



RADIO TEST REPORT

Test Report No.: 10835000S

Applicant : NIDEC SANKYO CORPORATION
Type of Equipment : Transmitter Module
Model No. : ICT0M0
FCC ID : WJ6-0AM000001A-M
Test regulation : FCC Part15 Subpart C: 2015
Test result : Complied

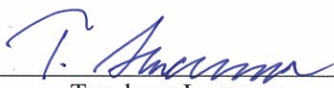
1. This test report shall not be reproduced in full or partial, without the written approval of UL Japan, Inc.
2. The results in this report apply only to the sample tested.
3. This sample tested is in compliance with the limits of the above regulation.
4. The test results in this test report are traceable to the national or international standards.
5. This test report must not be used by the customer to claim product certification, approval, or endorsement by any agency of the Federal Government.
6. The opinions and the interpretations to the result of the description in this report are outside scopes where UL Japan has been accredited.

Date of test: June 16 to 19, 2015

Representative test engineer:


Akira Sato
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".



UL Japan, Inc.

Shonan EMC Lab.

1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

13-EM-F0429

REVISION HISTORY

Original Test Report No.: 10835000S

[illegible]

UL Japan, Inc.

Shonan EMC Lab.

1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

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	8
SECTION 5: Radiated emission (Fundamental and Spurious emission)	9
SECTION 6: 20dB bandwidth & Occupied bandwidth (99%).....	11
SECTION 7: Frequency tolerances	11
Contents of APPENDIXES	12
APPENDIX 1: Data of Radio tests.....	13
APPENDIX 2: Test instruments	22
APPENDIX 3: Photographs of test setup.....	23

UL Japan, Inc.

Shonan EMC Lab.

1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

SECTION 1: Customer information

Company Name : NIDEC SANKYO CORPORATION
Address : 5329, Shimosuwa-machi, Suwa-gun, Nagano, 393-8511 Japan
Telephone Number : +81-266-27-4774
Facsimile Number : +81-266-27-4620
Contact Person : Junro Takeuchi

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

2.1 Identification of E.U.T.

Type of equipment : Transmitter Module
Model No. : ICT0M0
Serial No. : Refer to 4.2.
Rating : DC 24 V
Country of Mass-production : Japan
Condition of EUT : Production model
Receipt Date of Sample : June 12, 2015

2.2 Product description

Model: ICT0M0 (referred to as the EUT in this report) is a Transmitter Module.

Clock frequency(ies) in the system : 13.56 MHz, 16 MHz

Radio part:

Equipment type : Transceiver
Frequency of operation : 13.56MHz
Type of modulation : ASK
Antenna type : Loop
Antenna connector type : Ultra Miniature Coaxial
ITU code : A1D

FCC 15.31 (e)

The RF Module has its own regulator. The RF Module is constantly provided voltage (DC 3.3 V and 5.0 V) through the regulator regardless of input voltage. Therefore, this EUT complies with the requirement.

FCC 15.203 / 212

The EUT has a unique coupling/antenna connector. Therefore the equipment complies with the requirement.

UL Japan, Inc.

Shonan EMC Lab.

1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

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

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	10.4 dB Freq.: 13.55970 MHz Phase: N	Complied
Electric field strength of Fundamental emission	ANSI C63.4:2009 13. Measurement of intentional radiators	FCC 15.225 (a)	Radiated	N/A	67.7 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	45.9 dB Freq.: 14.010 MHz Polarization: Horizontal	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	4.2 dB Freq.: 245.547 MHz Polarization: Horizontal	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

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.

UL Japan, Inc.

Shonan EMC Lab.

1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

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	9 kHz-150 kHz	4.0 dB	3.8 dB	3.8 dB
	150 kHz-30 MHz	3.6 dB	3.4 dB	3.4 dB
Radiated emission (Measurement distance: 3m)	9 kHz-30 MHz	3.7 dB	3.5 dB	3.5 dB
	30 MHz-300 MHz	4.9 dB	4.9 dB	4.7 dB
	300 MHz-1 GHz	5.0 dB	5.0 dB	4.8 dB
	1 GHz-18 GHz	4.9 dB	4.9 dB	4.9 dB
	18 GHz-26.5 GHz	4.5 dB	4.3 dB	4.3 dB

*1: SAC=Semi-Anechoic Chamber

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

Conducted emission

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

Radiated emission

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

Other tests

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} .

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

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

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

3.5 Test location

UL Japan, Inc. Shonan EMC Lab.

1-22-3, Megumigaoka, Hiratsuka-shi, Kanagawa-ken 259-1220 JAPAN

Telephone number : +81 463 50 6400

Facsimile number : +81 463 50 6401

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	10 m
☒ No.2 Semi-anechoic chamber	2973D-2	20.6 x 11.3 x 7.65	20.6 x 11.3	10 m
☐ No.3 Semi-anechoic chamber	2973D-3	12.7 x 7.7 x 5.35	12.7 x 7.7	5 m
☐ 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.1 Measurement room	-	2.55 x 4.1 x 2.5	-	-

3.6 Test setup, Data of test & Test instruments

Refer to APPENDIX 1 to 3.

UL Japan, Inc.

Shonan EMC Lab.

