



EMI TEST REPORT

Test Report No. : 26AE0081-HO-2b

Applicant : Oki Data Corporation
Type of Equipment : Embedded RFID Read/Write System
Model No. : 4336821A
Test standard : FCC Part 15 Subpart C : 2005
Section 15.209 and 15.207
FCC ID : B2K-4336821A
Test Result : Complied

1. This test report shall not be reproduced in full or partial, without the written approval of UL Apex Co., Ltd.
2. The results in this report apply only to the sample tested.
3. This equipment is in compliance with above regulation. We hereby certify that the data contain a true representation of the EMC profile.
4. The test results in this report are traceable to the national or international standards.

Date of test:

August 22 to November 2, 2005

Tested by:

Norihisa Hashimoto
EMC Services

Kenichi Adachi
EMC Services

Approved by :

Hironobu Shimoji
Group Leader of EMC Services

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SECTION 1: Client information

Company Name : Oki Data Corporation
Address : 3-1, Futaba-cho, Takasaki-shi, Gunma, 370-8585 Japan
Telephone Number : +81-27-328-6183
Facsimile Number : +81-27-328-6396
Contact Person : Toshikazu Ito

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

2.1 Identification of E.U.T.

Type of Equipment : Embedded RFID Read/Write System
Model No. : 4336821A
Serial No. : 1, 3
Country of Manufacture : Japan
Rating : DC 5.0V
Receipt Date of Sample : July 28, 2005
Condition of EUT : Production prototype
(Not for Sale: This sample is equivalent to mass-produced items.)

2.2 Product Description

Oki Data Corporation, Model No: 4336821A is the RFID module.
The clock frequency of EUT is 13.56MHz (ASIC), 105.9375KHz(RFID module).

(Transmitter)
Equipment Type : Transmitter
Frequency of operation : 13.56MHz
Type of modulation : ASK
Mode of operation : Simplex
Antenna Type : Loop coil antenna
Antenna Connector Type : PH2 (JST)
Method of Frequency Generation : Crystal
Operating voltage (inner) : DC 3.3V±0.1V
Operating Temperature : +0 deg. C. - +50 deg. C.

(Receiver)
Type of Receiver : BPSK Demodulator
Frequency of operation : 13.56MHz
Intermediate frequency : 847.5KHz
Method of Frequency Generation : Crystal
Operating voltage (inner) : DC 3.3V±0.1V
Operating Temperature : +0 deg. C. - +50 deg. C.

FCC 15.31 (e)

This EUT provides stable voltage(DC3.3V) constantly to RF Module regardless of input voltage. Therefore, this EUT complies with the requirement.

FCC Part 15.203 Antenna requirement

It is impossible for end users to replace the antenna, because the antenna is mounted inside of Printer. Therefore, the equipment complies with the antenna requirement of Section 15.203.

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Head Office EMC Lab.

4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8116

Facsimile : +81 596 24 8124

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SECTION 3: Test specification, procedures & results

3.1 Test Specification

Test Specification : FCC Part15 Subpart C : 2005

Title : FCC 47CFR Part15 Radio Frequency Device Subpart C Intentional Radiators
Section 15.207 Conducted limits
Section 15.205 Restricted bands of operation
Section 15.209 Radiated emission limits, general requirements.

3.2 Procedures and results

No.	Item	Test Procedure	Specification	Remarks	Deviation	Worst margin	Results
1	Conducted emissions	ANSI C63.4:2003 7. AC powerline conducted emission measurements	FCC Section 15.207	Conducted	N/A	11.9dB, AV 0.40471MHz L	Complied
2	Electric Field Strength of Fundamental Emission	ANSI C63.4:2003 13. Measurement of intentional radiators	FCC Section 15.209	Radiated	N/A	33.4dB 13.55944MHz 0 deg.	Complied
3	Electric Field Strength of Spurious Emission	ANSI C63.4:2003 13. Measurement of intentional radiators	FCC Section 15.205 FCC Section 15.209	Radiated	N/A	9.3dB 311.872MHz Horizontal	Complied
4	-20dB Bandwidth	ANSI C63.4:2003 13. Measurement of intentional radiators	FCC Section 15.215	Radiated	N/A	N/A	Complied

Note: UL Apex's EMI Work Procedures No.QPM05 and QPM15.

