



RADIO TEST REPORT

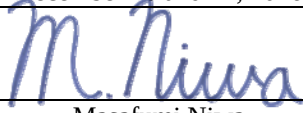
Test Report No. : 11555571H-C-R2

Applicant : SINFONIA TECHNOLOGY CO., LTD.
Type of Equipment : Card Printer
Model No. : ZC10L
Test regulation : FCC Part 15 Subpart C: 2016
FCC ID : ZQUZC10L
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 test report covers Radio technical requirements. It does not cover administrative issues such as Manual or non-Radio test related Requirements. (if applicable)
7. This report is a revised version of 11555571H-C-R1. 11555571H-C-R1 is replaced with this report.

Date of test: December 10 and 14, 2016

Representative test engineer:

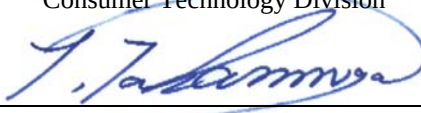


Masafumi Niwa

Engineer

Consumer Technology Division

Approved by:



Tsubasa Takayama

Engineer

Consumer Technology Division



NVLAP LAB CODE: 200572-0

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://japan.ul.com/resources/emc_accredited/

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13-EM-F0429

REVISION HISTORY

Original Test Report No.: 11555571H-C

[illegible]

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SECTION 1: Customer information

[Applicant]
Company Name : SINFONIA TECHNOLOGY CO., LTD.
Address : 100-Takegahana-cho Ise-shi Mie-ken 516-8550 JAPAN
Telephone Number : +81-596-36-1286
Facsimile Number : +81-596-36-3884
Contact Person : Tsutomu Inagaki

[Manufacturer]
Company Name : ZEBRA TECHNOLOGIES CORPORATION
Address : 3 Overlook Point, Lincolnshire IL. 60069
Telephone Number : 1.847.793.5719
Contact Person : Chuck Derrow

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

2.1 Identification of E.U.T.

Type of Equipment : Card Printer
Model No. : ZC10L
Serial No. : Refer to Section 4, Clause 4.2
Receipt Date of Sample : December 7, 2016
Country of Mass-production : Japan
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

Model: ZC10L (referred to as the EUT in this report) is a Card Printer.
The EUT receive image data from a PC and print images.

General Information

The clock frequencies used in the EUT: : External: 24 MHz, CPU: Internal 375 MHz,
SDRM: 133 MHz, FPGA: 60 MHz, RFID: 13.56 MHz,

Radio Specification

Radio Type : Transceiver
Frequency of Operation : 13.56 MHz
Modulation : ASK
Power Supply (inner) : DC 3.3 V
Antenna type : Pattern antenna
Clock frequency (Maximum) : 13.56 MHz
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
FCC Part 15 final revised on November 14, 2016 and effective December 14, 2016

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

* The revision on November 14, 2016, 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	ANSI C63.10:2013 6 Standard test methods	Section 15.207	[QP] 11.6 dB 13.56000 MHz, L	Complied	Radiated
	<IC>RSS-Gen 8.8	<IC>RSS-Gen 8.8	[AV] 6.6 dB 13.56000 MHz, L 6.3 dB 0.67988 MHz, L *1)		
Electric Field Strength of Fundamental Emission	ANSI C63.10:2013 6 Standard test methods	Section 15.225(a)	75.1 dB, 13.56000 MHz, QP, 0 deg.	Complied	Radiated
	<IC> RSS-Gen 6.4, 6.12	<IC>RSS-210 B.6			
Spectrum Mask	ANSI C63.10:2013 6 Standard test methods	Section 15.225(b)(c)	46.5 dB, 14.01000 MHz, QP, 0 deg.	Complied	Radiated
	<IC>RSS-Gen 6.4, 6.13	<IC> RSS-210 B.6			
20dB Bandwidth	ANSI C63.10:2013 6 Standard test methods	Section15.215(c)	See data	Complied	Radiated
	<IC> -	<IC> -			
Electric Field Strength of Spurious Emission	ANSI C63.10:2013 6 Standard test methods	Section 15.209, Section 15.225 (d)	6.2 dB 99.647 MHz, Vertical, QP	Complied	Radiated
	<IC>RSS-Gen 6.4, 6.13	<IC>RSS-210 B.6			
Frequency Tolerance	ANSI C63.10:2013 6 Standard test methods	Section 15.225(e)	See data	Complied	Radiated
	<IC>RSS-Gen 6.11, 8.11	<IC> RSS-210 B.6			
Note: UL Japan, Inc.'s EMI Work Procedures No. 13-EM-W0420 and 13-EM-W0422					
*1) As for EMC noise, the test was performed as Class A device of FCC Part 15 Subpart B.					

FCC Part 15.31 (e)

This EUT provides stable voltage (DC 3.3 V) constantly to RF Module regardless of input voltage. Therefore, this EUT complies with the requirement.