1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

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 items	Transmitting	13.56MHz

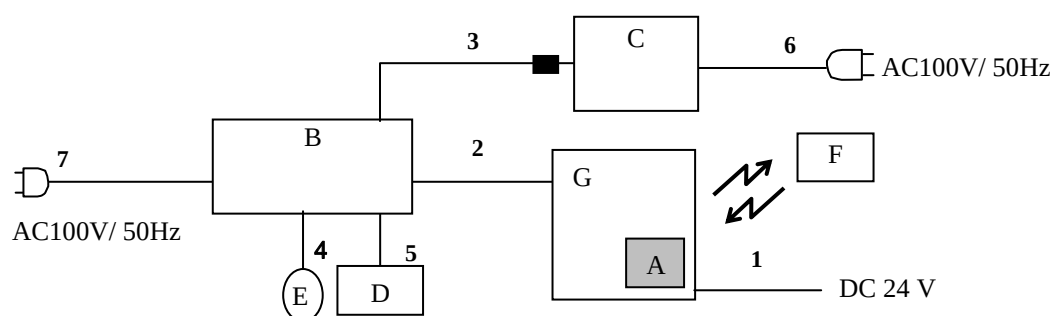
Software for testing: MST3Q8_3331DLL.dll ver. 3040-01A

The carrier level and noise levels were confirmed with and without Card, and the test was made with the condition that has the maximum noise.

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

4.2 Configuration and peripherals

■ : Standard ferrite core



*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	Transmitter Module	ICT0M0	001	NIDEC SANKYO	EUT
B	Desktop PC	FMV6667CLS	3136	Fujitsu	-
C	Monitor	VL-1530S	DF0238060	Fujitsu	-
D	Keyboard	RT6670_TJP	61651546	HP	-
E	Mouse	ECM-S5002 /R64-1229-07	4Y15527	NEC	-
F	Contactless IC Card	T1-C1	-	NIDEC SANKYO	-
G	Contactless IC card / Magnetic card dispenser	SCT3Q8-3AM232	DS R-5050003	NIDEC SANKYO	-

List of cables used

No.	Item	Length (m)	Shield (Cable)	Shield (Connector)	Remarks
1	DC	1.3	Unshielded	Unshielded	-
2	RS-232 C	3.0	Shielded	Shielded	-
3	RGB	1.27	Unshielded	Unshielded	-
4	Mouse	1.8	Unshielded	Unshielded	-
5	Keyboard	2.8	Shielded	Unshielded	-
6	AC	2.0	Shielded	Shielded	-
7	AC	1.7	Unshielded	Unshielded	-

UL Japan, Inc.

Shonan EMC Lab.

1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

SECTION 5: Conducted emission

5.1 Operating environment

Test place : See test data (APPENDIX 1)
Temperature : See test data (APPENDIX 1)
Humidity : See test data (APPENDIX 1)

5.2 Test configuration

EUT was placed on a platform of nominal size, 1.0 m by 1.5 m, raised 0.8 m above the conducting ground plane. The table is made of Styrofoam and covered with polyvinyl chloride. That has very low permittivity. The rear of tabletop was located 40 cm to the vertical conducting plane. The rear of peripheral was aligned and was 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 LISN. Each EUT current-carrying power lead, except the ground (safety) lead, was individually connected through a LISN to the input power source. All unused 50ohm connectors of the LISN were resistively terminated in 50 ohm 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 MHz - 30 MHz
EUT position : Table top

5.4 Test procedure

The AC Mains Terminal Continuous disturbance Voltage had been measured with the EUT within a Shielded room. The EUT 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 : 9 kHz

5.5 Results

Summary of the test results : Pass
Refer to APPENDIX 1

UL Japan, Inc.

Shonan EMC Lab.

1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

SECTION 6: Radiated emission (Fundamental and Spurious emission)

6.1 Operating environment

Test place : See test data (APPENDIX 1)
Temperature : See test data (APPENDIX 1)
Humidity : See test data (APPENDIX 1)

6.2 Test configuration

EUT was placed on a platform of nominal size, 1.0 m by 1.5 m, raised 0.8 m above the conducting ground plane. The table is made of Styrofoam and covered with polyvinyl chloride. That has very low permittivity. Photographs of the set up are shown in Appendix 1.

6.3 Test conditions

Frequency range : 9 kHz - 1 GHz
Test distance : 3 m
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 3 m.

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

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.to 360 deg.) and horizontal polarization. Drawing of the antenna direction is shown in Figure 1.

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

The measuring antenna height was 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.

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

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

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

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

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

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

The EUT was tested in the direction normally used.

UL Japan, Inc.

Shonan EMC Lab.

1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

6.5 Results

Summary of the test results : Pass
No spurious emissions exceeded the fundamental emission level.

Refer to APPENDIX 1.

