



Test report No. : 10181198S-C-R1
Page : 1 of 30
Issued date : January 30, 2015
Revised date : February 2, 2015
FCC ID : AZD226

RADIO TEST REPORT

Test Report No.: 10181198S-C-R1

Applicant : Canon Inc.
Type of Equipment : NFC module
Model No. : CH9-1372
FCC ID : AZD226
Test regulation : FCC Part15 Subpart C: 2015
Test result : Complied

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6. The opinions and the interpretations to the result of the description in this report are outside scopes where UL Japan has been accredited.
7. This report is a revised version of "10181198S-C ". "10181198S-C " is replaced with this report.

Date of test: November 3 to December 25, 2014

Tested by: 
Kenichi Adachi
Engineer
Consumer Technology Division

Approved by : 
Toyokazu Imamura
Leader
Consumer Technology Division



- ☐ The testing in which "Non-accreditation" is displayed is outside the accreditation scopes in UL Japan.
☒ There is no testing item of "Non-accreditation".

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13-EM-F0429

REVISION HISTORY

Original Test Report No.: 10181198S-C

[illegible]

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Contents

	<u>Page</u>
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: Conducted emission	10
SECTION 6: Radiated emission (Fundamental and Spurious emission)	11
SECTION 7: 20dB bandwidth & Occupied bandwidth (99%).....	13
SECTION 8: Frequency tolerances	13
Contents of APPENDIXES.....	14
APPENDIX 1: Data of radio tests.....	15
APPENDIX 2: Test instruments	25
APPENDIX 3: Photographs of test setup.....	27

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SECTION 1: Customer information

Company Name : Canon Inc.
Address : 30-2, Shimomaruko 3-chome, Ohta-ku, Tokyo, 146-8501 JAPAN
Telephone Number : +81- 3-3757-6218
Facsimile Number : +81- 3-3757-8431
Contact Person : Takato Matsuura

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

2.1 Identification of E.U.T.

Type of Equipment : NFC Module
Model No. : CH9-1372
Serial No. : Refer to Section 4.2
Rating : DC3.3V
Receipt Date of Sample : November 14, 2014
Country of Mass-production : China
Condition of EUT : Engineer 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

Model: CH9-1372 (referred to as the EUT in this report) is a NFC module.

The clock frequencies used in the EUT:

Crystal : 27.12MHz

<Radio part>

Equipment type : Transceiver
Frequency of operation : 13.56MHz
Type of modulation : ASK
ITU code : A1D

FCC 15.31 (e)

The stable voltage (DC3.0V) is provided constantly to RF part via regulator. Therefore, the EUT complies with the requirement.

FCC 15.203

It is impossible for end users to replace the antenna, because the antenna is mounted inside of the EUT. Therefore the EUT complies with the requirement.

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SECTION 3: Test specification, procedures & results

3.1 Test specification

Test specification : FCC Part 15 Subpart C: 2015, final revised on January 21, 2015
Title : FCC 47CFR Part15 Radio Frequency Device Subpart C Intentional Radiators
Section 15.207 Conducted limits
Section 15.209 Radiated emission limits, general requirements
Section 15.215 Additional provisions to the general radiated emission limitations
Section 15.225 Operation within the band 13.110-14.010MHz

* The revision on January 21, 2015 does not affect the test specification applied to the EUT.

3.2 Procedures & Results

Item	Test Procedure	Specification	Remarks	Deviation	Worst Margin	Results
Conducted emission	ANSI C63.4:2009 7. AC powerline conducted emission measurements	FCC 15.207	-	N/A	4.0 dB Freq.: 13.56000 MHz Detector: Average Phase: L1	Complied
Electric field strength of Fundamental emission	ANSI C63.4:2009 13. Measurement of intentional radiators	FCC 15.225 (a)	Radiated	N/A	68.6 dB Polarization: Vertical	Complied
Electric field strength of Spurious emission (within the 13.110-14.010MHz band)	ANSI C63.4:2009 13. Measurement of intentional radiators	FCC 15.225 (b)(c)	Radiated	N/A	41.5dB Polarization: Vertical Freq.: 13.772MHz	Complied
Electric field strength of Spurious emission (outside of the 13.110-14.010MHz band)	ANSI C63.4:2009 13. Measurement of intentional radiators	FCC 15.209 FCC 15.225 (d)	Radiated	N/A	3.8 dB Freq.: 609.639 MHz Polarization: Vertical	Complied
20dB bandwidth	ANSI C63.4:2009 13. Measurement of intentional radiators	FCC 15.215 (c)	Radiated	N/A	-	-
Frequency tolerance	ANSI C63.4:2009 13. Measurement of intentional radiators	FCC 15.225 (e)	Radiated	N/A	-	Complied

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

The voltage variation for testing was set to 2.81 to 3.795V, according to the EUT's specification. The EUT does not operate outside the range.

3.3 Addition to standard

Item	Test Procedure	Specification	Remarks	Worst Margin	Results
Occupied Bandwidth (99%)	ANSI C63.4:2009 13. Measurement of intentional radiators, RSS-Gen 6.6	-	Radiated	-	-

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

Other than above, no addition, exclusion nor deviation has been made from the standard.

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3.4 Uncertainty

The following uncertainties have been calculated to provide a confidence level of 95% using a coverage factor k=2.

Item	Frequency range	No.1 SAC ^{*1} /SR ^{*2} (±)	No.2 SAC/SR (±)	No.3 SAC/SR (±)
Conducted emission (AC Mains) AMN/LISN	150kHz-30MHz	3.6 dB	3.4 dB	3.4 dB
Radiated emission (Measurement distance: 3m)	9kHz-30MHz	3.7 dB	3.5 dB	3.5 dB
	30MHz-300MHz	4.8 dB	4.9 dB	4.7 dB
	300MHz-1GHz	5.0 dB	5.0 dB	4.8 dB

*1: SAC=Semi-Anechoic Chamber

*2: SR= Shielded Room is applied besides radiated emission

Conducted emission test

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

Radiated emission test

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

Frequency tolerance

Frequency (Normal condition) Measurement uncertainty for this test was: (±) 7.9×10^{-8} .

Frequency (Extreme condition) Measurement uncertainty for this test was: (±) 7.9×10^{-8} .

Temperature uncertainty for this test was: (±) 0.95deg.C

Voltage uncertainty for this test was: (±) 0.24%

Other tests

Bandwidth Measurement uncertainty for this test was: (±) 0.66%

3.5 Test location

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JAB Accreditation No. : RTL02610

	IC Registration No.	Width x Depth x Height (m)	Size of reference ground plane (m) / horizontal conducting plane	Maximum measurement distance
☒ No.1 Semi-anechoic chamber	2973D-1	20.6 x 11.3 x 7.65	20.6 x 11.3	10m
☐ No.2 Semi-anechoic chamber	2973D-2	20.6 x 11.3 x 7.65	20.6 x 11.3	10m
☒ No.3 Semi-anechoic chamber	2973D-3	12.7 x 7.7 x 5.35	12.7 x 7.7	5m
☐ No.4 Semi-anechoic chamber	-	8.1 x 5.1 x 3.55	8.1 x 5.1	-
☒ No.1 Shielded room	-	6.8 x 4.1 x 2.7	6.8 x 4.1	-
☐ No.2 Shielded room	-	6.8 x 4.1 x 2.7	6.8 x 4.1	-
☐ No.3 Shielded room	-	6.3 x 4.7 x 2.7	6.3 x 4.7	-
☐ No.4 Shielded room	-	4.4 x 4.7 x 2.7	4.4 x 4.7	-
☒ No.5 Shielded room	-	7.8 x 6.4 x 2.7	7.8 x 6.4	-
☐ No.6 Shielded room	-	7.8 x 6.4 x 2.7	7.8 x 6.4	-
☐ No.7 Shielded room	-	2.76 x 3.76 x 2.4	2.76 x 3.76	-
☐ No.8 Shielded room	-	3.45 x 5.5 x 2.4	3.45 x 5.5	-
☐ No.1 Measurement room	-	2.55 x 4.1 x 2.5	2.55 x 4.1	-

3.6 Test setup, Data of test & Test instruments

Refer to APPENDIX 1 to 3.

