IC: -	FCC: Section 15.247 (e) ----- IC: RSS-210 A8.2(b)		Complied	Conducted
Spurious Emission Restricted Band Edges	FCC: "Guidance on Measurement of Digital Transmission Systems Operating under Section15.247" ----- IC: RSS-Gen 4.9 RSS-Gen 4.10	FCC: Section15.247(d) ----- IC: RSS-210 A8.5 RSS-Gen 7.2.1 and 7.2.3		[Tx] 6.4dB 2400.00MHz, PK, Hori. [Rx] 19.7dB 799.990MHz, QP, Hori. 799.996MHz, QP, Vert.	Complied

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

\*1) The test is not applicable since the EUT is a battery-operated device.

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

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

The test was performed with the New Battery (DC1.5V).

This EUT provides stable voltage (DC1.8V) 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.

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### 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	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)	Radiated emission (10m*)(±dB)			Radiated emission					
				(3m*)(±dB)					(1m*)(±dB)
	9kHz -30MHz	30MHz -300MHz	300MHz -1GHz	9kHz -30MHz	30MHz -300MHz	300MHz -1GHz	1GHz -18GHz	18GHz -26.5GHz	26.5GHz -40GHz
No.1	2.7dB	4.8dB	5.0dB	2.9dB	4.8dB	5.0dB	3.9dB	4.5dB	4.4dB
No.2	-	-	-	3.5dB	4.8dB	5.1dB	4.0dB	4.3dB	4.2dB
No.3	-	-	-	3.8dB	4.6dB	4.7dB	4.0dB	4.5dB	4.4dB
No.4	-	-	-	3.5dB	4.4dB	4.9dB	4.0dB	4.6dB	4.5dB

\*10m/3m/1m = 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

#### Radiated emission test(3m)

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

### 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**

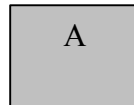
### **4.1 Operating Mode(s)**

<b>Mode</b>	<b>Remarks*</b>
Transmitting mode (Tx) Receiving mode (Rx)	1Mbps, PN9

\*The details of Operating mode(s)

<b>Test Item</b>	<b>Operating Mode</b>	<b>Tested frequency</b>
Spurious Emission	Tx	2402MHz 2441MHz 2481MHz
	Rx	2441MHz
6dB Bandwidth Maximum Peak Output Power Power Density 99% Occupied Bandwidth	Tx	2402MHz 2441MHz 2481MHz

### **4.2 Configuration and peripherals**



\* Setup was taken into consideration and test data was taken under worse case conditions.

#### **Description of EUT**

<b>No.</b>	<b>Item</b>	<b>Model number</b>	<b>Serial number</b>	<b>Manufacturer</b>	<b>Remarks</b>
A	Electronic Pen	UE-608026	WS5-8	Panasonic	EUT

## **SECTION 5: Radiated Spurious Emission**

### **Test Procedure**

It was measured based on "2. Radiated emission test" of "Guidance on Measurement of Digital Transmission Systems Operating under Section 15.247".

EUT was placed on a urethane platform of nominal size, 0.5m 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	30MHz to 300MHz	300MHz to 1GHz	Above 1GHz
Antenna Type	Biconical	Logperiodic	Horn

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

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

\*2) The test was performed with Burst transmission.

The test was performed with Max Duty Cycle (the maximum ON time and the minimum OFF time) by the specification (Please refer to P.19).

The test was performed by VBW=10Hz since the 1Cycle had enough the fast cycle.

\*3) Distance Factor:  $20 \times \log(3.0\text{m}/1.0\text{m}) = 9.5\text{dB}$

- The carrier level and noise levels were confirmed at each position of X, Y and Z 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-26.5GHz  
**Test data** : APPENDIX  
**Test result** : Pass

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## **SECTION 6: Antenna Terminal Conducted Tests**

### **Test Procedure**

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

<b>Test</b>	<b>Span</b>	<b>RBW</b>	<b>VBW</b>	<b>Sweep time</b>	<b>Detector</b>	<b>Trace</b>	<b>Instrument used</b>
6dB Bandwidth	10MHz	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	1.5MHz	3kHz	100kHz	500sec	Peak	Max Hold	Spectrum Analyzer *1)
Conducted Spurious Emission	Less or equal to 5GHz (Range: 30MHz-25GHz)	100kHz	300kHz	Auto	Peak	Max Hold	Spectrum Analyzer

\*1) PSD Option 1 of "Guidance on Measurement of Digital Transmission Systems Operating under Section15.247".

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

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