




RADIO TEST REPORT


Test Report No.: 10004105S

Applicant : NIDEC SANKYO CORPORATION
Type of Equipment : Contactless IC card reader
Model No. : ICM0M0-1x90
FCC ID : WJ6ICM0M0-1X90
Test regulation : FCC Part15 Subpart C: 2012
Test result : Complied

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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.
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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.

Date of test: January 31 to February 5, 2013

Tested by: 
Akio Hayashi
Engineer of WiSE Japan,
UL Verification Service

Approved by : 
Toyokazu Imamura
Leader of WiSE Japan,
UL Verification Service



- 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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Shonan EMC Lab.

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13-EM-F0429

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.....	8
SECTION 5: Conducted emission	9
SECTION 6: Radiated emission (Fundamental and Spurious emission).....	10
SECTION 7: 20dB bandwidth & Occupied bandwidth (99%)	11
SECTION 8: 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

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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 : Contactless IC card reader
Model No. : ICM0M0-1x90
Serial No. : Refer to Section 4, Clause 4.2
Rating : DC 12V
Receipt Date of Sample : January 30 and February 5, 2013
Country of Mass-production : Japan
Condition of EUT : Production model
Modification of EUT : No Modification by the test lab

2.2 Product description

Model: ICM0M0-1x90 (referred to as the EUT in this report), is a Contactless IC card reader.

Clock Frequency: 27.12MHz (RFID part)

Radio specification:

Equipment type : Transceiver
Frequency of operation : 13.56MHz
Type of modulation : ASK
Antenna type : Integrated
Antenna connector type : None

FCC 15.31 (e)

The equipment provides the wireless transmitter with stable power supply (DC3.3V). Therefore, the equipment complies with the requirement.

FCC 15.203

It is impossible for end users to replace the antenna, because the antenna is mounted on the board integrally. Therefore, the equipment complies with the requirement.

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SECTION 3: Test specification, procedures & results

3.1 Test specification

Test specification : Test specification: FCC Part 15 Subpart C: 2012,
final revised on December 27, 2012 and effective January 28, 2013
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 power line conducted emission measurements	FCC 15.207	-	N/A	2.6dB 14.0100MHz, Average, Phase: N	Complied
Electric field strength of Fundamental emission	ANSI C63.4:2009 13. Measurement of intentional radiators	FCC 15.225(a)	-	N/A	44.2dB 13.56MHz, Quasi-Peak, 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)	-	N/A	24.6dB 13.553MHz, Quasi-Peak, Vertical	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)	-	N/A	8.5dB 40.69MHz, Quasi-Peak, Vertical	Complied
20dB bandwidth	ANSI C63.4:2009 13. Measurement of intentional radiators	FCC 15.215(c)	-	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

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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 4.6.1	-	Conducted	-	-

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.

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	3.6 dB	3.5 dB
Radiated emission (Measurement distance: 3m)	9kHz-30MHz	3.7 dB	3.7 dB	3.6 dB
	30MHz-300MHz	4.9 dB	5.1 dB	4.9 dB
	300MHz-1GHz	5.0 dB	5.2 dB	4.9 dB

*1: SAC=Semi-Anechoic Chamber

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

Conducted emission

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

Radiated emission

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

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: (±) 5.4%

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3.5 Test location

UL Japan, Inc. Shonan EMC Lab.

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Telephone number : +81 463 50 6400

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JAB Accreditation No. : RTL02610

	FCC Registration No.	IC Registration No.	Width x Depth x Height (m)	Size of reference ground plane (m) / horizontal conducting plane	Maximum measurement distance
<input type="checkbox"/> No.1 Semi-anechoic chamber	697847	2973D-1	20.6 x 11.3 x 7.65	20.6 x 11.3	10m
<input type="checkbox"/> No.2 Semi-anechoic chamber	697847	2973D-2	20.6 x 11.3 x 7.65	20.6 x 11.3	10m
<input checked="" type="checkbox"/> No.3 Semi-anechoic chamber	697847	2973D-3	12.7 x 7.7 x 5.35	12.7 x 7.7	5m
<input type="checkbox"/> No.4 Semi-anechoic chamber	-	-	8.1 x 5.1 x 3.55	8.1 x 5.1	-
<input type="checkbox"/> No.1 shielded room	-	-	6.8 x 4.1 x 2.7	6.8 x 4.1	-
<input checked="" type="checkbox"/> No.2 shielded room	-	-	6.8 x 4.1 x 2.7	6.8 x 4.1	-
<input type="checkbox"/> No.3 shielded room	-	-	6.3 x 4.7 x 2.7	6.3 x 4.7	-
<input type="checkbox"/> No.4 shielded room	-	-	4.4 x 4.7 x 2.7	4.4 x 4.7	-
<input checked="" type="checkbox"/> No.5 shielded room	-	-	7.8 x 6.4 x 2.7	7.8 x 6.4	-
<input type="checkbox"/> No.6 shielded room	-	-	7.8 x 6.4 x 2.7	7.8 x 6.4	-

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.

