RADIO TEST REPORT

Test Report No.: 28IE0227-YK-B-R2

Applicant	:	**ART Technology Co., Ltd.**
Type of Equipment	:	**RFID Reader/Writer Unit ASI4000**
Model No.	:	**ASI4000-98-BS1**
FCC ID	:	**WHG-ASI4000XBS1**
Test regulation	:	**FCC Part15 Subpart C: 2008**
Test result	:	**Complied**

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2. The results in this report apply only to the sample tested.
3. This sample tested is in compliance with the limits of the above regulation.
4. The test results in this test report are traceable to the national or international standards.
5. Original test report number of this report is 28IE0227-YK-B.

Date of test: June 10, 18, 20, 24, 25 and 27, 2008

Tested by: Go Ishiwata & Akira Sato

Tatsuya Arai & Makoto Hosaka

Takahiro Suzuki

Approved by: Toyokazu Imamura
Engineer of Yamakita EMC Lab.

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1 Applicant information

Company Name	:	ART Technology Co., Ltd.
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Facsimile Number	:	+81-778-54-8088
Contact Person	:	Akio Yamamoto

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

2.1 Identification of E.U.T.

Type of Equipment	:	RFID Reader/Writer Unit ASI4000
Model No.	:	ASI4000-98-BS1
Serial No.	:	7D8610001
Rating	:	DC5.0V
Country of Mass-production	:	Japan
Receipt Date of Sample	:	June 9, 2008
Condition of EUT	:	Production model
Modification of EUT	:	No modification by the test lab.

2.2 Product description

Model: ASI4000-98-BS1 (referred to as the EUT in this report) is a RFID Reader/Writer Unit ASI4000, which is the small and low-cost solution to read and write passive RFID transponder tags complied with IEC/ISO-15693 standard.

Equipment type	:	Transceiver
Frequency of operation	:	13.56MHz
Clock frequency	:	13.56MHz
Type of modulation	:	ASK
Antenna type	:	Build-in loop antenna
Antenna connector type	:	None
ITU code	:	A1D
Operation temperature range	:	0 ~ +45 deg.C.

*FCC Part15.31 (e)
Host device provides the RFID unit with stable power supply, and the power is not changed when voltage of the device is varied. Therefore, the equipment complies power supply regulation.

*FCC Part15.203
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 antenna requirement of Section 15.203.

3 Test specification, procedures and results

3.1 Test specification

Test specification : FCC Part15 Subpart C: 2008, final revised on May 19, 2008
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

The host device, DNA Analyzer complies with FCC Part15 Subpart B: 2008, final revised on May 19, 2008. Refer to the test report 28HE0042-YK-C.

3.2 Procedures & results

Item	Test Procedure	Specification	Remarks	Deviation	Worst Margin	Results
Conducted Emission	ANSI C63.4:2003 7. AC powerline conducted emission measurements	FCC 15.207	-	N/A	32.0dB (17.1871MHz, N, QP)	Complied
Electric Field Strength of Fundamental Emission	ANSI C63.4:2003 13. Measurement of intentional radiators	FCC 15.225 (a)	Radiated	N/A	[Module built-in] 78.0dB (Horizontal) [Module alone] 64.0dB (Vertical)	Complied
Electric Field Strength of Outside the Allocated bands	ANSI C63.4:2003 13. Measurement of intentional radiators	FCC 15.225 (b) (c)	Radiated	N/A	[Module built-in] 44.4dB (14.010MHz, Horizontal & Vertical) [Module alone] 43.5dB (13.110MHz, Vertical)	Complied
Electric Field Strength of Spurious Emission	ANSI C63.4:2003 13. Measurement of intentional radiators	FCC15.209, FCC 15.225 (d)	Radiated	N/A	[Module built-in] 14.8dB (108.37MHz, Vertical) [Module alone] 5.6dB (149.00MHz, Vertical)	Complied
20dB Bandwidth	ANSI C63.4:2003 13. Measurement of intentional radiators	FCC15.215(c)	Radiated	N/A	-	Complied
Frequency Tolerance	ANSI C63.4:2003 13. Measurement of intentional radiators	FCC15.225 (e)	Radiated	N/A	-	Complied

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

3.3 Addition to standard

Item	Test Procedure	Specification	Remarks	Worst Margin	Results
Occupied Bandwidth (99%)	ANSI C63.4:2003 13. Measurement of intentional radiators RSS-Gen 4.6.1	RSS-Gen 4.6.1	Radiated	-	Complied

* 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.

	No.1 open site (±)	No.2 open site (±)	No.1 anechoic chamber (±)
Conducted emission			
150kHz-30MHz	2.8 dB	2.8 dB	2.8 dB
Radiated emission (3m)			
<30MHz	2.3 dB	2.3 dB	2.2 dB
30-300MHz	4.5 dB	4.4 dB	4.5 dB
300-1000MHz	4.3 dB	4.3 dB	4.3 dB

Frequency tolerance	(±)
	0.000014MHz

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.