However, the supply voltage was varied and tested at 85 % and 115 % of the nominal rated supply voltage during frequency tolerance test according to Section 15.225(e).

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 6.6	-	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 $k = 2$.

Frequency range	Conducted emission using AMN(LISN) (+/-)
0.009 MHz - 0.15 MHz	3.5 dB
0.15 MHz - 30 MHz	3.0 dB

Test distance	Radiated emission (+/-)
	9 kHz - 30 MHz
3 m	3.8 dB
10 m	3.7 dB

*Measurement distance

Polarity	Radiated emission (Below 1GHz)			
	(3 m*)(+/-)		(10 m*)(+/-)	
	30 MHz - 200 MHz	200 MHz - 1000 MHz	30 MHz - 200 MHz	200 MHz - 1000 MHz
Horizontal	5.0 dB	5.3 dB	5.0 dB	5.0 dB
Vertical	4.7 dB	5.9 dB	5.0 dB	5.1 dB

Radiated emission (Above 1GHz)				
(3 m*)(+/-)		(1 m*)(+/-)		(10 m*)(+/-)
1 GHz - 6 GHz	6 GHz - 18 GHz	10 GHz - 26.5 GHz	26.5 GHz - 40 GHz	1 GHz -18 GHz
5.2 dB	5.4 dB	5.5 dB	5.5 dB	5.4 dB

* Measurement distance

Frequency Tolerance
Spectrum Analyzer (+)
9×10^{-2} ppm

Conducted emission test

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

Radiated emission test (3 m)

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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	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	-	8.0 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 Test set up, Test data, 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)	The EUT Transmits and Receives at the same time and there is no receiving mode.
The EUT was operated in a manner similar to typical use during the tests.	

Test Item	Operating mode*
Conducted emission	Tx Mod on,without Tag
Electric Field Strength of Fundamental Emission	Tx Mod on,without Tag
Spectrum Mask	Tx Mod on,without Tag
20 dB Bandwidth	Tx Mod on,with Tag
99 % Occupied Bandwidth	Tx Mod on,without Tag
Electric Field Strength of Spurious Emission	Tx Mod on,without Tag
Frequency Tolerance	Tx Mod on, without Tag

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

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

Frequency Tolerance:

Temperature : -30 deg. C to +50 deg. C; Step 10 deg. C (-30deg.C: Reference)

Voltage : Normal Voltage AC 120 V

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

*This EUT provides stable voltage (DC 3.3 V) constantly to RF Part regardless of input voltage

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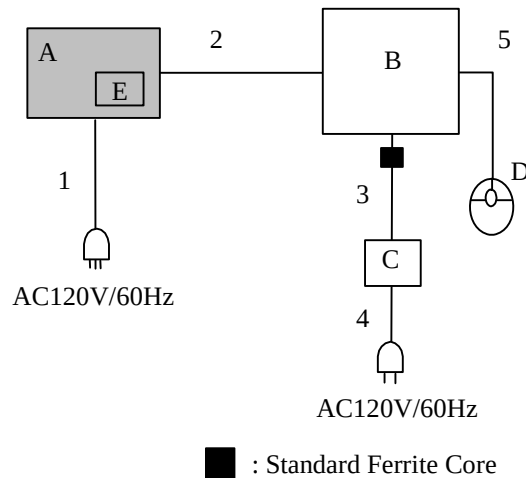
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4.2 Configuration and peripherals



* 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	Remarks
A	Card Printer	ZC10L	P2-005	ZEBRA TECHNOLOGIES CORPORATION	EUT
B	Laptop PC	2522-C49	R8-D74HD 11/01	Lenovo	-
C	AC Adapter	92P1160	11S92P1160Z1ZBG H86PEAN	Lenovo	-
D	Mouse	X05-87477	53121-576-0600186-00000	Microsoft	-
E	Ribbon Tag	RI-I17-112A-03	001	Texas Instruments, Inc.	EUT

List of cables used

No.	Name	Length (m)	Shield		Remark
			Cable	Connector	
1	AC Cable	2.5	Unshielded	Unshielded	-
2	USB Cable	1.5	Shielded	Shielded	-
3	DC Cable	1.7	Unshielded	Unshielded	-
4	AC Cable	0.8	Unshielded	Unshielded	-
5	Mouse cable	2.0	Shielded	Shielded	-

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SECTION 5: Conducted emission

Test Procedure and conditions

EUT was placed on a urethane platform of nominal size, 1.0 m by 1.5 m, raised 0.8 m above the conducting ground plane. The rear of tabletop was located 40 cm 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 80 cm from any other grounded conducting surface. EUT was located 80 cm from a Line Impedance Stabilization Network (LISN)/ Artificial mains Network (AMN) and excess AC cable was bundled in center.

