



EMI TEST REPORT

Test Report No. : 10310962H-B-R1

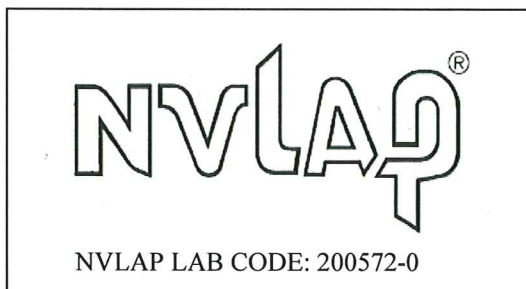
Applicant : Panasonic Corporation
Type of Equipment : SMART PCU
Model No. : HM1130CA
FCC ID : ACJ932HM1130CA
Test regulation : FCC Part 15 Subpart B: 2014 Class B
Test Result : Complied

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 limits of the above regulation.
4. The test results in this test 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 10310962H-B .10310962H-B is replaced with this report.

Date of test: May 9, 2014

Representative test engineer: *K. Kawamura*
Keisuke Kawamura
Engineer
Consumer Technology Division

Approved by: *M. Imura*
Motoya Imura
Engineer
Consumer Technology Division



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.
*As for the range of Accreditation in NVLAP, you may refer to the WEB address,
<http://www.ul.com/japan/jpn/pages/services/emc/about/mark1/index.jsp#nvlap>

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CONTENTS	PAGE
SECTION 1: Customer information	4
SECTION 2: Equipment under test (E.U.T.)	4
SECTION 3: Test specification, procedures & results	5
SECTION 4: Operation of E.U.T. during testing	7
SECTION 5: Radiated Emission	9
APPENDIX 1: Data of EMI test	10
Radiated Emission	10
APPENDIX 2: Test instruments	12
APPENDIX 3: Photographs of test setup.....	13
Radiated Emission	13
Worst Case Position (Horizontal: X-axis/ Vertical:X-axis)	14

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SECTION 1: Customer information

Company Name : Panasonic Corporation
Address : 600 Saedo-cho, Tsuzuki-ku, Yokohama City 224-8539 Japan
Telephone Number : +81-45-939-1665
Facsimile Number : +81-45-939-1917
Contact Person : Masahiro Yoshii

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

2.1 Identification of E.U.T.

Type of Equipment : SMART PCU
Model No. : HM1130CA
Serial No. : Refer to Section 4, Clause 4.2
Rating : DC 6.0 to 16.0 V
Receipt Date of Sample : April 26, 2014
Country of Mass-production : Japan, China
Condition of EUT : Production model
Modification of EUT : No Modification by the test lab

2.2 Product Description

General Specification

Clock frequency(ies) in the system : 16MHz (CPU Main Clock)

Radio Specification

Radio Type : Transceiver

[Transmitter part]

Frequency of Operation : 125kHz
Modulation : ASK
Method of Frequency Generation : Crystal
Output voltage : DC 7.0V
Antenna type : Ferrite Antenna

[Receiver part]

Frequency of Operation : 433.92MHz
Crystal oscillator frequency : 21.948717MHz
Local frequency : 434.194MHz
IF frequency : 274kHz
Antenna type : Monopole Antenna
Antenna gain : -15dBi

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SECTION 3: Test specification, procedures & results

3.1 Test specification

Test specification : FCC Part 15 Subpart B: 2014, final revised on May 1, 2014 and effective June 2, 2014

Title : FCC 47CFR Part15 Radio Frequency Device
Subpart B Unintentional Radiators

* The revision on May 1, 2014 does not affect the test specification applied to the EUT.

3.2 Procedures and results

Item	Test Procedure	Limits	Deviation	Worst margin	Result
Conducted emission	FCC: ANSI C63.4: 2003 7. AC powerline conducted emission measurements	Class B	N/A *1)	N/A	N/A
Radiated emission	FCC: ANSI C63.4: 2003 8. Radiated emission measurements	Class B	N/A	19.9dB 868.388MHz Vertical, QP	Complied

*Note: UL Japan, Inc's EMI Work Procedure 13-EM-W0420.