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

4.1 Operating mode

The EUT exercise program used during testing was designed to exercise the various system components in a manner similar to typical use.

Test item	Operating mode	Tested frequency
All item	Transmitting,	13.56MHz

*The transmission pattern has modulated transmission (PN9 data, with / without card) and unmodulated transmission, and the test was performed with the below worst modes which were determined based on the pre-test.

Test Item		Mode
Conducted emission		Modulated (Type F 424kbps, PN9 data ,with card)
Radiated emission	Fundamental	Modulated (Type A, PN9 data ,without card)
	Below 30MHz	Modulated (Type A, PN9 data ,without card)
	Above 30MHz	Modulated (Type A, PN9 data ,with card)
Bandwidth		Modulated (Type A, B, F 212kbps, F 424kbps, without card)
Frequency tolerance		Unmodulated

Software for testing : TeraTerm Ver.4.82, Power settings: Fixed

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

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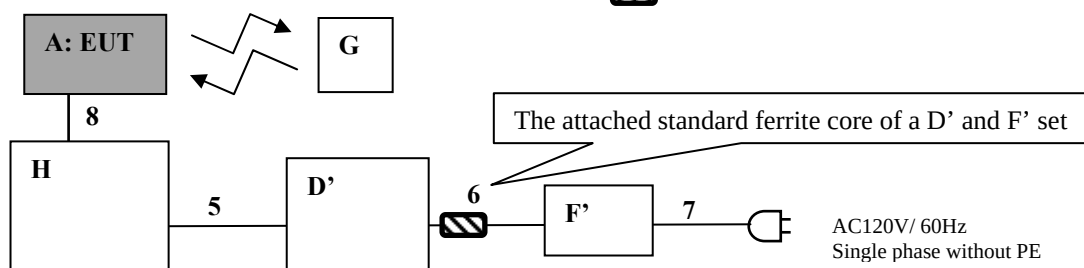
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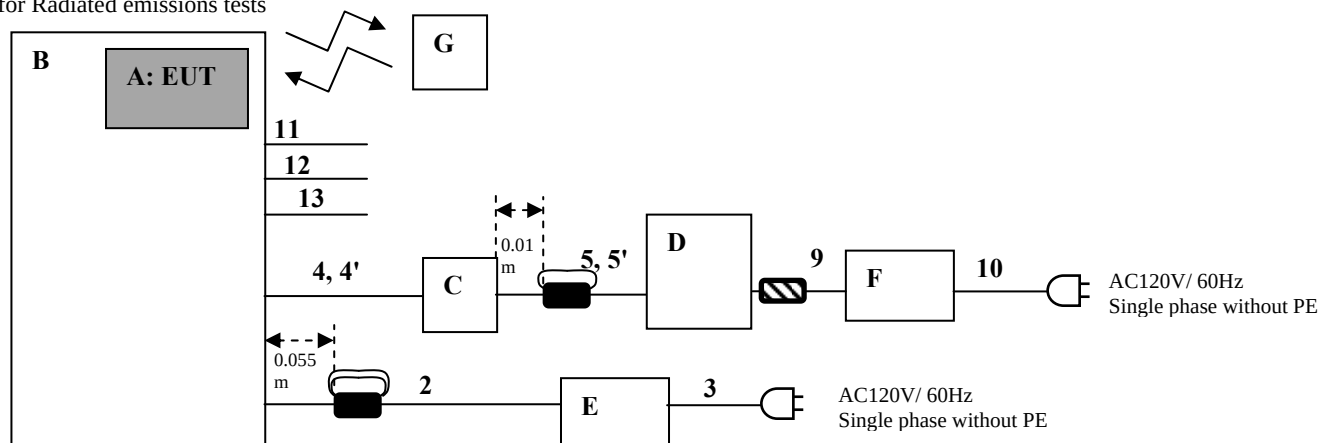
4.2 Configuration and peripherals

for Conducted emissions test, Test fixture tests, bandwidth test

■ : Ferrite core (refer to table)
▨ : Standard ferrite core



for Radiated emissions tests



* Test data was taken under worse case conditions.

**The core is a standard ferrite core attached to DC cable and not used to reduce the noise from the EUT. Therefore, that does not affect the emission level of the EUT.

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Description of EUT and support equipment

No.	Item	Model number	Serial number	Manufacturer	FCC ID (Remarks)
A	NFC Module	CH9-1372	14020159 (other test) 14020097 (only Voltage variation)	Canon Inc.	EUT
B	Reader/Writer	90B3-6N10100	010010000215	Canon Inc.	-
C	Jig(Serial board)	-	-	Canon Inc.	-
D	Personal Computer	Latitude E5500	33406843389 -	Dell	-
D'	Personal Computer	ThinkPad T43(2668-D59)	L3-YHFNX	IBM	-
E	AC Adapter	CA-PS700	2227-033-018	Canon Inc.	-
F	AC Adapter	HA90PE0-00	0W529	Dell	Personal Computer
F'	AC Adapter	92P1020	11S92P1020Z1Z9RM63Y 1A6	IBM	Personal Computer
G	Tag Type A	-	-	-	-
	Tag Type B	-	-	-	-
	Tag Type F (212k)	-	-	-	-
	Tag Type F (424k)	-	-	-	-
H	Jig	-	-	Canon Inc.	-

List of cables used

No.	Cable Name	Length (m)	Shield		Remark
			Cable	Connector	
2	DC	1.7	Unshielded	Unshielded	with Ferrite core: ZCAT2035-0930(TDK), 3 turn
3	AC	1.8	Unshielded	Unshielded	-
4	Signal	0.2	Unshielded	Unshielded	for below 30MHz no ferrite core
4'	Signal	0.2	Unshielded	Unshielded	for above 30MHz only with Ferrite core:GRFC-13 (Kitagawa Industries co., ltd.), 3 turn
5	USB	0.9	Shielded	Shielded	for below 30MHz no ferrite core
5'	USB	0.9	Shielded	Shielded	for above 30MHz only with Ferrite core:GRFC-13 (Kitagawa Industries co., ltd.), 2 turn
6	DC	1.8	Unshielded	Unshielded	-
7	AC	0.8	Unshielded	Unshielded	-
8	Flat	0.26	Unshielded	Unshielded	-
9	DC	1.8	Unshielded	Unshielded	-
10	AC	0.8	Unshielded	Unshielded	-
11	USB	3.0	Shielded	Shielded	-
12	HDMI	3.0	Shielded	Shielded	-
13	LAN	1.5	Unshielded	Unshielded	-

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SECTION 5: Conducted emission

5.1 Operating environment

The test was carried out in a shielded room.