Figure 1. Direction of the Loop Antenna

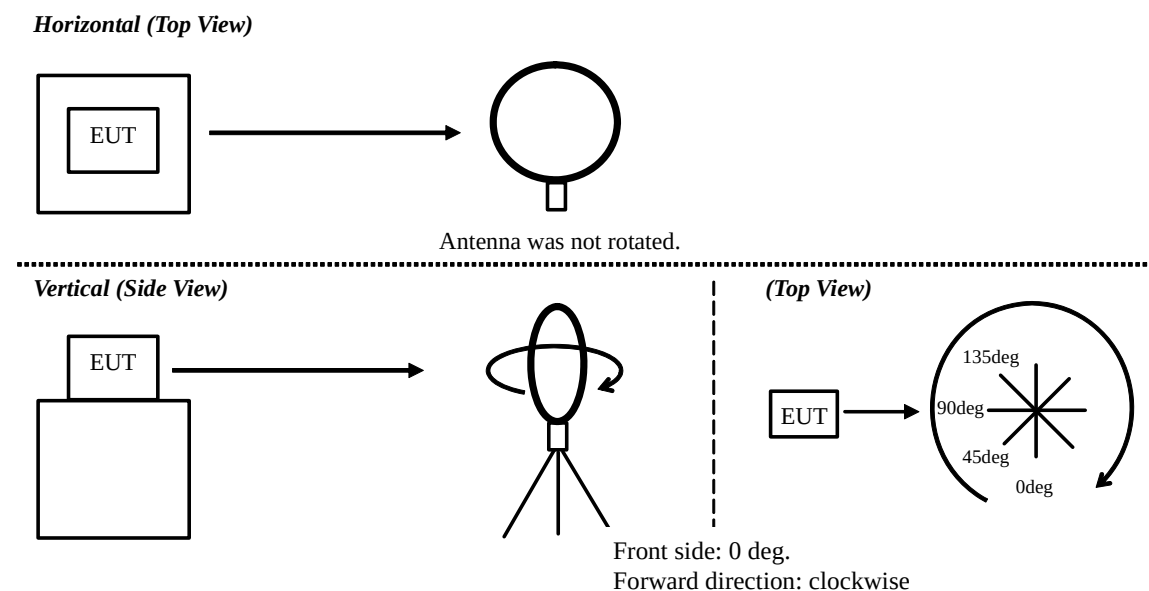
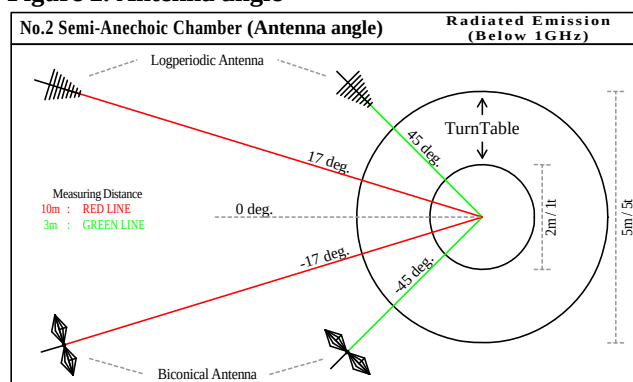


Figure 2. Antenna angle



UL Japan, Inc.

Shonan EMC Lab.

1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

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 spectrum analyzer 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.

UL Japan, Inc.

Shonan EMC Lab.

1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

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
Pre-check of the worst case
Tag used for the test as representative

UL Japan, Inc.

Shonan EMC Lab.

1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

Telephone : +81 463 50 6400

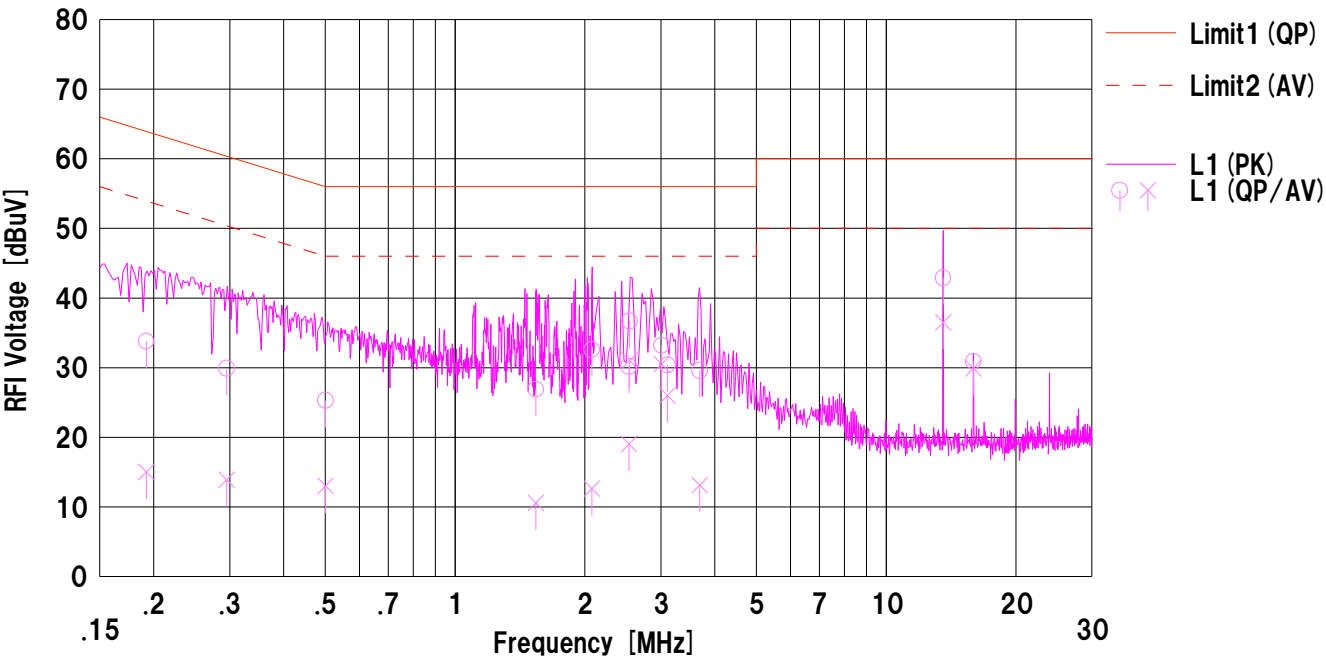
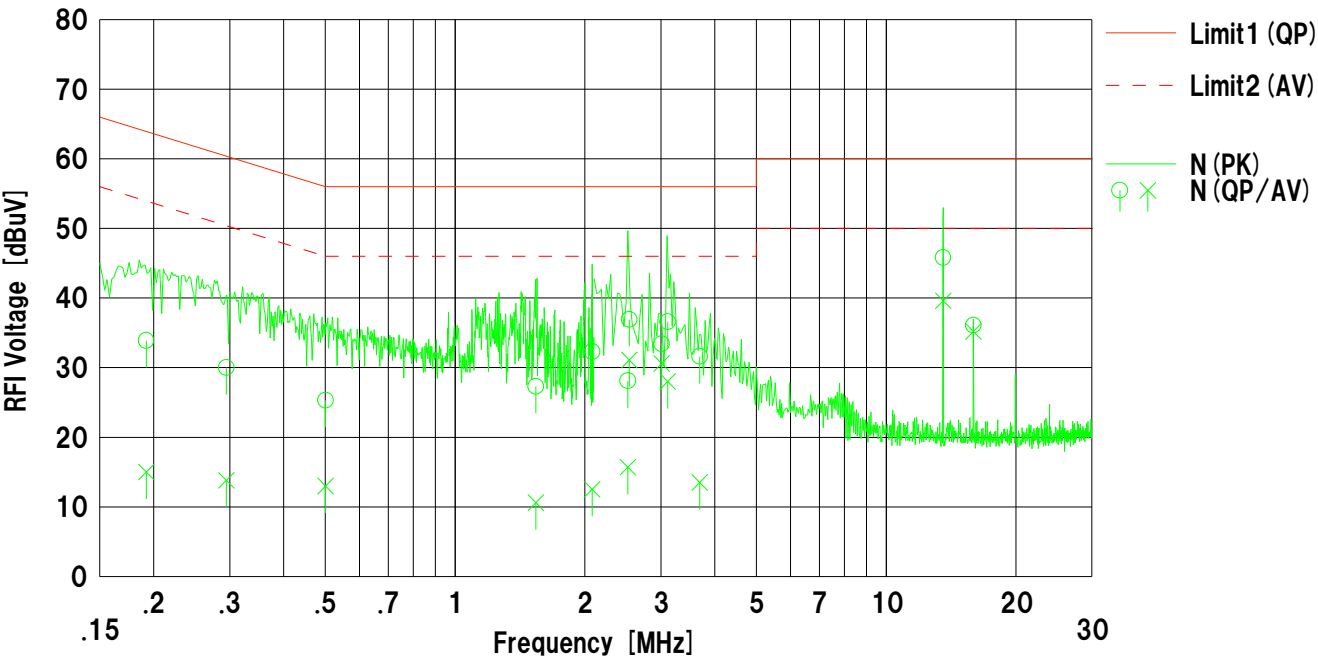
Facsimile : +81 463 50 6401