*1) The test is not applicable since the EUT is not the device that is designed to be connected to the public utility (AC) power line.

3.3 Addition to standard

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						
	(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	4.0dB	5.1dB	5.0dB	5.1dB	6.0dB	4.9dB	4.3dB
No.2	3.9dB	5.2dB	5.0dB	4.9dB	5.9dB	4.7dB	4.2dB
No.3	4.3dB	5.1dB	5.2dB	5.2dB	6.0dB	4.8dB	4.2dB
No.4	4.6dB	5.2dB	5.0dB	5.2dB	6.0dB	5.7dB	4.2dB

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

Radiated emission test(3m)

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

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3.5 Test Location

UL Japan, Inc. Ise EMC Lab. *NVLAP Lab. code: 200572-0
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	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	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	2973C-2	7.5 x 5.8 x 5.2m	4.0 x 4.0m	-
No.3 semi-anechoic chamber	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	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	4.0 x 4.5 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	-	8.8 x 4.6 x 2.8m	2.4 x 2.4m	-
No.11 measurement room	-	6.2 x 4.7 x 3.0m	4.8 x 4.6m	-

* 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 Data of EMI, Test instruments, and Test set up

Refer to APPENDIX.

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

4.1 Operating modes

The mode is used: Receiving mode (433.92MHz)

*The test signal level was confirmed to be sufficient to stabilize the local oscillator of the EUT.

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4.2 Configuration and peripherals

This page has been submitted for a separate exhibit.

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SECTION 5: Radiated Emission

5.1 Operating environment

Test place : No.3 semi anechoic chamber
Temperature : See data
Humidity : See data

5.2 Test configuration

EUT was placed on a urethane platform of nominal size, 1.0m by 1.5m, raised 0.8m above the conducting ground plane. The EUT was set on the edge of the tabletop.
Test was made with the antenna positioned in both the horizontal and vertical planes of polarization. The measurement antenna was varied in height above the conducting ground plane to obtain the maximum signal strength. Photographs of the set up are shown in Appendix 3.

5.3 Test conditions

Frequency range : 30MHz-300MHz (Biconical antenna) / 300MHz-1000MHz (Logperiodic antenna)
1000MHz - 2000MHz (Horn antenna)
Test distance : 3m
EUT position : Table top
EUT operation mode : See Clause 4.1

5.4 Test procedure

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 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.

Frequency	Below 1GHz	Above 1GHz
Instrument used	Test Receiver	Spectrum Analyzer
IF Bandwidth	QP: BW 120kHz	PK: RBW:1MHz/VBW: 3MHz AV *1): RBW:1MHz/VBW:10Hz

*1) When using Spectrum analyzer, the test was made with adjusting span to zero by using peak hold.

The 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 representative X-axis since no difference was found among each position.

5.5 Test result

Summary of the test results: Pass

Date: May 9, 2014

Test engineer: Keisuke Kawamura

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APPENDIX 1: Data of EMI test

Radiated Emission

DATA OF RADIATED EMISSION TEST

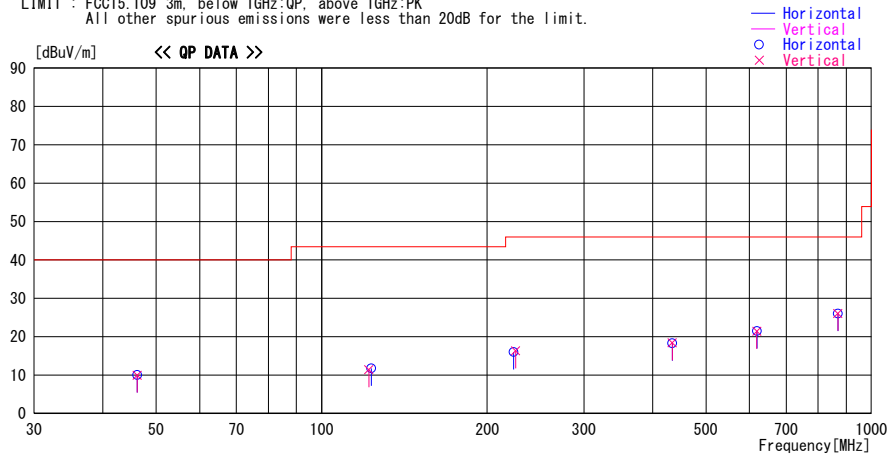
UL Japan, Inc. Ise EMC Lab. No. 3 Semi Anechoic Chamber
Date : 2014/05/09

