

## EMISSION -- TEST REPORT

TEST REPORT No.:

**TR1-08416F**

Date of Issue: May 9, 2008

KIND OF EQUIPMENT:

Embedded RFID Read/Write System

MODEL:

4399021A

APPLICANT:

Oki Data Corporation

FCC ID:

B2K-4399021A

TEST STANDARD(S):

FCC Part 15 Subpart C, Section 15.225

TEST RESULT:

Complied

It is not allowed to copy this report even partly without the written allowance of the test laboratory. The test result only responds to the tested sample. The report must not be used to claim products endorsement by the accreditation or authorization body. The engineers of EMC Kashima Corporation were not involved in modification for the tested sample.

TEST DATE(S):

April 23, 24, 2008

TEST ENGINEER(S):

Kazuhiro Ando  
Manager

APPROVED BY:

Ken'ichi Suda  
Director

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## 1 GENERAL INFORMATION

|      |                      |                                                          |
|------|----------------------|----------------------------------------------------------|
| 1.1  | APPLICANT            | Oki Data Corporation                                     |
| 1.2  | ADDRESS              | 3-1, Futaba-cho, Takasaki-shi, Gunma-ken 370-8585, Japan |
| 1.3  | MANUFACTURER         | Oki Data Corporation                                     |
| 1.4  | KIND OF EQUIPMENT    | Embedded RFID Read/Write System                          |
| 1.5  | MODEL                | 4399021A                                                 |
| 1.6  | POWER RATING         | DC 5V 0.2W                                               |
| 1.7  | PROTECTION CLASS     | Class III                                                |
| 1.8  | TESTING VOLTAGE      | DC 5V (AC120V, 60Hz for Printer)                         |
| 1.9  | CONDITION OF EUT     | Prototype                                                |
| 1.10 | OPERATING FREQUENCY  | 13.56MHz                                                 |
| 1.11 | TYPE OF MODURATION   | ASK                                                      |
| 1.12 | OPERATING TEMPERATUR | 10 °C to 32 °C                                           |
| 1.13 | TEST STANDARD(S)     | FCC Part 15 Subpart C, Section 15.225                    |
| 1.14 | TEST METHOD(S)       | ANSI C63.4: 2003                                         |
| 1.15 | TESTED DATE(S)       | April 23, 24, 2008                                       |
| 1.16 | REMARK(S)            |                                                          |

## 2 SUMMARY OF TEST RESULT

| FCC Part 15 Section | Test Item                           | Worst margin        | Condition | Result                |
|---------------------|-------------------------------------|---------------------|-----------|-----------------------|
| 15.203              | Antenna requirement                 | -                   | -         | Pass <sup>Note1</sup> |
| 15.207              | Conducted emissions<br>9kHz - 30MHz | 31.1dB at 0.1915MHz | -         | Pass                  |
| 15.225(a)(b)(c)     | Radiated emissions<br>9kHz - 30MHz  | 87.3dB at 13.56MHz  | Radiated  | Pass                  |
| 15.225(d)           | Radiated emissions<br>9kHz - 30MHz  | 47.3dB at 27.12MHz  | Radiated  | Pass                  |
| 15.225(d)<br>15.209 | Radiated emissions<br>30MHz - 1GHz  | 12.3dB at 298.32MHz | Radiated  | Pass                  |
| 15.225(e)           | Frequency stability                 | 0.0012%             | Conducted | Pass                  |
| 15.215(c)           | 20dB Bandwidth                      | 6.22kHz             | Conducted | Pass                  |

Note 1: Users cannot replace the antenna since it is attached to the inside of the printer.

Note 2: "Pass" is only based on the measurement data and it does not include the measurement uncertainty.

Accordingly, the statement below is applied to the test result.

- It is possible to determine compliance at a level of confidence of 95% in case that the margin is not less than the measurement uncertainty in the Laboratory.
- It is not possible to determine compliance at a level of confidence of 95% in case that the margin is less than the measurement uncertainty in the Laboratory. However, the measured result indicates that the product tested complies with the specification limit.

### **3 EQUIPMENT UNDER TEST**

#### **3.1 Description of The EUT**

The RFID equipment we'll make an application is built in a printer and is used for checking remaining amount of the toner.