DATA OF CONDUCTED EMISSION TEST

UL Japan,Inc. Shonan EMC Lab. No.1 Shielded Room
Date : 2015/06/19

Company	: NIDEC SANKYO CORPORATION	Mode	: Transmitting (13.56MHz)
Kind of EUT	: Transmitter Module	Order No.	: 10835000S
Model No.	: ICTOMO	Power	: DC 24 V, AC 120 V / 60 Hz (DC PS)
Serial No.	: 001	Temp./Humi.	: 24deg.C. / 64%RH
Remarks	: with card		

Limit1 : FCC 15C (15.207) QP
Limit2 : FCC 15C (15.207) AV
Engineer : Akira Sato



Calculation:Result [dBuV] =Reading [dBuV] +C.Fac (LISN+Cable+ATT) [dB]
LISN:SLS-01

DATA OF CONDUCTED EMISSION TEST

UL Japan,Inc. Shonan EMC Lab. No.1 Shielded Room

Date : 2015/06/19

Company : NIDEC SANKYO CORPORATION
 Kind of EUT : Transmitter Module
 Model No. : ICTOMO
 Serial No. : 001
 Remarks : with card

Mode : Transmitting (13.56MHz)
 Order No. : 10835000S
 Power : DC 24 V, AC 120 V / 60 Hz (DC PS)
 Temp./Humi. : 24deg.C. / 64%RH

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

Engineer : Akira Sato

<< QP/AV DATA >>

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	0.19200	21.1	2.2	12.8	33.9	15.0	63.9	53.9	30.0	38.9	N	
2	0.29471	17.2	1.0	12.8	30.0	13.8	60.3	50.3	30.3	36.5	N	
3	0.50067	12.5	0.2	12.8	25.3	13.0	56.0	46.0	30.7	33.0	N	
4	1.54003	14.4	-2.3	12.9	27.3	10.6	56.0	46.0	28.7	35.4	N	
5	2.07822	19.4	-0.4	12.9	32.3	12.5	56.0	46.0	23.7	33.5	N	
6	2.51745	15.2	2.8	12.9	28.1	15.7	56.0	46.0	27.9	30.3	N	
7	2.53682	24.0	18.2	12.9	36.9	31.1	56.0	46.0	19.1	14.9	N	
8	3.01353	20.4	17.6	13.0	33.4	30.6	56.0	46.0	22.6	15.4	N	
9	3.11340	23.6	15.0	13.0	36.6	28.0	56.0	46.0	19.4	18.0	N	
10	3.69308	18.6	0.5	13.0	31.6	13.5	56.0	46.0	24.4	32.5	N	
11	13.55970	32.3	26.1	13.5	45.8	39.6	60.0	50.0	14.2	10.4	N	
12	15.94330	22.6	21.7	13.5	36.1	35.2	60.0	50.0	23.9	14.8	N	
13	0.19208	21.0	2.2	12.8	33.8	15.0	63.9	53.9	30.1	38.9	L1	
14	0.29531	17.1	1.1	12.8	29.9	13.9	60.3	50.3	30.4	36.4	L1	
15	0.50040	12.5	0.2	12.8	25.3	13.0	56.0	46.0	30.7	33.0	L1	
16	1.53880	14.0	-2.3	12.9	26.9	10.6	56.0	46.0	29.1	35.4	L1	
17	2.07770	19.7	-0.3	12.9	32.6	12.6	56.0	46.0	23.4	33.4	L1	
18	2.53151	17.3	6.1	12.9	30.2	19.0	56.0	46.0	25.8	27.0	L1	
19	2.53974	23.8	18.1	12.9	36.7	31.0	56.0	46.0	19.3	15.0	L1	
20	3.01363	20.2	17.5	13.0	33.2	30.5	56.0	46.0	22.8	15.5	L1	
21	3.10787	17.4	13.0	13.0	30.4	26.0	56.0	46.0	25.6	20.0	L1	
22	3.69472	16.6	0.1	13.0	29.6	13.1	56.0	46.0	26.4	32.9	L1	
23	13.55962	29.4	23.0	13.5	42.9	36.5	60.0	50.0	17.1	13.5	L1	
24	15.94356	17.4	16.4	13.5	30.9	29.9	60.0	50.0	29.1	20.1	L1	