Report No. : 10310962H

Temp./Humi. : 24deg. C / 45% RH
Engineer : Keisuke Kawamura

Mode / Remarks : Rx 433.92MHz Worst-Axis(Hori:X / Vert:X)

LIMIT : FCC15.109 3m, below 1GHz:QP, above 1GHz:PK
All other spurious emissions were less than 20dB for the limit.



Frequency [MHz]	Reading [dBuV]	DET	Antenna		Level [dBuV/m]	Angle [Deg]	Height [cm]	Polar.	Limit [dBuV/m]	Margin [dB]	Comment
			Factor [dB/m]	Loss& Gain [dB]							
46.211	22.7	QP	12.2	-24.9	10.0	0	300	Hori.	40.0	30.0	
46.211	22.7	QP	12.2	-24.9	10.0	0	100	Vert.	40.0	30.0	
121.876	22.1	QP	13.1	-23.8	11.4	0	100	Vert.	43.5	32.1	
123.153	22.3	QP	13.2	-23.8	11.7	0	300	Hori.	43.5	31.8	
223.499	21.8	QP	16.9	-22.7	16.0	0	300	Hori.	46.0	30.0	
225.299	22.1	QP	16.9	-22.7	16.3	0	100	Vert.	46.0	29.7	
434.194	21.9	QP	17.7	-21.2	18.4	0	100	Vert.	46.0	27.6	
434.194	21.8	QP	17.7	-21.2	18.3	0	100	Hori.	46.0	27.7	
618.511	21.8	QP	19.6	-20.0	21.4	0	100	Vert.	46.0	24.6	
619.667	21.8	QP	19.7	-20.0	21.5	0	100	Hori.	46.0	24.5	
868.388	21.8	QP	22.2	-18.0	26.0	0	100	Hori.	46.0	20.0	
868.388	21.9	QP	22.2	-18.0	26.1	0	100	Vert.	46.0	19.9	

CHART: WITH FACTOR ANT TYPE: 30MHz: LOOP, 30-300MHz: BICONICAL, 300MHz-1000MHz: LOGPERIODIC, 1000MHz: HORN
CALCULATION: RESULT=READING + ANT FACTOR + LOSS & GAIN(CABLE+ATTEN. - GAIN(AMP))

*The limit is rounded down to one decimal place.

*The test result is rounded off to one or two decimal places, so some differences might be observed.

