



RADIO TEST REPORT

Test Report No. : 10097200H-A-R1

Applicant : Mitsubishi Electric Corp
Type of Equipment : Digital Color Printer
Model No. : CP-C60DW-WE
Test regulation : FCC Part 15 Subpart C: 2013
FCC ID : BGBCP-C60DW
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 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 10097200H-A. 10097200H-A is replaced with this report.

Date of test: November 10 to 14, 2013

Representative test engineer:

H. Kukita

Hiroshi Kukita

Engineer of WiSE Japan,
UL Verification Service

Approved by:

M. Nishiyama

Masanori Nishiyama
Manager of WiSE Japan,
UL Verification Service



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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13-EM-F0429

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SECTION 1: Customer information

Company Name	:	Mitsubishi Electric Corp
Address	:	1 Zusho, Baba, Nagaokakyo-city, Kyoto, 617-8550, Japan
Telephone Number	:	+81-75-958-3249
Facsimile Number	:	+81-75-958-3709
Contact Person	:	Tatsuya Egawa

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

2.1 Identification of E.U.T.

Type of Equipment	:	Digital Color Printer
Model No.	:	CP-C60DW-WE
Serial No.	:	Refer to Clause 4.2
Rating	:	AC 100-240V 50/60Hz
Receipt Date of Sample	:	November 9, 2013
Country of Mass-production	:	Malaysia
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

General Specification

Clock frequency(ies) in the system	:	CPU: 66.6MHz (Outer), 200MHz (Inner) USB: 480MHz (Inner) FPGA: 60MHz
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Radio Specification

Radio Type	:	Transceiver
Frequency of Operation	:	13.56MHz
Modulation	:	ASK
Bandwidth	:	14kHz
Power Supply (radio part input)	:	DC 5.0V
Antenna Type	:	Loop coil
Antenna Connector Type	:	Board to wire connector
Method of Frequency Generation	:	Quartz Crystal

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SECTION 3: Test specification, procedures & results

3.1 Test Specification

Test Specification : FCC Part 15 Subpart C: 2013, final revised on September 30, 2013 and effective October 30, 2013

Title : FCC 47CFR Part15 Radio Frequency Device Subpart C Intentional Radiators
Section 15.207 Conducted limits
Section 15.225 : Operation within the band 13.110-14.010MHz

3.2 Procedures and results

Item	Test Procedure	Specification	Worst margin	Results	Remarks
Conducted emission	ANSI C63.4:2003 7. AC powerline conducted emission measurements ----- <IC>RSS-Gen 7.2.2	Section 15.207 ----- <IC>RSS-Gen 7.2.2	[QP] 10.1dB, 13.56020MHz, L [AV] 0.3dB, 13.56020MHz, L	Complied	-
Electric Field Strength of Fundamental Emission	ANSI C63.4:2003 13. Measurement of intentional radiators ----- <IC> RSS-Gen 4.8, 4.11	Section 15.225(a) ----- <IC>RSS-210 A2.6	81.6dB 13.56000MHz, 0deg.	Complied	Radiated
Spectrum Mask	ANSI C63.4:2003 13. Measurement of intentional radiators ----- <IC>RSS-Gen 4.9, 4.11	Section 15.225(b)(c) ----- <IC> RSS-210 A2.6	45.6dB 13.10000MHz 0deg.	Complied	Radiated
20dB Bandwidth	ANSI C63.4:2003 13. Measurement of intentional radiators ----- <IC> - *	Section15.215(c) ----- <IC> - *	See data	Complied	Radiated
Electric Field Strength of Spurious Emission	ANSI C63.4:2003 13. Measurement of intentional radiators ----- <IC>RSS-Gen 4.9, 4.11	Section15.209, Section 15.225 (d) ----- <IC>RSS-210 A2.6	7.3dB 208.705MHz, Horizontal	Complied	Radiated
Frequency Tolerance	ANSI C63.4:2003 13. Measurement of intentional radiators ----- <IC>RSS-Gen 4.7	Section15.225(e) ----- <IC> RSS-210 A2.6	See data	Complied	Radiated

Note: UL Japan, Inc.'s EMI Work Procedures No. 13-EM-W0420 and 13-EM-W0422

FCC 15.31 (e)

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

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	Radiated	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 (semi-anechoic chamber)	Conducted emission (+dB)
	150kHz-30MHz
No.1	3.5dB
No.2	3.5dB
No.3	3.6dB
No.4	3.5dB

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

Frequency counter (±)	
Normal condition	Extreme condition
7×10^{-6}	9×10^{-6}

Conducted emission test

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

Radiated emission test

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

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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	4.0 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	-	-	8.0 x 4.6 x 2.8m	2.4 x 2.4m	-
No.11 measurement room	-	-	6.2 x 4.7 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 Modes

The mode is used :

Mode	Remarks*
Transmitting mode (Tx) 13.56MHz Mod on	The EUT Transmits and Receives at the same time and there is no receiving mode.
*Power setting: Same as production model Software: Tera term Version 4.66 Any condition under the normal use do not exceed the condition of setting. In addition, end users cannot change the settings of the output power of the product. The EUT Transmits and Receives at the same time and there is no receiving mode.	