The mode used:

Mode	Remarks
Transmitting (13.56MHz)	Continuous transmitting 13.56MHz (modulated)

Frequency tolerance:

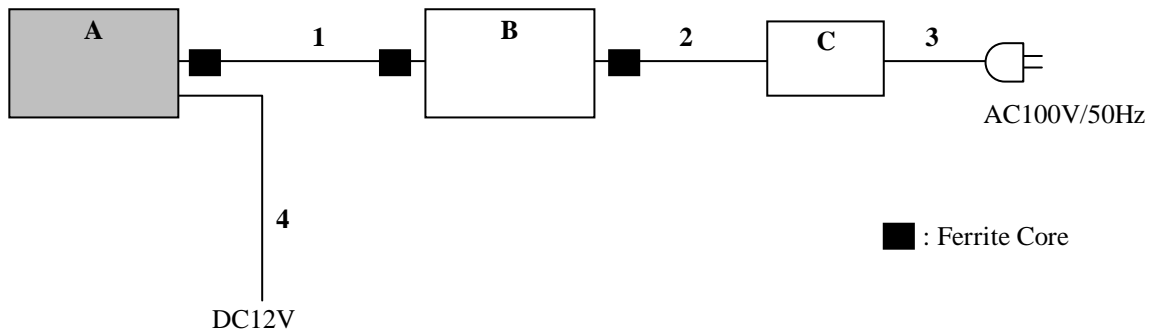
Temperature : -20deg.C to +50deg.C Step 10deg.C
Voltage : DC 10.2 to DC13.8V

*EUT was set by the software as follows;

Software: Sankyo Card Reader (Revision: 3245-01G)

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

4.2 Configuration and peripherals



* Setup was taken into consideration and test data was taken under worst case conditions.

Description of EUT and support equipment

No.	Item	Model number	Serial number	Manufacturer	Remarks
A	Contactless IC card reader	ICM0M0-1x90	*1)	NIDEC SANKYO	EUT
B	Laptop PC	ThinkPad T42	L3-64H12	IBM	-
C	AC Adaptor	08K8208	11S08K8208Z1Z9 MA5AB0U2	IBM	-

*1) Conducted emission (With a dummy load instead of the antenna): DS R-3010004, Other test: DS R-3010002

List of cables used

No.	Cable name	Length(m)	Shield		Remarks
			Cable	Connector	
1	USB	2.0	Shielded	Unshielded	-
2	DC	1.3	Unshielded	Unshielded	-
3	AC	1.8	Unshielded	Unshielded	-
4	DC	1.5	Unshielded	Unshielded	-

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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, 1m by 1.5m, raised 0.8m 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 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. EUT was located 80cm from LISN and excess AC cable was bundled in center. 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 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 was connected to a Line Impedance Stabilization Network (LISN) via DC power supply.

An overview sweep with peak detection has been performed.

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

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

Detector Type : Quasi-Peak/ Average
IF Bandwidth : 9kHz

5.5 Results

Summary of the test results : Pass

Refer to APPENDIX

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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, 1m by 1.5m, raised 0.8m 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 3.

6.3 Test conditions

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

6.4 Test procedure

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

Frequency: From 9kHz to 30MHz

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

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.

	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 type	Loop				Biconical (30-299.99MHz) Logperiodic (300MHz-1GHz)

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. The carrier level was compared also between with and without IC tag, and the test was performed under the worse-case, i.e. without IC tag.

	Horizontal	Vertical
Carrier	Y	Y
Spurious emission (9k-30MHz)	Y	Y
Spurious emission (30M-1GHz)	Y	Y

* FCC Part 15 Section 15.31 (f)(2)

$$9\text{kHz} - 490\text{kHz} [\text{Limit at } 3\text{m}] = [\text{Limit at } 300\text{m}] - 40\log\left(\frac{3}{300}\right)$$

$$490\text{kHz} - 30\text{MHz} [\text{Limit at } 3\text{m}] = [\text{Limit at } 30\text{m}] - 40\log\left(\frac{3}{30}\right)$$

6.5 Results

Summary of the test results : Pass
Refer to APPENDIX

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Figure 1. Antenna angle

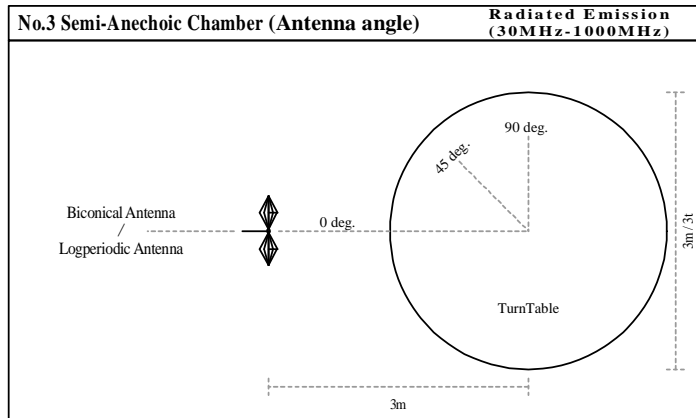
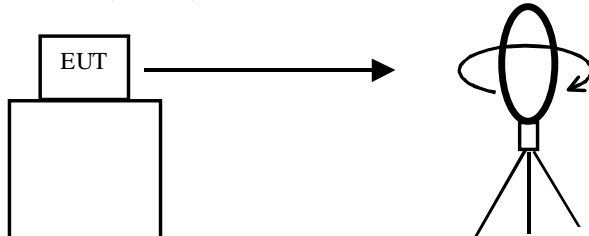
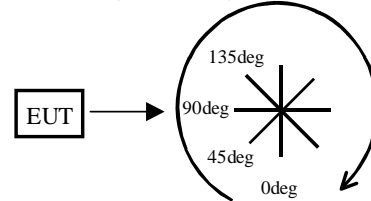


Figure 2. Direction of the Loop Antenna

Side View (Vertical)

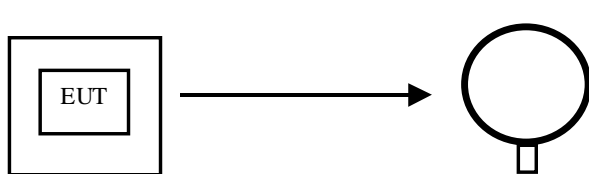


Side View (Horizontal)



Front side: 0 deg.
Forward direction: clockwise

Top View (Horizontal)



Antenna was not rotated.