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.2 Semi Anechoic Chamber

Company: NIDEC SANKYO CORPORATION	Regulation: FCC Part15 Subpart C 15.225
Equipment: Transmitter Module	Test Distance: 3m
Model: ICT0M0	Date: 06 16, 2015
Sample No.: 001	Temperature: 22 deg.C
Power: DC24V	Humidity: 62 %RH
Mode: Transmitting 13.56MHz	ENGINEER: Akira Sato

Remarks: : Vertical polarization (antenna angle) of the worst case: 0deg, without card

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	
		Hor [dBuV]	Ver [dBuV]					Hor [dBuV/m]	Ver [dBuV/m]		Hor [dB]	Ver [dB]
1	13.560	62.9	63.1	18.6	6.4	31.9	-40.0	16.0	16.2	83.9	67.9	67.7

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	13.110	30.3	30.2	18.6	6.4	31.9	-40.0	-16.6	-16.7	29.5	46.1	46.2
2	13.410	32.2	32.5	18.6	6.4	31.9	-40.0	-14.7	-14.4	40.5	55.2	54.9
3	13.553	50.2	50.3	18.6	6.4	31.9	-40.0	3.3	3.4	50.4	47.1	47.0
4	13.567	47.5	47.5	18.6	6.4	31.9	-40.0	0.6	0.6	50.4	49.8	49.8
5	13.710	31.9	31.8	18.5	6.5	31.9	-40.0	-15.0	-15.1	40.5	55.5	55.6
6	14.010	30.5	30.4	18.5	6.5	31.9	-40.0	-16.4	-16.5	29.5	45.9	46.0

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)

UL Japan, Inc.

Shonan EMC Lab.

1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa, Japan 259-1220

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

Radiated Emission (above 30MHz)

UL Japan, Inc.

Shonan EMC Lab. No.2 Semi Anechoic Chamber

Company: NIDEC SANKYO CORPORATION
 Equipment: Transmitter Module
 Model: ICT0M0
 Sample No.: 001
 Power: DC24V
 Mode: Transmitting 13.56MHz

Regulation: FCC Part15 Subpart C 15.225
 Test Distance: 3m
 Date: 06 16, 2015
 Temperature: 22 deg.C
 Humidity: 62 %RH
 ENGINEER: Akira Sato

Remarks: without card

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	29.8	19.4	6.7	31.9	-40.0	-16.0	29.5	45.5	-	359	at 30m
Hori.	40.68	QP	26.1	14.1	7.1	31.9		15.4	40.0	24.6	289	234	at 3m
Hori.	54.24	QP	25.6	9.5	7.3	31.9		10.5	40.0	29.5	100	359	at 3m
Hori.	135.52	QP	32.7	14.0	8.3	31.7		23.3	43.5	20.2	226	54	at 3m
Hori.	245.547	QP	47.3	16.9	9.3	31.7		41.8	46.0	4.2	137	253	at 3m
Hori.	250.682	QP	44.9	17.0	9.3	31.7		39.5	46.0	6.5	142	264	at 3m
Hori.	256.015	QP	46.2	17.2	9.4	31.7		41.1	46.0	4.9	136	267	at 3m
Hori.	314.472	QP	43.9	14.3	6.6	31.7		33.1	46.0	12.9	108	133	at 3m
Hori.	384.014	QP	43.9	15.8	7.1	31.7		35.1	46.0	10.9	100	272	at 3m
Hori.	416.018	QP	38.2	16.4	7.3	31.6		30.3	46.0	15.7	100	310	at 3m
Hori.	592.009	QP	33.5	18.9	8.2	31.6		29.0	46.0	17.0	162	2	at 3m
Hori.	944.013	QP	34.2	22.6	9.8	30.5		36.1	46.0	9.9	100	292	at 3m
Vert.	27.12	QP	30.0	19.4	6.7	31.9	-40.0	-15.8	29.5	45.3	-	359	at 30m
Vert.	40.68	QP	36.9	14.1	7.1	31.9		26.2	40.0	13.8	100	14	at 3m
Vert.	54.24	QP	35.7	9.5	7.3	31.9		20.6	40.0	19.4	100	349	at 3m
Vert.	135.52	QP	34.8	14.0	8.3	31.8		25.3	43.5	18.2	100	199	at 3m
Vert.	359.680	QP	32.4	15.3	6.9	31.6		23.0	46.0	23.0	100	228	at 3m
Vert.	672.032	QP	32.7	20.0	8.6	31.5		29.8	46.0	16.2	100	201	at 3m
Vert.	823.511	QP	25.7	21.1	9.3	31.1		25.0	46.0	21.0	100	10	at 3m

Result = Reading + Ant Factor + Loss (Cable+ATT+ΔAF(above 30MHz)) - Gain(Amplifier) + 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= 56dBuV/m, Ver= 56.2 dBuV/m

UL Japan, Inc.

Shonan EMC Lab.