Temperature : Refer to APPENDIX 1.
Humidity : Refer to APPENDIX 1.

5.2 Test configuration

The EUT was placed on a 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 was aligned and was flushed with rear of tabletop. All other surfaces of tabletop were at least 80cm from any other grounded conducting surface.

The EUT was located 0.8m from Line Impedance Stabilization Network (LISN) 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 0.3m to 0.4m long. Each EUT current-carrying power lead, except the ground (safety) lead, was individually connected through an LISN to the input power source. All unused 50ohm connectors of the LISN were resistively terminated in 50ohm when not connected to the measuring equipment. Photographs of the set up are shown in Appendix 3.

5.3 Test conditions

Frequency range : 0.15 - 30MHz
EUT position : Table top

5.4 Test procedure

The AC Mains Terminal Continuous disturbance Voltage had been measured with the EUT via DC power supply within a shielded room. The EUT via Laptop PC was connected to a Line Impedance Stabilization Network (LISN). An overview sweep with peak detection has been performed.

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

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

Detection Type : Quasi-Peak/ CISPR-Average
IF Bandwidth : 9kHz

5.5 Results

Summary of the test results : Pass

Refer to APPENDIX 1.

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SECTION 6: Radiated emission (Fundamental and Spurious emission)

6.1 Operating environment

The test was carried out in a semi-anechoic chamber.

Temperature : Refer to APPENDIX 1.

Humidity : Refer to APPENDIX 1.

6.2 Test configuration

EUT was placed on a platform of nominal size, 0.5m by 0.5m, and 1.0m by 2.0m, raised 0.8m above the conducting ground plane.

EUT was set up typical spacing for the other equipment. Photographs of the set up are shown in Appendix 3.

6.3 Test conditions

Frequency range : 9kHz - 1GHz

Test distance : 3m

EUT position : Table top

6.4 Test procedure

The Radiated Electric Field Strength intensity has been measured on a semi-anechoic chamber with a ground plane at a distance of 3m.

Although these tests were performed other than open area test site, adequate comparison measurements were confirmed against 30 m open area test site. Therefore sufficient tests were made to demonstrate that the alternative site produces results that correlate with the ones of tests made in an open field based on KDB 937606. These tests were performed in semi anechoic chamber. Therefore the measured level of emissions may be higher than if measurements were made without a ground plane. However test results were confirmed to pass against standard limit.

The Radiated Electric Field Strength intensity has been measured with a ground plane and at a distance of 3m

Frequency: From 9kHz to 30MHz at distance 3m

The EUT was rotated a full revolution in order to obtain the maximum value of the electric field intensity.

The measurements were performed for vertical polarization (antenna angle: 0deg.to 360deg.) and horizontal polarization. Drawing of the antenna direction is shown in Figure 1.

Frequency: From 30MHz to 1GHz at distance 3m (Refer to Figure 2).

The measuring antenna height was 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.

Measurements were performed with QP, PK, and AV detector.

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

	9kHz to 90kHz & 110kHz to 150kHz	90kHz to 110kHz	150kHz to 490kHz	490kHz to 30MHz	30MHz to 1GHz
Detector Type	PK/AV	QP	PK/AV	QP	QP
IF Bandwidth	200Hz	200Hz	9kHz	9kHz	120kHz
Measuring antenna	Loop antenna				Biconical (30-299.99MHz) Logperiodic (300MHz-1GHz)

* FCC 15.31 (f)(2) (9kHz-30MHz)

9kHz – 490kHz [Limit at 3m]= [Limit at 300m]-40log (3[m]/300[m])

490kHz – 30MHz [Limit at 3m]= [Limit at 30m]-40log (3[m]/30[m])

6.5 Results

Summary of the test results : Pass

Refer to APPENDIX 1.

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Figure 1. Direction of the Loop Antenna

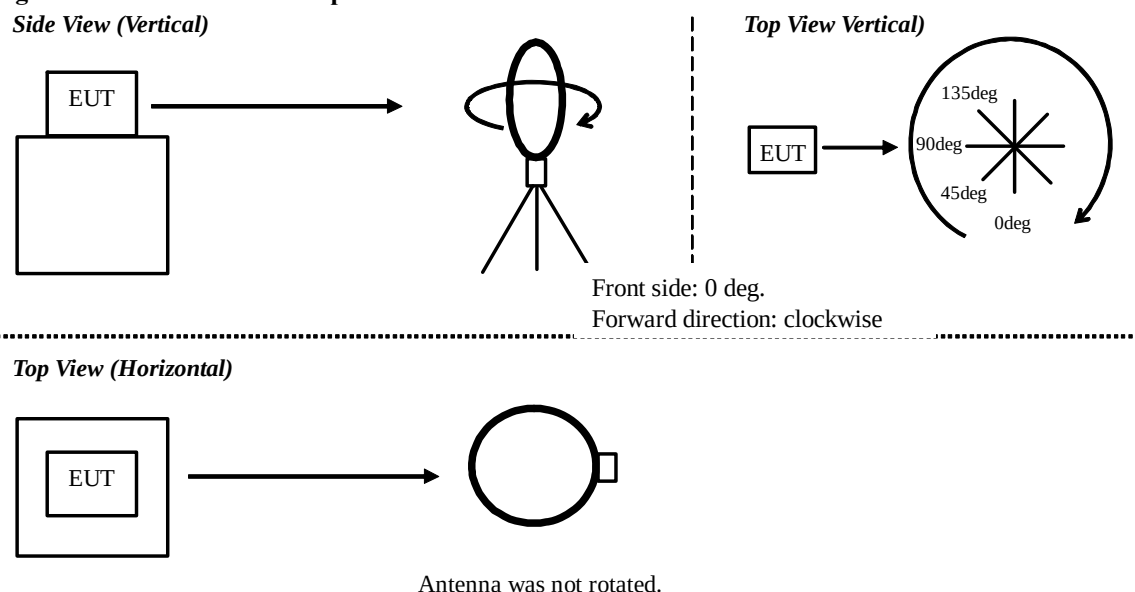
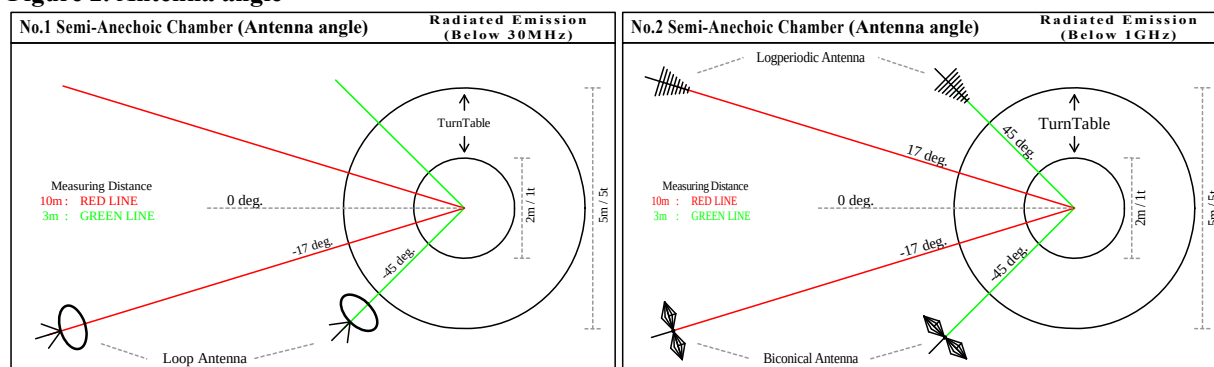


Figure 2. Antenna angle



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. See data.