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

Test procedure

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

Summary of the test results: Pass

Refer to APPENDIX

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.

Summary of the test results: Pass

Refer to APPENDIX

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Contents of APPENDIXES

APPENDIX 1: Data of Radio tests

Conducted emission
Radiated emission
Frequency tolerance
20dB bandwidth & 99% Occupied bandwidth

APPENDIX 2: Test instruments

Test instruments

APPENDIX 3: Photographs of test setup

Conducted emission
Radiated emission
Pre-check of worst position

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DATA OF CONDUCTED EMISSION TEST

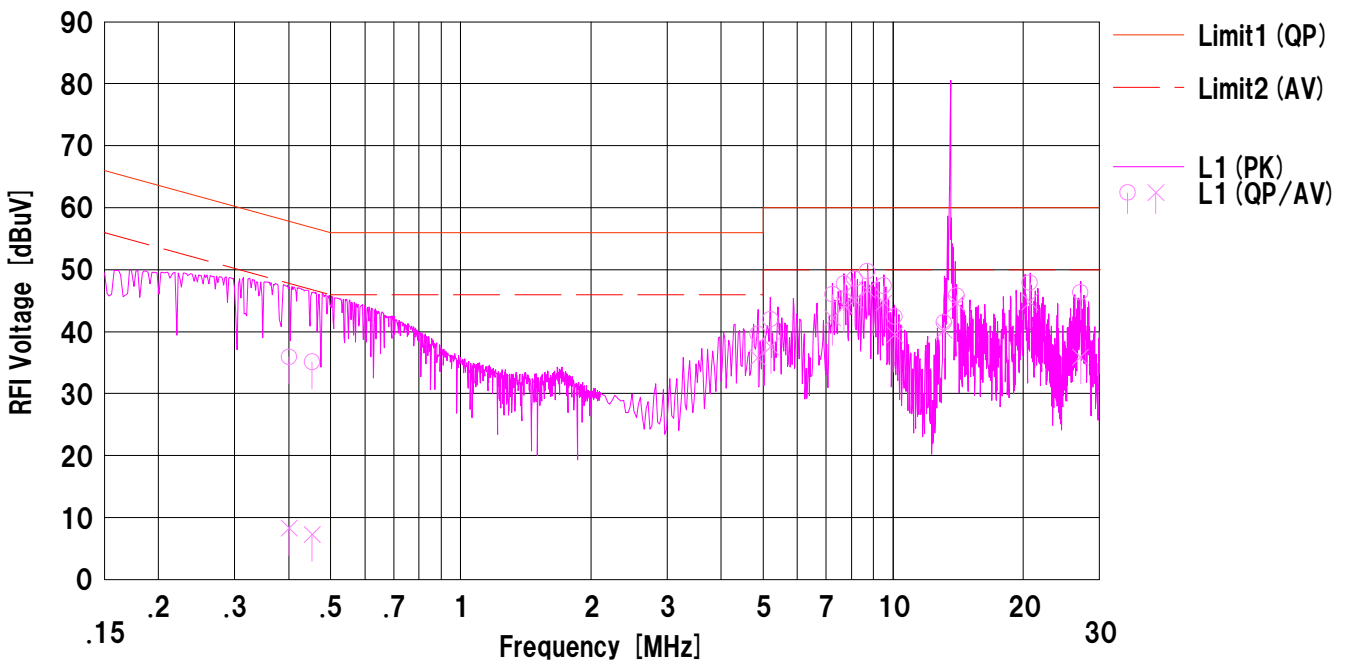
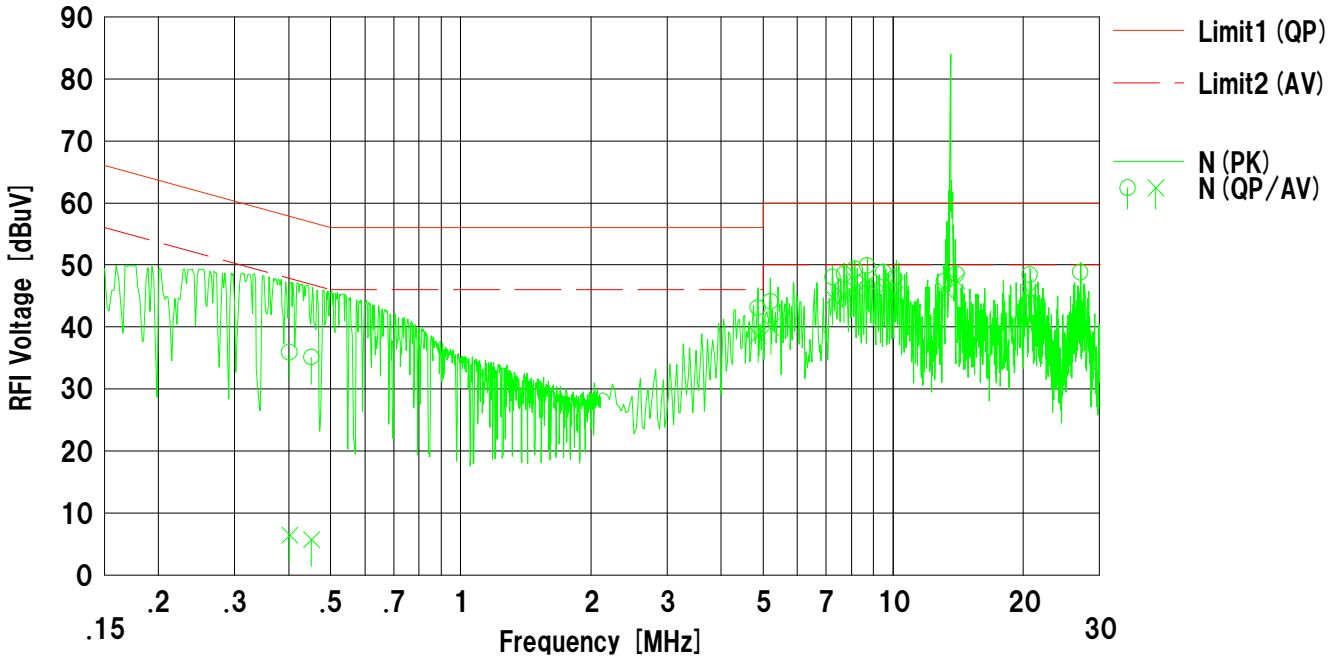
UL Japan, Inc. Shonan EMC Lab. No.2 Shielded Room
Date : 2013/02/05