Uncertainty:

*In case of the margin below the EMC Head Office's uncertainty.

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

Conducted Emission

The measurement uncertainty (with a 95% confidence level) for this test was ± 1.3 dB.

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

Spurious Emission (Radiated)

The measurement uncertainty (with a 95% confidence level) for this test using Loop antenna is ± 1.9 dB(3m)/ ± 1.8 dB(10m).

The measurement uncertainty (with a 95% confidence level) for this test using Biconical antenna is ± 4.5 dB(3m)/ ± 4.7 dB(10m).

The measurement uncertainty (with a 95% confidence level) for this test using Logperiodic antenna is ± 5.2 dB(3m)/ ± 3.8 dB(10m).

The measurement uncertainty (with a 95% confidence level) for this test using Horn antenna is ± 6.6 dB.

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

Other test except Conducted Emission and Spurious Emission (Radiated)

The measurement uncertainty (with a 95% confidence level) for this test is ± 3.0 dB.

*These tests were performed without any deviations from test procedure except for additions or exclusions.

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3.3 Addition to standards

No.	Item	Test Procedure	Specification	Remarks	Deviation	Worst margin	Results
1	99% Occupied Band Width	RSS-210(issue 6): 2005	RSS-210(issue 6): 2005	Radiated	N/A	N/A	N/A

3.4 Test Location

UL Apex Co., Ltd. Head Office EMC Lab. *NVLAP Lab. code: 200572-0
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8116 Facsimile : +81 596 24 8124

	FCC Registration Number	IC Registration Number	Width x Depth x Height (m)	Size of reference ground plane (m) / horizontal conducting plane	Other rooms
No.1 semi-anechoic chamber	313583	IC4247A	19.2 x 11.2 x 7.7m	7.0 x 6.0m	Preparation room
No.2 semi-anechoic chamber	846015	IC4247A-2	7.5 x 5.8 x 5.2m	4.0 x 4.0m	-
No.3 shielded room	-	-	4.7 x 7.5 x 2.7m	4.7 x 7.5m	-
No.4 measurement room	-	-	3.1 x 5.0 x 2.7m	N/A	-

* Size of vertical conducting plane (for Conducted Emission test) : 2.0 x 2.0m for No.1 and No.2 semi-anechoic and No.3 shielded room.

3.5 Test set up, Test instruments and Data of EMI

Refer to APPENDIX 1 to 3.

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

4.1 Operating Modes

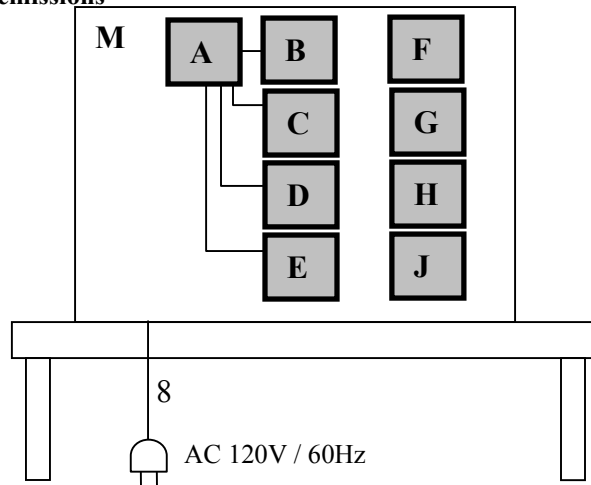
The mode is used : Transmitting and Receiving mode.

* Tag is in continuously transmitting and receiving mode during the tests.