1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa, Japan 259-1220

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

Radiated Emission (Worst mode plot)

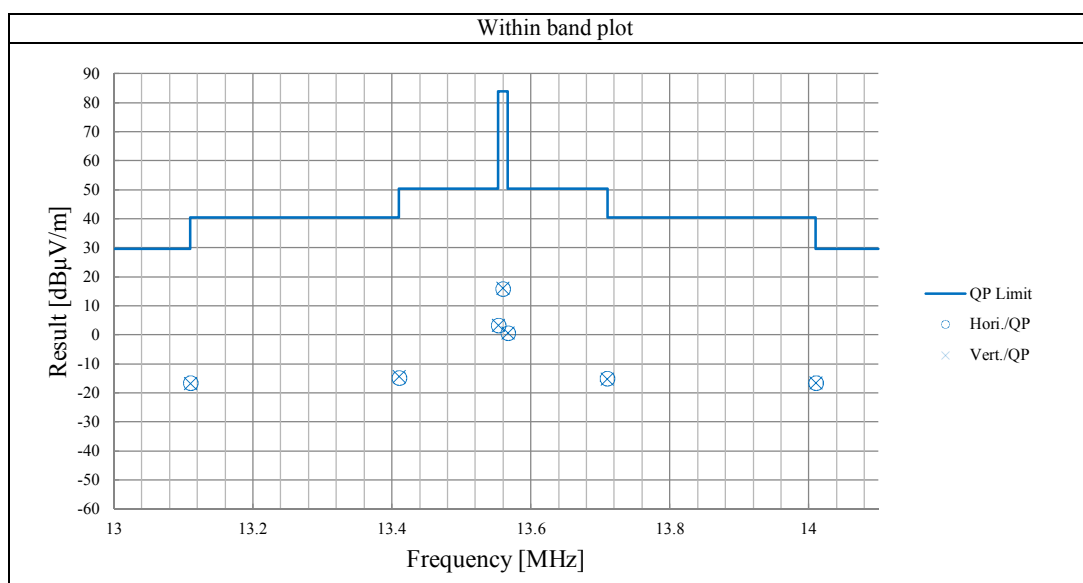
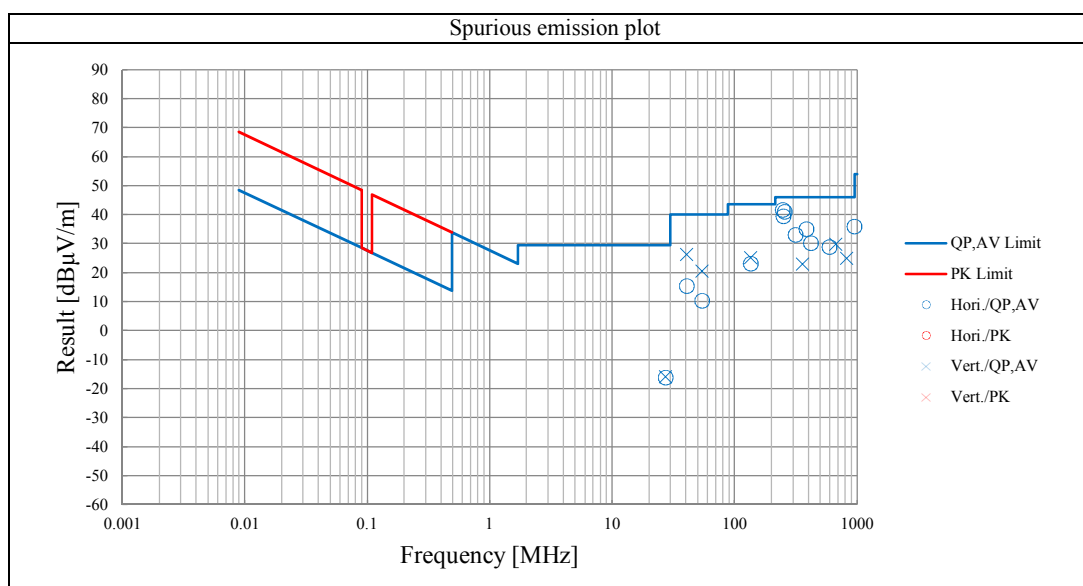
UL Japan, Inc.

Shonan EMC Lab. No.2 Semi Anechoic Chamber

Company: NIDEC SANKYO CORPORATION
Equipment: Transmitter Module
Model: ICT0M0
Sample No.: 001
Power: DC24V
Mode: Transmitting 13.56MHz

Regulation: FCC Part15 Subpart C 15.225
Test Distance: 3m
Date: 06 16, 2015
Temperature: 22 deg.C
Humidity: 62 %RH
ENGINEER: Akira Sato

Remarks: These plots data contains sufficient number to show the trend of characteristic features for EUT.
without Tag



Data of Frequency Tolerance

UL Japan, Inc.

Shonan EMC Lab. No.5 Shielded room

Company NIDEC SANKYO CORPORATION
 Equipment Transmitter Module
 Model ICT0M0
 Serial No. 001
 Power DC 24V
 Mode Transmitting 13.56 MHz

Regulation FCC Part15 Subpart C 15.225 (e)
 Date June, 17 2015
 Temperature 25 deg.C
 Humidity 50 %RH
 ENGINEER Wataru Kojima

Temperature Variation: -20deg.C

Test Conditions	Original Frequency (MHz)	Measure Frequency (MHz)	Frequency Error (MHz)	Frequency tolerance (%)	Limit (%)
startup	13.56	13.559635	-0.000365	-0.00269	0.010
after 2minutes	13.56	13.559651	-0.000349	-0.00257	0.010
after 5minutes	13.56	13.559656	-0.000344	-0.00254	0.010
after 10minutes	13.56	13.559659	-0.000341	-0.00251	0.010