Test Item	Operating mode*
Electric Field Strength of Fundamental Emission	Tx Mod on
Spectrum Mask	Tx Mod on
20dB Bandwidth	Tx Mod on
Electric Field Strength of Spurious Emission	Tx Mod on
Frequency Tolerance	Tx Mod on

* After the comparison of the test data between with Tag and without Tag, the tests were performed with Tag which was the worst case.

Justification: The system was configured in typical fashion (as a customer would normally use it) for testing.

Frequency Tolerance:

Temperature : -30deg.C to +50deg.C Step 10deg.C

Voltage : Normal Voltage AC 120V

Maximum Voltage AC 138V, Minimum Voltage AC 102V (AC 120V $\pm$ 15%)

*This EUT provides stable voltage(DC 5.0V) constantly to RF Part regardless of input voltage

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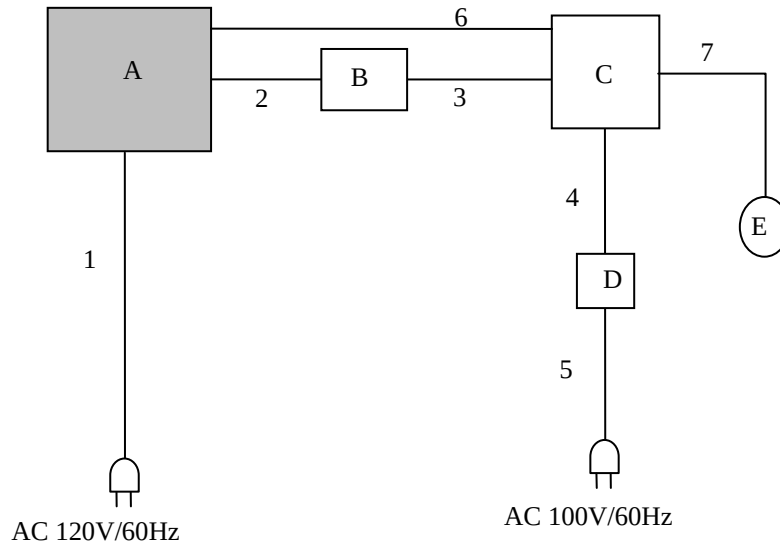
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4.2 Configuration and peripherals



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

Description of EUT and Support equipment

No.	Item	Model number	Serial number	Manufacturer	Remark
A	Digital Color Printer	CP-C60DW-WE	776C519B10	Mitsubishi Electric Corp	EUT
B	Jig	-	-	Mitsubishi Electric Corp	*1)
C	Personal Computer	7661	L3-R2055	Lenovo	-
D	AC Adapter	92P1156	11S92P1156Z1 ZDXN07Y1TJ	Lenovo	-
E	Mouse	TK-MSUK	060801070	Sanwa Supply	-

List of cables used

No.	Name	Length (m)	Shield		Remark
			Cable	Connector	
1	AC Cable	1.9	Unshielded	Unshielded	-
2	Signal Cable	0.2	Unshielded	Unshielded	*1)
3	RS-232C Cable	3.1	Shielded	Shielded	*1)
4	DC Cable	1.7	Unshielded	Unshielded	-
5	AC Cable	0.9	Unshielded	Unshielded	-
6	USB Cable	1.9	Shielded	Shielded	*1)
7	USB Cable	1.5	Shielded	Shielded	-

*1) Used for Conducted emission

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SECTION 5: Conducted emission

5.1 Operating environment

Test place	: No.1 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 rear of tabletop was located 40cm to the vertical conducting plane. The rear of EUT and its peripherals was 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 LISN/AMN and excess AC cable was bundled in center. 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. Each EUT current-carrying power lead, except the ground (safety) lead, was individually connected through a LISN/ an AMN to the input power source. All unused 50ohm connectors of the LISN/ AMN were resistively terminated in 50ohm when not connected to the measuring equipment.