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

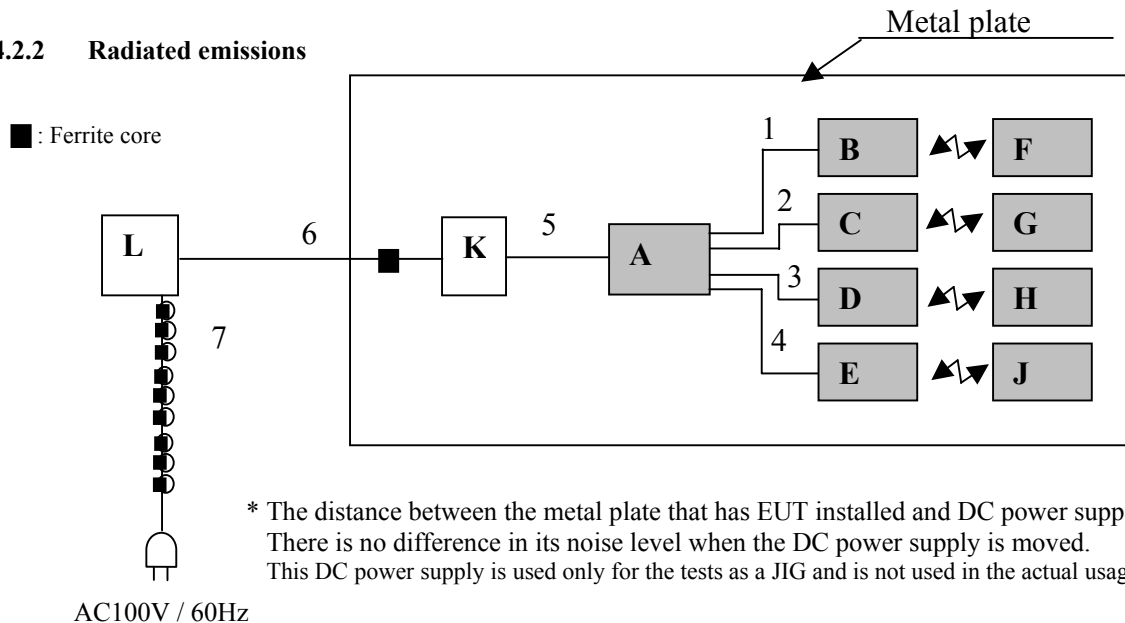
4.2 Configuration and peripherals

4.2.1 Conducted emissions



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

4.2.2 Radiated emissions



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

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Description of EUT and Support equipment

No.	Item	Model number	Serial number	Manufacturer	FCC ID
A	RFID module	4336821A	3 (for Conducted emissions), 1 (for other tests)	Oki Data Corporation	B2K-4336821A
B	Antenna unit	-	-	Oki Data Corporation	B2K-4336821A
C	Antenna unit	-	-	Oki Data Corporation	B2K-4336821A
D	Antenna unit	-	-	Oki Data Corporation	B2K-4336821A
E	Antenna unit	-	-	Oki Data Corporation	B2K-4336821A
F	Tag	-	-	Oki Data Corporation	B2K-4336821A
G	Tag	-	-	Oki Data Corporation	B2K-4336821A
H	Tag	-	-	Oki Data Corporation	B2K-4336821A
J	Tag	-	-	Oki Data Corporation	B2K-4336821A
K	Micro-Computer for test	-	-	Oki Data Corporation	-
L	DC power supply	DMS35-1.5	1036277	METRONIX	-
M	Printer	N31171A	61	Oki Data Corporation	-

List of cables used

No.	Name	Length (m)	Shield	Backshell Material
1	Antenna cable	0.1	N	Polyvinyl chloride
2	Antenna cable	0.1	N	Polyvinyl chloride
3	Antenna cable	0.1	N	Polyvinyl chloride
4	Antenna cable	0.1	N	Polyvinyl chloride
5	Signal cable	0.5	N	Polyvinyl chloride
6	DC cable	0.2	N	Polyvinyl chloride
7	AC cable	1.5	N	Polyvinyl chloride
8	AC cable	1.8	N	Polyvinyl chloride

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SECTION 5: Conducted Emissions

5.1 Test Procedure and conditions

EUT was placed on a platform of nominal size, 1m by 1.5m, raised 80cm above the conducting ground plane. The rear of tabletop was located 40cm to the vertical conducting plane. The rear of EUT, including peripherals aligned and flushed with rear of tabletop. All other surfaces of tabletop were at least 80cm from any other grounded conducting surface. EUT was located 80cm from a Line Impedance Stabilization Network (LISN)/ Artificial mains Network (AMN) 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 /(AMN) to the input power source. All unused 50ohm connectors of the LISN(AMN) were resistivity terminated in 50ohm when not connected to the measuring equipment.

The AC Mains Terminal Continuous disturbance Voltage has been measured with the EUT in a Semi Anechoic Chamber or a Measurement Room.

The EUT was connected to a LISN (AMN).

An overview sweep with peak detection has been performed.

