RADIO TEST REPORT

Test Report No.: 14091107M-A

Applicant	:	**Oki Data Corporation**
Type of Equipment	:	**Embedded RFID Read/Write System**
Model No.	:	**4465873A**
FCC ID	:	**B2K-4465873A**
Test regulation	:	**FCC Part15 Subpart C: 2014**
Test result	:	**Complied**

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6. The opinions and the interpretations to the result of the description in this report are outside scopes where UL Kashima has been accredited.

Date of test: October 6-8, 2014

Tested by:

Kazuhiro Ando
Manager of EMC Testing Sec.,
Operation Dept.

Approved by :

Go Ishiwata
Department Manager
Operation Dept.

ilac-MRA

A2LA ACCREDITED TESTING CERTIFICATE 1266.01

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☒ There is no testing item of "Non-accreditation".

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REVISION HISTORY

Original Test Report No. 14091107M-A

Revision	Date	Page revised	Revision Description
00	October 22, 2014	-	Original
01	October 23, 2014	P3	Typo Correction (Product description)
02	October 24, 2014	P3, P4	Typo Correction (Product description, Procedures & Results)
03	November 5, 2014	P3	Addition of Product description
04	November 10, 2014	P4	Addition of Note of clause 3.2
		P6	Addition of Description of Operation mode

SECTION 1: Customer information

Company Name	:	Oki Data Corporation
Brand Name	:	Oki Data
Address	:	3-1, Futaba-cho, Takasaki-shi, Gunma-ken 370-8585, Japan
Telephone Number	:	+81-27-328-6399
Facsimile Number	:	+81-27-328-6396
Contact Person	:	Hidetoshi Okazaki

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

2.1 Identification of E.U.T.

Type of Equipment	:	Embedded RFID Read/Write System
Model Number	:	4465873A
Serial Number	:	Refer to clause 4.2
Rating	:	DC 5V 0.2W
Country of Mass-production	:	China
Condition of EUT	:	Production prototype
Receipt Date of Sample	:	October 4, 2014
Modification of EUT	:	No modification by the test lab.

2.2 Product description

Model: 4465873A (referred to as the EUT in this report) is an Embedded RFID Read/Write System which is built in a printer and is used for checking remaining amount of the toner.

Clock frequency(ies) in the system : 13.56 MHz

<Radio part>

Equipment type	:	Transceiver
Frequency of operation	:	13.56MHz
Type of modulation	:	ASK
Antenna type	:	Printed Loop Coil
Antenna connector type	:	PH
ITU code	:	A1D
Operation temperature range	:	+0 to +50 deg.C.

FCC 15.31 (e)
The RF Module is constantly provided voltage through its own regulator regardless of input voltage. Therefore, this EUT complies with the requirement.

FCC 15.203
The EUT has a unique coupling/antenna connector (PH connector). Therefore the equipment complies with the requirement of 15.203.

SECTION 3: Test specification, procedures & results

3.1 Test specification

Test specification : FCC Part 15 Subpart C: 2014, final revised on August 15, 2014 and effective October 14, 2014
* The revision on August 15, 2014 does not affect the test specification applied to the EUT.

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	18.4dB Freq.: 11.3224MHz Detector: AV Phase: L1	Complied
Electric field strength of Fundamental emission	ANSI C63.4:2009 13. Measurement of intentional radiators	FCC 15.225 (a)	Radiated	N/A	82.0dB Polarization: Vertical *1)	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	49.0dB Freq.: 13.110MHz Polarization: Horizontal *1)	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	9.1dB Freq.: 501.72MHz Polarization: Vertical *1)	Complied
20dB bandwidth	ANSI C63.4:2009 13. Measurement of intentional radiators	FCC 15.215 (c)	Conducted	N/A	-	-
Frequency tolerance	ANSI C63.4:2009 13. Measurement of intentional radiators	FCC 15.225 (e)	Conducted	N/A	-	Complied
Note: UL Kashima's Work Procedures No. 13-EM-W0420 and 13-EM-W0422 *1) The data of Anechoic chamber was adapted because attenuation characteristics of over 40 dB/decade had been was confirmed by taking the correlation of the data of 3 m Anechoic chamber and 30 m Open field and Open site (KDB937606).						

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	RSS-Gen 4.6.1	Conducted	-	-
Note: UL Kashima'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.