The AC Mains Terminal Continuous disturbance Voltage has been measured with the EUT on a horizontal conducting plane 4.0 x 4.0m and a vertical conducting plane 2.0 x 2.0m in a semi Anechoic Chamber.

Photographs of the set up are shown in Appendix 3.

5.3 Test conditions

Frequency range	: 0.15MHz-30MHz
EUT position	: Table top
EUT operation mode	: Transmitting mode

5.4 Test procedure

The AC Mains Terminal Continuous disturbance Voltage had been measured with the EUT in the semi Anechoic Chamber.

The EUT was connected to a Line Impedance Stabilization Network (LISN)/ Artificial Mains Network (AMN).

An overview sweep with peak detection has been performed.

The measurements had been performed with a quasi-peak detector and if required, with an average detector.

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

Detector Type	: QP and CISPR AV
IF Bandwidth	: 9kHz

5.5 Test result

Summary of the test results : Pass

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SECTION 6: Radiated emission (Fundamental, Spurious Emission and Spectrum Mask)

Test Procedure

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 (angle of loop antenna: 0deg., 45deg., 90deg., and 135 deg.) 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

Frequency	From 9kHz to 90kHz and From 110kHz to 150kHz	From 90kHz to 110kHz	From 150kHz to 490kHz	From 490kHz to 30MHz	From 30MHz to 1GHz	Above 1GHz
Instrument used	Test Receiver					Spectrum Analyzer
Detector	PK/AV	QP	PK/AV	QP	QP	PK AV
IF Bandwidth	200Hz	200Hz	9kHz	9kHz	120kHz	RBW: 1MHz VBW: 3MHz
Test Distance	3m *1)	3m *1)	3m *1)	3m *2)	3m	3m

*1) Distance Factor: $40 \times \log (3\text{m}/300\text{m}) = -80\text{dB}$

*2) Distance Factor: $40 \times \log (3\text{m}/30\text{m}) = -40\text{dB}$

Measurement range : **0.009M-2GHz**
 Test data : **APPENDIX**
 Test result : **Pass**

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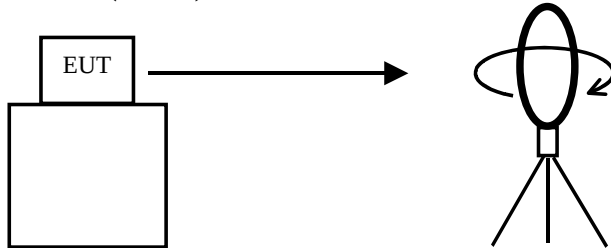
SECTION 7: Other test

Test	Span	RBW	VBW	Sweep	Detector	Trace	Instrument used
20dB Bandwidth	300kHz	3kHz	10kHz	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 *1)	Max Hold *1)	Spectrum Analyzer
Frequency Tolerance	-	-	-	-	-	-	Frequency counter
*1) The measurement was performed with Peak detector, Max Hold since the duty cycle was not 100%.							

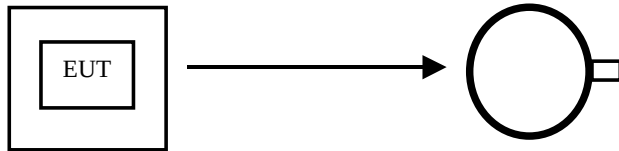
Test data : APPENDIX
Test result : Pass

Figure 1: Direction of the Loop Antenna

Side View (Vertical)

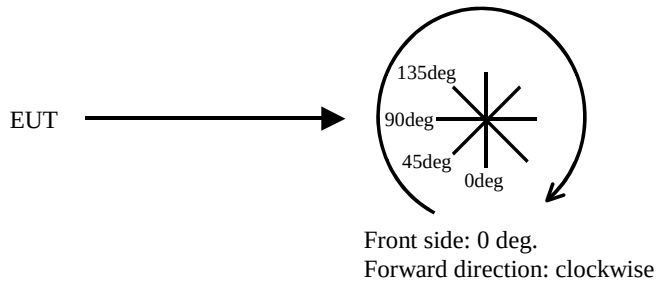


Top View (Horizontal)



Antenna was not rotated.