Detector	: CISPR quasi-peak and average detector (IF BW 9 kHz)
Measurement range	: 0.15-30MHz
Test data	: APPENDIX 3
Test result	: Pass

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SECTION 6: Radiated emission (Fundamental and Spurious Emission and Bandwidth)

5.1 Operating environment

Test place : No.2 semi Anechoic Chamber
Temperature : See data
Humidity : See data

5.2 Test Procedure

The Radiated Electric Field Strength intensity has been measured on No.2 semi anechoic chamber 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 each antenna angle 0deg. , 45deg. and 90deg.

Frequency : From 30MHz to 1GHz at distance 3m

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 a QP, PK, and AV detector.

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

	From 9kHz to 90kHz and From 110kHz to 150kHz	From 90kHz to 110kHz	From 150kHz to 490kHz	From 490kHz to 30MHz	From 30MHz to 1GHz
Detector Type	PK/AV	QP	PK/AV	QP	QP
IF Bandwidth	200Hz	200Hz	9kHz	9kHz	120kHz

*The test was made on EUT in the normal use position.

* Part 15 Section 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])

5.3 Test result

Summary of the test results : Pass

Date : August 22 and September 1 and November 2, 2005

Test engineer : Norihisa Hashimoto

UL Apex Co., Ltd.

Head Office EMC Lab.

4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8116

Facsimile : +81 596 24 8124

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APPENDIX 1: Photographs of test setup