#### **3.2 Operation - mode of The EUT**

The equipment under test was operated during the measurement under following conditions:

- Transmitting and Receiving mode (with Passive Tag)

## 4 TEST CONFIGURATION

### 4.1 EUT(s) and Peripheral(s)

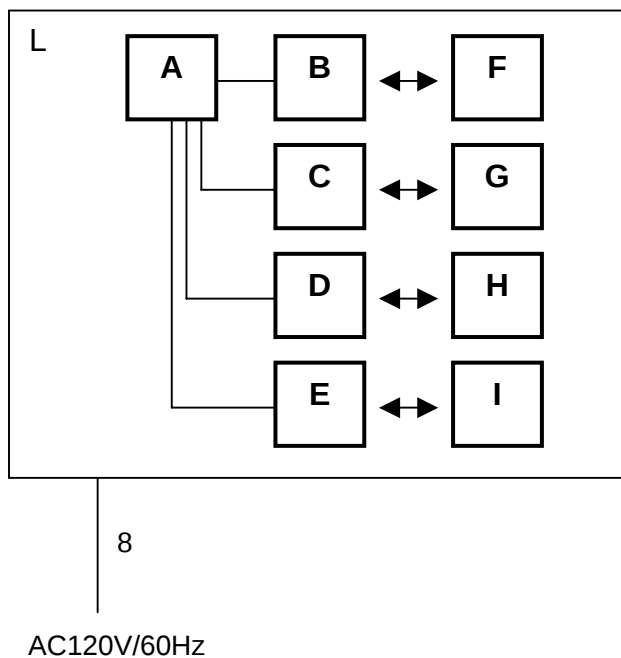
|                                  | Equipment Name          | Model     | Serial No.                                             | Company              | FCC ID       |
|----------------------------------|-------------------------|-----------|--------------------------------------------------------|----------------------|--------------|
| A                                | RFID Module (EUT)       | 4399021A  | 1 (for Conducted Emissions)<br>2 (for Other Emissions) | Oki Data Corporation | B2K-4399021A |
| B                                | Antenna Unit (EUT)      | -         | -                                                      | Oki Data Corporation | B2K-4399021A |
| C                                | Antenna Unit (EUT)      | -         | -                                                      | Oki Data Corporation | B2K-4399021A |
| D                                | Antenna Unit (EUT)      | -         | -                                                      | Oki Data Corporation | B2K-4399021A |
| E                                | Antenna Unit (EUT)      | -         | -                                                      | Oki Data Corporation | B2K-4399021A |
| F                                | Tag (EUT)               | -         | -                                                      | Oki Data Corporation | B2K-4399021A |
| G                                | Tag (EUT)               | -         | -                                                      | Oki Data Corporation | B2K-4399021A |
| H                                | Tag (EUT)               | -         | -                                                      | Oki Data Corporation | B2K-4399021A |
| I                                | Tag (EUT)               | -         | -                                                      | Oki Data Corporation | B2K-4399021A |
| J                                | Micro-Computer for Test | None      | None                                                   | Oki Data Corporation | N/A          |
| K                                | DC Power Supply         | PAL 35-10 | CE001899                                               | KIKUSUI              | N/A          |
| L                                | Printer                 | N34220C   | AA73012339A0                                           | Oki Data Corporation | DoC*         |
| *Note: Declaration of Conformity |                         |           |                                                        |                      |              |
| N/A: Not Applicable              |                         |           |                                                        |                      |              |
|                                  |                         |           |                                                        |                      |              |

### 4.2 Cable(s) Used

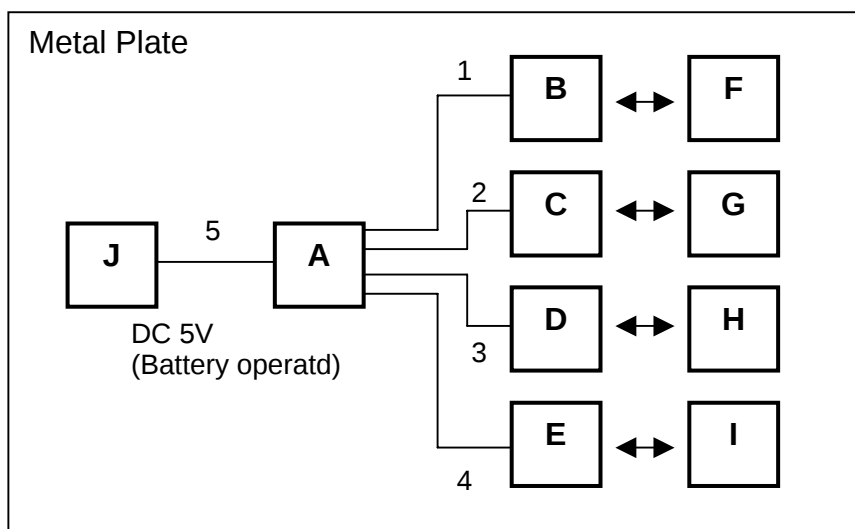
|   | Cable Name                 | Length  | Shielded | Remarks (Model, Company, etc.) |
|---|----------------------------|---------|----------|--------------------------------|
| 1 | Antenna                    | 0.125 m | no       | 43171501                       |
| 2 | Antenna                    | 0.07 m  | no       | 43171502                       |
| 3 | Antenna                    | 0.07 m  | no       | 43171502                       |
| 4 | Antenna                    | 0.125 m | no       | 43171501                       |
| 5 | Signal                     | 0.4 m   | no       |                                |
| 6 | DC Power (EUT)             | 2.0 m   | no       |                                |
| 7 | AC Power (DC Power Supply) | 3.0 m   | no       |                                |
| 8 | AC Power (Printer)         | 1.8 m   | no       |                                |
|   |                            |         |          |                                |
|   |                            |         |          |                                |
|   |                            |         |          |                                |

