

RADIO TEST REPORT

Test Report No. : 27BE0239-HO-A-1

Applicant : Maxell Seiki, Ltd.
Type of Equipment : RFID Reader / Writer Module
Model No. : ME-MA21-A-SNT/ ME-MR21-A-SG
Test standard : FCC Part 15 Subpart C : 2006
Section 15.207 and 15.225
FCC ID : UOEME-M21
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.
4. The test results in this report are traceable to the national or international standards.

Date of test:


October 17 to November 17, 2006

Tested by:


Kenichi Adachi
EMC Services


Takumi Shimada
EMC Services

Approved by :


Naoki Sakamoto
Group Leader of EMC Services


NVLAP LAB CODE: 200572-0

This laboratory is accredited by the NVLAP LAB CODE 200572-0, U.S.A. The tests reported herein have been performed in accordance with its terms of accreditation.
*As for the range of Accreditation in NVLAP, you may refer to the WEB address, <http://ulapex.jp/emc/nvlap.htm>

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

MF060b(14.06.06)

CONTENTS	PAGE
SECTION 1: Client information.....	3
SECTION 2: Equipment under test (E.U.T.)	3
SECTION 3: Test specification, procedures & results	4
SECTION 4: Operation of E.U.T. during testing.....	7
SECTION 5: Conducted emission	9
SECTION 6: Radiated emission (Fundamental , Spurious Emission and Spectrum Mask)	10
SECTION 7: -20dB Bandwidth	11
SECTION 8: Frequency Tolerance	11
SECTION 9: 99% Occupied Bandwidth	11
APPENDIX 1: Photographs of test setup.....	12
Conducted emission(ME-MR21-A-SG).....	12
Conducted emission (ME-MA21-A-SNT)	13
Radiated emission (ME-MR21-A-SG).....	14
Worst Case Position (ME-MR21-A-SG) (Z-axis)	15
Radiated emission (ME-MA21-A-SNT).....	16
Worst Case Position (ME-MA21-A-SNT) (Z-axis).....	17
APPENDIX 2: Data of EMI test	18
Conducted emission	18
Radiated emission(Fundamental emission and Spectrum Mask and Spurious emission below 30MHz)	22
Radiated emission (Spurious emission: above 30MHz)	30
-20dB Bandwidth	34
99% Occupied Bandwidth	36
Frequency Tolerance	38
APPENDIX 3: Test instruments	40

SECTION 1: Client information

Company Name : Maxell Seiki, Ltd.
Brand or Trade name : Maxell Seiki
Address : 1-3-1, Kandaizumi, Chiyoda-ku, Tokyo, 101-0024, Japan
Telephone Number : +81-3-5833-8537
Facsimile Number : +81-3-5820-5930
Contact Person : Hiroto Watanabe

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

2.1 Identification of E.U.T.

Type of Equipment : RFID Reader / Writer Module
Model No. : ME-MA21-A-SNT/ ME-MR21-A-SG
Serial No. : #01
Rating : DC5.0V/ 0.7A
Country of Manufacture : Japan
Receipt Date of Sample : October 13, 2006
Condition of EUT : Production prototype
(Not for Sale: This sample is equivalent to mass-produced items.)
Modification of EUT : No modification by the test lab.

2.2 Product Description

Model No: ME-MA21-A-SNT/ ME-MR21-A-SG are the RFID Reader / Writer Module.

The clock frequency of EUT is 6MHz (CPU).

*Model No. ME-MA21-A-SNT is identical to Model No. ME-MR21-A-SG.

The differences between the two are the interface and the length of the antenna cable.

Model No. ME-MA21-A-SNT has UART Interface, while Model No. ME-MR21-A-SG has RS-232C Interface.

The length of antenna cable of Model No. ME-MA21-A-SNT is 100mm, while Model No. ME-MR21-A-SG is 150mm.

Therefore, the differences are not to cause any modification to the radio and electrical characteristics of the two models.

Equipment Type : Transceiver
Frequency of Operation : 13.56 MHz
Type of modulation : Amplitude Modulation
Mode of operation : Simplex
Antenna Type : Loop Pattern Antenna
Method of Frequency Generation : Crystal
Operating voltage : u-com, Transceiver: DC 4.5-5.0V,
Antenna Power : DC 9.0V

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

MF060b(14.06.06)

SECTION 3: Test specification, procedures & results

3.1 Test Specification

Test Specification : FCC Part15 Subpart C : 2006
Title : FCC 47CFR Part15 Radio Frequency Device Subpart C Intentional Radiators
Section 15.207 Conducted limits
Section 15.225 : Operation within the band 13.110-14.010MHz

FCC 15.31 (e)

This EUT provides stable voltage (DC 4.5-5.0V) constantly to RF Module regardless of input voltage. Therefore, this EUT complies with the requirement.

FCC Part 15.203 Antenna requirement

This EUT complies with the requirement of 15.203, because the antenna that uses a unique coupling (antenna connector, Type: PH (JST)) to the intentional radiator in this equipment is used.