Conducted emissions

Front



Rear

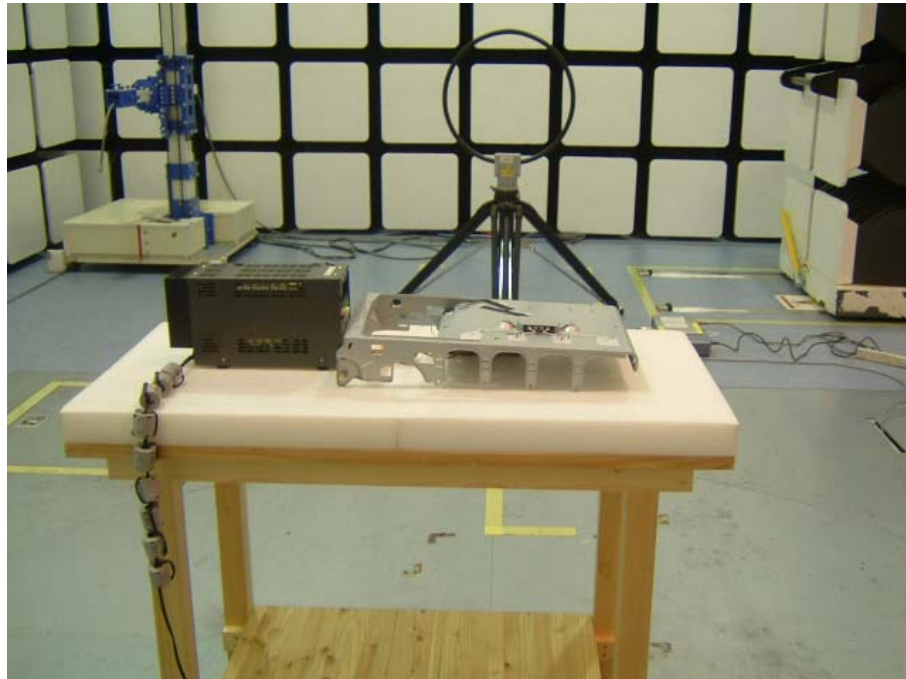


Radiated emission

Front



Rear



APPENDIX 2: Test instruments

EMI test equipment

Control No.	Instrument	Manufacturer	Model No	Test Item	Calibration Date * Interval(month)
MAEC-02	Anechoic Chamber	TDK	Semi Anechoic Chamber 3m	RE / ME	2005/04/11 * 12
MSA-04	Spectrum Analyzer	Agilent	E4448A	RE / ME	2005/05/19 * 12
MCC-31	coaxial cable	ULApex	-	ME	2005/06/02 * 12
MLPA-02	Loop Antenna	Rohde & Schwarz	HFH2-Z2	ME	2004/12/10 * 12
MPA-06	Pre Amplifier	Hewlett Packard	8447D	RE / ME	2005/08/31 * 12
MCC-13	Coaxial Cable	Fujikura/Agilent	-	ME	2005/02/24 * 12
MCC-12	Coaxial Cable	Fujikura/Agilent	-	RE	2005/02/24 * 12
MBA-02	Biconical Antenna	Schwarzbeck	BBA9106	RE	2004/10/14 * 12 / 2005/10/10 * 12
MLA-02	Logperiodic Antenna	Schwarzbeck	USLP9143	RE	2004/10/14 * 12 / 2005/10/10 * 12
MAT-07	Attenuator(6dB)	Weinschel Corp	2	RE	2004/12/16 * 12
MRENT-21	Spectrum Analyzer	Advantest	R3273	RE	2005/08/19 * 12
MTR-02	Test Receiver	Rohde & Schwarz	ESCS30	RE / ME	2005/02/02 * 12
MPA-07 gain50	Pre Amplifier	UNITEK ELECTROBICS INC.	Amp1G	RE	2004/10/10 * 12 / 2005/10/05 * 12
MCC-03	Coaxial Cable	Fujikura/Suhner/ Agilent/TSJ	-	CE	2004/12/24 * 12
MLS-02	LISN(AMN)	Schwarzbeck	NSLK8127	CE (EUT)	2004/11/10 * 12
MAEC-01	Anechoic Chamber	TDK	Semi Anechoic Chamber 10m	CE	2004/11/13 * 12
MTR-01	Test Receiver	Rohde & Schwarz	ESI40	CE	2004/11/12 * 12

All equipment is calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.

Test Item :

CE: Conducted emission,
RE: Radiated emission,
ME: Magnetic radiated emission,

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APPENDIX 3: Data of EMI test

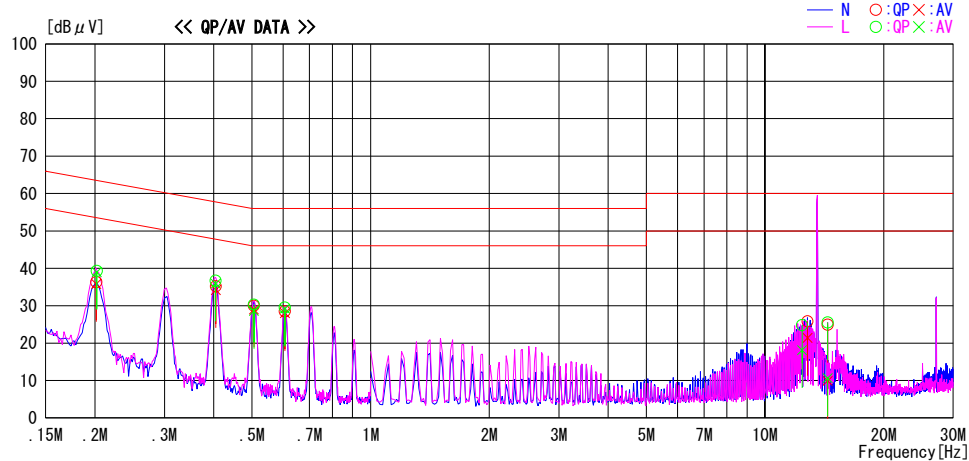
Conducted emissions DATA OF CONDUCTED EMISSION TEST

UL Apex Co., Ltd. Head Office EMC Lab. No.1 Semi Anechoic Chamber
Date : 2005/10/04 09:22:26

Applicant : Oki Data Corporation
Kind of EUT : Embedded RFID Read/Write System
Model No. : 4336821A (Printer: N31171A)
Serial No. : No.3 (Printer: No.61)
Report No. : 26AE0081-HO
Power : AC120V / 60Hz
Temp./Humi. : 25deg. C / 60%
Operator : Kenichi Adachi

Mode / Remarks : Transmitting and Receiving mode

LIMIT : FCC15C § 15.207 (QP)
FCC15C § 15.207 (AV)