### 4.3 Connection figure

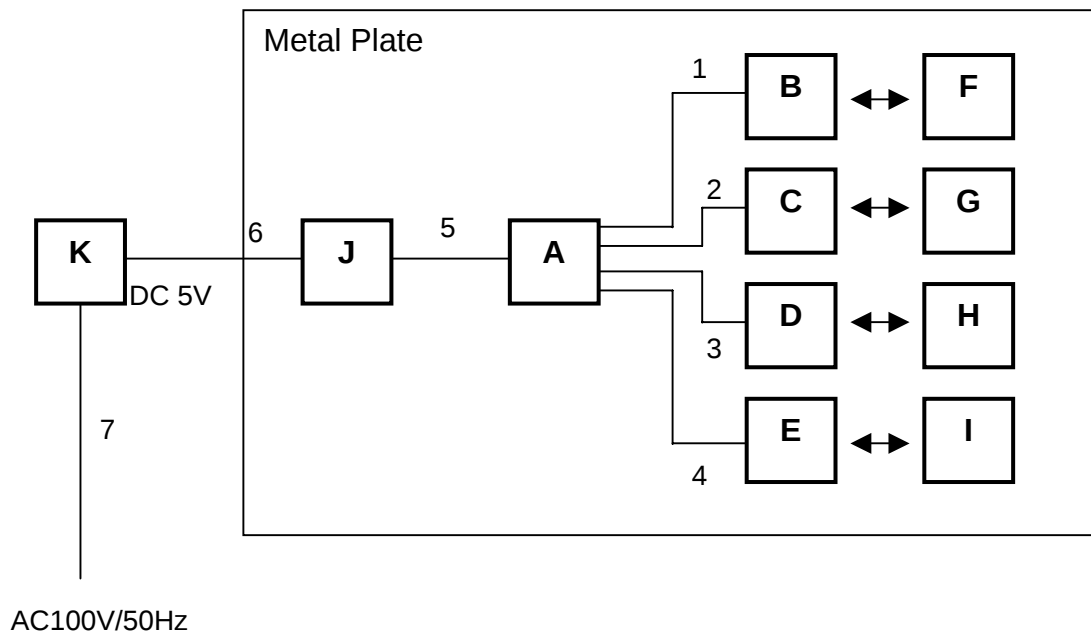
#### Conducted Emissions



#### Radiated Emissions



Frequency stability Test condition



## 5 TEST FACILITIES

All measurement facilities in EMC Kashima Corporation are located in 1614, Mushihata, Katori-shi, Chiba-ken, 289-0341 Japan.

Accredited by American Association for Laboratory Accreditation (A2LA) for the emission and immunity tests stated in the scope of the certificate under Certificate Number 1266-01.

Authorized by TUV Rheinland for the emission and immunity tests stated in the scope of the certificate under Certificate No. UA 50061520-0001.

Registered by Federal Communications Commission (FCC). Each registered facility number is as follows;

Test site No. 1 90558 / Test site No. 2 510504 / Test site No. 4 90557

Test site No. 5 99356 / Test site No. 6 372431

Registered by Industry Canada (IC). Each registered facility number is as follows;

Test site No. 1 IC 4659A-1 / Test site No. 2 IC 4659A-2 / Test site No.5 IC 4659A-5

Test site No. 6 IC 4659A-6

Approved by Saudi Arabian Standards Organization (SASO).

Registered by Voluntary Control Council for Interference by Information Technology Equipment (VCCI).

Each registered facility number is as follows;

Test site No. 1 R-188 · C-785 (Open site) / C-187 (Shielded room)

Test site No. 2 R-189 (Open site) / C-188 (Shielded room)

Test site No. 4 R-656 (Open site) / C-613 (Shielded room)

Test site No. 5 R-1227 · C-1290 (Open site) / C-1291 (Shielded room)

Test site No. 6 R-1895 · C-2042 (Anechoic chamber)

## 6 MEASUREMENT UNCERTAINTY

The treatment of uncertainty is based on the general matters on the definition of uncertainty in “Guide to the expression of uncertainty in measurement (GUM)” published by ISO. The Lab’s uncertainty is determined by referring UKAS Publication LAB34:2002 “The Expression of Uncertainty in EMC Testing” and CISPR16-4-2:2003 “Uncertainty in EMC Measurements”.