Combinations of the worst case

Model	Worst case	
	below 30MHz	30-1000MHz
Horizontal	Z-axis (NFC type A, without Tag)	Z-axis (NFC type A with Tag)
Vertical	Z-axis (NFC type A, without Tag)	Y-axis (NFC type A with Tag)

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SECTION 7: 20dB bandwidth & Occupied bandwidth (99%)

Test procedure

The test was measured with a spectrum analyzer using a test fixture.

Results

Summary of the test results: Pass
Refer to APPENDIX 1.

SECTION 8: Frequency tolerances

Test procedure

The test was measured with a frequency counter using a test fixture.
The temperature test was started after the temperature stabilization time of 30 minutes.
The test was begun from 50 deg.C and the temperature was lowered each 10 deg.C.

Results

Summary of the test results: Pass
Refer to APPENDIX 1.

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Contents of APPENDIXES

APPENDIX 1: Data of Radio tests

Conducted emission
Radiated emission
Frequency tolerance
Bandwidth

APPENDIX 2: Test instruments

Test instruments

APPENDIX 3: Photographs of test setup

Conducted emission
Radiated emission

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APPENDIX 1: Data of radio tests

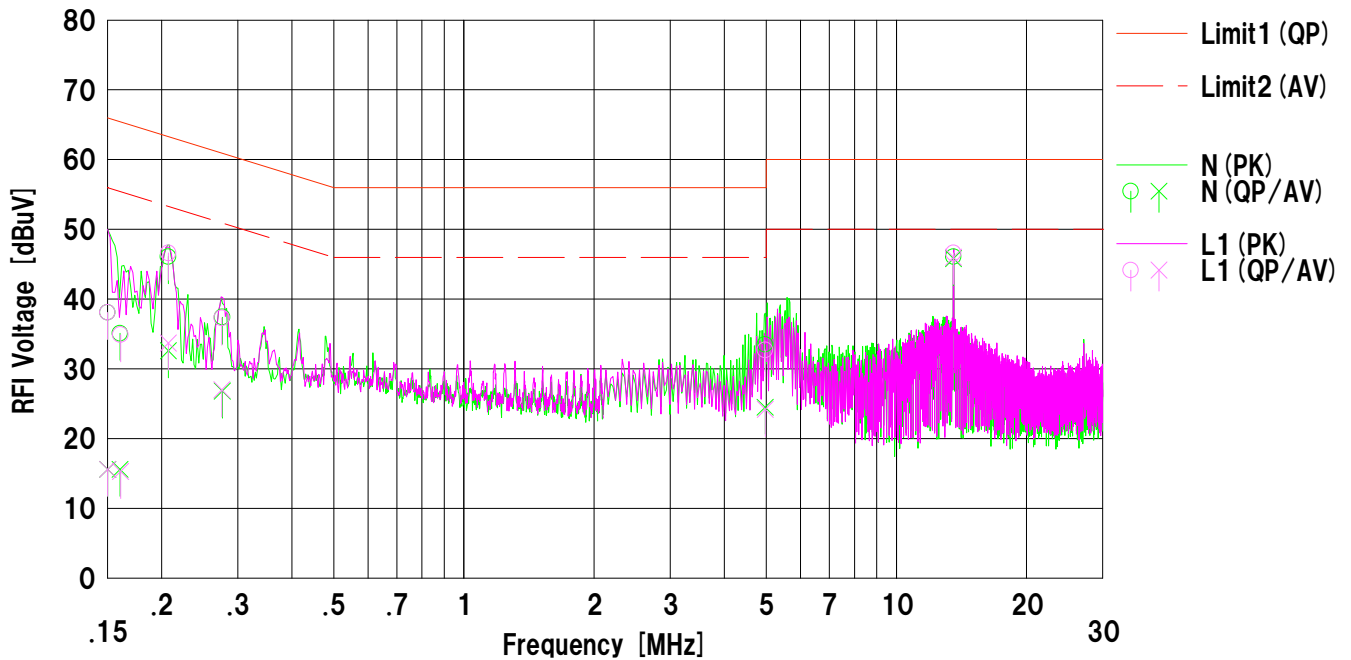
DATA OF CONDUCTED EMISSION TESTUL Japan,Inc. Shonan EMC Lab. No.1 Shielded Room
Date : 2014/11/21

Company : Canon INC.
 Kind of EUT : NFC Module
 Model No. : CH9-1372
 Serial No. : 14020159
 Remarks : Card Type F (2) / With Card

Mode : Transmitting 13.56MHz
 Order No. : 10181198S
 Power : DC 3.3V (AC adapter:AC120V/60Hz)
 Temp./Humi. : 25deg.C. / 40%RH

Limit1 : FCC 15C (15.207) QP
 Limit2 : FCC 15C (15.207) AV

Engineer : Yohsuke Matsuzawa



No.	Freq. [MHz]	Reading		C.Fac [dB]	Results		Limit		Margin		Phase	Comment
		<QP> [dBuV]	<AV> [dBuV]		<QP> [dBuV]	<AV> [dBuV]	<QP> [dBuV]	<AV> [dBuV]	<QP> [dB]	<AV> [dB]		
1	0.15000	25.5	3.0	12.6	38.1	15.6	66.0	56.0	27.9	40.4	N	
2	0.16024	22.5	3.0	12.6	35.1	15.6	65.4	55.4	30.3	39.8	N	
3	0.20729	33.5	20.0	12.6	46.1	32.6	63.3	53.3	17.2	20.7	N	
4	0.27632	24.8	14.2	12.6	37.4	26.8	60.9	50.9	23.5	24.1	N	
5	4.97374	20.5	11.5	13.0	33.5	24.5	56.0	46.0	22.5	21.5	N	
6	13.56000	32.8	32.5	13.3	46.1	45.8	60.0	50.0	13.9	4.2	N	
7	0.15000	25.5	3.0	12.6	38.1	15.6	66.0	56.0	27.9	40.4	L1	
8	0.16072	22.3	2.7	12.6	34.9	15.3	65.4	55.4	30.5	40.1	L1	
9	0.20742	34.0	21.1	12.6	46.6	33.7	63.3	53.3	16.7	19.6	L1	
10	0.27564	24.7	14.4	12.6	37.3	27.0	60.9	50.9	23.6	23.9	L1	
11	4.97401	19.7	11.2	13.0	32.7	24.2	56.0	46.0	23.3	21.8	L1	
12	13.56000	33.3	32.7	13.3	46.6	46.0	60.0	50.0	13.4	4.0	L1	

Calculation: Result [dBuV] = Reading [dBuV] + C.Fac (LISN+Cable+ATT) [dB]
 LISN: SLS-02

Data of Electric field strength of Fundamental emission and Spurious emission within the band: FCC15.225(a)(b)(c)

UL Japan, Inc.