Company : NIDEC SANKYO CORPORATION
 Kind of EUT : Contactless IC card reader
 Model No. : ICMOMO-1x90
 Serial No. : DS R-3010002
 Remarks : -

Mode : Transmitting 13.56MHz
 Report No. : 10004105S
 Power : AC120V / 60Hz
 Temp./Humi. : 24deg.C. / 35%RH

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

Engineer : Akio Hayashi



Calculation: Result [dBuV] = Reading [dBuV] + C.Fac (LISN+Cable+ATT) [dB]
 LISN: SLS-03

DATA OF CONDUCTED EMISSION TEST

UL Japan, Inc. Shonan EMC Lab. No.2 Shielded Room
Date : 2013/02/05

Company : NIDEC SANKYO CORPORATION
Kind of EUT : Contactless IC card reader
Model No. : ICMOMO-1x90
Serial No. : DS R-3010002
Remarks : -

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Power : AC120V / 60Hz
Temp./Humi. : 24deg.C. / 35%RH

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

Engineer : Akio Hayashi

<< 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	0.40210	23.3	-6.2	12.6	35.9	6.4	57.8	47.8	21.9	41.4	N	
2	0.45142	22.5	-6.9	12.6	35.1	5.7	56.8	46.8	21.7	41.1	N	
3	4.86652	30.2	25.7	12.9	43.1	38.6	56.0	46.0	12.9	7.4	N	
4	5.20744	31.1	26.9	13.0	44.1	39.9	60.0	50.0	15.9	10.1	N	
5	7.24490	35.0	31.7	13.0	48.0	44.7	60.0	50.0	12.0	5.3	N	
6	7.69829	35.5	32.0	13.0	48.5	45.0	60.0	50.0	11.5	5.0	N	
7	8.15092	36.3	33.1	13.0	49.3	46.1	60.0	50.0	10.7	3.9	N	
8	8.71625	36.8	34.1	13.1	49.9	47.2	60.0	50.0	10.1	2.8	N	
9	9.50897	35.7	33.1	13.1	48.8	46.2	60.0	50.0	11.2	3.8	N	
10	10.07511	34.7	31.9	13.2	47.9	45.1	60.0	50.0	12.1	4.9	N	
11	13.11000	34.0	32.8	13.3	47.3	46.1	60.0	50.0	12.7	3.9	N	
12	14.01000	35.1	34.0	13.4	48.5	47.4	60.0	50.0	11.5	2.6	N	
13	20.71580	34.8	31.9	13.6	48.4	45.5	60.0	50.0	11.6	4.5	N	
14	27.12000	34.9	25.6	13.9	48.8	39.5	60.0	50.0	11.2	10.5	N	
15	0.40115	23.3	-4.3	12.6	35.9	8.3	57.8	47.8	21.9	39.5	L1	
16	0.45360	22.5	-5.3	12.6	35.1	7.3	56.8	46.8	21.7	39.5	L1	
17	4.86642	26.7	22.9	12.9	39.6	35.8	56.0	46.0	16.4	10.2	L1	
18	5.20700	29.0	24.6	13.0	42.0	37.6	60.0	50.0	18.0	12.4	L1	
19	7.24501	33.0	29.2	13.0	46.0	42.2	60.0	50.0	14.0	7.8	L1	
20	7.69814	34.7	31.2	13.0	47.7	44.2	60.0	50.0	12.3	5.8	L1	
21	8.15110	35.5	32.1	13.0	48.5	45.1	60.0	50.0	11.5	4.9	L1	
22	8.71720	36.6	33.6	13.1	49.7	46.7	60.0	50.0	10.3	3.3	L1	
23	9.50884	34.3	31.6	13.1	47.4	44.7	60.0	50.0	12.6	5.3	L1	
24	10.07460	29.2	26.3	13.2	42.4	39.5	60.0	50.0	17.6	10.5	L1	
25	13.11000	28.2	26.9	13.3	41.5	40.2	60.0	50.0	18.5	9.8	L1	
26	14.01000	32.4	31.2	13.4	45.8	44.6	60.0	50.0	14.2	5.4	L1	
27	20.71560	34.3	31.2	13.6	47.9	44.8	60.0	50.0	12.1	5.2	L1	
28	27.12000	32.4	22.0	13.9	46.3	35.9	60.0	50.0	13.7	14.1	L1	