Test Items	Frequency range	Uncertainty
Conducted emission (AC Mains) AMN	0.15 MHz-30 MHz	2.8 dB
Radiated emission (Measurement distance: 3 m)	0.009 MHz-30 MHz	2.7 dB
	30 MHz-1000 MHz	5.9 dB

Conducted emission test

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

Radiated emission test

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

Frequency tolerance

Frequency Measurement uncertainty for this test was: (±) 7.9 x 10^-8

3.5 Test location

UL Kashima, Inc.
1614 Mushihata, Katori-shi, Chiba-ken, 289-0341 JAPAN
Telephone number : +81 478 82 0963
Facsimile number : +81 478 82 3373
A2LA Accreditation No. : 1266-01

	FCC Registration No.	IC Registration No.	Width x Depth x Height (m)	Size of reference ground plane/horizontal conducting plane (m)	Maximum measurement distance
No.1 Open site	90558	IC 4659A-1	6.0 x 5.5 x 2.5	20 x 40	10 m
No.2 Open site	510504	IC 4659A-2	4.4 x 4.4 x 2.15	18 x 20	10 m
No.5 Open site	99356	IC 4659A-5	8.6 x 7.1 x 2.4	18 x 23	10 m
No.1 Shielded room	90558	IC 4659A-1	5.4 x 4.5 x 2.3		-
No.2 Shielded room	510504	IC 4659A-2	3.6 x 2.7 x 2.3		-
No.3 Shielded room	-	-	5.4 x 3.6 x 2.3		-
No.4 Shielded Room	-	-	6.1 x 6.1 x 3.1		-
No.5 Shielded Room	99356	IC 4659A-5	4.2 x 3.1 x 2.5		-
No.1 Measurement room	-	-	5.0 x 3.7 x 2.6		-
No.6 Measurement room	-	-	4.3 x 4.4 x 2.7		-
No.3 Fully Anechoic Chamber	-	-	7.0 x 3.5 x 3.5		-
No.6 Semi-anechoic Chamber	372431	IC 4659A-6	8.5 x 5.5 x 5.2		3 m
No.10 Semi-anechoic Chamber	682397	IC 4659A-10	18.4 x 9.9 x 7.7		10 m
No.11 Semi-anechoic Chamber	718605	IC 4659A-7	9.0 x 6.5 x 5.2		3 m

3.6 Test setup, Data of test & Test instruments

Refer to APPENDIX 1 to 3.

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.

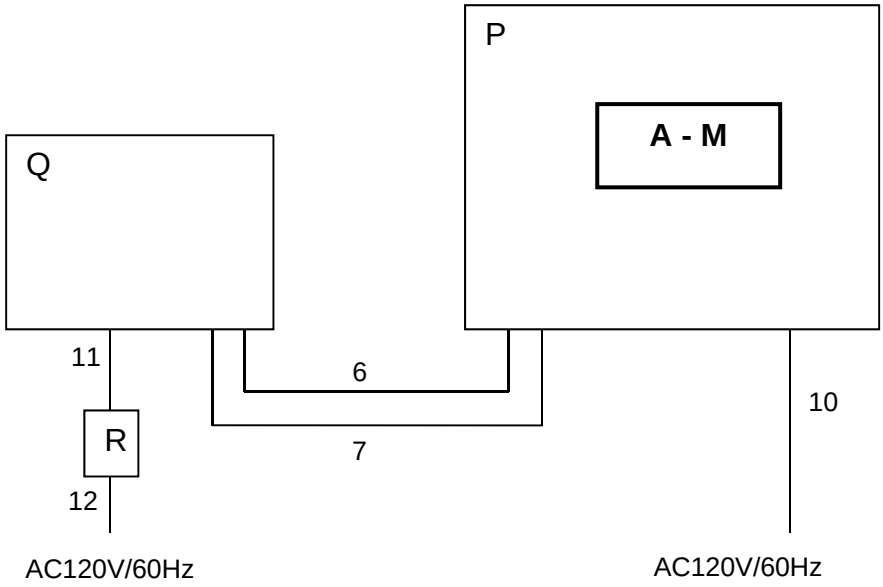
Test item	Operating mode	Tested frequency
All items except for Frequency tolerances	Transmitting and Receiving mode (with Passive Tag) • Modulation ASK10% • Data transfer rate 106kbps • 4ch serially transmitting (Continuous Transmitting with switching 4 antenna in order)	13.56MHz
Frequency tolerances	Transmitting Unmodulated	13.56MHz

The EUT has the power settings by the software as follows;
Power settings: Setting is controlled by the firmware and cannot be changed.
Software: Emi-4Ch AFE-TP7 v4.00