For the tests on EUT with other peripherals (as a whole system)

I/O cables that were connected to the peripherals were bundled in center. They were folded back and forth forming a bundle 30 cm to 40 cm long and were hanged at a 40 cm height to the ground plane. All unused 50 ohm connectors of the LISN (AMN) were resistivity terminated in 50 ohm when not connected to the measuring equipment.

The AC Mains Terminal Continuous disturbance Voltage has been measured with the EUT in a Semi Anechoic Chamber. The EUT was connected to a LISN (AMN).

An overview sweep with peak detection has been performed.

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

Detector	: QP and CISPR AV
Measurement range	: 0.15 MHz - 30 MHz
Test data	: APPENDIX
Test result	: Pass

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

Test Procedure

EUT was placed on a urethane platform of nominal size, 1.0 m by 1.5 m, raised 0.8 m above the conducting ground plane. The Radiated Electric Field Strength has been measured in a Semi Anechoic Chamber with a ground plane.

Frequency: From 9 kHz to 30 MHz

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: 0 deg., 45 deg., 90 deg., and 135 deg.) and horizontal polarization.

*Refer to Figure 1 about Direction of the Loop Antenna.

Frequency: From 30 MHz to 1 GHz

The measuring antenna height varied between 1 and 4 m 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.

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 30 MHz	30 MHz to 200 MHz	200 MHz to 1 GHz
Antenna Type	Loop	Biconical	Logperiodic

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

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

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

Although these tests were performed other than open field test site, adequate comparison measurements were confirmed against 30 m open field 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 test was made on EUT at the normal use position.

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

Measurement range : 9 kHz - 1 GHz

Test data : APPENDIX 1

Test result : Pass

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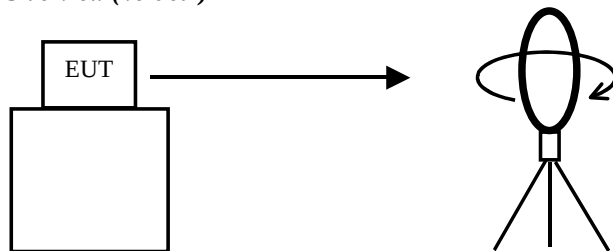
SECTION 7: Other test

Test	Span	RBW	VBW	Sweep	Detector	Trace	Instrument used
20 dB Bandwidth	200 kHz	1 kHz	3 kHz	Auto	Peak	Max Hold	Spectrum Analyzer
99 % Occupied Bandwidth	Enough width to display emission skirts	1 to 5 % of OBW	Three times of RBW	Auto	Peak *1)	Max Hold *1)	Spectrum Analyzer
Frequency Tolerance	20kHz	1kHz	3kHz	Auto	Peak	Clear Write	Spectrum Analyzer *2)
*1) The measurement was performed with Peak detector, Max Hold since the duty cycle was not 100 %. Peak hold was applied as Worst-case measurement. *2) The measurement was performed with Marker Frequency Counter Function.							

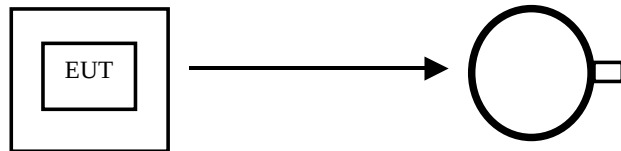
Test data : APPENDIX
Test result : Pass

Figure 1: Direction of the Loop Antenna

Side View (Vertical)

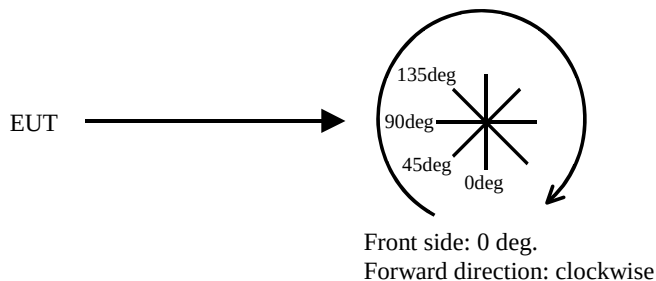


Top View (Horizontal)



Antenna was not rotated.

Top View (Vertical)