Shonan EMC Lab., No.3 Semi-Anechoic Chamber

Company: Canon Inc.
 Equipment: NFC Module (Reader / Writer)
 Model: CH9-1372 (90B3-6N10100)
 Sample No.: 14020159 (010010000215)
 Power: DC3.3V (AC120V/60Hz)
 Mode: Transmitting 13.56MHz

Regulation: FCC Part15 Subpart C 15.225
 Test Distance: 3m
 Date: December 22, 2014
 Temperature: 23 deg.C
 Humidity: 24 %RH
 ENGINEER: Kenichi Adachi

Remarks: : NFC type A, without Tag (Axis:Hor_Z / Ver_Z) , Vertical polarization (antenna angle) of the worst case: 0deg

Fundamental emission

No.	FREQ [MHz]	Test Receiver Reading		Antenna Factor [dB/m]	Loss [dB]	AMP GAIN [dB]	Distance factor [dB]	RESULT		LIMIT (30m) [dBuV/m]	MARGIN		EUT angle	
		Hor [dBuV]	Ver [dBuV]					Hor [dBuV/m]	Ver [dBuV/m]		Hor [dB]	Ver [dB]	Hor [deg.]	Ver [deg.]
1	13.560	52.0	62.6	18.6	6.3	32.2	-40.0	4.7	15.3	83.9	79.2	68.6	278	269

Calculation: Result[dBuV/m]=Reading[dBuV]+Ant.Fac[dB/m]+Loss(Cable+ATT)[dB]-Gain(AMP)[dB]+Distance factor[dB]

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

Limits (30m)

•13.553MHz to 13.567MHz : 83.9dBuV/m (FCC 15.225(a))

Spurious emission within the band

No.	FREQ [MHz]	Test Receiver Reading		Antenna Factor [dB/m]	Loss [dB]	AMP GAIN [dB]	Distance factor [dB]	RESULT		LIMIT (30m) [dBuV/m]	MARGIN	
		Hor [dBuV]	Ver [dBuV]					Hor [dBuV/m]	Ver [dBuV/m]		Hor [dB]	Ver [dB]
1	13.031	30.3	33.3	18.6	6.3	32.2	-40.0	-17.0	-14.0	29.5	46.5	43.5
2	13.110	29.9	30.2	18.6	6.3	32.2	-40.0	-17.4	-17.1	29.5	46.9	46.6
3	13.349	36.5	45.0	18.6	6.3	32.2	-40.0	-10.8	-2.3	40.5	51.3	42.8
4	13.410	32.5	40.1	18.6	6.3	32.2	-40.0	-14.8	-7.2	40.5	55.3	47.7
5	13.455	36.8	46.0	18.6	6.3	32.2	-40.0	-10.5	-1.3	50.4	60.9	51.7
6	13.553	38.3	48.4	18.6	6.3	32.2	-40.0	-9.0	1.1	50.4	59.4	49.3
7	13.567	38.7	48.8	18.6	6.3	32.2	-40.0	-8.6	1.5	50.4	59.0	48.9
8	13.666	37.2	46.7	18.6	6.3	32.2	-40.0	-10.1	-0.6	50.4	60.5	51.0
9	13.710	32.8	40.9	18.5	6.3	32.2	-40.0	-14.6	-6.5	40.5	55.1	47.0
10	13.772	37.3	46.4	18.5	6.3	32.2	-40.0	-10.1	-1.0	40.5	50.6	41.5
11	14.010	30.0	30.3	18.5	6.3	32.2	-40.0	-17.4	-17.1	29.5	46.9	46.6
12	14.090	30.5	34.2	18.5	6.3	32.2	-40.0	-16.9	-13.2	29.5	46.4	42.7

Calculation: Result[dBuV/m]=Reading[dBuV]+Ant.Fac[dB/m]+Loss(Cable+ATT)[dB]-Gain(AMP)[dB]+Distance factor[dB]

Outside filed strength frequencies

- Fc±7kHz:13.553MHz to 13.567MHz
- Fc±150kHz:13.410MHz to 13.710MHz
- Fc±450kHz:13.110MHz to 14.010MHz

Fc = 13.56MHz

Limits (30m)

- 13.410MHz to 13.553MHz and 13.567MHz to 13.710MHz : 50.4dBuV/m (FCC 15.225(b))
- 13.110MHz to 13.410MHz and 13.710MHz to 14.010MHz : 40.5dBuV/m (FCC 15.225(c))
- Below 13.110MHz and Above 14.010MHz : 29.5dBuV/m (FCC 15.225(d)and FCC 15.209)

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Radiated Emission

UL Japan, Inc.
Shonan EMC Lab. No.3 and No. 1 Semi Anechoic Chamber

Company: Canon Inc.
Equipment: NFC Module (Reader / Writer)
Model: CH9-1372 (90B3-6N10100)
Sample No.: 14020159 (010010000215)
Power: DC3.3V (AC120V/60Hz)
Mode: Transmitting 13.56MHz

Regulation: FCC Part15 Subpart C 15.225
Test Distance: 3m
Date: December 25, 2014
Temperature: 22 deg.C
Humidity: 24 %RH
ENGINEER: Kenichi Adachi

EUT axis: Below 30MHz(Horizontal: Z-axis, Vertical: Z-axis), NFC type A, without Tag
Above 30MHz(Horizontal: Z-axis, Vertical: Y-axis), NFC type A with Tag

Remarks:

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg.]	Remark
Hori.	27.12	QP	29.9	19.4	6.5	32.2	-40.0	-16.4	29.5	45.9	-	278	* Limit: 30m
Hori.	40.680	QP	39.8	14.1	7.2	31.8	0.0	29.3	40.0	10.7	245	307	
Hori.	67.800	QP	41.2	6.6	7.3	31.8	0.0	23.3	40.0	16.7	265	308	
Hori.	94.921	QP	38.5	9.1	8.2	31.8	0.0	24.0	43.5	19.5	181	299	
Hori.	149.161	QP	36.9	14.8	8.7	31.8	0.0	28.6	43.5	14.9	216	307	
Hori.	176.281	QP	33.3	16.0	8.9	31.8	0.0	26.4	43.5	17.1	181	22	
Hori.	338.688	QP	48.9	15.0	6.6	31.8	0.0	38.7	46.0	7.3	100	213	
Hori.	609.639	QP	37.6	19.3	8.1	32.1	0.0	32.9	46.0	13.1	150	119	
Vert.	27.12	QP	30.0	19.4	6.5	32.2	-40.0	-16.3	29.5	45.8	-	269	* Limit: 30m
Vert.	40.680	QP	46.5	14.1	7.2	31.8	0.0	36.0	40.0	4.0	100	56	
Vert.	67.800	QP	49.9	6.6	7.3	31.8	0.0	32.0	40.0	8.0	100	55	
Vert.	94.921	QP	43.9	9.1	8.2	31.8	0.0	29.4	43.5	14.1	100	57	
Vert.	149.161	QP	39.4	14.8	8.7	31.8	0.0	31.1	43.5	12.4	100	298	
Vert.	176.281	QP	32.5	16.0	8.9	31.8	0.0	25.6	43.5	17.9	100	244	
Vert.	338.688	QP	44.5	15.0	6.6	31.8	0.0	34.3	46.0	11.7	100	16	
Vert.	609.639	QP	46.9	19.3	8.1	32.1	0.0	42.2	46.0	3.8	100	307	

Result = Reading + Ant Factor + Loss (Cable+ATT+ΔAF(above 30MHz)) - Gain(Ampriifier) + Distance factor(below 30MHz)

* Other frequency noises omitted in this report were not seen or have enough margin (more than 20dB).

* Carrier level (Result at 3m): Hor= 44.7dBuV/m, Ver= 55.3 dBuV/m

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Data of Frequency Tolerance

UL Japan, Inc.