The uncertainty of the measurement result in the level of confidence of approximately 95% (k=2) is as follows;

|                                          |           |
|------------------------------------------|-----------|
| Conducted Emissions                      | ± 2.56 dB |
| Radiated emission test (9kHz - 30MHz)    | ± 3.25 dB |
| Radiated emission test (30MHz - 1000MHz) | ± 4.32 dB |

## 7 TEST CONDITIONS

### 7.1 Section 15.207 Conducted Emissions

#### 7.1.1 Test Location

Test site No. 1 (Shielded room)

#### 7.1.2 Used Test Instruments

| Model   | Name              | Manufacturer    | Code No. | Last Cal. | Remarks |
|---------|-------------------|-----------------|----------|-----------|---------|
| ESCS30  | Test Receiver     | Rohde & Schwarz | RCV04    | 2007.10   | for EUT |
| ESH3-Z5 | AMN               | Rohde & Schwarz | LSN03    | 2007.08   |         |
| 8568B   | Spectrum Analyzer | Hewlett Packard | SPR12    | 2007.05   |         |
| 5D-2W   | Coaxial cable     | FUJIKURA        | 1CSR     | 2007.06   |         |

All used test instruments are calibrated at least once a year.

#### 7.1.3 Test Procedure

The test setup and measurements were implemented according to the test method of ANSI C63.4: 2003  
7. AC power line conducted emission measurements.

Final measurements were made on the conditions described on this page, and the photos of test-setup indicate the final conducted emissions.

#### 7.1.4 Limit

| Frequency (MHz) | Quasi-peak (dBuV) | Average (dBuV) |
|-----------------|-------------------|----------------|
| 0.15 - 0.5      | 66 - 56*          | 56 - 46*       |
| 0.5 - 5         | 56                | 46             |
| 5 - 30          | 60                | 50             |

\* Decreases with the logarithm of the frequency.

## 7.2 Section 15.225(a)(b)(c)(d) Radiated Emissions (9kHz - 30MHz)

### 7.2.1 Test Location

Test site No. 1 (Open site) 3 meters distance

### 7.2.2 Used Test Instruments

| Model   | Name          | Manufacturer    | Code No. | Last Cal. | Remarks |
|---------|---------------|-----------------|----------|-----------|---------|
| ESHS10  | Test Receiver | Rohde & Schwarz | RCH02    | 2008.03   |         |
| HFH2-Z2 | Loop Antenna  | Rohde & Schwarz | LPA01    | 2008.04   |         |
| 5D-2W   | Coaxial cable | FUJIKURA        | MG5m     | 2007.10   |         |

All used test instruments are calibrated at least once a year.

### 7.2.3 Test Procedure

The test setup and measurements were implemented according to the test method of ANSI C63.4: 2003 8. Radiated emission measurements.

The test was performed at 3 meter distance and its result was converted into the one at specified 30 meter distance according to 15.31(f). The turntable was rotated and the center point of the loop antenna was fixed at 1 meter above ground level to investigate the maximum radiated emission, positioning the loop antenna in vertical and horizontal. Final measurements were made on the conditions described on this page, and the photos of test-setup indicate the final radiated emissions.

### 7.2.4 Limit

| Frequency<br>(MHz) | Field strength @30m<br>(uV/m) | Field strength @30m<br>(dBuV/m) | Field strength @3m<br>(dBuV/m) |
|--------------------|-------------------------------|---------------------------------|--------------------------------|
| Below 13.110       | 30                            | 29.5                            | 69.5                           |
| 13.110 - 13.410    | 106                           | 40.5                            | 80.5                           |
| 13.410 - 13.553    | 334                           | 50.5                            | 90.5                           |
| 13.553 - 13.567    | 15,848                        | 84                              | 124                            |
| 13.567 - 13.710    | 334                           | 50.5                            | 90.5                           |
| 13.710 - 14.010    | 106                           | 40.5                            | 80.5                           |
| Above 14.010       | 30                            | 29.5                            | 69.5                           |

$\text{dBuV/m} = 20 \times \log(\text{uV/m})$

Distance factor = 40dB / decade (15.31(f))