3.2 Procedures and results

No.	Item	Test Procedure	Specification	Remarks	Deviation	Worst margin	Results
1	Conducted emission	ANSI C63.4:2003 7. AC powerline conducted emission measurements <IC>RSS-Gen 7.2.2	Section 15.207 <IC>RSS-Gen 7.2.2	-	N/A	0.4dB, 13.56MHz, AV, N	Complied
2	Electric Field Strength of Fundamental Emission	ANSI C63.4:2003 13. Measurement of intentional radiators <IC>RSS-Gen 4.6, 4.9	Section 15.225(a) <IC>RSS-210 A2.6	Radiated	N/A	62.9dB, 13.56MHz, QP 45 deg.	Complied
3	Spectrum Mask	ANSI C63.4:2003 13. Measurement of intentional radiators <IC>RSS-Gen 4.7, 4.9	Section 15.225(b)(c) <IC> RSS-210 A2.6	Radiated	N/A	See data	Complied
4	-20dB Bandwidth	ANSI C63.4:2003 13. Measurement of intentional radiators <IC>.-	Section15.215(c) <IC>.-	Radiated	N/A	See data	Complied
5	Electric Field Strength of Spurious Emission	ANSI C63.4:2003 13. Measurement of intentional radiators <IC>RSS-Gen 4.7, 4.9	Section15.209, Section 15.225 (d) <IC>RSS-210 A2.6	Radiated	N/A	1.0dB 54.03MHz, Vertical, QP	Complied
6	Frequency Tolerance	ANSI C63.4:2003 13. Measurement of intentional radiators <IC>RSS-Gen 4.5	Section15.225(e) <IC> RSS-210 A2.6	Radiated	N/A	See data	Complied

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

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

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

MF060b(14.06.06)

3.3 Addition to standards

No.	Item	Test Procedure	Specification	Remarks	Deviation	Worst margin	Results
1	99% Occupied Band Width	RSS-Gen 4.4.1	RSS-Gen 4.4.1	Radiated	N/A	N/A	Complied

3.4 Uncertainty

Conducted Emission

The measurement uncertainty (with a 95% confidence level) for this test is ± 2.66 dB.
The data listed in this report meets the limits unless the uncertainty is taken into consideration.

Radiated Emission

The measurement uncertainty (with a 95% confidence level) for this test using Loop antenna is ± 4.41 dB(3m)/ ± 4.39 dB(10m).
The measurement uncertainty (with a 95% confidence level) for this test using Biconical antenna is ± 4.59 dB(3m)/ ± 4.58 dB(10m).
The measurement uncertainty (with a 95% confidence level) for this test using Logperiodic antenna is ± 4.62 dB(3m)/ ± 4.60 dB(10m).
The measurement uncertainty (with a 95% confidence level) for this test using Horn antenna is ± 5.27 dB.
The data listed in this report meets the limits unless the uncertainty is taken into consideration.

3.5 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	655103	IC4247A-2	7.5 x 5.8 x 5.2m	4.0 x 4.0m	-
No.3 semi-anechoic chamber	148738	IC4247A-3	12.0 x 8.5 x 5.9m	6.8 x 5.75m	
No.3 shielded room	-	-	4.0 x 6.0 x 2.7m	N/A	-
No.4 semi-anechoic chamber	134570	IC4247A-4	12.0 x 8.5 x 5.9m	6.8 x 5.75m	-
No.4 shielded room	-	-	4.0 x 6.0 x 2.7m	N/A	-
No.5 semi-anechoic chamber	-	-	6.0 x 6.0 x 3.9m	N/A	-
No.6 shielded room	-	-	4.0 x 4.5 x 2.7m	2.0 x 2.0 m	-
No.6 measurement room	-	-	4.75 x 5.4 x 3.0m	4.75 x 5.4 m	-
No.7 shielded room	-	-	4.7 x 7.5 x 2.7m	4.7 x 7.5m	-
No.8 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, No.2, No.3 and No.4 semi-anechoic chambers and No.7 shielded room.

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

3.6 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

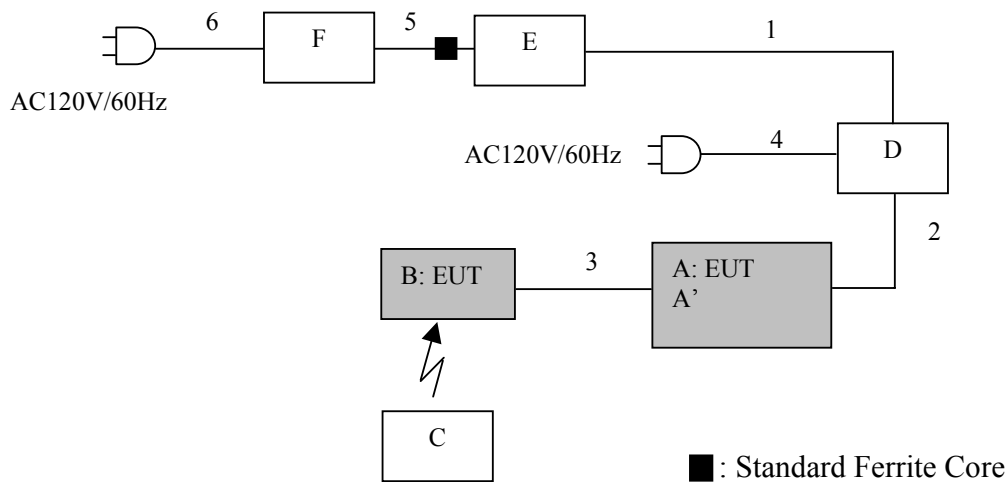
The mode is used : Non Modulation mode (Transmitting and Receiving) With Card (for Frequency Tolerance test)
Modulation mode (Transmitting and Receiving) With Card (for other tests)
Standby mode
*This EUT cannot operate without tag. Therefore, the test was made with Tag.