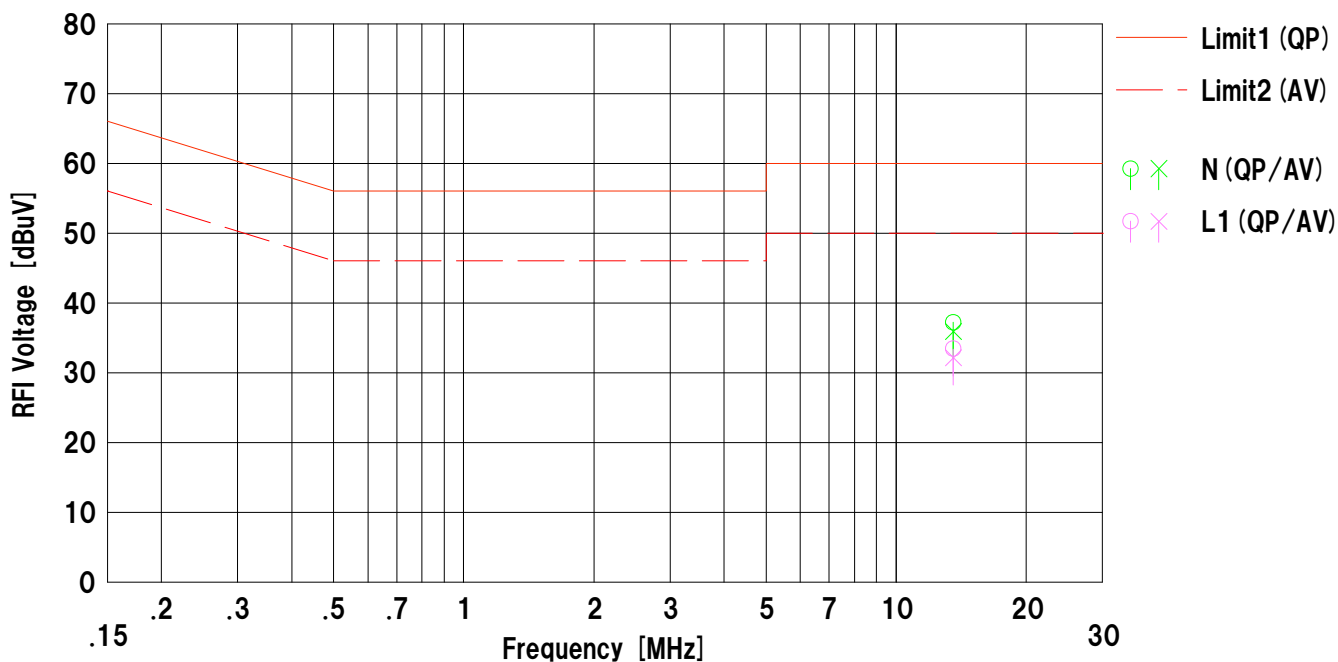
DATA OF CONDUCTED EMISSION TEST

UL Japan, Inc. Shonan EMC Lab. No.2 Shielded Room
Date : 2013/02/05

Company : NIDEC SANKYO CORPORATION	Mode : Transmitting 13.56MHz
Kind of EUT : Contactless IC card reader	Report No. : 10004105S
Model No. : ICMOMO-1x90	Power : AC120V / 60Hz
Serial No. : DS R-3010004	Temp./Humi. : 24deg.C. / 35%RH
Remarks : With a dummy load instead of the antenna	

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

Engineer : Akio Hayashi



No.	Freq. [MHz]	Reading		C.Fac [dB]	Results		Limit		Margin		Phase	Comment
		<QP>	<AV>		<QP>	<AV>	<QP>	<AV>	<QP>	<AV>		
		[dBuV]	[dBuV]		[dBuV]	[dBuV]	[dB]	[dB]	[dB]	[dB]		
1	13.56000	23.9	22.6	13.3	37.2	35.9	60.0	50.0	22.8	14.1	N	
2	13.56000	20.1	18.8	13.3	33.4	32.1	60.0	50.0	26.6	17.9	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.3 Semi-Anechoic Chamber

Company: NIDEC SANKYO CORPORATION	Regulation: FCC Part15 SupartC 15.225
Equipment: Contactless IC card reader	Test Distance: 3m
Model: ICM0M0-1x90	Date: February 2, 2013
Sample No.: DS R-3010002	Temperature: 22deg.C
Power: DC12V	Humidity: 39% RH
Mode: Transmitting 13.56MHz	ENGINEER: Akio Hayashi

Remarks: : EUT axis:Hor_Y / Ver_Y), Vertical polarization (measuring antenna angle) of the worst case: 0deg

Fundamental emission

No.	FREQ [MHz]	Test Receiver Reading		Antenna Factor [dB/m]	LOSS [dB]	AMP GAIN [dB]	RESULT		LIMIT (3m) [dBuV/m]	MARGIN	
		Hor [dBuV]	Ver [dBuV]				Hor [dBuV/m]	Ver [dBuV/m]		Hor [dB]	Ver [dB]
1	13.560	78.6	86.7	18.9	6.3	32.2	71.6	79.7	123.9	52.3	44.2

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

Field strength of 13.553MHz to 13.567MHz Limit(3m) = 83.9dBuV/m + 40log 30m/3m
= 123.9dBuV/m (FCC15.225(a))