Shonan EMC Lab. No.5 Shielded room

Company Canon Inc.
 Equipment NFC Module
 Model CH9-1372
 Serial No. 14020159
 Power DC 3.3V
 Mode Transmitting 13.56 MHz

Regulation FCC Part15 Subpart C 15.225 (e)
 Date November 5, 2014
 Temperature 24 deg.C
 Humidity 42 %RH
 ENGINEER Akio Hayashi

Temperature Variation: -20deg.C

Test Conditions	Original Frequency (MHz)	Measure Frequency (MHz)	Frequency Error (MHz)	Frequency tolerance (%)	Limit (%)
startup	13.56	13.560101	0.000101	0.00074	0.010
after 2minutes	13.56	13.560123	0.000123	0.00091	0.010
after 5minutes	13.56	13.560124	0.000124	0.00091	0.010
after 10minutes	13.56	13.560125	0.000125	0.00092	0.010

Temperature Variation: -10deg.C

Test Conditions	Original Frequency (MHz)	Measure Frequency (MHz)	Frequency Error (MHz)	Frequency tolerance (%)	Limit (%)
startup	13.56	13.560157	0.000157	0.00116	0.010
after 2minutes	13.56	13.560171	0.000171	0.00126	0.010
after 5minutes	13.56	13.560173	0.000173	0.00128	0.010
after 10minutes	13.56	13.560117	0.000117	0.00087	0.010

Temperature Variation: 0deg.C

Test Conditions	Original Frequency (MHz)	Measure Frequency (MHz)	Frequency Error (MHz)	Frequency tolerance (%)	Limit (%)
startup	13.56	13.560185	0.000185	0.00136	0.010
after 2minutes	13.56	13.560189	0.000189	0.00139	0.010
after 5minutes	13.56	13.560190	0.000190	0.00140	0.010
after 10minutes	13.56	13.560189	0.000189	0.00139	0.010

Temperature Variation: 10deg.C

Test Conditions	Original Frequency (MHz)	Measure Frequency (MHz)	Frequency Error (MHz)	Frequency tolerance (%)	Limit (%)
startup	13.56	13.560189	0.000189	0.00139	0.010
after 2minutes	13.56	13.560186	0.000186	0.00137	0.010
after 5minutes	13.56	13.560186	0.000186	0.00137	0.010
after 10minutes	13.56	13.560186	0.000186	0.00137	0.010

Temperature Variation: 20deg.C

Test Conditions	Original Frequency (MHz)	Measure Frequency (MHz)	Frequency Error (MHz)	Frequency tolerance (%)	Limit (%)
startup	13.56	13.560173	0.000173	0.00128	0.010
after 2minutes	13.56	13.560169	0.000169	0.00125	0.010
after 5minutes	13.56	13.560169	0.000169	0.00125	0.010
after 10minutes	13.56	13.560169	0.000169	0.00125	0.010

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Data of Frequency Tolerance

Temperature Variation: 30deg.C

Test Conditions	Original Frequency (MHz)	Measure Frequency (MHz)	Frequency Error (MHz)	Frequency tolerance (%)	Limit (%)
startup	13.56	13.560155	0.000155	0.00114	0.010
after 2minutes	13.56	13.560149	0.000149	0.00110	0.010
after 5minutes	13.56	13.560148	0.000148	0.00109	0.010
after 10minutes	13.56	13.560148	0.000148	0.00109	0.010

Temperature Variation: 40deg.C

Test Conditions	Original Frequency (MHz)	Measure Frequency (MHz)	Frequency Error (MHz)	Frequency tolerance (%)	Limit (%)
startup	13.56	13.560133	0.000133	0.00098	0.010
after 2minutes	13.56	13.560130	0.000130	0.00096	0.010
after 5minutes	13.56	13.560128	0.000128	0.00094	0.010
after 10minutes	13.56	13.560128	0.000128	0.00094	0.010

Temperature Variation: 50deg.C

Test Conditions	Original Frequency (MHz)	Measure Frequency (MHz)	Frequency Error (MHz)	Frequency tolerance (%)	Limit (%)
startup	13.56	13.560121	0.000121	0.00089	0.010
after 2minutes	13.56	13.560120	0.000120	0.00088	0.010
after 5minutes	13.56	13.560120	0.000120	0.00088	0.010
after 10minutes	13.56	13.560120	0.000120	0.00088	0.010

Data of Frequency Tolerance

UL Japan, Inc.

Shonan EMC Lab. No.5 Shielded room

Company Canon Inc.

Equipment NFC Module

Model CH9-1372

Serial No. 14020097

Power DC 3.3V

Mode Transmitting 13.56 MHz

Regulation FCC Part15 Subpart C 15.225 (e)

Date November 7, 2014

Temperature 25 deg.C

Humidity 50 %RH

ENGINEER Akio Hayashi

Voltage Variation: DC 2.81 V**Temperature Variation: 20deg.C**

Test Conditions	Original Frequency (MHz)	Measure Frequency (MHz)	Frequency Error (MHz)	Frequency tolerance (%)	Limit (%)
startup	13.56	13.560204	0.000204	0.00150	0.010
after 2minutes	13.56	13.560198	0.000198	0.00146	0.010
after 5minutes	13.56	13.560195	0.000195	0.00144	0.010
after 10minutes	13.56	13.560194	0.000194	0.00143	0.010

Voltage Variation: DC 3.795 V**Temperature Variation: 20deg.C**

Test Conditions	Original Frequency (MHz)	Measure Frequency (MHz)	Frequency Error (MHz)	Frequency tolerance (%)	Limit (%)
startup	13.56	13.560220	0.000220	0.00162	0.010
after 2minutes	13.56	13.560211	0.000211	0.00156	0.010
after 5minutes	13.56	13.560206	0.000206	0.00152	0.010
after 10minutes	13.56	13.560202	0.000202	0.00149	0.010

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20dB bandwidth & 99% Occupied bandwidth: FCC 15.215 / RSS-Gen

UL Japan, Inc.

Shonan EMC Lab. No.5 Shielded Room

Company: Canon Inc.
Equipment: NFC Module
Model: CH9-1372
Sample No.: 14020159
Power: DC3.3V
Mode: Transmitting 13.56MHz
NFC type A