Frequency [MHz]	Reading Level		Corr. Factor	Results		Limit		Margin		Phase
	QP [dBμV]	AV [dBμV]		QP [dBμV]	AV [dBμV]	QP [dBμV]	AV [dBμV]	QP [dB]	AV [dB]	
0.20171	35.7	35.2	0.6	36.3	35.8	63.5	53.5	27.2	17.7	N
0.40485	34.9	33.9	0.3	35.2	34.2	57.8	47.8	22.6	13.6	N
0.50585	29.5	28.5	0.5	30.0	29.0	56.0	46.0	26.0	17.0	N
0.60635	27.9	27.4	0.6	28.5	28.0	56.0	46.0	27.5	18.0	N
12.81237	23.9	19.5	1.9	25.8	21.4	60.0	50.0	34.2	28.6	N
14.40561	22.9	7.8	2.0	24.9	9.8	60.0	50.0	35.1	40.2	N
0.20231	38.7	38.4	0.6	39.3	39.0	63.5	53.5	24.2	14.5	L
0.40471	36.4	35.6	0.3	36.7	35.9	57.8	47.8	21.1	11.9	L
0.50594	29.8	28.1	0.5	30.3	28.6	56.0	46.0	25.7	17.4	L
0.60627	28.9	28.6	0.6	29.5	29.2	56.0	46.0	26.5	16.8	L
12.40710	23.0	16.3	1.8	24.8	18.1	60.0	50.0	35.2	31.9	L
14.40678	23.5	8.6	2.0	25.5	10.6	60.0	50.0	34.5	39.4	L

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

Radiated emission (Fundamental and Spurious emission : below 30MHz)

DATA OF MAGNETIC RADIATED EMISSION TEST

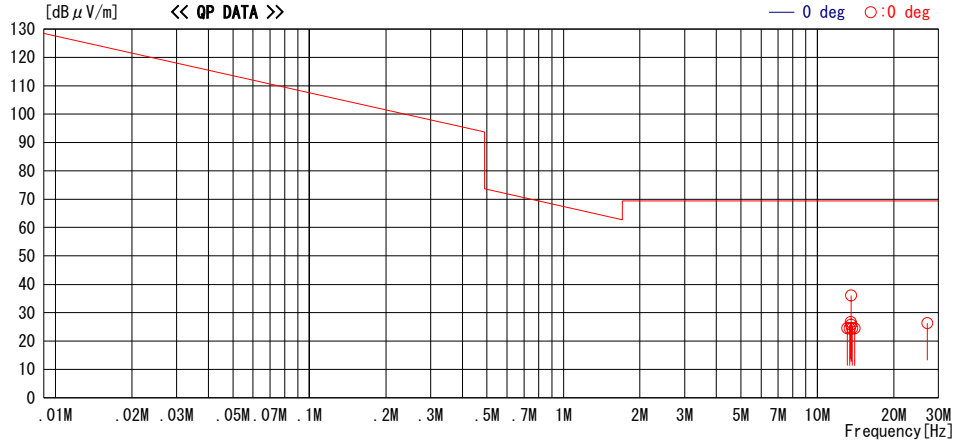
UL Apex Co., LTD. Head Office EMC Lab. No. 2 Semi Anechoic Chamber
Date : 2005/08/22 21:18:20

Applicant : Oki Data Corporation
Kind of EUT : Embedded RFID Read/Write System
Model No. : 4336821A
Serial No. : 1

Report No. : 26AE0081-HO
Power : DC 5V
Temp°C/Humi% : 26deg.C / 60%
Operator : Norihisa Hashimoto

Mode / Remarks : Transmitting and Receiving

LIMIT : FCC15C §15.209(a) 3m
Except for the data below : adequate margin data below the limits.



Freq.	Reading	DET	Ant.Fac	Loss	Gain	Result	Limit	Margin	Antenna	Table	Comment
[MHz]	[dBuV]		[dB/m]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dB]		[deg]	
13.11000	31.3	QP	20.0	1.0	27.8	24.5	69.4	44.9	0deg	244	0deg
13.41000	31.2	QP	20.0	1.0	27.8	24.4	69.4	45.0	0deg	244	0deg
13.55300	33.5	QP	20.0	1.0	27.8	26.7	69.4	42.7	0deg	244	0deg
13.55944	42.7	QP	20.0	1.1	27.8	36.0	69.4	33.4	0deg	244	0deg
13.55944	41.1	QP	20.0	1.1	27.8	34.4	69.4	35.0	45deg	228	45deg
13.55944	38.9	QP	20.0	1.1	27.8	32.2	69.4	37.2	90deg	360	90deg
13.56700	32.5	QP	20.0	1.1	27.8	25.8	69.4	43.6	0deg	244	0deg
13.71000	31.2	QP	20.0	1.1	27.8	24.5	69.4	44.9	0deg	244	0deg
14.01000	31.1	QP	20.0	1.1	27.8	24.4	69.4	45.0	0deg	244	0deg
27.12000	32.6	QP	19.9	1.6	27.8	26.3	69.4	43.1	0deg	360	0deg

CHART : WITH FACTOR ANT TYPE : LOOP
CALCULATION : READING + ANT FACTOR + LOSS(CABLE + ATTEN. -AMP.)