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APPENDIX 1: Test data

Conducted emission

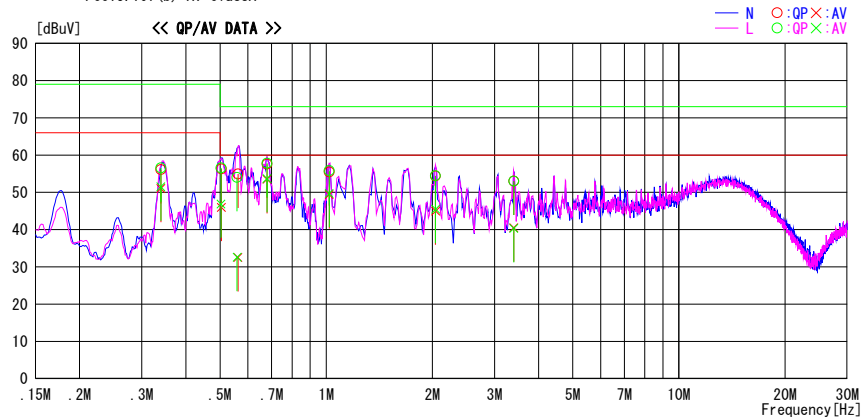
DATA OF CONDUCTED EMISSION TEST

UL Japan, Inc. Ise EMC Lab. No.3 Semi Anechoic Chamber
Date : 2016/12/10

Report No. : 11555571H
Temp./Humi. : 23deg. C / 35% RH
Engineer : Masafumi Niwa

Mode / Remarks : Tx 13.56MHz Without tag

LIMIT : FCC15.107(b) QP ClassA
FCC15.107(b) AV ClassA



Frequency [MHz]	Reading Level		Corr. Factor	Results		Limit		Margin		Phase	Comment
	QP [dBuV]	AV [dBuV]		QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	QP [dB]	AV [dB]		
0.33978	43.3	38.2	13.3	56.6	51.5	79.0	66.0	22.4	14.5	L	
0.33982	42.8	37.8	13.3	56.1	51.1	79.0	66.0	22.9	14.9	N	
0.50353	43.3	33.6	13.3	56.6	46.9	73.0	60.0	16.4	13.1	L	
0.50442	43.0	32.7	13.3	56.3	46.0	73.0	60.0	16.7	14.0	N	
0.55872	40.7	19.3	13.3	54.0	32.6	73.0	60.0	19.0	27.4	L	
0.56188	41.6	19.2	13.3	54.9	32.5	73.0	60.0	18.1	27.5	N	
0.67982	44.3	40.2	13.3	57.6	53.5	73.0	60.0	15.4	6.5	N	
0.67988	44.5	40.4	13.3	57.8	53.7	73.0	60.0	15.2	6.3	L	
1.01932	42.5	36.4	13.3	55.8	49.7	73.0	60.0	17.2	10.3	L	
1.01985	42.2	36.1	13.3	55.5	49.4	73.0	60.0	17.5	10.6	N	
2.04042	41.1	32.1	13.4	54.5	45.5	73.0	60.0	18.5	14.5	L	
2.04078	41.0	31.6	13.4	54.4	45.0	73.0	60.0	18.6	15.0	N	
3.40178	39.4	26.7	13.6	53.0	40.3	73.0	60.0	20.0	19.7	L	
3.40228	39.4	26.9	13.6	53.0	40.5	73.0	60.0	20.0	19.5	N	

CHART : WITH FACTOR, Peak hold data. CALCULATION : RESULT = READING + C.F (LISN + ATTEN + CABLE)
Except for the above table : adequate margin data below the limits.

*For a limit of Conducted emission, the Section 15.107(b) Class A for the EMC noise and the Section 15.207 for 13.56 MHz were applied since this product was corresponded to Class A device based on the FCC15 subpart B. In addition, there are no differences in spurious emission of radio operation and EMC operation.

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Conducted emission

DATA OF CONDUCTED EMISSION TEST

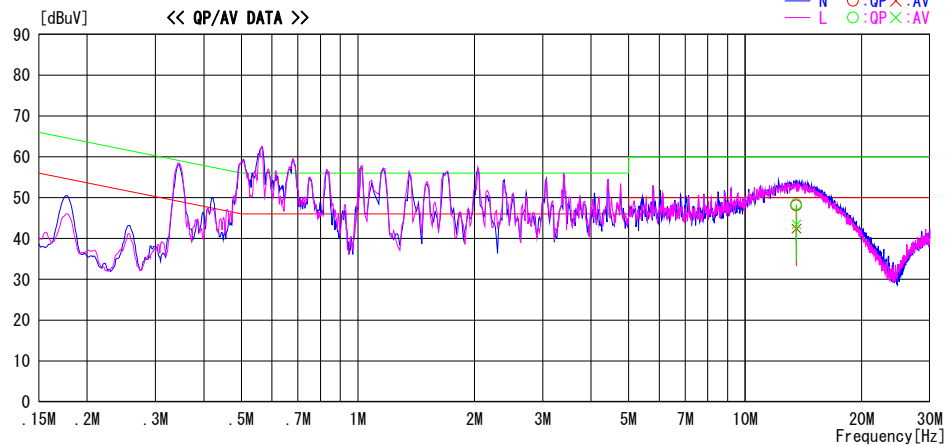
UL Japan, Inc. Ise EMC Lab. No.3 Semi Anechoic Chamber
Date : 2016/12/10

Report No. : 11555571H

Temp./Humi. : 23deg. C / 35% RH
Engineer : Masafumi Niwa

Mode / Remarks : Tx 13.56MHz Without tag

LIMIT : FCC15.207 QP
FCC15.207 AV



Frequency [MHz]	Reading Level		Corr. Factor [dB]	Results		Limit		Margin		Phase	Comment
	QP [dBuV]	AV [dBuV]		QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	QP [dB]	AV [dB]		
13.56000	34.0	28.3	14.1	48.1	42.4	60.0	50.0	11.9	7.6	N	
13.56000	34.3	29.3	14.1	48.4	43.4	60.0	50.0	11.6	6.6	L	

CHART : WITH FACTOR, Peak hold data. CALCULATION : RESULT = READING + C. F (LISN + ATTN + CABLE)
Except for the above table : adequate margin data below the limits.