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

Frequency Tolerance:

Temperature for the extreme tests : -20 deg.C.(minimum) to + 50deg.C.(maximum)
Voltage for the extreme tests : Vnom:DC5.0, Vmin:DC4.25V, Vmax:DC5.75V

4.2 Configuration and peripherals



* 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	Remarks
A	RFID Reader / Writer Module	ME-MA21-A-SNT	#01	Maxell Seiki	EUT
A'	RFID Reader / Writer Module	ME-MR21-A-SG	#01	Maxell Seiki	EUT
B	Antenna Module	ME-CK21	-	Maxell Seiki	EUT
C	Card	ME-Y2E4	-	Maxell Seiki	-
D	I/F Power unit	-	-	Maxell Seiki	-
E	PC	T23 (= 2647-LJ3)	97-ALT9W	IBM	-
F	AC Adaptor	02K6750	11S02K6750Z1Z2U P2950KD	IBM	-

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

MF060b(14.06.06)

List of cables used

No.	Name	Length (m)	Shield	
			Cable	Connector
1	PC Cable	1.0	Unshielded	Unshielded
2	HOST Cable	0.8	Unshielded	Unshielded
3	Antenna Cable	0.1 *1), 0.15 *2)	Shielded	Shielded
4	AC Cable	1.8	Unshielded	Unshielded
5	DC Cable	1.8	Unshielded	Unshielded
6	AC Cable	1.0	Unshielded	Unshielded

*1) For Model No. ME-MA21-A-SNT

*2) For Model No. ME-MR21-A-SG

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

MF060b(14.06.06)

SECTION 5: Conducted emission

5.1 Operating environment

Test place : No.1 semi anechoic chamber.
Temperature : See data
Humidity : See data

5.2 Test configuration

EUT was placed on a urethane platform of nominal size, 1.0m 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 and its 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 LISN/AMN and excess AC cable was bundled in center. I/O cables that were connected to the peripherals were bundled in center. They were folded back and forth forming a bundle 30cm to 40cm long and were hanged at a 40cm height to the ground plane. Each EUT current-carrying power lead, except the ground (safety) lead, was individually connected through a LISN/ an AMN to the input power source. All unused 50ohm connectors of the LISN/ AMN were resistively terminated in 50ohm when not connected to the measuring equipment. A drawing of the set up is shown in the photos of APPENDIX 1.

5.3 Test conditions

Frequency range : 0.15MHz – 30MHz
EUT position : Table top
EUT operation mode : See Clause 4.1

5.4 Test procedure

The AC Mains Terminal Continuous disturbance Voltage had been measured with the EUT in the semi Anechoic Chamber. The EUT was connected to a Line Impedance Stabilization Network (LISN)/ Artificial Mains Network (AMN). An overview sweep with peak detection has been performed. The measurements had been performed with a quasi-peak detector and if required, with an average detector. The conducted emission measurements were made with the following detector function of the test receiver.

Detector Type : QP and AV
IF Bandwidth : 9kHz

5.5 Test result

Summary of the test results : Pass

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

MF060b(14.06.06)

SECTION 6: Radiated emission (Fundamental , Spurious Emission and Spectrum Mask)

6.1 Operating environment

The test was carried out in a No.3 and No.4 semi Anechoic Chamber

Temperature : See data
Humidity : See data

6.2 Test Procedure

The Radiated Electric Field Strength intensity has been measured in a 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 carrier level and noise levels were confirmed at each position of X, Y and Z axes of EUT to see the position of maximum noise, and the test was made at the position that has the maximum noise.

* 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])

6.3 Test result

Summary of the test results : Pass

SECTION 7: -20dB Bandwidth

Test Procedure

The measurement was performed in the antenna height to gain the maximum of Electric field strength.

Test data : APPENDIX 2
Test result : Pass

SECTION 8: Frequency Tolerance

Test Procedure

The measurement was performed in the antenna height to gain the Electric field strength.

Test data : APPENDIX 2
Test result : Pass

SECTION 9: 99% Occupied Bandwidth

Test Procedure

The measurement was performed in the antenna height to gain the maximum of Electric field strength.

Test data : APPENDIX 2
Test result : Pass