Temperature Variation: -10deg.C

Test Conditions	Original Frequency (MHz)	Measure Frequency (MHz)	Frequency Error (MHz)	Frequency tolerance (%)	Limit (%)
startup	13.56	13.559679	-0.000321	-0.00237	0.010
after 2minutes	13.56	13.559680	-0.000320	-0.00236	0.010
after 5minutes	13.56	13.559681	-0.000319	-0.00235	0.010
after 10minutes	13.56	13.559681	-0.000319	-0.00235	0.010

Temperature Variation: 0deg.C

Test Conditions	Original Frequency (MHz)	Measure Frequency (MHz)	Frequency Error (MHz)	Frequency tolerance (%)	Limit (%)
startup	13.56	13.559680	-0.000320	-0.00236	0.010
after 2minutes	13.56	13.559675	-0.000325	-0.00240	0.010
after 5minutes	13.56	13.559672	-0.000328	-0.00242	0.010
after 10minutes	13.56	13.559671	-0.000329	-0.00243	0.010

Temperature Variation: 10deg.C

Test Conditions	Original Frequency (MHz)	Measure Frequency (MHz)	Frequency Error (MHz)	Frequency tolerance (%)	Limit (%)
startup	13.56	13.559657	-0.000343	-0.00253	0.010
after 2minutes	13.56	13.559648	-0.000352	-0.00260	0.010
after 5minutes	13.56	13.559644	-0.000356	-0.00263	0.010
after 10minutes	13.56	13.559643	-0.000357	-0.00263	0.010

Temperature Variation: 20deg.C

Test Conditions	Original Frequency (MHz)	Measure Frequency (MHz)	Frequency Error (MHz)	Frequency tolerance (%)	Limit (%)
startup	13.56	13.559662	-0.000338	-0.00249	0.010
after 2minutes	13.56	13.559661	-0.000339	-0.00250	0.010
after 5minutes	13.56	13.559607	-0.000393	-0.00290	0.010
after 10minutes	13.56	13.559606	-0.000394	-0.00291	0.010

UL Japan, Inc.

Shonan EMC Lab.

1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

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	13.559579	-0.000421	-0.00310	0.010
after 2minutes	13.56	13.559571	-0.000429	-0.00316	0.010
after 5minutes	13.56	13.559559	-0.000441	-0.00325	0.010
after 10minutes	13.56	13.559555	-0.000445	-0.00328	0.010

Temperature Variation: 40deg.C

Test Conditions	Original Frequency (MHz)	Measure Frequency (MHz)	Frequency Error (MHz)	Frequency tolerance (%)	Limit (%)
startup	13.56	13.559504	-0.000496	-0.00366	0.010
after 2minutes	13.56	13.559495	-0.000505	-0.00372	0.010
after 5minutes	13.56	13.559486	-0.000514	-0.00379	0.010
after 10minutes	13.56	13.559484	-0.000516	-0.00381	0.010

Temperature Variation: 50deg.C

Test Conditions	Original Frequency (MHz)	Measure Frequency (MHz)	Frequency Error (MHz)	Frequency tolerance (%)	Limit (%)
startup	13.56	13.559467	-0.000533	-0.00393	0.010
after 2minutes	13.56	13.559450	-0.000550	-0.00406	0.010
after 5minutes	13.56	13.559448	-0.000552	-0.00407	0.010
after 10minutes	13.56	13.559446	-0.000554	-0.00409	0.010

Data of Frequency Tolerance

UL Japan, Inc.

Shonan EMC Lab. No.5 Shielded room

Company NIDEC SANKYO CORPORATION

Equipment Transmitter Module

Model ICT0M0

Serial No. 001

Power DC 24V

Mode Transmitting 13.56 MHz

Regulation FCC Part15 Subpart C 15.225 (e)

Date June, 17 2015

Temperature 25 deg.C

Humidity 50 %RH

ENGINEER Wataru Kojima

Voltage Variation: DC 20.4 V**Temperature Variation: 20deg.C**

Test Conditions	Original Frequency (MHz)	Measure Frequency (MHz)	Frequency Error (MHz)	Frequency tolerance (%)	Limit (%)
startup	13.56	13.559617	-0.000383	-0.00282	0.010
after 2minutes	13.56	13.559612	-0.000388	-0.00286	0.010
after 5minutes	13.56	13.559606	-0.000394	-0.00291	0.010
after 10minutes	13.56	13.559605	-0.000395	-0.00291	0.010

Voltage Variation: DC 27.6 V**Temperature Variation: 20deg.C**

Test Conditions	Original Frequency (MHz)	Measure Frequency (MHz)	Frequency Error (MHz)	Frequency tolerance (%)	Limit (%)
startup	13.56	13.559613	-0.000387	-0.00285	0.010
after 2minutes	13.56	13.559609	-0.000391	-0.00288	0.010
after 5minutes	13.56	13.559607	-0.000393	-0.00290	0.010
after 10minutes	13.56	13.559606	-0.000394	-0.00291	0.010

UL Japan, Inc.

Shonan EMC Lab.

1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

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

UL Japan, Inc.