*For a limit of Conducted emission, the Section 15.107(b) Class A for the EMC noise and the Section 15.207 for 13.56 MHz were applied since this product was corresponded to Class A device based on the FCC15 subpart B. In addition, there are no differences in spurious emission of radio operation and EMC operation.

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Fundamental emission and Spectrum Mask

DATA OF RADIATED EMISSION TEST

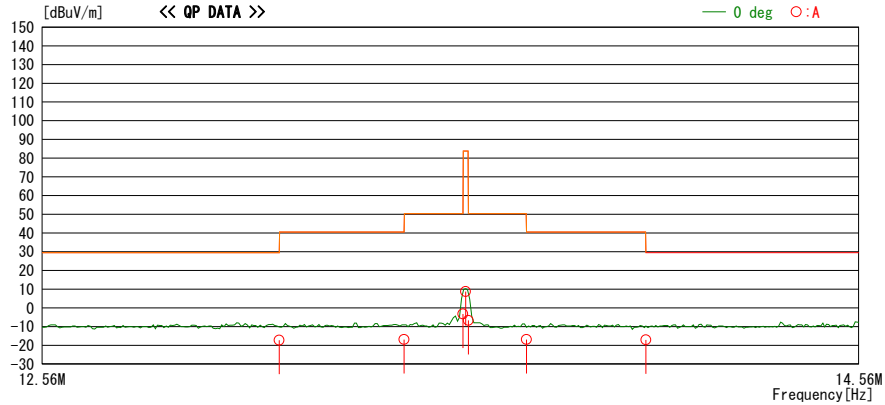
UL Japan, Inc. Ise HQ EMC Lab. No.3 Semi Anechoic Chamber
Date : 2016/12/10

Report No. : 1155571H

Temp./ Humi. : 23deg. C / 35% RH
Engineer : Masafumi Niwa

Mode / Remarks : Tx 13.56MHz without tag

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]	
13.11000	28.9	QP	19.4	-33.3	32.2	-17.2	29.5	46.7	0	A	193
13.41000	29.2	QP	19.4	-33.3	32.2	-16.9	40.5	57.4	0	A	193
13.55300	42.9	QP	19.4	-33.3	32.2	-3.2	50.4	53.6	0	A	193
13.56000	54.9	QP	19.4	-33.3	32.2	8.8	83.9	75.1	0	A	193
13.56700	39.4	QP	19.4	-33.3	32.2	-6.7	50.4	57.1	0	A	193
13.71000	29.2	QP	19.4	-33.3	32.2	-16.9	40.5	57.4	0	A	193
14.01000	29.1	QP	19.4	-33.3	32.2	-17.0	29.5	46.5	0	A	193

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)

Result of the fundamental emission at 3 m without Distance factor

QP

Ant Deg [deg]	Frequency	Detector	Reading	Ant Factor	Loss	Gain	Duty Factor	Result	Limit	Margin	Remark
	[MHz]		[dBuV]	[dB/m]	[dB]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	
0	13.56000	QP	54.9	19.4	6.7	32.2	-	48.8	-	-	Fundamental

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter) - Gain(Amplifier)

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Spurious emission

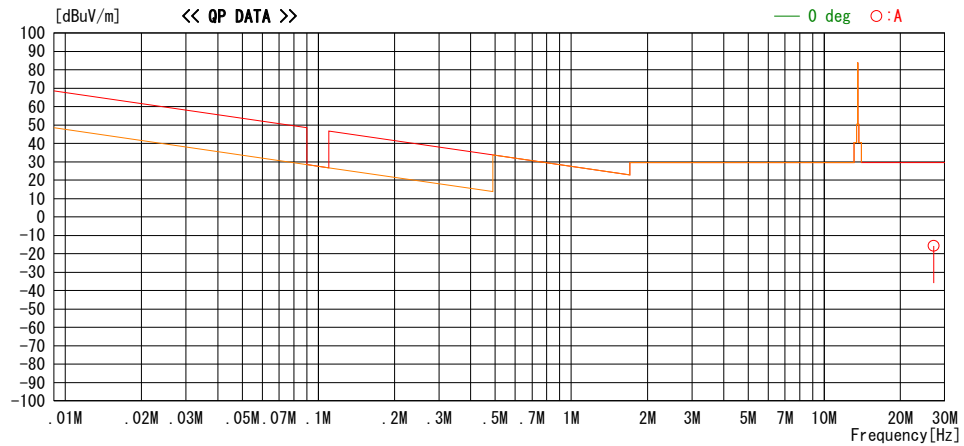
DATA OF RADIATED EMISSION TEST

UL Japan, Inc. Ise HQ EMC Lab. No.3 Semi Anechoic Chamber
Date : 2016/12/10

Report No. : 11555571H
Temp./ Humi. : 23deg. C / 35% RH
Engineer : Masafumi Niwa

Mode / Remarks : Tx 13.56MHz without tag

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]	
27.12000	29.2	QP	20.3	-33.0	32.2	-15.7	29.5	45.2	0	A	332