Top View (Vertical)



Fundamental emission and Spectrum Mask

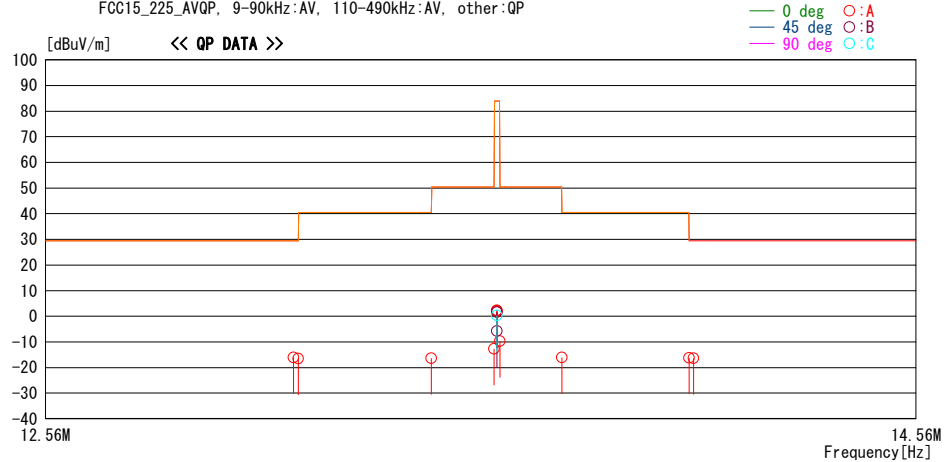
DATA OF RADIATED EMISSION TEST

UL Japan, Inc. Head Office EMC Lab. No.1 Semi Anechoic Chamber

Report No. : 10097200H
Power : AC 120V / 60Hz
Temp./ Humi. : 21deg. C / 42% RH
Engineer : Hiroshi Kukita

Mode / Remarks : Transmitting mode (13.56MHz), Mod ON

LIMIT : FCC15_225_PKQP, 9-90kHz:PK, 110-490kHz:PK, other:QP
FCC15_225_AVQP, 9-90kHz:AV, 110-490kHz:AV, other:QP



Freq.	Reading	DET	Ant. Fac	Loss	Gain	Result	Limit	Margin	Antenna	Table	Comment
[MHz]	[dBuV]		[dB/m]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	[deg]	[deg]	
13.10000	29.9	QP	19.7	-33.5	32.2	-16.1	29.5	45.6	0	A	311
13.11000	29.5	QP	19.7	-33.5	32.2	-16.5	29.5	46.0	0	A	311
13.41000	29.6	QP	19.7	-33.4	32.2	-16.3	40.5	56.8	0	A	311
13.55300	33.2	QP	19.7	-33.4	32.2	-12.7	50.4	63.1	0	A	311
13.56000	48.2	QP	19.7	-33.4	32.2	2.3	83.9	81.6	0	A	311
13.56000	47.5	QP	19.7	-33.4	32.2	1.6	83.9	82.3	45	B	58
13.56000	47.7	QP	19.7	-33.4	32.2	1.8	83.9	82.1	135	A	309
13.56000	46.2	QP	19.7	-33.4	32.2	0.3	83.9	83.6	90	C	359
13.56000	40.2	QP	19.7	-33.4	32.2	-5.7	83.9	89.6	45	B	359
13.56000	48.0	QP	19.7	-33.4	32.2	2.1	83.9	81.8	0	A	311
13.56700	36.2	QP	19.7	-33.4	32.2	-9.7	50.4	60.1	0	A	311
13.71000	29.8	QP	19.7	-33.4	32.2	-16.1	40.5	56.6	0	A	311
14.01000	29.7	QP	19.7	-33.4	32.2	-16.2	29.5	45.7	0	A	311
14.02000	29.6	QP	19.7	-33.4	32.2	-16.3	29.5	45.8	0	A	311

CHART: WITH FACTOR, ANT TYPE: LOOP Except for the data below: adequate margin data below the limits.
CALCULATION: RESULT = READING + ANT FACTOR + LOSS (CABLE + ATTEN. + D.FACTOR) - 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.