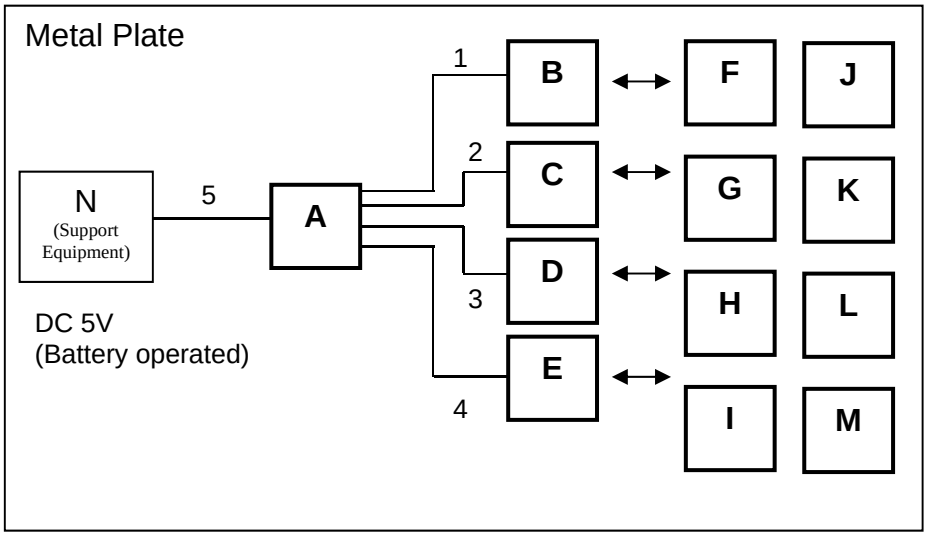
Justification: The system was configured in typical fashion (as customer would normally use it) for testing.

4.2 Configuration and peripherals

Conducted Emissions

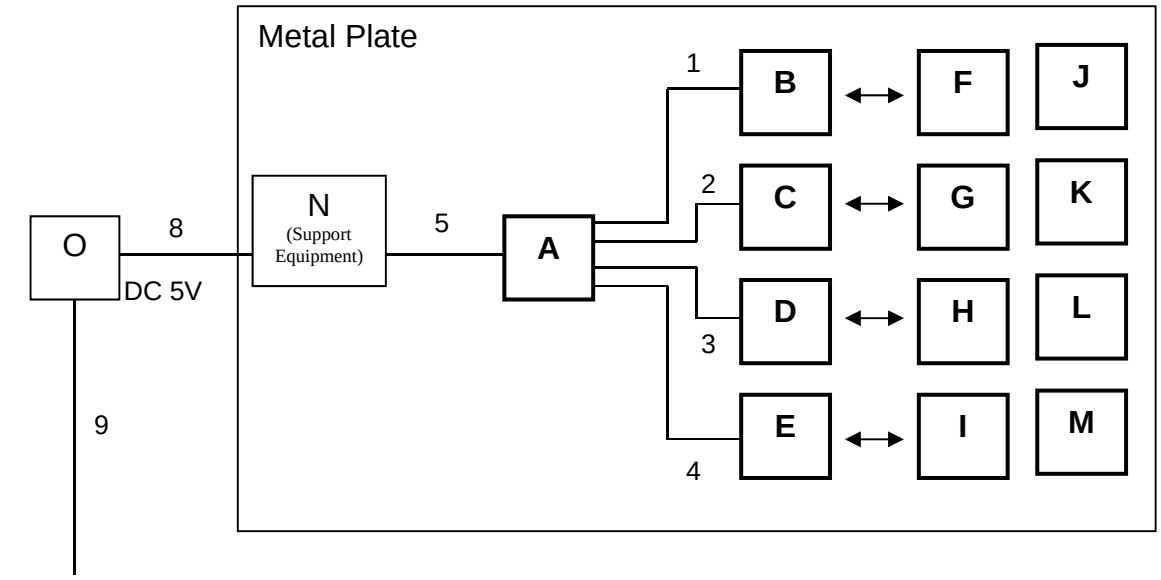


Radiated Emissions



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

Frequency stability Test condition



AC100V/50Hz

Description of EUT and support equipment

No.	Item	Model number	Serial number	Manufacturer	Remarks
A	RFID Module	4465873A	*1)	Oki Data Corporation	EUT
B-E	Antenna Unit	-	-	Oki Data Corporation	EUT
F-M	Tag	-	-	Oki Data Corporation	EUT
N	Micro-Computer for Test	None	None	Oki Data Corporation	Support equipment
O	DC Power Supply	GSV3000	60646742	DIAMOND ANTENNA	-
P	Printer	MC883	α1#29	Oki Data Corporation	-
Q	PC	3358-3VJ	LR-L593L	lenovo	-
R	AC Adapter	92P1156	11S92P1156Z1ZDXN 26D4TY	lenovo	-

*1) WMJ14071390: Conducted emission test, WMJ12280566: Other tests

List of cables used

No.	Item	Length(m)	Shield		Remarks
			Cable	Connector	
1	Antenna cable 0	0.135	Unshielded	Unshielded	44995801YS
2	Antenna cable 1	0.07	Unshielded	Unshielded	44995801YS
3	Antenna cable 2	0.07	Unshielded	Unshielded	44995801YS
4	Antenna cable 3	0.135	Unshielded	Unshielded	44995801YS
5	Signal	0.93	Unshielded	Unshielded	-
6	USB	2.0	Shielded	Shielded	-
7	LAN	2.0	Unshielded	Unshielded	-
8	AC	2.0	Unshielded	Unshielded	-
9	AC	1.7	Unshielded	Unshielded	DC Power Supply
10	AC	1.8	Unshielded	Unshielded	Printer
11	DC	1.7	Unshielded	Unshielded	AC Adapter
12	AC	0.8	Unshielded	Unshielded	AC Adapter