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)

Spurious emission

DATA OF RADIATED EMISSION TEST

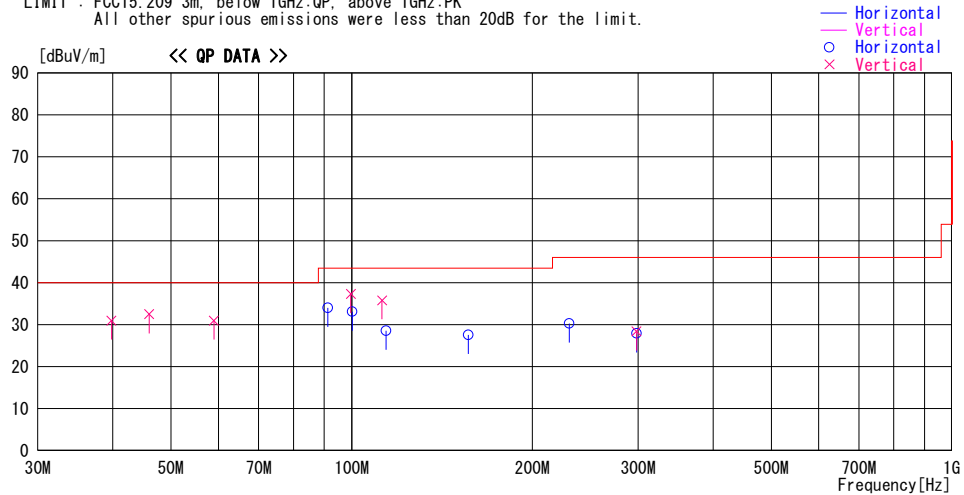
UL Japan, Inc. Ise EMC Lab. No.3 Semi Anechoic Chamber
Date : 2016/12/10

Report No. : 1155571H

Temp./Humi. : 23deg. C / 35% RH
Engineer : Masafumi Niwa

Mode / Remarks : Tx 13.56MHz Without tag

LIMIT : FCC15.209 3m, below 1GHz:QP, above 1GHz:PK
All other spurious emissions were less than 20dB for the limit.



Frequency [MHz]	Reading [dBuV]	DET	Antenna	Loss&	Level [dBuV/m]	Angle [Deg]	Height [cm]	Polar.	Limit [dBuV/m]	Margin [dB]	Comment
			Factor [dB/m]	Gain [dB]							
39.791	41.6	QP	14.3	-24.9	31.0	210	100	Vert.	40.0	9.0	
46.002	45.1	QP	12.2	-24.8	32.5	196	100	Vert.	40.0	7.5	
58.977	47.8	QP	7.8	-24.6	31.0	186	100	Vert.	40.0	9.0	
91.220	49.5	QP	8.7	-24.2	34.0	232	190	Hori.	43.5	9.5	
99.647	51.5	QP	9.9	-24.1	37.3	271	100	Vert.	43.5	6.2	
100.288	47.1	QP	10.0	-24.0	33.1	249	286	Hori.	43.5	10.4	
112.319	47.9	QP	11.8	-23.9	35.8	126	100	Vert.	43.5	7.7	
114.123	40.5	QP	12.0	-23.9	28.6	1000	274	Hori.	43.5	14.9	
156.503	35.5	QP	15.4	-23.3	27.6	68	195	Hori.	43.5	15.9	
230.513	40.8	QP	12.1	-22.6	30.3	296	100	Hori.	46.0	15.7	
298.310	36.8	QP	13.5	-21.9	28.4	242	148	Vert.	46.0	17.6	
298.320	36.3	QP	13.5	-21.9	27.9	212	100	Hori.	46.0	18.1	

CHART:WITH FACTOR ANT TYPE: -30MHz:LOOP. 30-200MHz:BICONICAL. 200MHz-1000MHz:LOGPERIODIC. 1000MHz-:HORN
CALCULATION: RESULT = READING + ANT FACTOR + LOSS & GAIN (CABLE + ATTEN. - GAIN (AMP))