3.5 Test location

UL Japan, Inc. Yamakita EMC Lab.
907, Kawanishi, Yamakita-machi, Ashigarakami-gun, Kanagawa-ken 258-0124 JAPAN
Telephone number : +81 465 77 1011
Facsimile number : +81 465 77 2112
NVLAP Lab. code : 200441-0

No. 1 test site has been fully described in a report submitted to FCC office, and accepted on July 23, 2008 (Registration No.: 95486).
IC Registration No. : 2973B-1

No. 2 test site has been fully described in a report submitted to FCC office, and accepted on February 27, 2008 (Registration No.: 466226).
IC Registration No. : 2973B-3

No. 1 anechoic chamber has been fully described in a report submitted to FCC office, and accepted on October 22, 2008 (Registration No.: 95967).
IC Registration No. : 2973B-2

Test room	Width x Depth x Height (m)	Test room	Width x Depth x Height (m)
No.1 shielded room	8.0 x 5.0 x 2.5	No.1 Semi-anechoic chamber	10.0 x 7.5 x 5.7
No.2 shielded room	5.0 x 4.0 x 2.5		
No.3 shielded room	4.0 x 5.0 x 2.7		

Open test site	Maximum measurement distance
No.1 open test site	30m
No.2 open test site	10m

4 System test configuration

4.1 Operation mode

The EUT exercise program used during testing was designed to exercise the various system components in a manner similar to typical use.

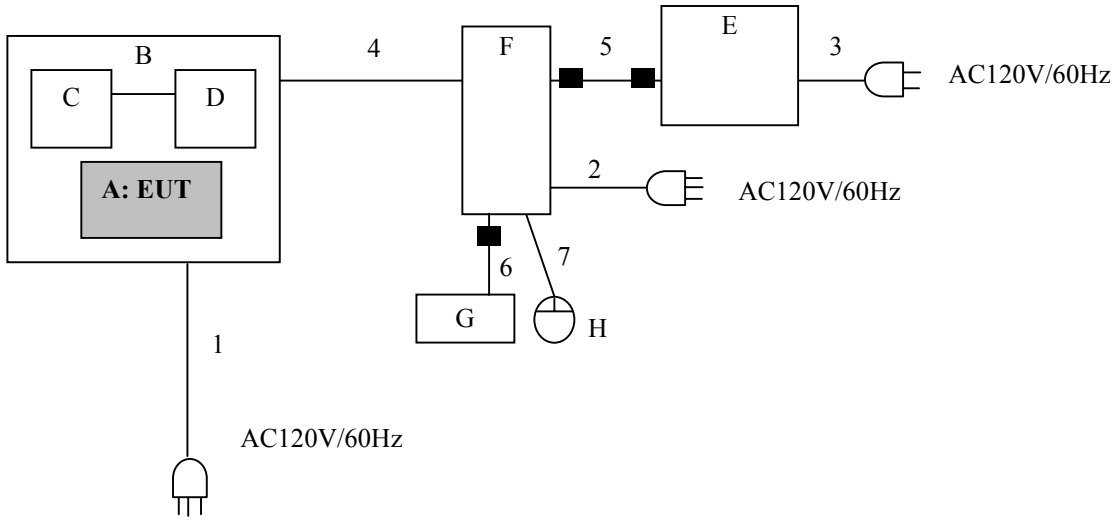
Test item	Configuration	Operating mode	Tested frequency
All items except for Frequency tolerance	Module built-in	Transmitting (ASK) 1. Read the identification code of tag named UIDNO by RFID 2. Write characters (TUFVSQ==), defined by BASE64, under UIDNO and read	13.56MHz
	Module alone	Transmitting (ASK) Read and Write of User block 4Byte*28 Data: 00H to 6FH	13.56MHz
Frequency tolerance	Module alone	Transmitting, Unmodulated	13.56MHz

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

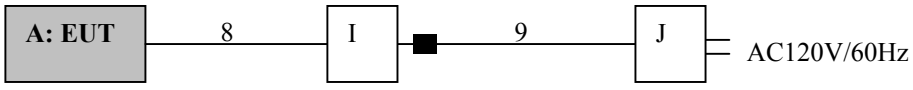
4.2 Configuration of tested system

[Module built-in]

■ : Ferrite core (Standard attachment)



[Module alone]



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

Description of EUT and support equipment

No.	Item	Model number	Serial number	Manufacturer	Remark
A	RFID Reader/Writer Unit ASI4000	ASI4000-98-BS1	7D8610001	ART Technology	EUT
B	DNA Analyzer	3500	DVT1-52	HITACHI	-
C	Multifunctional Digital Color Systems	FC-6520C	DVT1-52	HITACHI	-
D	Multifunctional Digital Color Systems	FC-6530C	DVT2-62	HITACHI	-
E	Monitor	2007FPb	MX0C9536742627cc26ML	DELL	-
F	Personal Computer	OPTIPREX755	12TN7G1	DELL	-
G	Keyboard	L100	CN0RH6597357182-DOGZR	DELL	-
H	Mouse	MO56UC	HOB008U1	DELL	-
I	Test Jig	-	-	ART Technology	-
J	AC Adaptor	STD-0502	-	Adaptor technology	-