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Radiated emission (Spurious emission : above 30MHz)

DATA OF RADIATED EMISSION TEST

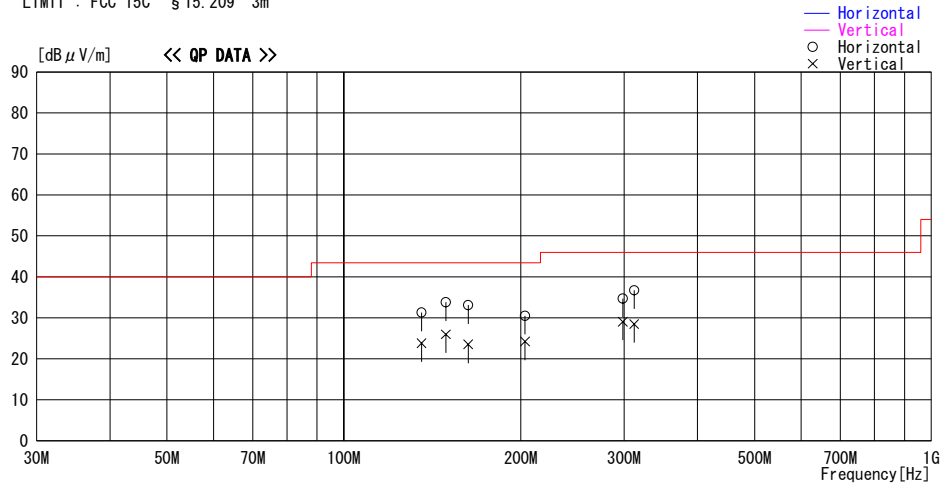
UL Apex Co., Ltd. Head Office EMC Lab. No.2 Semi Anechoic Chamber
Date : 2005/09/01 10:17:12

Applicant : Oki Data Corporation
Kind of EUT : Embedded RFID Read/Write System
Model No. : 4336821A
Serial No. : 1

Report No. : 26AE0081-HO
Power : DC5.0V
Temp./Humi. : 25deg.C / 58%
Operator : Norihisa Hashimoto

Mode / Remarks : Transmitting and Receiving

LIMIT : FCC 15C § 15.209 3m



Frequency	Reading	DET	Antenna	Loss&	Level	Angle	Height	Polar.	Limit	Margin
			Factor	Gain						
[MHz]	[dBuV]		[dB/m]	[dB]	[dBuV/m]	[Deg]	[cm]		[dBuV/m]	[dB]
135.594	61.0	QP	14.3	-44.0	31.3	154	191	Hori.	43.5	12.2
135.599	53.5	QP	14.3	-44.0	23.8	67	270	Vert.	43.5	19.7
149.154	62.1	QP	15.6	-43.9	33.8	355	224	Hori.	43.5	9.7
149.158	54.3	QP	15.6	-43.9	26.0	233	291	Vert.	43.5	17.5
162.716	60.1	QP	16.8	-43.8	33.1	0	183	Hori.	43.5	10.4
162.716	50.5	QP	16.8	-43.8	23.5	63	171	Vert.	43.5	20.0
203.395	57.1	QP	17.1	-43.7	30.5	29	100	Hori.	43.5	13.0
203.393	50.8	QP	17.1	-43.7	24.2	32	100	Vert.	43.5	19.3
298.311	57.8	QP	20.3	-43.4	34.7	322	115	Hori.	46.0	11.3
298.310	52.2	QP	20.3	-43.4	29.1	239	100	Vert.	46.0	16.9
311.870	56.5	QP	15.3	-43.3	28.5	159	237	Vert.	46.0	17.5
* 311.872	64.7	QP	15.3	-43.3	36.7	194	100	Hori.	46.0	9.3

*Refer to P17 / 15.209(c).