SECTION 5: Conducted emission

5.1 Operating environment

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

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

5.2 Test configuration

EUT was placed on a platform of nominal size, 1.0m by 2.0m, raised 0.8m above the conducting ground plane. The rear of tabletop was located 40cm to the vertical conducting plane. The rear of EUT 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. I/O cables that were connected to the peripherals were bundled in center. They were folded back and for the forming a bundle 30cm to 40cm long and were hanged at a 40cm height to the ground plane.
Each EUT current-carrying power lead was individually connected through a LISN to the input power source.
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 in a semi-anechoic chamber. 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 : 9kHz

5.5 Results

Summary of the test results : Pass

Refer to APPENDIX 1.

SECTION 6: Radiated emission (Fundamental and Spurious emission)

6.1 Operating environment

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

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

6.2 Test configuration

EUT was placed on a platform of nominal size, 0.5m by 0.5m, raised 0.8m above the conducting ground plane.
The table is made of polystyrene foam. That has very low permittivity.
I/O cables that were connected to the peripherals were bundled in center. They were folded back and for the forming a bundle 30cm to 40cm long and were hanged at a 40cm height to the ground plane.
Photographs of the set up are shown in Appendix 3.

6.3 Test conditions

Frequency range : 9kHz - 1GHz
Test distance : 3m
EUT position : Table top

6.4 Test procedure

The Radiated Electric Field Strength intensity has been measured with a ground plane and at a distance of 3m
Frequency: From 9kHz to 30MHz at distance 3m

The EUT was rotated a full revolution in order to obtain the maximum value of the electric field intensity.
The measurements were performed for vertical polarization (antenna angle: 0deg.to 360deg.) and horizontal polarization. Drawing of the antenna direction is shown in Figure 1.

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

The measuring antenna height was varied between 1 and 4m and EUT was rotated a full revolution in order to obtain the maximum value of the electric field intensity.
The measurements were performed for both vertical and horizontal antenna polarization.

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

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

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

* FCC 15.31 (f)(2) (9kHz-30MHz)
9kHz – 490kHz [Limit at 3m]= [Limit at 300m]-40log (3[m]/300[m])
490kHz – 30MHz [Limit at 3m]= [Limit at 30m]-40log (3[m]/30[m])

6.5 Results

Summary of the test results : Pass

Refer to APPENDIX 1.

Figure 1. Direction of the Loop Antenna

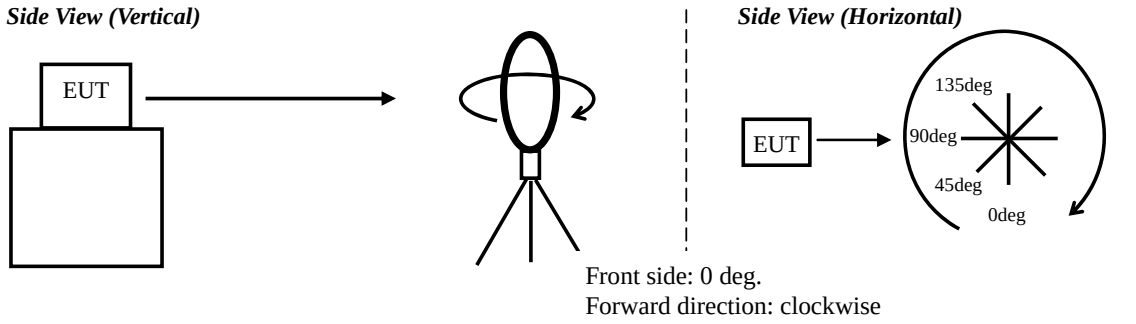
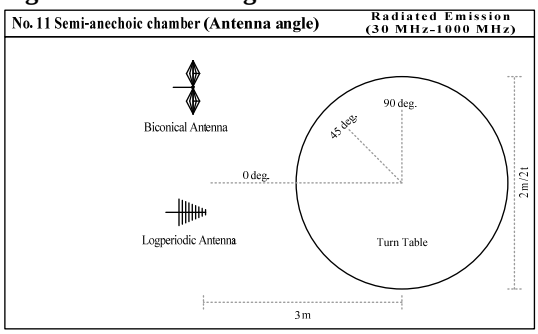


Figure 2. Antenna angle



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 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.