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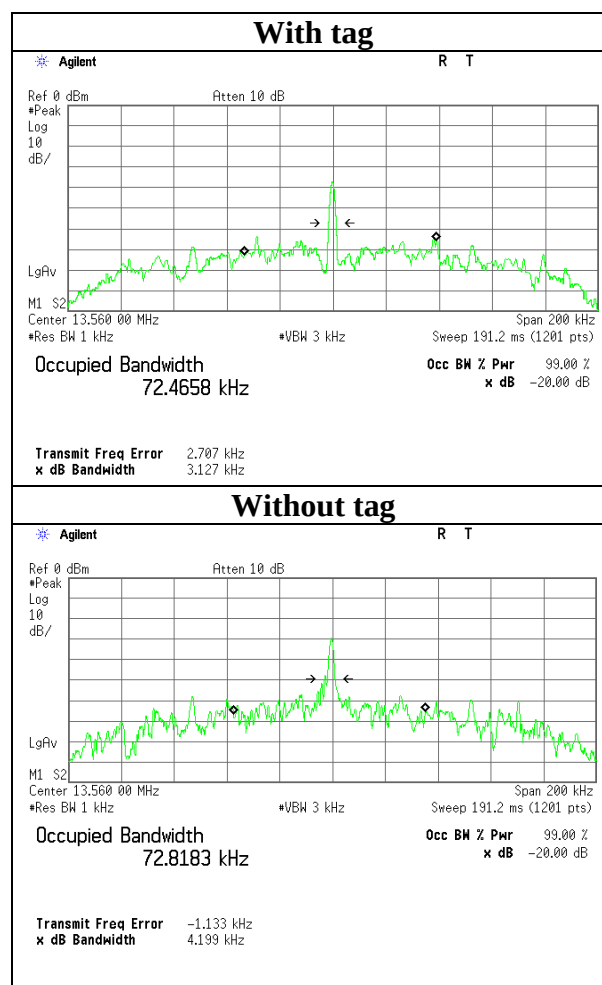
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20dB Bandwidth and 99% Occupied Bandwidth

Test place : Ise EMC Lab. No.6 Measurement Room
Report No. : 11555571H
Date : 12/14/2016
Temperature/ Humidity : 25 deg. C / 48 % RH
Engineer : Ryota Yamanaka
Mode : Tx Mod on

FREQ [MHz]	Mode	20dB Bandwidth [kHz]	99% Occupied Bandwidth [kHz]
13.56	Without Tag	4.20	72.82
	With Tag	3.13	72.47



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Frequency Tolerance

Test place Ise EMC Lab. No.6 Measurement Room
Report No. 11555571H
Date 12/14/2016
Temperature/ Humidity 25 deg. C / 48 % RH
Engineer Ryota Yamanaka
Mode Tx Mod on Without Tag

Test Condition deg.C Volts		Test Timing	Measured freq [MHz]	Freq error [MHz]	Result [ppm]	Limit (± 0.01%) [± ppm]	Margin [ppm]
20deg.C	102V	Power on	13.55961284	-0.00038716	-28.55	100.00	71.45
		on 2min.	13.55963367	-0.00036633	-27.02	100.00	72.98
		on 5min.	13.55958383	-0.00041617	-30.69	100.00	69.31
		on 10min.	13.55961592	-0.00038408	-28.32	100.00	71.68
	120V	Power on	13.55958364	-0.00041636	-30.70	100.00	69.30
		on 2min.	13.55958303	-0.00041697	-30.75	100.00	69.25
		on 5min.	13.55958252	-0.00041748	-30.79	100.00	69.21
		on 10min.	13.55958240	-0.00041760	-30.80	100.00	69.20
	138V	Power on	13.55958465	-0.00041535	-30.63	100.00	69.37
		on 2min.	13.55958335	-0.00041665	-30.73	100.00	69.27
		on 5min.	13.55958245	-0.00041755	-30.79	100.00	69.21
		on 10min.	13.55958174	-0.00041826	-30.84	100.00	69.16
50deg.C.	120V	Power on	13.55961006	-0.00038994	-28.76	100.00	71.24
		on 2min.	13.55952990	-0.00047010	-34.67	100.00	65.33
		on 5min.	13.55956778	-0.00043222	-31.87	100.00	68.13
		on 10min.	13.55957396	-0.00042604	-31.42	100.00	68.58
40deg.C.		Power on	13.55961323	-0.00038677	-28.52	100.00	71.48
		on 2min.	13.55961912	-0.00038088	-28.09	100.00	71.91
		on 5min.	13.55954451	-0.00045549	-33.59	100.00	66.41
		on 10min.	13.55959895	-0.00040105	-29.58	100.00	70.42
30deg.C.		Power on	13.55962621	-0.00037379	-27.57	100.00	72.43
		on 2min.	13.55959042	-0.00040958	-30.21	100.00	69.79
		on 5min.	13.55961330	-0.00038670	-28.52	100.00	71.48
		on 10min.	13.55960769	-0.00039231	-28.93	100.00	71.07
20deg.C.		Power on	13.55958364	-0.00041636	-30.70	100.00	69.30
		on 2min.	13.55958303	-0.00041697	-30.75	100.00	69.25
		on 5min.	13.55958252	-0.00041748	-30.79	100.00	69.21
		on 10min.	13.55958240	-0.00041760	-30.80	100.00	69.20
10deg.C.		Power on	13.55962593	-0.00037407	-27.59	100.00	72.41
		on 2min.	13.55966223	-0.00033777	-24.91	100.00	75.09
		on 5min.	13.55962441	-0.00037559	-27.70	100.00	72.30
		on 10min.	13.55965182	-0.00034818	-25.68	100.00	74.32
0deg.C.		Power on	13.55964896	-0.00035104	-25.89	100.00	74.11
		on 2min.	13.55968039	-0.00031961	-23.57	100.00	76.43
		on 5min.	13.55963307	-0.00036693	-27.06	100.00	72.94
		on 10min.	13.55963327	-0.00036673	-27.04	100.00	72.96
-10deg.C.		Power on	13.55961851	-0.00038149	-28.13	100.00	71.87
		on 2min.	13.55964907	-0.00035093	-25.88	100.00	74.12
		on 5min.	13.55962157	-0.00037844	-27.91	100.00	72.09
		on 10min.	13.55962719	-0.00037281	-27.49	100.00	72.51
-20deg.C		Power on	13.55957102	-0.00042898	-31.64	100.00	68.36
		on 2min.	13.55962009	-0.00037991	-28.02	100.00	71.98
		on 5min.	13.55959598	-0.00040402	-29.80	100.00	70.20
		on 10min.	13.55959697	-0.00040303	-29.72	100.00	70.28
-30deg.C		Power on	13.55956890	-0.00043110	-31.79	100.00	68.21
		on 2min.	13.55953919	-0.00046081	-33.98	100.00	66.02
		on 5min.	13.55958361	-0.00041639	-30.71	100.00	69.29
		on 10min.	13.55958576	-0.00041424	-30.55	100.00	69.45