Spurious emission

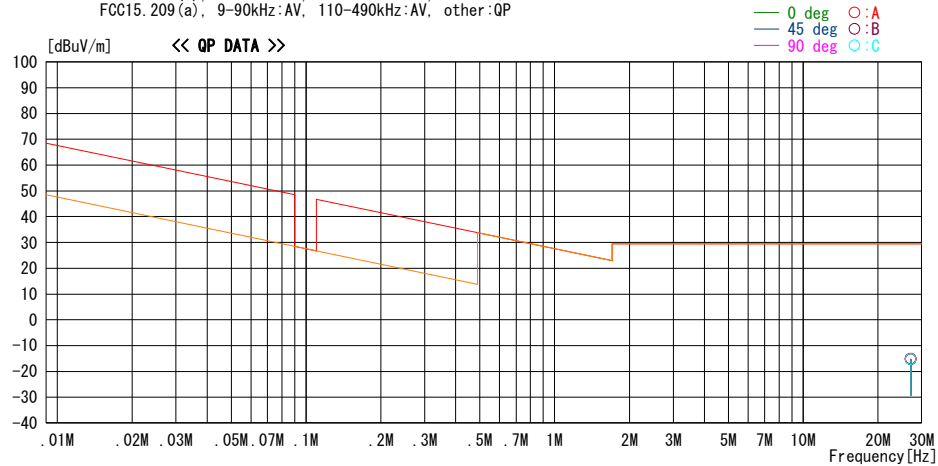
DATA OF RADIATED EMISSION TEST

UL Japan, Inc. Head Office EMC Lab. No.3 Semi Anechoic Chamber
Date : 2013/11/13

Report No. : 10097200H
Power : AC 120V / 60Hz
Temp./ Humi. : 21deg. C / 42% RH
Engineer : Hiroshi Kukita

Mode / Remarks : Transmitting mode (13.56MHz), Mod ON

LIMIT : FCC15.209(a), 9-90kHz:PK, 110-490kHz:PK, other:QP
FCC15.209(a), 9-90kHz:AV, 110-490kHz:AV, other:QP



Freq.	Reading	DET	Ant. Fac	Loss	Gain	Result	Limit	Margin	Antenna	Table	Comment
[MHz]	[dBuV]		[dB/m]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	[deg]	[deg]	
27.12000	29.5	QP	20.7	-33.2	32.2	-15.2	29.5	44.7	90	C	359
27.12000	29.5	QP	20.7	-33.2	32.2	-15.2	29.5	44.7	45	B	359
27.12000	29.6	QP	20.7	-33.2	32.2	-15.1	29.5	44.6	0	A	359
27.12000	29.5	QP	20.7	-33.2	32.2	-15.2	29.5	44.7	135	A	359
27.12000	29.4	QP	20.7	-33.2	32.2	-15.3	29.5	44.8	45	B	359

CHART: WITH FACTOR, ANT TYPE: LOOP Except for the data below : adequate margin data below the limits.
CALCULATION : RESULT = READING + ANT FACTOR + LOSS (CABLE + ATTEN. + D.FACTOR) - 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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Spurious emission

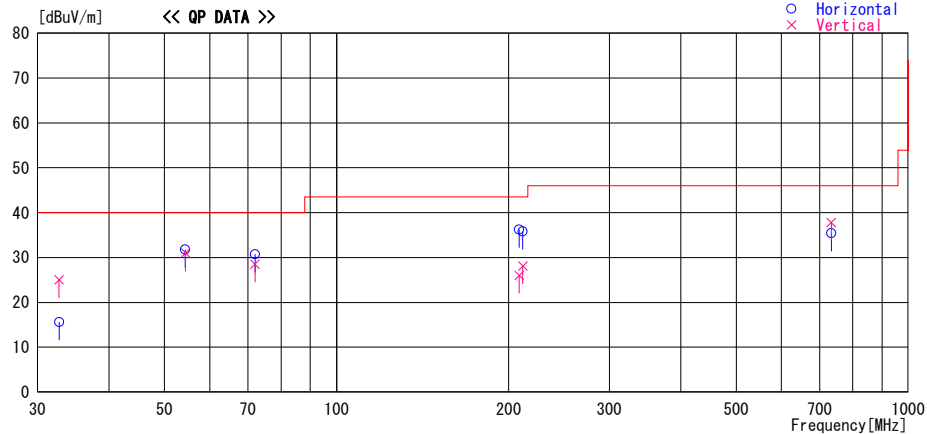
DATA OF RADIATED EMISSION TEST

UL Japan, Inc. Head Office EMC Lab. No.3 Semi Anechoic Chamber
Date : 2013/11/14

Report No. : 10097200H
Power : AC 120V / 60Hz
Temp./Humi. : 21deg. C / 42% RH
Engineer : Hiroshi Kukita

Mode / Remarks : Transmitting mode (13.56MHz), Mod ON

LIMIT : FCC15.209 3m, below 1GHz:QP, above 1GHz:PK
Except for the data below : adequate margin data below the limits.