Spurious emission within the band

No.	FREQ [MHz]	Test Receiver Reading		Antenna Factor [dB/m]	LOSS [dB]	AMP GAIN [dB]	RESULT		LIMIT (3m) [dBuV/m]	MARGIN	
		Hor [dBuV]	Ver [dBuV]				Hor [dBuV/m]	Ver [dBuV/m]		Hor [dB]	Ver [dB]
1	13.110	30.7	36.2	18.9	6.3	32.2	23.7	29.2	69.5	45.8	40.3
2	13.410	47.7	56.7	18.9	6.3	32.2	40.7	49.7	80.5	39.8	30.8
3	13.553	63.9	72.8	18.9	6.3	32.2	56.9	65.8	90.4	33.5	24.6
4	13.567	62.2	71.2	18.9	6.3	32.2	55.2	64.2	90.5	35.3	26.3
5	13.710	42.5	51.4	18.9	6.3	32.2	35.5	44.4	80.5	45.0	36.1
6	14.010	30.5	31.5	18.9	6.3	32.2	23.5	24.5	69.5	46.0	45.0

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

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 (3m)

- 13.410MHz to 13.553MHz and 13.567MHz to 13.710MHz : 50.5dBuV/m + 40log30m/3m = 90.5dBuV/m (FCC15.225(b))
- 13.110MHz to 14.010MHz and 13.710MHz to 14.010MHz : 40.5dBuV/m + 40log30m/3m = 80.5dBuV/m (15.225(c))
- Below 13.110MHz and Above 14.010MHz : 29.5dBuV/m + 40log30m/3m = 69.5dBuV/m (FCC15.225(d)and FCC15.209)

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Radiated Emission

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

Company: NIDEC SANKYO CORPORATION
Equipment: Contactless IC card reader
Model: ICM0M0-1x90
Sample No.: DS R-3010002
Power: DC12V
Mode: Transmitting 13.56MHz

Regulation: FCC Part15 SupartC 15.225
Test Distance: 3m
Date: February 2, 2013
Temperature: 22deg.C
Humidity: 39% RH
ENGINEER: Akio Hayashi

EUT axis: Below 30MHz(Horizontal Y-axis, Vertical Y-axis)*,
Above 30MHz(Horizontal: Y-axis, Vertical: Y-axis)

*Vertical polarization (measuring antenna angle) of the worst case: 90deg

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg.]	Remark
Hori.	27.12	QP	29.8	19.0	6.5	32.2	23.1	69.5	46.4	-	0	
Hori.	40.68	QP	35.3	14.4	6.6	32.2	24.1	40.0	15.9	327	353	
Hori.	54.24	QP	24.3	9.6	6.7	32.2	8.4	40.0	31.6	300	78	
Hori.	299.46	QP	23.3	19.5	8.5	32.0	19.3	46.0	26.7	150	349	
Hori.	447.71	QP	21.4	16.8	9.2	32.0	15.4	46.0	30.6	100	259	
Hori.	786.47	QP	31.2	20.8	10.4	31.7	30.7	46.0	15.3	101	198	
Vert.	27.12	QP	49.2	19.0	6.5	32.2	42.5	69.5	27.0	-	26	
Vert.	40.69	QP	42.7	14.4	6.6	32.2	31.5	40.0	8.5	100	104	
Vert.	54.24	QP	38.9	9.6	6.7	32.2	23.0	40.0	17.0	100	358	
Vert.	299.46	QP	30.2	19.5	8.5	32.0	26.2	46.0	19.8	100	85	
Vert.	447.71	QP	22.8	16.8	9.2	32.0	16.8	46.0	29.2	100	56	
Vert.	786.47	QP	25.5	20.8	10.4	31.7	25.0	46.0	21.0	100	262	

Result = Reading + Ant Factor +Site Factor+ Loss (Cable+Attenuator) - Gain(Amprifier)

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

Data of Frequency Tolerance: FCC 15.225(e)

UL Japan, Inc.
Shonan EMC Lab. No.5 Shield room

Company: NIDEC SANKYO CORPORATION
Equipment: Contactless IC card reader
Model: ICM0M0-1x90
Sample No.: DS R-3010002
Power: DC12V
Mode: Transmitting 13.56MHz

Regulation: FCC Part15 SupartC 15.225
Date: January 31, 2013
Temperature: 24deg.C
Humidity: 46%RH
ENGINEER: Akio Hayashi

Temperature Variation: 50deg.C

Test Conditions	Original Frequency (MHz)	Measured Frequency (MHz)	Frequency Error (MHz)	Frequency Tolerance (%)	Limit (%)
startup	13.56	13.559810	-0.000190	-0.00140	0.01
after 2minutes	13.56	13.559819	-0.000181	-0.00133	0.01
after 5minutes	13.56	13.559820	-0.000180	-0.00133	0.01
after 10minutes	13.56	13.559821	-0.000179	-0.00132	0.01

Temperature Variation: 40deg.C

Test Conditions	Original Frequency (MHz)	Measured Frequency (MHz)	Frequency Error (MHz)	Frequency Tolerance (%)	Limit (%)
startup	13.56	13.559872	-0.000128	-0.00094	0.01
after 2minutes	13.56	13.559800	-0.000200	-0.00147	0.01
after 5minutes	13.56	13.559801	-0.000199	-0.00147	0.01
after 10minutes	13.56	13.559812	-0.000188	-0.00139	0.01