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Radiated Emission

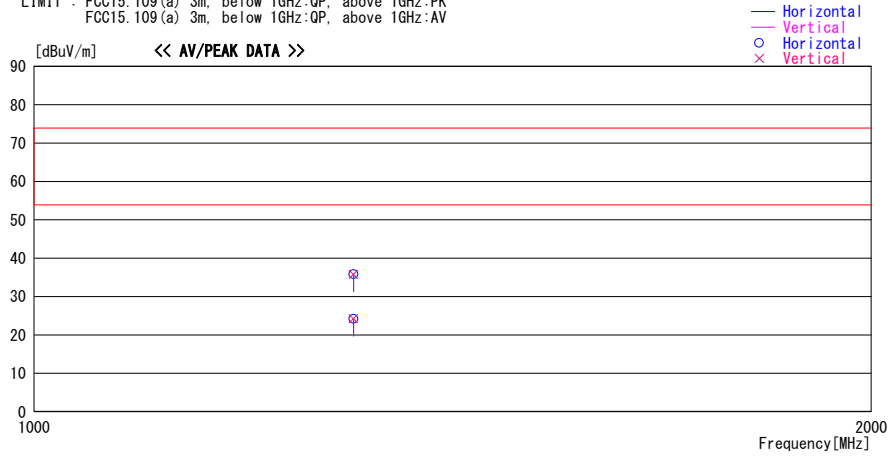
DATA OF RADIATED EMISSION TEST

UL Japan, Inc. Ise EMC Lab. No.3 Semi Anechoic Chamber
 Date : 2014/05/09

Report No. : 10310962H
 Temp./Humi. : 24deg. C / 45% RH
 Engineer : Keisuke Kawamura

Mode / Remarks : Rx 433.92MHz Worst-Axis(Hori:X / Vert:X)

LIMIT : FCC15.109 (a) 3m, below 1GHz:QP, above 1GHz:PK
 FCC15.109 (a) 3m, below 1GHz:QP, above 1GHz:AV



Frequency [MHz]	Reading [dBuV]	DET	Antenna	Loss&	Level	Angle	Height	Polar.	Limit	Margin	Comment
			Factor [dB/m]	Gain [dB]							
1302.580	43.4	PK	25.0	-32.6	35.8	0	100	Vert.	73.9	38.1	
1302.580	43.4	PK	25.0	-32.6	35.8	0	100	Hori.	73.9	38.1	
1302.580	31.8	AV	25.0	-32.6	24.2	0	100	Vert.	53.9	29.7	
1302.580	31.8	AV	25.0	-32.6	24.2	0	100	Hori.	53.9	29.7	

CHART: WITH FACTOR ANT TYPE: -30MHz: LOOP, 30-300MHz: BICONICAL, 300MHz-1000MHz: LOGPERIODIC, 1000MHz: HORN
 CALCULATION: RESULT=READING + ANT FACTOR + LOSS & GAIN(CABLE+ATTEN. - GAIN(AMP))

*The limit is rounded down to one decimal place.
 *The test result is rounded off to one or two decimal places, so some differences might be observed.

APPENDIX 2: Test instruments

EMI test equipment

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
MAEC-03	Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-10005	RE	2014/02/27 * 12
MOS-13	Thermo-Hygrometer	Custom	CTH-180	1301	RE	2014/02/20 * 12
MJM-16	Measure	KOMELON	KMC-36	-	RE	-
COTS-MEMI	EMI measurement program	TSJ	TEPTO-DV	-	RE	-
MSA-03	Spectrum Analyzer	Agilent	E4448A	MY44020357	RE	2014/04/08 * 12
MTR-08	Test Receiver	Rohde & Schwarz	ESCI	100767	RE	2013/08/20 * 12
MBA-03	Biconical Antenna	Schwarzbeck	BBA9106	1915	RE	2013/10/13 * 12
MLA-03	Logperiodic Antenna	Schwarzbeck	USLP9143	174	RE	2013/10/13 * 12
MCC-51	Coaxial cable	UL Japan	-	-	RE	2013/07/23 * 12
MAT-70	Attenuator(6dB)	Agilent	8491A-006	MY52460153	RE	2014/04/14 * 12
MPA-13	Pre Amplifier	SONOMA INSTRUMENT	310	260834	RE	2014/03/14 * 12
MHA-20	Horn Antenna 1-18GHz	Schwarzbeck	BBHA9120D	258	RE	2013/05/17 * 12
MCC-133	Microwave Cable	HUBER+SUHNER	SUCOFLEX104	336164/4(1m) / 340640(5m)	RE	2013/09/27 * 12
MPA-11	MicroWave System Amplifier	Agilent	83017A	MY39500779	RE	2014/03/24 * 12

The expiration date of the calibration is the end of the expired month.

All equipment is calibrated with valid calibrations. Each measurement data is traceable to the national or international standards.

As for some calibrations performed after the tested dates, those test equipment have been controlled by means of an unbroken chains of calibrations.

Test Item:

RE: Radiated emission

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