## 7.3 Section 15.225(d) Radiated Emissions (30MHz - 1000MHz)

### 7.3.1 Test Location

Test site No. 1 (Open site) 3 meters distance

### 7.3.2 Used Test Instruments

| Model         | Name              | Manufacturer    | Code No. | Last Cal. | Remarks |
|---------------|-------------------|-----------------|----------|-----------|---------|
| ESCS30        | Test Receiver     | Rohde & Schwarz | RCV04    | 2007.10   |         |
| VULB 9168     | Logbicon Antenna  | Schwarzbeck     | LGBC01   | 2008.04   |         |
| 8568B         | Spectrum Analyzer | Hewlett Packard | SPR12    | 2007.05   |         |
| 8447D         | Pre-Amplifier     | Hewlett Packard | PRA03    | 2007.11   |         |
| 12DSFA/SF106A | Coaxial cable     | FUJIKURA/SUHNER | 1R10m106 | 2007.12   |         |

All used test instruments are calibrated at least once a year.

### 7.3.3 Test Procedure

The test setup and measurements were implemented according to the test method of ANSI C63.4: 2003 8. Radiated emission measurements.

They were performed at the measurement distance that specified for compliance to determine the frequency producing the maximum emissions. The turntable was rotated and the antenna height was varied 1 to 4 meters to investigate the maximum radiated emission for the horizontal and vertical polarization. Final measurements were made on the conditions described on this page, and the photos of test-setup indicate the final radiated emissions.

### 7.3.4 Limit

| Frequency<br>(MHz) | Field strength @3m<br>(uV/m) | Field strength @3m<br>(dBuV/m) |
|--------------------|------------------------------|--------------------------------|
| 30 - 88            | 100                          | 40                             |
| 88 - 216           | 150                          | 43.5                           |
| 216 -960           | 200                          | 46                             |
| Above 960          | 500                          | 54                             |

$\text{dBuV/m} = 20 \times \log (\text{uV/m})$

## 7.4 Section 15.225(e) Frequency Stability

### 7.4.1 Test Location

Test site No. 6

### 7.4.2 Used Test Instruments

| Model        | Name                | Manufacturer | Code No. | Last Cal. | Remarks |
|--------------|---------------------|--------------|----------|-----------|---------|
| R3162        | Spectrum Analyzer   | ADVANTEST    | SPTG02   | 2007.05   |         |
| 8494B        | Attenuator          | HP           | SAT10    | 2007.09   |         |
| 8495B        | Attenuator          | HP           | SAT09    | 2007.09   |         |
| Sucoflex 104 | Micro Wave cable    | SUHNER       | MWC-3m   | 2008.02   |         |
| Sucoflex 104 | Micro Wave cable    | SUHNER       | MWC-0.5m | 2008.02   |         |
| PR-4KPH      | Temperature Chamber | ESPEC        | TMPC02   | 2007.12   |         |
| 112          | MULTIMETER          | FLUKE        | MTM27    | 2007.10   |         |

All used test instruments are calibrated at least once a year.

### 7.4.3 Test Procedure

The test setup and measurements were implemented according to the test method of ANSI C63.4: 2003 Annex H5.

The EUT was measured with the condition that the measuring instrument was connected to the antenna through the coaxial cable, whose antenna was placed near the EUT. The measurement started with the Temperature chamber sufficiently stabilized.

### 7.4.4 Limit

| Item                  | Variation     | Limit (%) |
|-----------------------|---------------|-----------|
| Temperature variation | -20°C - +50°C | +/- 0.01  |
| Voltage variation     | 85% - 115%    | +/- 0.01  |

## 7.5 Section 15.215(c) 20dB Bandwidth

### 7.5.1 Test Location

Test site No. 6

### 7.5.2 Used Test Instruments

| Model        | Name                | Manufacturer | Code No. | Last Cal. | Remarks |
|--------------|---------------------|--------------|----------|-----------|---------|
| R3162        | Spectrum Analyzer   | ADVANTEST    | SPTG02   | 2007.05   |         |
| 8494B        | Attenuator          | HP           | SAT10    | 2007.09   |         |
| 8495B        | Attenuator          | HP           | SAT09    | 2007.09   |         |
| Sucoflex 104 | Micro Wave cable    | SUHNER       | MWC-3m   | 2008.02   |         |
| Sucoflex 104 | Micro Wave cable    | SUHNER       | MWC-0.5m | 2008.02   |         |
| PR-4KPH      | Temperature Chamber | ESPEC        | TMPC02   | 2007.12   |         |
| 112          | MULTIMETER          | FLUKE        | MTM27    | 2007.10   |         |

All used test instruments are calibrated at least once a year.

### 7.5.3 Test Procedure

The test setup and measurements were implemented according to the test method of ANSI C63.4: 2003 Annex H6.

The spectrum analyzer RBW and VBW were set as follows. The marker-to-peak function of the spectrum analyzer was used to measure to peak level and the marker-delta function was used to measure the emission 20dB below the peak. It has been plotted.