Temperature Variation: 30deg.C

Test Conditions	Original Frequency (MHz)	Measured Frequency (MHz)	Frequency Error (MHz)	Frequency Tolerance (%)	Limit (%)
startup	13.56	13.559816	-0.000184	-0.00136	0.01
after 2minutes	13.56	13.559809	-0.000191	-0.00141	0.01
after 5minutes	13.56	13.559812	-0.000188	-0.00139	0.01
after 10minutes	13.56	13.559809	-0.000191	-0.00141	0.01

Temperature Variation: 20deg.C

Test Conditions	Original Frequency (MHz)	Measured Frequency (MHz)	Frequency Error (MHz)	Frequency Tolerance (%)	Limit (%)
startup	13.56	13.559832	-0.000168	-0.00124	0.01
after 2minutes	13.56	13.559820	-0.000180	-0.00133	0.01
after 5minutes	13.56	13.559819	-0.000181	-0.00133	0.01
after 10minutes	13.56	13.559919	-0.000081	-0.00060	0.01

Data of Frequency Tolerance: FCC 15.225(e)

UL Japan, Inc.
Shonan EMC Lab. No.5 Shield room

Company: NIDEC SANKYO CORPORATION
Equipment: Contactless IC card reader
Model: ICM0M0-1x90
Sample No.: DS R-3010002
Power: DC12V
Mode: Transmitting 13.56MHz

Regulation: FCC Part15 SupartC 15.225
Date: January 31, 2013
Temperature: 24deg.C
Humidity: 46%RH
ENGINEER: Akio Hayashi

Temperature Variation: 10deg.C

Test Conditions	Original Frequency (MHz)	Measured Frequency (MHz)	Frequency Error (MHz)	Frequency Tolerance (%)	Limit (%)
startup	13.56	13.559844	-0.000156	-0.00115	0.01
after 2minutes	13.56	13.559849	-0.000151	-0.00111	0.01
after 5minutes	13.56	13.559849	-0.000151	-0.00111	0.01
after 10minutes	13.56	13.559846	-0.000154	-0.00114	0.01

Temperature Variation: 0deg.C

Test Conditions	Original Frequency (MHz)	Measured Frequency (MHz)	Frequency Error (MHz)	Frequency Tolerance (%)	Limit (%)
startup	13.56	13.559859	-0.000141	-0.00104	0.01
after 2minutes	13.56	13.559847	-0.000153	-0.00113	0.01
after 5minutes	13.56	13.559867	-0.000133	-0.00098	0.01
after 10minutes	13.56	13.559831	-0.000169	-0.00125	0.01

Temperature Variation: -10deg.C

Test Conditions	Original Frequency (MHz)	Measured Frequency (MHz)	Frequency Error (MHz)	Frequency Tolerance (%)	Limit (%)
startup	13.56	13.559829	-0.000171	-0.00126	0.01
after 2minutes	13.56	13.559836	-0.000164	-0.00121	0.01
after 5minutes	13.56	13.559828	-0.000172	-0.00127	0.01
after 10minutes	13.56	13.559834	-0.000166	-0.00122	0.01

Temperature Variation: -20deg.C

Test Conditions	Original Frequency (MHz)	Measured Frequency (MHz)	Frequency Error (MHz)	Frequency Tolerance (%)	Limit (%)
startup	13.56	13.559791	-0.000209	-0.00154	0.01
after 2minutes	13.56	13.559776	-0.000224	-0.00165	0.01
after 5minutes	13.56	13.559798	-0.000202	-0.00149	0.01
after 10minutes	13.56	13.559801	-0.000199	-0.00147	0.01

Data of Frequency Tolerance: FCC 15.225(e)

UL Japan, Inc.
Shonan EMC Lab. No.5 Shield room

Company: NIDEC SANKYO CORPORATION
Equipment: Contactless IC card reader
Model: ICM0M0-1x90
Sample No.: DS R-3010002
Power: DC12V
Mode: Transmitting 13.56MHz

Regulation: FCC Part15 SupartC 15.225
Date: January 31, 2013
Temperature: 24deg.C
Humidity: 46%RH
ENGINEER: Akio Hayashi

Input Voltage:DC10.2V (85%)

Temperature Variation: 20deg.C

Test Conditions	Original Frequency (MHz)	Measure Frequency (MHz)	Frequency Error (MHz)	Frequency Tolerance (%)	Limit (%)
startup	13.56	13.559840	-0.000160	-0.00118	0.01
after 2minutes	13.56	13.559821	-0.000179	-0.00132	0.01
after 5minutes	13.56	13.559827	-0.000173	-0.00128	0.01
after 10minutes	13.56	13.559828	-0.000172	-0.00127	0.01

Input Voltage:DC13.8V (115%)

Temperature Variation: 20deg.C

Test Conditions	Original Frequency (MHz)	Measure Frequency (MHz)	Frequency Error (MHz)	Frequency Tolerance (%)	Limit (%)
startup	13.56	13.559837	-0.000163	-0.00120	0.01
after 2minutes	13.56	13.559830	-0.000170	-0.00125	0.01
after 5minutes	13.56	13.559816	-0.000184	-0.00136	0.01
after 10minutes	13.56	13.559836	-0.000164	-0.00121	0.01