Frequency	Reading	DET	Antenna	Loss&	Level	Angle	Height	Polar.	Limit	Margin	Comment
[MHz]	[dBuV]		Factor	Gain	[dBuV/m]	[Deg]	[cm]		[dBuV/m]	[dB]	
32.707	33.0	QP	17.2	-25.2	25.0	352	100	Vert.	40.0	15.0	
32.740	23.6	QP	17.2	-25.2	15.6	9	180	Hori.	40.0	24.4	
54.349	46.9	QP	9.6	-24.7	31.8	88	256	Hori.	40.0	8.2	
54.448	46.2	QP	9.5	-24.7	31.0	161	100	Vert.	40.0	9.0	
72.000	48.7	QP	6.5	-24.5	30.7	73	265	Hori.	40.0	9.3	
72.001	46.5	QP	6.5	-24.5	28.5	35	100	Vert.	40.0	11.5	
208.705	42.5	QP	16.7	-23.0	36.2	204	167	Hori.	43.5	7.3	
208.706	32.3	QP	16.7	-23.0	26.0	278	100	Vert.	43.5	17.5	
211.730	42.0	QP	16.7	-22.9	35.8	40	156	Hori.	43.5	7.7	
211.734	34.3	QP	16.7	-22.9	28.1	285	100	Vert.	43.5	15.4	
733.552	34.0	QP	20.9	-19.5	35.4	347	188	Hori.	46.0	10.6	
733.554	36.4	QP	20.9	-19.5	37.8	0	135	Vert.	46.0	8.2	

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

UL Japan, Inc.

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Spurious emission

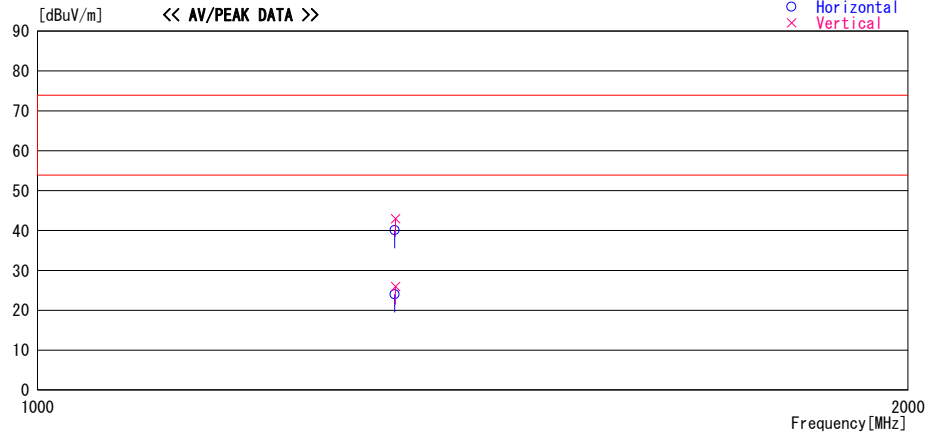
DATA OF RADIATED EMISSION TEST

UL Japan, Inc. Head Office EMC Lab. No.3 Semi Anechoic Chamber
Date : 2013/11/16

Report No. : 10097200H
Power : AC 120V / 60Hz
Temp./Humi. : 22deg. C / 45% RH
Engineer : Hiroshi Kukita

Mode / Remarks : Transmitting mode (13.56MHz), Mod ON

LIMIT : FCC15.209 3m, below 1GHz:QP, above 1GHz:PK
FCC15.209 3m, below 1GHz:QP, above 1GHz:AV



Frequency	Reading	DET	Antenna	Loss&	Level	Angle	Height	Polar.	Limit	Margin	Comment
[MHz]	[dBuV]		Factor	Gain	[dBuV/m]	[Deg]	[cm]		[dBuV/m]	[dB]	
1329.038	47.1	PK	25.1	-32.1	40.1	23	100	Hori.	73.9	33.8	
1329.038	31.0	AV	25.1	-32.1	24.0	23	100	Hori.	53.9	29.9	
1329.676	33.0	AV	25.1	-32.1	26.0	184	100	Vert.	53.9	27.9	
1329.676	50.0	PK	25.1	-32.1	43.0	184	100	Vert.	73.9	30.9	