#### Spectrum Analyzer Setup

| RBW  | VBW  | Detector |
|------|------|----------|
| 1kHz | 3kHz | Peak     |

## 8 TEST DATA

### 8.1 Section 15.207 Conducted Emissions

Company : Oki Data Corporation      Tested Date : April 23, 2008  
 Equipment : Embedded RFID Read/Write System      Temperature : 23 °C  
 Model : 4399021A      Humidity : 38 %  
 Power : DC 5V (AC120V, 60Hz for Printer)      Atmos. Press : 1018 hPa  
 Test Mode : Transmitting and Receiving mode

Engineer : Kazuhiro Ando

| Freq.<br>(MHz) | Phase | Reading<br>(dBuV) |    | Corr.<br>Factor<br>(dB) | Result<br>(dBuV) |    | Limit<br>(dBuV) |      | Margin<br>(dB) |    |
|----------------|-------|-------------------|----|-------------------------|------------------|----|-----------------|------|----------------|----|
|                |       | QP                | AV |                         | QP               | AV | QP              | AV   | QP             | AV |
| 0.1500         | N     | 33.6              | -  | 0.2                     | 33.8             | -  | 66.0            | 56.0 | 32.2           | -  |
| 0.1915         | N     | 25.0              | -  | 0.2                     | 25.2             | -  | 64.0            | 54.0 | 38.8           | -  |
| 0.3841         | N     | 24.0              | -  | 0.2                     | 24.2             | -  | 58.2            | 48.2 | 34.0           | -  |
| 0.5763         | N     | 20.0              | -  | 0.3                     | 20.3             | -  | 56.0            | 46.0 | 35.7           | -  |
| 13.5600        | N     | 21.7              | -  | 1.2                     | 22.9             | -  | 60.0            | 50.0 | 37.1           | -  |
| 27.1200        | N     | 2.0               | -  | 2.0                     | 4.0              | -  | 60.0            | 50.0 | 56.0           | -  |
| 0.1500         | L     | 33.5              | -  | 0.2                     | 33.7             | -  | 66.0            | 56.0 | 32.3           | -  |
| 0.1915         | L     | 32.7              | -  | 0.2                     | 32.9             | -  | 64.0            | 54.0 | 31.1           | -  |
| 0.3841         | L     | 26.0              | -  | 0.2                     | 26.2             | -  | 58.2            | 48.2 | 32.0           | -  |
| 0.5763         | L     | 21.2              | -  | 0.3                     | 21.5             | -  | 56.0            | 46.0 | 34.5           | -  |
| 13.5600        | L     | 23.5              | -  | 1.2                     | 24.7             | -  | 60.0            | 50.0 | 35.3           | -  |
| 27.1200        | L     | 2.5               | -  | 2.0                     | 4.5              | -  | 60.0            | 50.0 | 55.5           | -  |

Correction Factor(dB) = AMN Factor(dB) + Cable Loss(dB)

Result(dBuV) = Reading (dBuV) + Correction Factor(dB)

## 8.2 Section 15.225(a)(b)(c) Radiated Emissions (9kHz - 30MHz)

Company : Oki Data Corporation      Tested Date : April 23, 2008  
Equipment : Embedded RFID Read/Write System      Temperature : 23 °C  
Model : 4399021A      Humidity : 38 %  
Power : DC 5V      Atmos. Press : 1018 hPa  
Test Mode : Transmitting and Receiving mode  
Test Distance : 3m

Engineer : Kazuhiro Ando

| Freq.<br>(MHz) | Reading @3m<br>(dBuV) | Detector<br>(QP/Pk) | Corr. Factor<br>(dB) | Result<br>(dBuV/m) | Limit @3m<br>(dBuV/m) | Margin<br>(dB) |
|----------------|-----------------------|---------------------|----------------------|--------------------|-----------------------|----------------|
| 13.5600        | 36.5                  | QP                  | 0.2                  | 36.7               | 124.0                 | 87.3           |
|                |                       |                     |                      |                    |                       |                |
|                |                       |                     |                      |                    |                       |                |

Correction Factor(dB) = Antenna Factor(dB/m) + Cable Loss(dB)

Result(dBuV/m) = Reading(dBuV) + Correction Factor(dB)

The test examined it with a new battery.