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

Contents of APPENDIXES

DATA OF CONDUCTED EMISSION TEST

UL Kashima, Inc. No.11 Semi-Anechoic Chamber
Date : 2014/10/06 10:33:49

Company : Oki Data Corporation
Kind of EUT : Embeded RFID Read/Write System
Model No. : 4465873A
Serial No. : WMJ14071390
Remarks :

Mode : Transmitting and Receiving
Job No. : 14091107M
Power : DC 5V (Printer: AC120V/60Hz)
Temp./Humi. : 23deg.C / 59%RH

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

Tested by : Kazuhiro Ando

<< QP/AV DATA >>

No.	Freq.	Reading		C.Fac	Results		Limit		Margin		Phase	Comment
		<QP>	<AV>		<QP>	<AV>	<QP>	<AV>	<QP>	<AV>		
	[MHz]	[dBuV]	[dBuV]	[dB]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dB]	[dB]		
1	0.15000	23.5	---	10.3	33.8	---	66.0	56.0	32.2	---	N	
2	0.19040	22.2	---	10.3	32.5	---	64.0	54.0	31.5	---	N	
3	0.38020	15.0	---	10.4	25.4	---	58.3	48.3	32.9	---	N	
4	0.50700	16.8	---	10.4	27.2	---	56.0	46.0	28.8	---	N	
5	1.23600	16.4	---	10.5	26.9	---	56.0	46.0	29.1	---	N	
6	11.33200	19.5	---	11.7	31.2	---	60.0	50.0	28.8	---	N	
7	13.56000	15.6	---	12.0	27.6	---	60.0	50.0	32.4	---	N	
8	0.15000	24.0	---	10.3	34.3	---	66.0	56.0	31.7	---	L1	
9	0.19410	22.3	---	10.3	32.6	---	63.9	53.9	31.3	---	L1	
10	0.38100	13.9	---	10.4	24.3	---	58.3	48.3	34.0	---	L1	
11	0.50700	16.3	---	10.4	26.7	---	56.0	46.0	29.3	---	L1	
12	1.23550	8.7	---	10.5	19.2	---	56.0	46.0	36.8	---	L1	
13	11.32240	19.9	19.9	11.7	31.6	31.6	60.0	50.0	28.4	18.4	L1	
14	13.56000	12.3	---	12.0	24.3	---	60.0	50.0	35.7	---	L1	

Calculation:Result[dBuV]=Reading[dBuV]+C.Fac(LISN+Cable+ATT)[dB]
LISN: LSN03

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

UL Kashima, Inc.
No.11 Semi Anechoic Chamber, No.1 Open Site

Company:	Oki Data Corporation	Regulation:	FCC Part15 Subpart C 15.225
Equipment:	Embedded RFID Read/Write System	Test Distance:	3m
Model:	4465873A	Date:	October 7, 2014
Sample No.:	WMJ12280566	Temperature:	23 deg.C
Power:	DC 5V	Humidity:	59 %RH
Mode:	Transmitting and receiving	ENGINEER:	Kazuhiro Ando

Remarks:

Fundamental emission

No.	FREQ	Test Receiver Reading		Antenna Factor	Loss	AMP GAIN	Distance factor	RESULT		LIMIT (30m)	MARGIN		Note
		Hor	Ver					Hor	Ver		Hor	Ver	
	[MHz]	[dBuV]	[dBuV]	[dB/m]	[dB]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dBuV/m]	[dB]	[dB]	
1	13.560	44.0	55.0	18.2	0.9	32.2	-40.0	-9.1	1.9	83.9	93.0	82.0	Anechoic Chamber, 3m
2	13.560	-	35.2	18.2	0.9	32.2	0.0	-	22.1	83.9	-	61.8	Open Site, 30m, Floor Noise
3	13.560	-	39.5	18.2	0.9	32.2	-20.9	-	5.5	83.9	-	78.4	Open Site, 10m
4	13.560	-	54.5	18.2	0.9	32.2	-40.0	-	1.4	83.9	-	82.5	Open Site, 3m

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

Distance factor: 40 x log (3m/30m) = -40 dB

Distance factor: 40 x log (3m/10m) = -20.9 dB

Limits (30m) ((reference) worst carrier @3m)

・13.553MHz to 13.567MHz : 83.9dBuV/m (FCC 15.225(a)) 41.9 dBuV/m

Spurious emission within the band

No.	FREQ	Test Receiver Reading		Antenna Factor	Loss	AMP GAIN	Distance factor	RESULT		LIMIT (30m)	MARGIN	
		Hor	Ver					Hor	Ver		Hor	Ver
	[MHz]	[dBuV]	[dBuV]	[dB/m]	[dB]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dBuV/m]	[dB]	[dB]
1	13.110	33.7	33.6	18.1	0.9	32.2	-40.0	-19.5	-19.6	29.5	49.0	49.1
2	13.410	33.5	33.4	18.2	0.9	32.2	-40.0	-19.6	-19.7	40.5	60.1	60.2
3	13.553	34.0	40.0	18.2	0.9	32.2	-40.0	-19.1	-13.1	50.4	69.5	63.5
4	13.567	34.0	40.1	18.2	0.9	32.2	-40.0	-19.1	-13.0	50.4	69.5	63.4
5	13.710	33.2	33.0	18.2	0.9	32.2	-40.0	-19.9	-20.1	40.5	60.4	60.6
6	14.010	32.7	32.7	18.3	0.9	32.2	-40.0	-20.3	-20.3	29.5	49.8	49.8

