



EMI TEST REPORT

Test Report No. : 26FE0133-YK-F1

Applicant : SATO CORPORATION
Type of Equipment : RFID Reader/Writer Module
Model No. : Mercury 4e
FCC ID : MMFRWMTM1
Test Standard : FCC Part15 Subpart C,
Section 15.207, Section 15.209, Section 15.247: 2005
Test Result : Complied

1. This test report shall not be reproduced except in full, 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 test report are traceable to the national or international standards.

Date of test: February 16, 17 and 28, 2006

Tested by: M. Hosaka
Makoto Hosaka

Approved by: O. Watatani
Osamu Watatani
Site Manager of Yamakita EMC Lab.

UL Apex Co., Ltd.

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1 Applicant Information

Company Name : SATO CORPORATION
Brand Name : SATO CORPORATION
Address : 1-207 Onari-cho, Omiya-ku, Saitama-shi, Saitama-ken, 330-0852 JAPAN
Telephone Number : +81 48 663 8118
Facsimile Number : +81 48 651 6662
Contact Person : Yukio Nagashima

2 Product Description

Type of Equipment : RFID Reader/Writer Module
Model No. : Mercury 4e
Serial No. : 05434E00E008
Rating : DC5.3V, 2.5A
Country of Manufacture : U.S.A
Receipt Date of Sample : February 3, 2006
Condition of EUT : Production model

Clock frequency		16MHz, 20MHz
Equipment type		Transceiver
Frequency band	Lower limit	902.990MHz
	Upper limit	927.186MHz
Channel spacing		470kHz/CH
Type of Modulation		FHSS
Antenna type		Miniature dipole
Antenna connector type		MMCX
Antenna gain		-5dBi
Antenna cable loss		0.675dB
Mode of Operation		Duplex
ITU code		A1D
Power supply (Inner)		DC 5.3V $\pm$ 5%
Operating temperature range		0 to +55 deg.C.

FCC Part15.31 (e)

Host device provides the module with stable power supply (DC 1.28 and 3.3 V), therefore the equipment complies power supply regulation.

FCC Part15.203 Antenna requirement

The equipment and its antenna comply with this requirement. Since this antenna is connected with unique connector and installed in the end product (Printer), it cannot be replaced by end users.

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3 Test Specification, Procedures and 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 15.209 Radiated emission limits, general requirements
Section 15.247 Operation within the bands 902-928MHz, 2400-2483.5MHz,
and 5725-5850MHz

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	Section 15.207	-	N/A	6.6dB (0.2116MHz, L1, AV, Tx 902.990MHz)	Complied
Carrier Frequency Separation	ANSI C63.4:2003 13. Measurement of intentional radiators	Section15.247 (a)(1)	Conducted	N/A	*See data.	Complied
20dB Bandwidth	ANSI C63.4:2003 13. Measurement of intentional radiators	Section15.247 (a)(1)	Conducted	N/A		Complied
Number of Hopping Frequency	ANSI C63.4:2003 13. Measurement of intentional radiators	Section15.247 (a)(1)(iii)	Conducted	N/A		Complied
Dwell Time	ANSI C63.4:2003 13. Measurement of intentional radiators	Section15.247 (a)(1)(iii)	Conducted	N/A		Complied
Maximum Peak Output Power	ANSI C63.4:2003 13. Measurement of intentional radiators	Section15.247 (b)(1)	Conducted	N/A		Complied
Spurious Emission	ANSI C63.4:2003 13. Measurement of intentional radiators	Section15.209 Section15.247(d)	Conducted / Radiated	N/A	5.4dB (959.24MHz, Horizontal, Tx 902.990MHz)	Complied

The measurements also referred to FCC Public Notice DA 00-705 "Guidance on Measurement for Frequency Hopping Spread Spectrum Systems".

* No addition, exclusion nor deviation has been made from the standard.

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3.3 Uncertainty

Conducted emission

The measurement uncertainty (with 95% confidence level) for this test is ± 2.7 dB.

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

Antenna port conducted test

The measurement uncertainty (with 95% confidence level) for this test is ± 0.4 dB.

Spurious emission test (Radiated)

The measurement uncertainty (with 95% confidence level) for this test using Biconical antenna is ± 4.5 dB.

The measurement uncertainty (with 95% confidence level) for this test using Logperiodic antenna is ± 4.3 dB.

The measurement uncertainty (with 95% confidence level) for this test using Horn antenna is ± 5.2 dB.

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

3.4 Test Location

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Telephone number : +81 465 77 1011

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NVLAP Lab. code : 200441-0

No. 1 test site has been fully described in a report submitted to FCC office, and accepted on August 26, 2005 (Registration No.: 95486).

IC Registration No. : IC3489A

No. 2 test site has been fully described in a report submitted to FCC office, and accepted on April 4, 2005 (Registration No.: 466226).

IC Registration No. : IC3489A-2

No. 1 anechoic chamber has been fully described in a report submitted to FCC office, and accepted on November 2, 2005 (Registration No.: 95967).