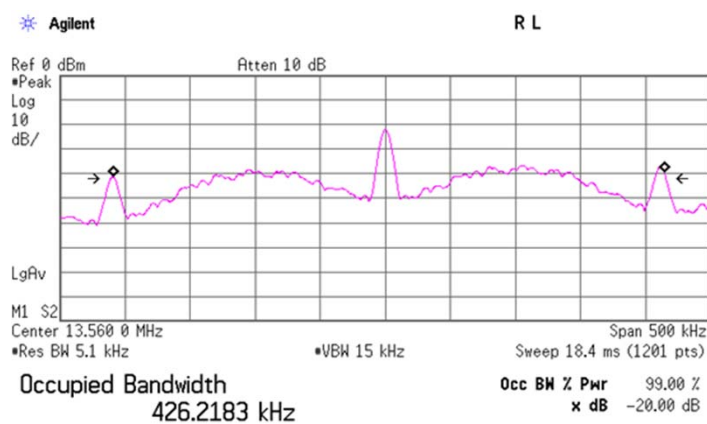
Regulation: FCC Part15 Subpart C 15.215

Date: November 5, 2014

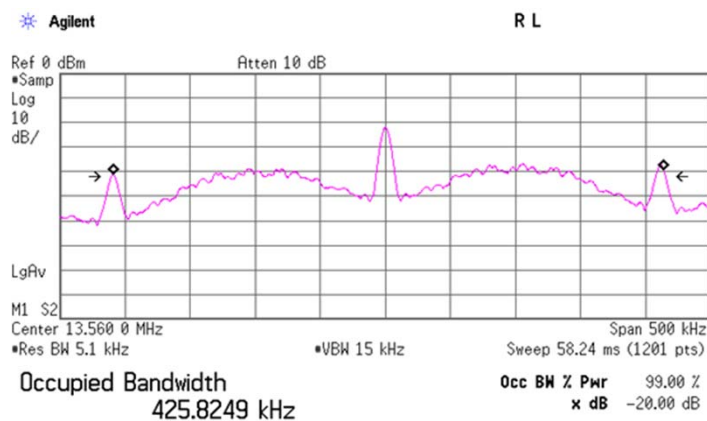
Temperature: 24 deg.C

Humidity: 42 %RH

ENGINEER: Akio Hayashi

20dB Bandwidth: 429.733 kHz

Transmit Freq Error 2.683 kHz
x dB Bandwidth 429.733 kHz

99% Occupied Bandwidth: 425.825 kHz

Transmit Freq Error 2.790 kHz
x dB Bandwidth 428.971 kHz*

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20dB bandwidth & 99% Occupied bandwidth: FCC 15.215 / RSS-Gen

UL Japan, Inc.

Shonan EMC Lab. No.5 Shielded Room

Company: Canon Inc.
Equipment: NFC Module
Model: CH9-1372
Sample No.: 14020159
Power: DC3.3V
Mode: Transmitting 13.56MHz
NFC type B

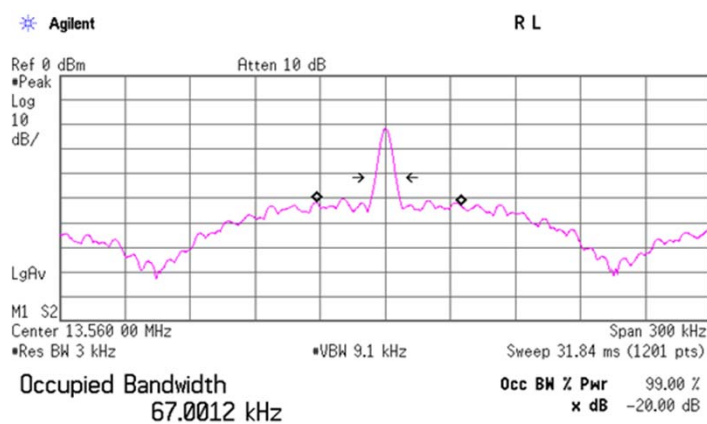
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Date: November 5, 2014

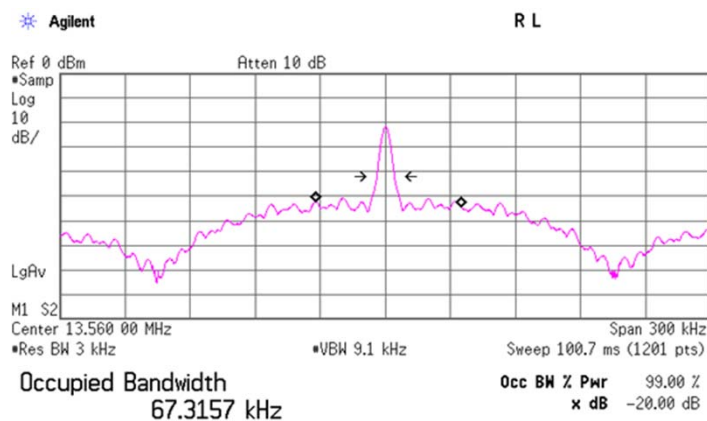
Temperature: 24 deg.C

Humidity: 42 %RH

ENGINEER: Akio Hayashi

20dB Bandwidth: 9.789 kHz

Transmit Freq Error 1.568 kHz
x dB Bandwidth 9.789 kHz

99% Occupied Bandwidth: 67.316 kHz

Transmit Freq Error 1.597 kHz
x dB Bandwidth 8.342 kHz*

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20dB bandwidth & 99% Occupied bandwidth: FCC 15.215 / RSS-Gen

UL Japan, Inc.

Shonan EMC Lab. No.5 Shielded Room

Company: Canon Inc.
Equipment: NFC Module
Model: CH9-1372
Sample No.: 14020159
Power: DC3.3V
Mode: Transmitting 13.56MHz
NFC type F, 212kbps

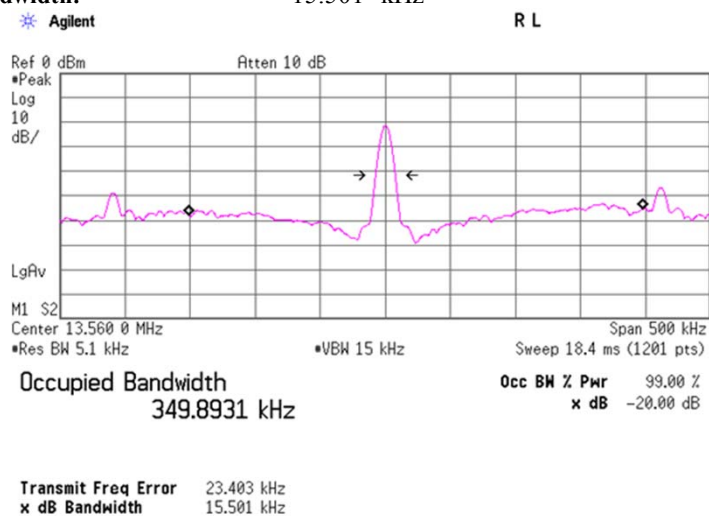
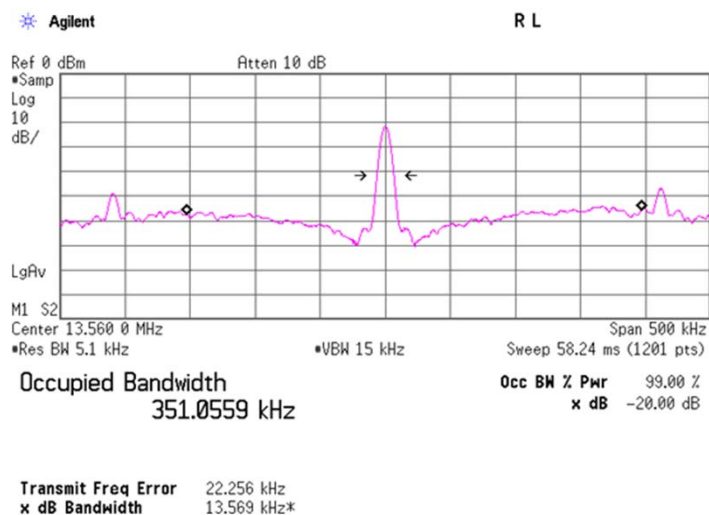
Regulation: FCC Part15 Subpart C 15.215

Date: November 5, 2014

Temperature: 24 deg.C

Humidity: 42 %RH

ENGINEER: Akio Hayashi

20dB Bandwidth: 15.501 kHz**99% Occupied Bandwidth:** 351.056 kHz

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20dB bandwidth & 99% Occupied bandwidth: FCC 15.215 / RSS-Gen

UL Japan, Inc.