CHART:WITH FACTOR ANT TYPE: -30MHz:LOOP, 30-300MHz:BICONICAL, 300MHz-1000MHz:LOGPERIODIC, 1000MHz-:HORN
CALCULATION:RESULT = READING + ANT FACTOR + LOSS(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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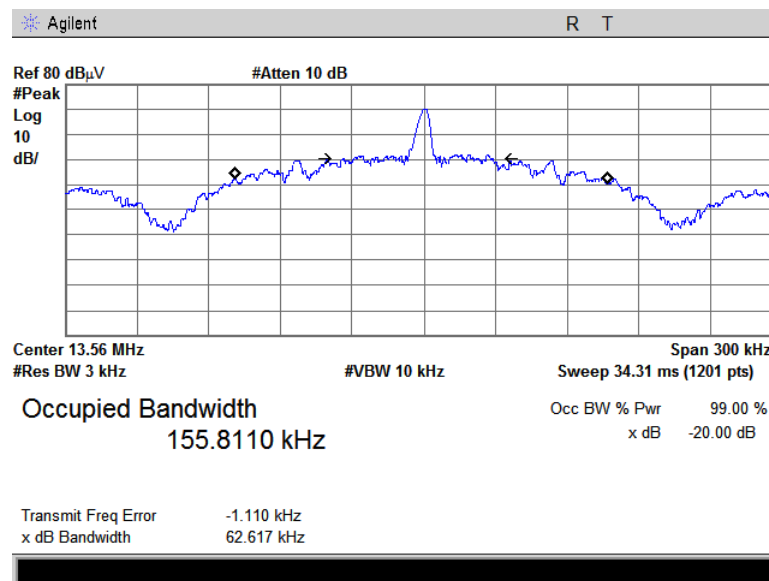
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20dB Bandwidth and 99% Occupied Bandwidth

Test place Head Office EMC Lab. No.11 measurement room
Report No. 10097200H
Date 11/11/2013
Temperature/ Humidity 20 deg.C / 50% RH
Engineer Kazuya Yoshioka
Mode Tx Mod on

FREQ [MHz]	20dB Bandwidth [kHz]	99% Occupied Bandwidth [kHz]
13.56	62.62	155.81



Frequency Tolerance

Test place	Head Office EMC Lab. No.11 measurement room
Report No.	10097200H
Date	11/11/2013
Temperature/ Humidity	20 deg.C / 50% RH
Engineer	Kazuya Yoshioka
Mode	Tx Mod on

Test Condition deg.C Volts		Test Timing	Measured freq [MHz]	Freq error [MHz]	Result [ppm]	Limit (+/- 0.01%) [+/- ppm]	Margin [ppm]
20deg.C	138V	Power on	13.560474	0.000474	34.96	100.00	65.04
		on 2min.	13.560491	0.000491	36.21	100.00	63.79
		on 5min.	13.560491	0.000491	36.21	100.00	63.79
		on 10min.	13.560483	0.000483	35.62	100.00	64.38
	120V	Power on	13.560564	0.000564	41.59	100.00	58.41
		on 2min.	13.560416	0.000416	30.68	100.00	69.32
		on 5min.	13.560454	0.000454	33.48	100.00	66.52
		on 10min.	13.560462	0.000462	34.07	100.00	65.93
	102V	Power on	13.560445	0.000445	32.82	100.00	67.18
		on 2min.	13.560449	0.000449	33.11	100.00	66.89
		on 5min.	13.560458	0.000458	33.78	100.00	66.22
		on 10min.	13.560458	0.000458	33.78	100.00	66.22
50deg.C.		Power on	13.560383	0.000383	28.24	100.00	71.76
		on 2min.	13.560404	0.000404	29.79	100.00	70.21
		on 5min.	13.560424	0.000424	31.27	100.00	68.73
		on 10min.	13.560408	0.000408	30.09	100.00	69.91
40deg.C.		Power on	13.560424	0.000424	31.27	100.00	68.73
		on 2min.	13.560379	0.000379	27.95	100.00	72.05
		on 5min.	13.560458	0.000458	33.78	100.00	66.22
		on 10min.	13.560379	0.000379	27.95	100.00	72.05
30deg.C.		Power on	13.560437	0.000437	32.23	100.00	67.77
		on 2min.	13.560437	0.000437	32.23	100.00	67.77
		on 5min.	13.560399	0.000399	29.42	100.00	70.58
		on 10min.	13.560320	0.000320	23.60	100.00	76.40
20deg.C.		Power on	13.560564	0.000564	41.59	100.00	58.41
		on 2min.	13.560416	0.000416	30.68	100.00	69.32
		on 5min.	13.560454	0.000454	33.48	100.00	66.52
		on 10min.	13.560462	0.000462	34.07	100.00	65.93
10deg.C.		Power on	13.560470	0.000470	34.66	100.00	65.34
		on 2min.	13.560491	0.000491	36.21	100.00	63.79
		on 5min.	13.560483	0.000483	35.62	100.00	64.38
		on 10min.	13.560483	0.000483	35.62	100.00	64.38
0deg.C.		Power on	13.560533	0.000533	39.31	100.00	60.69
		on 2min.	13.560512	0.000512	37.76	100.00	62.24
		on 5min.	13.560504	0.000504	37.17	100.00	62.83
		on 10min.	13.560479	0.000479	35.32	100.00	64.68
-10deg.C.		Power on	13.560474	0.000474	34.96	100.00	65.04
		on 2min.	13.560454	0.000454	33.48	100.00	66.52
		on 5min.	13.560454	0.000454	33.48	100.00	66.52
		on 10min.	13.560508	0.000508	37.46	100.00	62.54
-20deg.C		Power on	13.560462	0.000462	34.07	100.00	65.93
		on 2min.	13.560499	0.000499	36.80	100.00	63.20
		on 5min.	13.560449	0.000449	33.11	100.00	66.89
		on 10min.	13.560483	0.000483	35.62	100.00	64.38
-30deg.C		Power on	13.560349	0.000349	25.74	100.00	74.26
		on 2min.	13.560366	0.000366	26.99	100.00	73.01
		on 5min.	13.560404	0.000404	29.79	100.00	70.21
		on 10min.	13.560441	0.000441	32.52	100.00	67.48