List of cables used

No.	Name	Length (m)	Shield		Remark
			Cable	Connector	
1	AC Power cable	2.0	Unshielded	Unshielded	-
2	AC Power cable	2.0	Unshielded	Unshielded	-
3	AC Power cable	2.0	Unshielded	Unshielded	-
4	USB cable	3.2	Shielded	Shielded	-
5	RGB cable	1.9	Shielded	Shielded	-
6	Keyboard cable	1.9	Shielded	Shielded	-
7	Mouse cable	1.8	Shielded	Shielded	-
8	#135040-02 cable	1.5	Unshielded	Unshielded	-
9	DC cable	1.8	Unshielded	Unshielded	-

5 Conducted emissions

5.1 Operating environment

The test was carried out in No.1 shielded room.

5.2 Test configuration

EUT was placed on a wooden platform of nominal size, 1m by 1.8m, raised 80cm above the conducting ground plane. The rear of tabletop was located 40cm to the vertical conducting plane. The rear of peripherals was 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) and excess AC cable was bundled in center. Photographs of the setup are shown in Appendix 1.

5.3 Test conditions

Frequency range : 0.15 - 30MHz

5.4 Test procedure

The EUT was connected to a LISN (AMN). An overview sweep with peak detection has been performed. The Conducted emission measurements were made with the following detector function of the test receiver.

Detector: QP/AV
IF Bandwidth: 9kHz

5.5 Results

Summary of the test results : Pass

Date : June 20, 2008 Test engineer : Go Ishiwata

6 Radiated emissions (Fundamental, Spurious and Outside the Allocated bands)

6.1 Operating environment

The test was carried out in No.1 anechoic chamber.

6.2 Test configuration

Photographs of the setup are shown in Appendix 1.
[Module built-in] EUT was placed on a wooden platform of nominal size, 1m by 1.8m, raised 80cm above the conducting ground plane. The rear of peripherals was aligned and flushed with rear of tabletop. 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.
[Module alone] EUT was placed on a urethane platform of nominal size, 0.5m by 0.5m, raised 80cm above the conducting ground plane to prevent the reflection influence. The setup was not the one for a system which is specified in ANSI C63.4: 2003. The cables did not have much effect on spurious emission.

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 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
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	10kHz	9kHz	120kHz
Measuring antenna	Loop antenna				Biconical (30-299.99MHz) Logperiodic (300MHz-1GHz)

* 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])

The equipment was previously checked at each position of three axes X, Y and Z. The position in which the maximum noise occurred was chosen to put into measurement. See the table below and photographs in page 16. With the position, the noise levels of all the frequencies were measured.

Frequency	Horizontal	Vertical
Below 30MHz	X	X
Above 30MHz	Y	Y

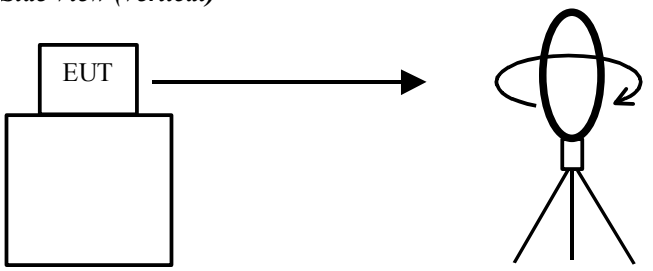
6.6 Results

Summary of the test results : Pass

Date : June 10, 25 and 27, 2008 Test engineer : Makoto Hosaka, Takahiro Suzuki and Akira Sato

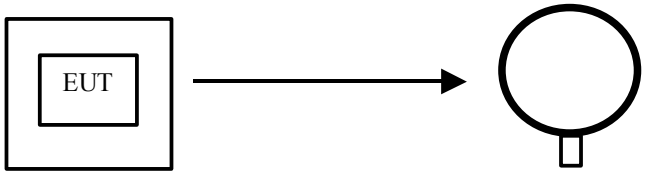
Figure 1: Direction of the Loop Antenna

Side View (Vertical)



Front side: 0 deg.
Forward direction: clockwise

Top View (Horizontal)



Antenna was not rotated.

7 20dB bandwidth & Occupied bandwidth (99%)

7.1 Test procedure

The measurement was performed in the antenna height to gain the maximum of Electric field strength. At the measurement of Occupied bandwidth (99%), the span of the analyzer was set to 20kHz in order to raise the measurement accuracy.

7.2 Results

Summary of the test results : Pass

Date : June 24, 2008 Test engineer : Tatsuya Arai

8 Frequency tolerance

8.1 Test procedure

The measurement was performed in the antenna height to gain the maximum of Electric field strength.
The temperature test was started after the temperature stabilization time of 30 minutes.

8.2 Results

Summary of the test results : Pass

Date : June 18, 2008 Test engineer : Tatsuya Arai

APPENDIX 1: Photographs of test setup

APPENDIX 2: Test data

APPENDIX 3: Test instruments