Shonan EMC Lab. No.5 Shielded Room

Company: Canon Inc.
Equipment: NFC Module
Model: CH9-1372
Sample No.: 14020159
Power: DC3.3V
Mode: Transmitting 13.56MHz
NFC type F, 424kbps

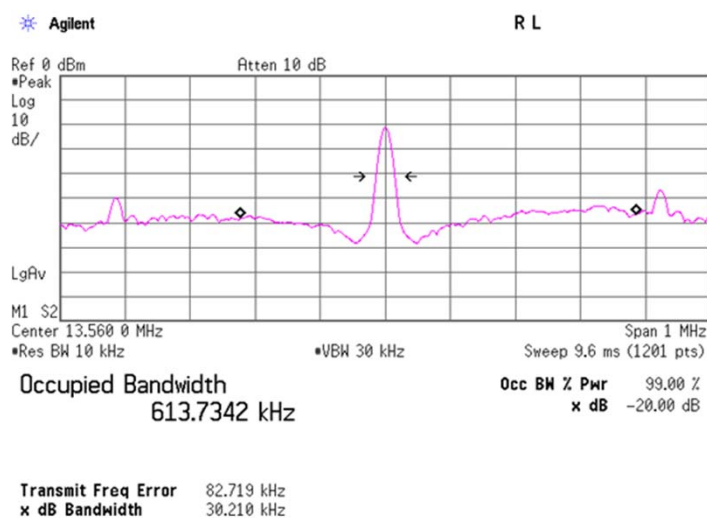
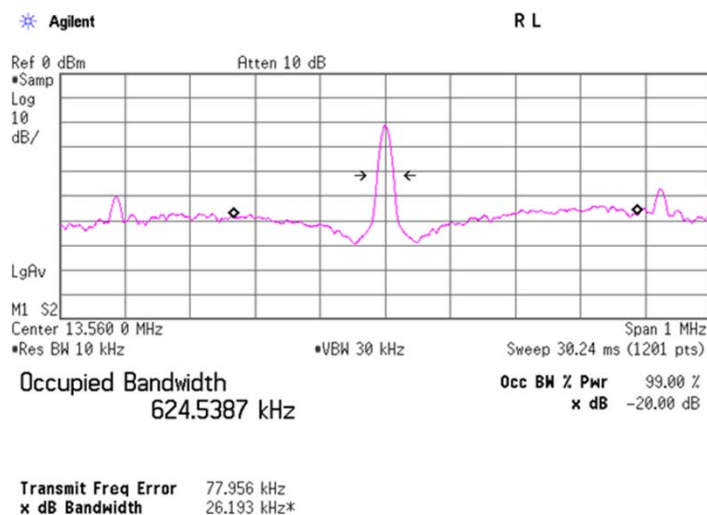
Regulation: FCC Part15 Subpart C 15.215

Date: November 5, 2014

Temperature: 24 deg.C

Humidity: 42 %RH

ENGINEER: Akio Hayashi

20dB Bandwidth: 30.210 kHz**99% Occupied Bandwidth:** 624.539 kHz

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APPENDIX 2

Test Instruments

EMI test equipment

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
SAEC-03(NSA)	Semi-Anechoic Chamber	TDK	SAEC-03(NSA)	3	RE	2014/07/14 * 12
SLP-02	Loop Antenna	Rohde & Schwarz	HFH2-Z2	100218	RE	2014/11/30 * 12
SAT6-06	Attenuator	JFW	50HF-006N	-	RE	2014/02/17 * 12
SCC-C1/C2/C3/C4/C5/C10/SRSE-03	Coaxial Cable&RF Selector	Fujikura/Fujikura/Suhner/Suhner/Suhner/TOYO	8D2W/12DSFA/141PE/141PE/141PE/141PE/NS4906	-/0901-271(RF Selector)	RE	2014/04/25 * 12
SAF-03	Pre Amplifier	SONOMA	310N	290213	RE	2014/02/14 * 12
STR-06	Test Receiver	Rohde & Schwarz	ESCI	101259	RE	2014/03/04 * 12
COTS-SEMI-1	EMI Software	TSJ	TEPTO-DV(RE,CE,RF1,MF)	-	RE, CE	-
SJM-15	Measure	ASKUL	-	-	RE	-
SOS-05	Humidity Indicator	A&D	AD-5681	4062518	RE	2014/10/30 * 12
SAEC-01(NSA)	Semi-Anechoic Chamber	TDK	SAEC-01(NSA)	1	RE	2014/07/09 * 12
SBA-01	Biconical Antenna	Schwarzbeck	BBA9106	91032664	RE	2014/10/18 * 12
KAT6-04	Attenuator	INMET	18N-6dB	-	RE	2014/12/19 * 12
SCC-A1/A3/A5/A7/A8/A13/SRSE-01	Coaxial Cable&RF Selector	Fujikura/Fujikura/Suhner/Suhner/Suhner/TOYO	8D2W/12DSFA/141PE/141PE/141PE/141PE/NS4906	-/0901-269(RF Selector)	RE	2014/04/25 * 12
SLA-01	Logperiodic Antenna	Schwarzbeck	UHALP9108A	UHALP 9108-A 0888	RE	2014/10/18 * 12
KAT3-09	Attenuator	JFW IND. INC.	50HF-003N	-	RE	2014/08/27 * 12
SCC-A2/A4/A6/A7/A8/A13/SRSE-01	Coaxial Cable&RF Selector	Fujikura/Fujikura/Suhner/Suhner/Suhner/TOYO	8D2W/12DSFA/141PE/141PE/141PE/141PE/NS4906	-/0901-269(RF Selector)	RE	2014/04/25 * 12
SAF-01	Pre Amplifier	SONOMA	310N	290211	RE	2014/02/17 * 12
STR-01	Test Receiver	Rohde & Schwarz	ESU40	100093	RE, CE	2014/11/11 * 12
SOS-01	Humidity Indicator	A&D	AD-5681	4062555	RE	2014/10/30 * 12
SJM-13	Measure	ASKUL	-	-	RE, CE	-

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

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

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

Test Item :

CE: Conducted emission,

RE: Radiated emission,

BW: bandwidth

TF: Test Fixture

APPENDIX 2

Test Instruments

EMI test equipment

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
SSA-03	Spectrum Analyzer	Agilent	E4448A	MY48250152	BW	2014/02/03 * 12
SSCA-01	Search coil	LANGER	RF-R 400-1	02-0634	BW,TF	Pre Check
SCH-01	Temperature and Humidity Chamber	Espec	PL-1KT	14020837	TF	2014/04/15 * 12
SFC-01	Microwave Counter	Agilent	53151A	US40511493	TF	2014/04/01 * 12
SOS-09	Humidity Indicator	A&D	AD-5681	4061484	BW,TF	2014/03/07 * 12
SCC-A12/A13/ SRSE-01	Coaxial Cable&RF Selector	Suhner/Suhner/TOYO	RG223U/141PE/N S4906	-/0901-269(RF Selector)	CE	2014/04/25 * 12
SLS-02	LISN	Rohde & Schwarz	ENV216	100512	CE	2014/03/05 * 12
SAT3-06	Attenuator	JFW	50HF-003N	-	CE	2014/02/17 * 12
SOS-02	Humidity Indicator	A&D	AD-5681	4063343	CE	2014/03/07 * 12

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

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

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

Test Item :

CE: Conducted emission,

RE: Radiated emission,

BW: bandwidth

TF: Test Fixture