Limit : 13.56 13.56 MHz +/-0.01 % (+/- 100ppm) = +/- 0.001356 MHz

*The test was begun from 50 deg.C and the temperature was lowered each 10 deg.C.

APPENDIX 2: Test instruments

EMI test equipment

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
MAEC-01	Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 10m	DA-06881	CE	2013/08/01 * 12
MOS-27	Thermo-Hygrometer	CUSTOM	CTH-201	A08Q26	CE	2013/02/26 * 12
MJM-01	Measure	KDS	ES19-55	-	CE	-
COTS-MEMI	EMI measurement program	TSJ	TEPTO-DV	-	CE/RE	-
MTR-09	EMI Test Receiver	Rohde & Schwarz	ESU26	100412	CE	2013/06/07 * 12
MLS-02	LISN(AMN)	Schwarzbeck	NSLK8127	8127383	CE(EUT)	2013/07/11 * 12
MLS-03	LISN(AMN)	Schwarzbeck	NSLK8127	8127384	CE(AE)	2013/03/18 * 12
MTA-30	Terminator	TME	CT-01	-	CE	2013/01/10 * 12
MCC-03	Coaxial Cable	Fujikura/Suhner/TSJ	5D-2W(20m)/ 3D-2W(7.5m)/ RG400u(1.5m)/ RFM-E421(Switcher)	-/ 01068(Switcher)	CE	2013/09/12 * 12
MAT-64	Attenuator(13dB)	JFW Industries, Inc.	50FP-013H2 N	-	CE	2013/01/09 * 12
MSA-06	Spectrum Analyzer	Agilent	E4407B	MY45107638	FT	2013/04/05 * 12
MPA-14	Pre Amplifier	SONOMA INSTRUMENT	310	260833	FT	2013/03/12 * 12
MLPA-06	Loop Antenna	UL Japan	-	-	FT	Pre Check
MCH-06	Temperature and Humidity Chamber	Tabai Espec	PL-1KT	14007630	FT	2013/04/25 * 12
MOS-19	Thermo-Hygrometer	Custom	CTH-201	0001	FT	2012/12/25 * 12
MAEC-03	Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-10005	RE	2013/02/28 * 12
MOS-13	Thermo-Hygrometer	Custom	CTH-180	-	RE	2013/02/26 * 12
MJM-16	Measure	KOMELON	KMC-36	-	RE	-
MSA-05	Spectrum Analyzer	Advantest	R3273	160400285	RE	2013/11/08 * 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	2013/04/05 * 12
MPA-13	Pre Amplifier	SONOMA INSTRUMENT	310	260834	RE	2013/03/12 * 12
MLPA-01	Loop Antenna	Rohde & Schwarz	HFH2-Z2	100017	RE	2013/10/30 * 12
MCC-112	Coaxial cable	Fujikura/Suhner/TSJ	5D-2W(10m)/ SFM141(3m)/ sucoform141-PE(1m)/ 421-010(1.5m)/ RFM-E321(Switcher)	-/00640	RE	2013/07/23 * 12
MCC-143	Coaxial Cable	UL Japan	-	-	RE	2013/07/22 * 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	2013/03/12 * 12
MRENT-112	Spectrum Analyzer	Agilent	E4440A	MY48250080	RE	2013/10/04 * 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: CE: Conducted Emission
RE: Radiated Emission
FT: Frequency Tolerance

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