**Section 15.225(d) Radiated Emissions (9kHz - 30MHz)**

Company : Oki Data Corporation      Tested Date : April 23, 2008  
Equipment : Embedded RFID Read/Write System      Temperature : 23 °C  
Model : 4399021A      Humidity : 38 %  
Power : DC 5V      Atmos. Press : 1018 hPa  
Test Mode : Transmitting and Receiving mode  
Test Distance : 3m

Engineer : Kazuhiro Ando

| Freq.<br>(MHz) | Reading @3m<br>(dBuV) | Detector<br>(QP/Pk) | Corr. Factor<br>(dB) | Result<br>(dBuV/m) | Limit @3m<br>(dBuV/m) | Margin<br>(dB) |
|----------------|-----------------------|---------------------|----------------------|--------------------|-----------------------|----------------|
| 27.1200        | 22.0                  | QP                  | 0.2                  | 22.2               | 69.5                  | 47.3           |
|                |                       |                     |                      |                    |                       |                |
|                |                       |                     |                      |                    |                       |                |

Correction Factor(dB) = Antenna Factor(dB/m) + Cable Loss(dB)

Result(dBuV/m) = Reading(dBuV) + Correction Factor(dB)

The test examined it with a new battery.

### 8.3 Section 15.225(d) Radiated Emissions (30MHz - 1000MHz)

Company : Oki Data Corporation  
 Equipment : Embedded RFID Read/Write System  
 Model : 4399021A  
 Power : DC 5V  
 Test Mode : Transmitting and Receiving mode  
 Test Distance : 3m

Tested Date : April 23, 2008

Temperature : 23 °C

Humidity : 38 %

Atmos. Press : 1018 hPa

Engineer : Kazuhiro Ando

| Freq.<br>(MHz) | Pol.<br>(H/V) | Reading<br>(dBuV) | Detector<br>(QP/Pk) | Corr. Factor<br>(dB) | Result<br>(dBuV/m) | Limit<br>(dBuV/m) | Margin<br>(dB) |
|----------------|---------------|-------------------|---------------------|----------------------|--------------------|-------------------|----------------|
| 189.84         | H             | 38.3              | QP                  | -13.7                | 24.6               | 43.5              | 18.9           |
| 203.40         | H             | 38.5              | QP                  | -14.4                | 24.1               | 43.5              | 19.4           |
| 216.96         | H             | 41.5              | QP                  | -13.4                | 28.1               | 46.0              | 17.9           |
| 244.08         | H             | 44.8              | QP                  | -11.5                | 33.3               | 46.0              | 12.7           |
| 257.64         | H             | 42.6              | QP                  | -11.0                | 31.6               | 46.0              | 14.4           |
| 298.32         | H             | 44.0              | QP                  | -10.3                | 33.7               | 46.0              | 12.3           |
| 311.88         | H             | 42.0              | QP                  | -9.9                 | 32.1               | 46.0              | 13.9           |
| 311.88         | V             | 36.5              | QP                  | -9.9                 | 26.6               | 46.0              | 19.4           |
| 474.60         | H             | 37.9              | QP                  | -7.0                 | 30.9               | 46.0              | 15.1           |
| 474.60         | V             | 34.5              | QP                  | -7.0                 | 27.5               | 46.0              | 18.5           |
| 813.60         | H             | 33.0              | QP                  | 0.2                  | 33.2               | 46.0              | 12.8           |
| 813.60         | V             | 31.0              | QP                  | 0.2                  | 31.2               | 46.0              | 14.8           |
| 827.16         | H             | 31.2              | QP                  | 0.4                  | 31.6               | 46.0              | 14.4           |
| 827.16         | V             | 30.7              | QP                  | 0.4                  | 31.1               | 46.0              | 14.9           |

Correction Factor(dB) = Antenna Factor(dB/m) + Cable Loss(dB) – Preamplifier Gain(dB)

Result(dBuV/m) = Reading(dBuV) + Correction Factor(dB)

The test examined it with a new battery.

## 8.4 Section 15.225(e) Frequency Stability

Company : Oki Data Corporation  
 Equipment : Embedded RFID Read/Write System  
 Model : 4399021A  
 Power : DC 5V  
 Test Mode : Transmitting and Receiving mode