CHART: WITH FACTOR ANT TYPE : -30MHz LOOP, 30-300MHz BICONICAL, 300MHz-1000MHz LOGPERIODIC, 1000MHz- HORN
CALCULATION: RESULT = READING + ANT FACTOR + LOSS (CABLE+ATTEN.) - GAIN (AMP)
Except for the data below : adequate margin data below the limits.

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-20dB Bandwidth and 99% Occpied Bandwidth

UL Apex Co., Ltd.
No2 Semi Anechoic Chamber

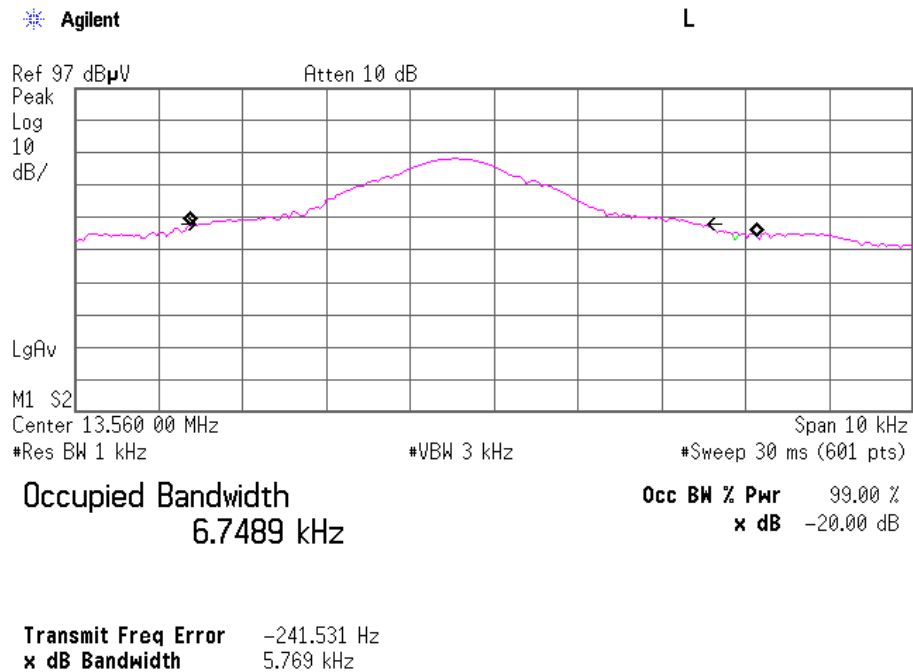
COMPANY : Oki Data Corporation
EQUIPMENT : Embedded RFID Read/Write System
MODEL : 4336821A
S/ N : 1
POWER : DC 5V
MODE : Transmitting

REPORT NO : 26AE0081-HO
REGULATION : FCC 15.215 (c)
TEST DISTANCE : 3m
DATE : 08/22/2005
TEMPERATURE : 26 deg. C
HUMIDITY : 60%

ENGINEER : Norihisa Hashimoto

FREQ [MHz]	-20dB Bandwidth [kHz]
13.56	5.77

FREQ [MHz]	99% Occpied Bandwidth [kHz]
13.56	6.75



Comparison between Carrier and Spurious Emission (Radiated)

UL Apex Co., Ltd.
Head Office EMC Lab. No.2 Semi Anechoic Chamber

Company : Oki Data Corporation	REPORT NO : 26AE0081-HO
Equipment : Embedded RFID Read/Write System	REGULATION : Fcc Part15 Subpart C 15.209
Model : 4336821A	TEST DISTANCE : 3m
Sample No. : 1	DATE : 11/02/2005
Power : DC 5V	TEMPERATURE : 23deg.C
Mode : Transmitting and Receiving	HUMIDITY : 54%
	ENGINEER : Norihisa Hashimoto

PK DETECT (RBW: 100kHz, VBW: 300kHz)

No.	FREQ [MHz]	S/A READING [dBuV]	ANT Factor [dB/m]	AMP GAIN [dB]	CABLE LOSS [dB]	RESULT [dBuV/m]
Test distance 3meters RESULT=Reading + ANT Factor - Amp Gain + Cable Loss						
1	13.6	52.5	20.0	28.8	1.1	44.8
2	311.9	40.5	14.6	27.3	8.0	35.8

*The result is rounded off to the second decimal place. Therefore, there may be 0.1 difference for the result.

*Carrier level is higher than spurious emission level under the same condition so that the data is applied with 15.209(c).