Freq error=Measured freq(MHz)-13.56(MHz)

Result=Freq error(MHz)/13.56(MHz)*10⁶

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.

*As for the range of specification operating temperature, the test was performed with required temperature range on Frequency Tolerance.

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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)
MAEC-03	Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-10005	RE,CE	2016/10/20 * 12
MOS-13	Thermo-Hygrometer	Custom	CTH-180	1301	RE,CE	2016/01/21 * 12
MJM-16	Measure	KOMELON	KMC-36	-	RE,CE	-
COTS-MEMI	EMI measurement program	TSJ	TEPTO-DV	-	RE,CE	-
MSA-04	Spectrum Analyzer	Agilent	E4448A	US44300523	RE,CE	2016/11/10 * 12
MTR-08	Test Receiver	Rohde & Schwarz	ESCI	100767	RE,CE	2016/09/15 * 12
MBA-03	Biconical Antenna	Schwarzbeck	BBA9106	1915	RE	2016/10/15 * 12
MLA-22	Logperiodic Antenna(200-1000MHz)	Schwarzbeck	VUSLP9111B	911B-191	RE	2016/01/30 * 12
MCC-51	Coaxial cable	UL Japan	-	-	RE	2016/07/26 * 12
MAT-70	Attenuator(6dB)	Agilent	8491A-006	MY52460153	RE	2016/04/05 * 12
MPA-13	Pre Amplifier	SONOMA INSTRUMENT	310	260834	RE	2016/03/24 * 12
MMM-08	DIGITAL HiTESTER	Hioki	3805	051201197	RE,CE	2016/01/13 * 12
MLS-26	LISN(AMN)	Schwarzbeck	NSLK8127	8127-732	CE(AE)	2016/07/25 * 12
MLS-24	LISN(AMN)	Schwarzbeck	NSLK8127	8127-730	CE(EUT)	2016/07/11 * 12
MCC-112	Coaxial cable	Fujikura/Suhner/TSJ	5D-2W(10m)/ SFM141(3m)/ sucoform141-PE(1m)/ 421-010(1.5m)/ RFM-E321(Switcher)	-/00640	CE	2016/07/26 * 12
MAT-66	Attenuator(13dB)	JFW Industries, Inc.	50FP-013H2 N	-	CE	2016/01/14 * 12
MTA-28	Terminator	TME	CT-01	-	CE	2016/11/16 * 12
MLPA-01	Loop Antenna	Rohde & Schwarz	HFH2-Z2	100017	RE	2016/10/14 * 12
MCC-143	Coaxial Cable	UL Japan	-	-	RE	2016/06/20 * 12
MSA-16	Spectrum Analyzer	Agilent	E4440A	MY46186390	FT	2016/02/08 * 12
MCH-04	Temperature and Humidity Chamber	Tabai Espec	PL-2KP	14015723	FT	2016/08/30 * 12
MOS-14	Thermo-Hygrometer	Custom	CTH-201	1401	FT	2016/01/21 * 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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