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

Outside filed strength frequencies (Fc = 13.56MHz)

・Fc±7kHz:13.553MHz to 13.567MHz

・Fc±150kHz:13.410MHz to 13.710MHz

・Fc±450kHz:13.110MHz to 14.010MHz

Limits (30m)

・13.410MHz to 13.553MHz and 13.567MHz to 13.710MHz : 50.4dBuV/m (FCC 15.225(b))

・13.110MHz to 13.410MHz and 13.710MHz to 14.010MHz : 40.5dBuV/m (FCC 15.225(c))

・Below 13.110MHz and Above 14.010MHz : 29.5dBuV/m (FCC 15.225(d)and FCC 15.209)

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Radiated Emission

UL Kashima, Inc.
No.11 Semi Anechoic Chamber

Company:	Oki Data Corporation	Regulation:	FCC Part15 Subpart C 15.225
Equipment:	Embedded RFID Read/Write System	Test Distance:	3m
Model:	4465873A	Date:	October 7, 2014
Sample No.:	WMJ12280566	Temperature:	23 deg.C
Power:	DC 5V	Humidity:	59 %RH
Mode:	Transmitting and receiving	ENGINEER:	Kazuhiro Ando

Remarks:

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg.]	Remark
Hori.	27.12	QP	22.0	24.9	1.2	32.2	-40.0	-24.1	29.5	53.6	-	0	* Limit: 30m
Hori.	94.920	QP	42.0	9.4	4.6	32.2	0.0	23.8	43.5	19.7	220	34	
Hori.	203.400	QP	41.6	14.6	5.4	32.1	0.0	29.5	43.5	14.0	164	290	
Hori.	230.520	QP	43.2	15.4	5.6	32.0	0.0	32.2	46.0	13.8	144	273	
Hori.	271.200	QP	45.3	17.4	5.8	32.0	0.0	36.5	46.0	9.5	122	306	
Hori.	298.320	QP	41.3	19.2	6.0	32.0	0.0	34.5	46.0	11.5	110	131	
Hori.	311.880	QP	44.4	13.2	6.1	32.0	0.0	31.7	46.0	14.3	100	270	
Hori.	406.800	QP	42.2	15.6	6.6	32.0	0.0	32.4	46.0	13.6	100	103	
Hori.	501.720	QP	35.8	17.6	7.1	32.0	0.0	28.5	46.0	17.5	158	24	
Vert.	27.12	QP	22.3	24.9	1.2	32.2	-40.0	-23.8	29.5	53.3	-	90	* Limit: 30m
Vert.	298.320	QP	36.5	19.2	6.0	32.0	0.0	29.7	46.0	16.3	100	94	
Vert.	501.720	QP	44.2	17.6	7.1	32.0	0.0	36.9	46.0	**9.1**	100	294	
Vert.	515.280	QP	41.7	17.9	7.1	32.0	0.0	34.7	46.0	11.3	100	294	
Vert.	935.640	QP	34.5	23.4	8.7	31.1	0.0	35.5	46.0	10.5	140	262	

Result = Reading + Ant Factor + Loss (Cable+ATT+ΔAF(above 30MHz)) - Gain(Amprifier) + 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= 30.9dBuV/m, Ver= 41.9 dBuV/m

Data of Frequency Tolerance

UL Kashima, Inc.
No.6 Measurement Room

Company	Oki Data Corporation		
Equipment	Embedded RFID Read/Write System	Regulation	FCC Part15 Subpart C 15.225 (e)
Model	4465873A	Date	October 7, 2014
Serial No.	WMJ12280566	Temperature	24 deg.C
Power	DC 5V	Humidity	66 %RH
Mode	Transmitting and receiving	ENGINEER	Kazuhiro Ando

Temperature Variation: -20deg.C

Test Conditions	Original Frequency (MHz)	Measure Frequency (MHz)	Frequency Error (MHz)	Frequency torerance (%)	Limit (%)
startup	13.56	13.559965	-0.000035	-0.00026	0.010
after 2minutes	13.56	13.559981	-0.000019	-0.00014	0.010
after 5minutes	13.56	13.559983	-0.000017	-0.00013	0.010
after 10minutes	13.56	13.559984	-0.000016	-0.00012	0.010

Temperature Variation: -10deg.C

Test Conditions	Original Frequency (MHz)	Measure Frequency (MHz)	Frequency Error (MHz)	Frequency torerance (%)	Limit (%)
startup	13.56	13.560015	0.000015	0.00011	0.010
after 2minutes	13.56	13.560023	0.000023	0.00017	0.010
after 5minutes	13.56	13.560024	0.000024	0.00018	0.010
after 10minutes	13.56	13.560024	0.000024	0.00018	0.010