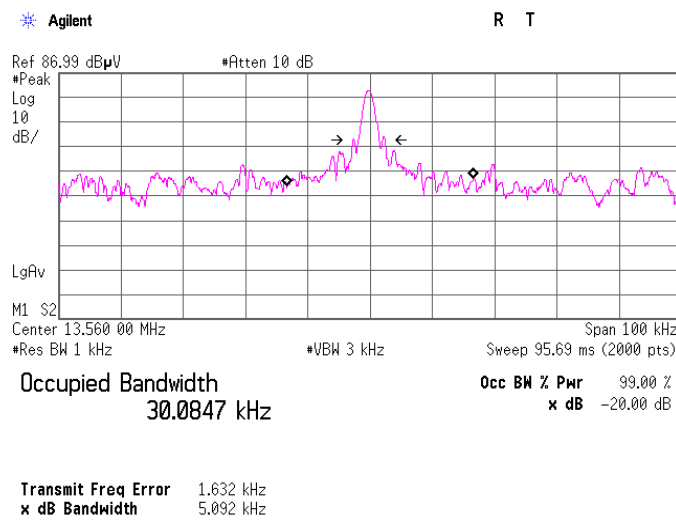
20dB bandwidth & 99% Occupied bandwidth: FCC 15.215 / RSS-Gen

UL Japan, Inc.
Shonan EMC Lab. No.5 Shield room

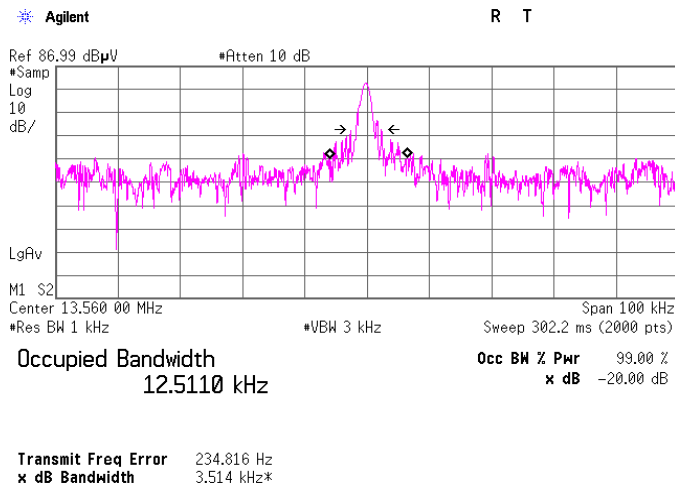
Company: NIDEC SANKYO CORPORATION
 Equipment: Contactless IC card reader
 Model: ICM0M0-1x90
 Sample No.: DS R-3010002
 Power: DC12V
 Mode: Transmitting 13.56MHz

Regulation: FCC Part15 Subpart C 15.215
 Date: January 31, 2013
 Temperature: 24deg.C
 Humidity: 46%RH
 ENGINEER: Akio Hayashi

20dB Bandwidth: 5.092 kHz



99% Occupied Bandwidth: 12.5110 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)
SFC-01	Microwave Counter	Agilent	53151A	US40511493	TF	2012/03/21 * 12
SSA-02	Spectrum Analyzer	Agilent	E4448A	MY48250106	TF	2012/03/16 * 12
SCH-01	Temperature and Humidity Chamber	Espec	PL-1KT	14020837	TF	2012/04/04 * 12
SOS-01	Humidity Indicator	A&D	AD-5681	4062555	TF	2012/02/06 * 12
SAF-03	Pre Amplifier	SONOMA	310N	290213	RE	2012/02/10 * 12
SAT6-03	Attenuator	JFW	50HF-006N	-	RE	2012/02/10 * 12
SBA-03	Biconical Antenna	Schwarzbeck	BBA9106	91032666	RE	2012/10/08 * 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	2012/04/10 * 12
SLA-03	Logperiodic Antenna	Schwarzbeck	UHALP9108A	UHALP 9108-A0901	RE	2012/10/08 * 12
SOS-05	Humidity Indicator	A&D	AD-5681	4062518	RE	2012/02/06 * 12
STR-06	Test Receiver	Rohde & Schwarz	ESCI	101259	RE	2012/02/07 * 12
SJM-11	Measure	PROMART	SEN1935	-	RE	-
SAEC-03(NSA)	Semi-Anechoic Chamber	TDK	SAEC-03(NSA)	3	RE	2012/09/21 * 12
COTS-SEMI-1	EMI Software	TSJ	TEPTO-DV(RE,CE,RF,IMF)	-	RE, CE	-
SAT6-07	Attenuator	JFW	50HF-006N	-	RE	2012/02/17 * 12
SLP-02	Loop Antenna	Rohde & Schwarz	HFH2-Z2	100218	RE	2012/10/31 * 12
SCC-B12/B13/SRSE-02	Coaxial Cable&RF Selector	Suhner/Suhner/TOYO	RG223U/141PE/NS4906	-/0901-270(RF Selector)	CE	2012/04/10 * 12
SLS-03	LISN	Rohde & Schwarz	ENV216	100513	CE(EUT)	2012/02/23 * 12
SLS-04	LISN	Rohde & Schwarz	ENV216	100514	CE	2012/02/20 * 12
SAT3-05	Attenuator	JFW	50HF-003N	-	CE	2012/02/17 * 12
SOS-04	Humidity Indicator	A&D	AD-5681	4061512	CE	2012/03/26 * 12
STM-03	Terminator	TME	CT-01 BP	-	CE	2013/01/16 * 12
STR-02	Test Receiver	Rohde & Schwarz	ESCI	100575	CE	2012/09/03 * 12
SJM-02	Measure	KOMELON	KMC-36	-	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 ,

TF: Test Fixture (Frequency Tolerance and Occupied Bandwidth)