Shonan EMC Lab. No.5 Shielded Room

Company: NIDEC SANKYO CORPORATION
Equipment: Transmitter Module
Model: ICT0M0
Sample No.: 001
Power: DC24V
Mode: Transmitting 13.56MHz without card

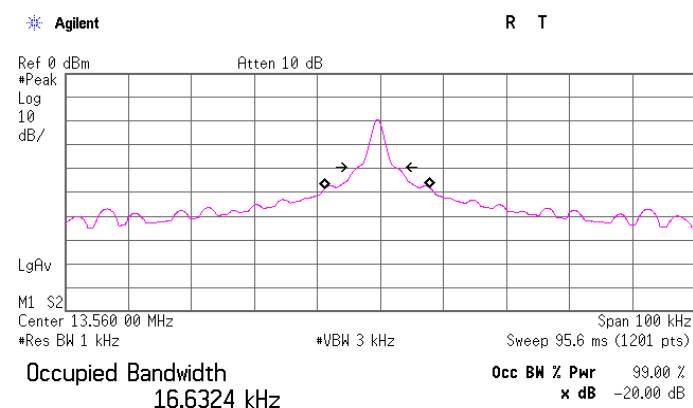
Regulation: FCC Part15 Subpart C 15.215

Date: June 17, 2015

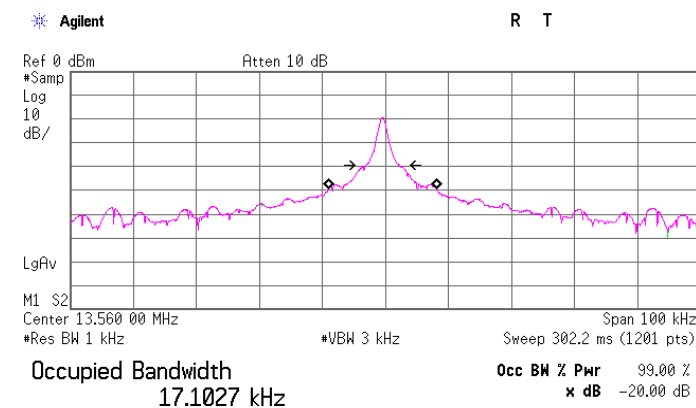
Temperature: 25 deg.C

Humidity: 50 %RH

ENGINEER: Wataru Kojima

20dB Bandwidth: 5.966 kHz

Transmit Freq Error -446.132 Hz
x dB Bandwidth 5.966 kHz

99% Occupied Bandwidth: 17.103 kHz

Transmit Freq Error -466.410 Hz
x dB Bandwidth 5.410 kHz*

UL Japan, Inc.**Shonan EMC Lab.**

1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa, Japan 259-1220

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

APPENDIX 2

Test Instruments

EMI test equipment

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
SAF-02	Pre Amplifier	SONOMA	310N	290212	RE	2015/02/18 * 12
SAT6-02	Attenuator	JFW	50HF-006N	-	RE	2015/02/18 * 12
KAT3-11	Attenuator	JFW IND. INC.	50HF-003N	-	RE	2014/08/27 * 12
SBA-02	Biconical Antenna	Schwarzbeck	BBA9106	91032665	RE	2014/11/22 * 12
SCC-B1/B3/B5/B7/B8/B13/SRSE-02	Coaxial Cable&RF Selector	Fujikura/Fujikura/Suhner/Suhner/Suhner/TOYO	8D2W/12DSFA/141PE/141PE/141PE/141PE/NS4906	-/0901-270(RF Selector)	RE	2015/04/17 * 12
SCC-B2/B4/B6/B7/B8/B13/SRSE-02	Coaxial Cable&RF Selector	Fujikura/Fujikura/Suhner/Suhner/Suhner/TOYO	8D2W/12DSFA/141PE/141PE/141PE/141PE/NS4906	-/0901-270(RF Selector)	RE	2015/04/17 * 12
SLA-02	Logperiodic Antenna	Schwarzbeck	UHALP9108A	UHALP 9108-A 0893	RE	2014/11/22 * 12
SOS-03	Humidity Indicator	A&D	AD-5681	4063325	RE	2014/10/30 * 12
STR-01	Test Receiver	Rohde & Schwarz	ESU40	100093	CE	2014/11/11 * 12
STR-07	Test Receiver	Rohde & Schwarz	ESU26	100484	CE/RE	2014/09/03 * 12
SJM-14	Measure	ASKUL	-	-	RE	-
SAEC-02(NSA)	Semi-Anechoic Chamber	TDK	SAEC-02(NSA)	2	RE	2014/07/08 * 12
COTS-SEMI-1	EMI Software	TSJ	TEPTO-DV(RE,CE, RFLMF)	-	CE/RE	-
SLP-02	Loop Antenna	Rohde & Schwarz	HFH2-Z2	100218	RE	2014/11/30 * 12
SAT6-07	Attenuator	JFW	50HF-006N	-	RE	2015/02/18 * 12
SCC-A12/A13/SRSE-01	Coaxial Cable&RF Selector	Suhner/Suhner/TOYO	RG223U/141PE/NS4906	-/0901-269(RF Selector)	CE	2015/04/17 * 12
SLS-01	LISN	Rohde & Schwarz	ENV216	100511	CE(EUT)	2015/02/24 * 12
SLS-02	LISN	Rohde & Schwarz	ENV216	100512	CE(AE)	2015/02/24 * 12
SAT3-06	Attenuator	JFW	50HF-003N	-	CE	2015/02/18 * 12
SOS-02	Humidity Indicator	A&D	AD-5681	4063343	CE	2014/12/24 * 12
STM-01	Terminator	TME	CT-01 BP	-	CE	2014/12/19 * 12
SCH-01	Temperature and Humidity Chamber	Espec	PL-1KT	14020837	FT	2015/04/22 * 12
SSA-02	Spectrum Analyzer	Agilent	E4448A	MY48250106	FT, BW	2015/03/26 * 12
SOS-09	Humidity Indicator	A&D	AD-5681	4061484	FT	2014/12/24 * 12
SSCA-01	Search coil	LANGER	RF-R 400-1	02-0634	FT	Pre Check

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,

FT: Frequency Tolerance,

BW: 20dB bandwidth and 99 % Occupied bandwidth