Temperature Variation: 0deg.C

Test Conditions	Original Frequency (MHz)	Measure Frequency (MHz)	Frequency Error (MHz)	Frequency torerance (%)	Limit (%)
startup	13.56	13.560033	0.000033	0.00024	0.010
after 2minutes	13.56	13.560034	0.000034	0.00025	0.010
after 5minutes	13.56	13.560034	0.000034	0.00025	0.010
after 10minutes	13.56	13.560034	0.000034	0.00025	0.010

Temperature Variation: 10deg.C

Test Conditions	Original Frequency (MHz)	Measure Frequency (MHz)	Frequency Error (MHz)	Frequency torerance (%)	Limit (%)
startup	13.56	13.560028	0.000028	0.00021	0.010
after 2minutes	13.56	13.560024	0.000024	0.00018	0.010
after 5minutes	13.56	13.560023	0.000023	0.00017	0.010
after 10minutes	13.56	13.560023	0.000023	0.00017	0.010

Temperature Variation: 20deg.C

Test Conditions	Original Frequency (MHz)	Measure Frequency (MHz)	Frequency Error (MHz)	Frequency torerance (%)	Limit (%)
startup	13.56	13.560001	0.000001	0.00001	0.010
after 2minutes	13.56	13.560001	0.000001	0.00001	0.010
after 5minutes	13.56	13.560001	0.000001	0.00001	0.010
after 10minutes	13.56	13.560000	0.000000	0.00000	0.010

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Data of Frequency Tolerance

Temperature Variation: 30deg.C

Test Conditions	Original Frequency (MHz)	Measure Frequency (MHz)	Frequency Error (MHz)	Frequency torerance (%)	Limit (%)
startup	13.56	13.559979	-0.000021	-0.00015	0.010
after 2minutes	13.56	13.559972	-0.000028	-0.00021	0.010
after 5minutes	13.56	13.559970	-0.000030	-0.00022	0.010
after 10minutes	13.56	13.559970	-0.000030	-0.00022	0.010

Temperature Variation: 40deg.C

Test Conditions	Original Frequency (MHz)	Measure Frequency (MHz)	Frequency Error (MHz)	Frequency torerance (%)	Limit (%)
startup	13.56	13.559949	-0.000051	-0.00038	0.010
after 2minutes	13.56	13.559942	-0.000058	-0.00043	0.010
after 5minutes	13.56	13.559941	-0.000059	-0.00044	0.010
after 10minutes	13.56	13.559941	-0.000059	-0.00044	0.010

Temperature Variation: 50deg.C

Test Conditions	Original Frequency (MHz)	Measure Frequency (MHz)	Frequency Error (MHz)	Frequency torerance (%)	Limit (%)
startup	13.56	13.559927	-0.000073	-0.00054	0.010
after 2minutes	13.56	13.559922	-0.000078	-0.00058	0.010
after 5minutes	13.56	13.559922	-0.000078	-0.00058	0.010
after 10minutes	13.56	13.559922	-0.000078	-0.00058	0.010

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Data of Frequency Tolerance

UL Kashima, Inc.
No.6 Measurement Room

Company	Oki Data Corporation		
Equipment	Embedded RFID Read/Write System	Regulation	FCC Part15 Subpart C 15.225 (e)
Model	4465873A	Date	October 7, 2014
Serial No.	WMJ12280566	Temperature	24 deg.C
Power	DC 5V	Humidity	66 %RH
Mode	Transmitting and receiving	ENGINEER	Kazuhiro Ando

Voltage Variation: DC 4.25 V
Temperature Variation: 20deg.C

Test Conditions	Original Frequency (MHz)	Measure Frequency (MHz)	Frequency Error (MHz)	Frequency torerance (%)	Limit (%)
startup	13.56	13.560007	0.000007	0.00005	0.010
after 2minutes	13.56	13.560002	0.000002	0.00001	0.010
after 5minutes	13.56	13.560001	0.000001	0.00001	0.010
after 10minutes	13.56	13.560001	0.000001	0.00001	0.010

Voltage Variation: DC 5.75 V
Temperature Variation: 20deg.C

Test Conditions	Original Frequency (MHz)	Measure Frequency (MHz)	Frequency Error (MHz)	Frequency torerance (%)	Limit (%)
startup	13.56	13.560004	0.000004	0.00003	0.010
after 2minutes	13.56	13.559999	-0.000001	-0.00001	0.010
after 5minutes	13.56	13.559998	-0.000002	-0.00001	0.010
after 10minutes	13.56	13.559998	-0.000002	-0.00001	0.010