Tested Date : April 24, 2008

Temperature : 23 °C

Humidity : 45 %

Atmos. Press : 1010 hPa

Engineer : Kazuhiro Ando

### Temperature Variations

| Temp.<br>(°C) | Voltage<br>(V) | Measured Frequency (MHz) |          |          |          | Worst Deviation<br>(%) | Limit<br>(%) |
|---------------|----------------|--------------------------|----------|----------|----------|------------------------|--------------|
|               |                | Start-up                 | 2 min.   | 5 min.   | 10 min.  |                        |              |
| 50            | 5              | 13.56007                 | 13.56006 | 13.56006 | 13.56006 | 0.0005                 | +/- 0.01     |
| 40            | 5              | 13.56009                 | 13.56008 | 13.56008 | 13.56008 | 0.0007                 | +/- 0.01     |
| 30            | 5              | 13.56012                 | 13.56011 | 13.56011 | 13.56011 | 0.0009                 | +/- 0.01     |
| 20            | 5              | 13.56014                 | 13.56014 | 13.56014 | 13.56014 | 0.0010                 | +/- 0.01     |
| 10            | 5              | 13.56016                 | 13.56016 | 13.56016 | 13.56016 | 0.0012                 | +/- 0.01     |
| 0             | 5              | 13.56016                 | 13.56016 | 13.56016 | 13.56016 | 0.0012                 | +/- 0.01     |
| -10           | 5              | 13.56015                 | 13.56015 | 13.56015 | 13.56015 | 0.0011                 | +/- 0.01     |
| -20           | 5              | 13.56010                 | 13.56010 | 13.56011 | 13.56011 | 0.0008                 | +/- 0.01     |

### Voltage Variations

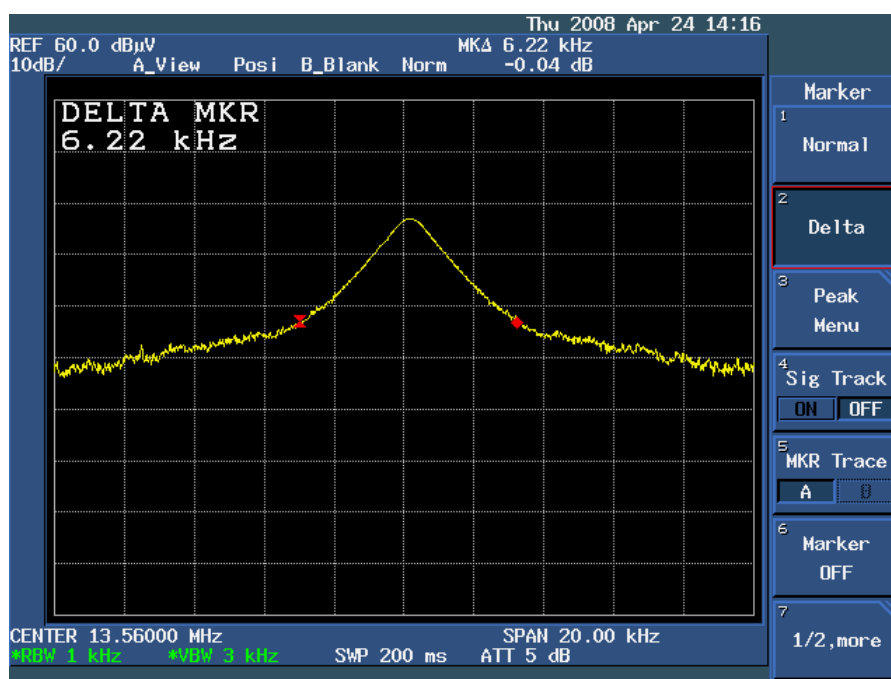
| Temp.<br>(°C) | Voltage<br>(V) | Measured Frequency (MHz) |          |          |          | Worst Deviation<br>(%) | Limit<br>(%) |
|---------------|----------------|--------------------------|----------|----------|----------|------------------------|--------------|
|               |                | Start-up                 | 2 min.   | 5 min.   | 10 min.  |                        |              |
| 20            | 4.25           | 13.56012                 | 13.56012 | 13.56012 | 13.56012 | 0.0009                 | +/- 0.01     |
| 20            | 5              | 13.56014                 | 13.56014 | 13.56014 | 13.56014 | 0.0010                 | +/- 0.01     |
| 20            | 5.75           | 13.56016                 | 13.56016 | 13.56015 | 13.56015 | 0.0012                 | +/- 0.01     |

## 8.5 Section 15.215(c) 20dB Bandwidth

|           |                                   |              |                  |
|-----------|-----------------------------------|--------------|------------------|
| Company   | : Oki Data Corporation            | Tested Date  | : April 24, 2008 |
| Equipment | : Embedded RFID Read/Write System | Temperature  | : 23 °C          |
| Model     | : 4399021A                        | Humidity     | : 45 %           |
| Power     | : DC 5V                           | Atmos. Press | : 1010 hPa       |
| Test Mode | : Transmitting and Receiving mode |              |                  |

Engineer : Kazuhiro Ando

| Freq.<br>(MHz) | 20dB Bandwidth<br>(kHz) |
|----------------|-------------------------|
| 13.56          | 6.22                    |



## 9 THE PHOTOS OF TEST-SETUP

### 9.1 Conducted Emissions 150 kHz - 30 MHz



## 9.2 Radiated Emissions 9 kHz - 1000 MHz



### 9.3 Frequency Stability