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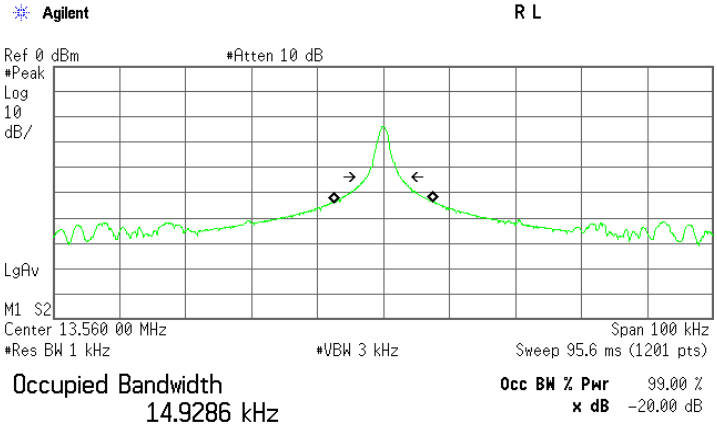
20dB bandwidth & 99% Occupied bandwidth: FCC 15.215 / RSS-Gen

UL Kashima, Inc.
No.6 Measurement Room

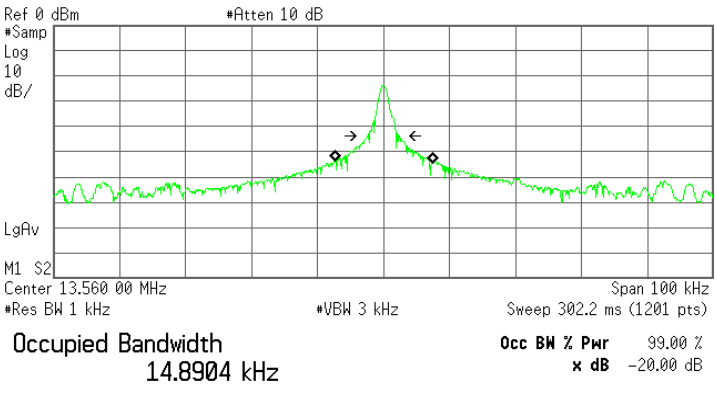
Company:	Oki Data Corporation	Regulation:	FCC Part15 Subpart C 15.215
Equipment:	Embedded RFID Read/Write System		
Model:	4465873A	Date:	October 7, 2014
Sample No.:	WMJ12280566	Temperature:	24 deg.C
Power:	DC 5V	Humidity:	66 %RH
Mode:	Transmitting and receiving	ENGINEER:	Kazuhiro Ando

20dB Bandwidth: 5.133 kHz



Transmit Freq Error -13.302 Hz
x dB Bandwidth 5.133 kHz

99% Occupied Bandwidth: 14.890 kHz



Transmit Freq Error 77.373 Hz
x dB Bandwidth 4.705 kHz*

APPENDIX 2: Test Instruments

No.11 Test site (Conducted Emission)

Instrument	Manufacturer	Model	Internal Code	Cal. Date	Due Date
Test Receiver	Rohde & Schwarz	ESCI	RCV06	2013/10/02	2014/10/31
AMN	Rohde & Schwarz	ESH3-Z5	LSN08	2014/07/09	2015/07/31
AMN (for EUT)	Rohde & Schwarz	ESH3-Z5	LSN03	2014/07/22	2015/07/31
Coaxial Cable	Fujikura	5D-2W	11CSAC	2014/05/23	2015/05/31

No.11 Test site (Radiated Emission: 9kHz – 30MHz)

Instrument	Manufacturer	Model	Internal Code	Cal. Date	Due Date
Loop Antenna	Rohde & Schwarz	HFH2-Z2	LPA01	2014/09/05	2015/09/30
Coaxial Cable	Fujikura	3D-2W	MG5m	2014/05/10	2015/05/31
Coaxial Cable	Fujikura	5D-2W	11CSAC	2014/05/23	2015/05/31
Test Receiver	Rohde & Schwarz	ESCI	RCV06	2013/10/02	2014/10/31

No.11 Test site (Radiated Emission: 30MHz – 1000MHz)

Instrument	Manufacturer	Model	Internal Code	Cal. Date	Due Date
Test Receiver	Rohde & Schwarz	ESCI	RCV06	2013/10/02	2014/10/31
Biconical Antenna	Schwarzbeck	VHBB 9124	BCA13	2014/05/07	2015/05/31
Logperiodic Antenna	Schwarzbeck	VULP 9118-B	LGA15	2014/05/07	2015/05/31
Pre-Amplifier	Sonoma	310N	PRA16	2014/05/23	2015/05/31
Coaxial Cable	Fujikura	5D-2W	11R10m	2014/05/23	2015/05/31

No.6 Measurement Room (Frequency tolerance and 20dB & 99% bandwidth)

Instrument	Manufacturer	Model	Internal Code	Cal. Date	Due Date
Spectrum Analyzer	Agilent	E4448A	SPR25	2014/05/19	2015/05/31
Frequency Counter	Agilent	53151A	FRC04	2014/03/26	2015/03/31
Attenuator	Hewlett Packard	8494B	SAT05	2013/10/15	2014/10/31
Attenuator	Hewlett Packard	8495B	SAT06	2013/10/15	2014/10/31
Temp. & Humid. Chamber	ESPEC	PR-4KPH	TMPC02	2014/06/04	2015/06/30