IC Registration No. : IC3489A-B

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 EMS lab. (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		

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4 System Test Configuration

4.1 Justification

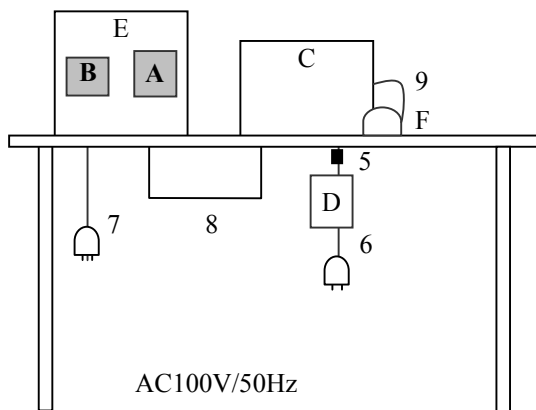
The system was configured in typical fashion (as a customer would normally use it) for testing.

Test mode: Transmitting mode (Packet size: DH5)
 - Low channel : 902.990MHz
 - Middle channel : 915.120MHz
 - High channel : 927.186MHz
 - Hopping

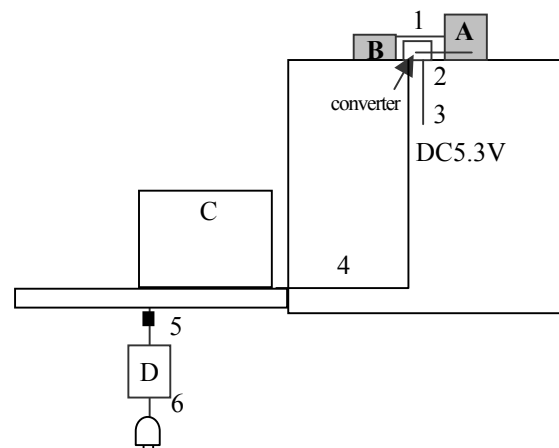
4.2 Configuration of Tested System

■: Ferrite core (Standard attachment of PC)

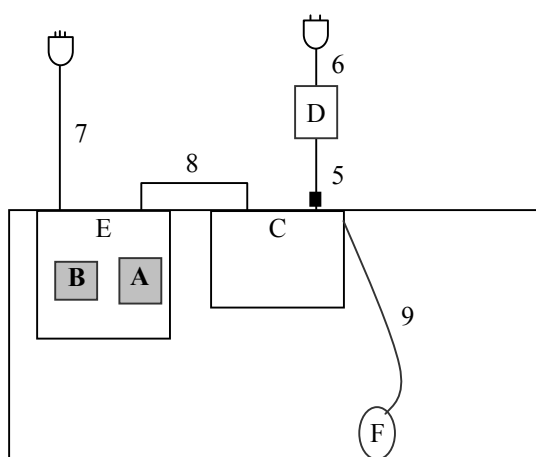
Front View (Conducted emission)



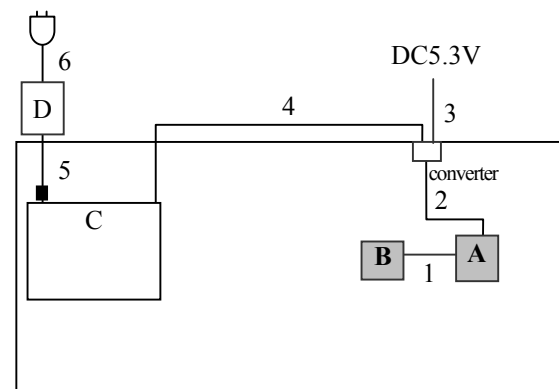
Front View (Radiated emission)



Top View (Conducted emission)



Front View (Radiated emission)



* 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 (Remarks)
A	RFID Reader/Writer Module	Mercury 4e	05434E00E008	ThingMagic	MMFRWMTM1 (EUT)
B	Antenna	Miniature Dipole	-	ThingMagic	-
C	Personal Computer	PC-VA20CWAAAA23	89000251A	NEC	-
D	AC Adapter	ADP52	89015185G	NEC	-
E	Barcode Printer	CL408e	47590002	SATO	(Host device)
F	Mouse	ITE 78CJ	-	Microsoft	-

* DC Power Supply (Model No.: PAN55-20A) was used for DC 5.3V input.

List of cables used

No.	Name	Length (m)	Shield	Remark
1	Antenna cable	0.45	Shielded	-
2	Cable for Converter	0.4	Unshielded	-
3	DC cable	0.7	Unshielded	-
4	Serial cable	2.0	Shielded	-
5	DC cable	1.9	Unshielded	-
6	AC cable	1.8	Unshielded	-
7	AC cable	2.9	Unshielded	-
8	RS232C cable	1.5	Shielded	-
9	Mouse cable	1.9	Shielded	-

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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 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 EUT's host device (Printer), including 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. I/O cable 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.

5.3 Test conditions

Frequency range : 0.15 - 30MHz

EUT operation mode : Transmitting

5.4 Test procedure

The EUT's host device 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

Test data : APPENDIX 2 Page 15 to 19

Date : February 28, 2006 Test engineer : Makoto Hosaka

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6 Carrier Frequency Separation

Test Procedure

The carrier frequency separation was measured with a spectrum analyzer connected to the antenna port.

Summary of the test results: Pass
Date: February 17, 2006

Test data: APPENDIX 2 Page 20
Test engineer : Makoto Hosaka

7 20dB Bandwidth

Test Procedure

The bandwidth was measured with a spectrum analyzer connected to the antenna port.

Summary of the test results: Pass
Date: February 17, 2006

Test data: APPENDIX 2 Page 21
Test engineer : Makoto Hosaka

8 Number of Hopping Frequency

Test Procedure

The Number of Hopping Frequency was measured with a spectrum analyzer connected to the antenna port.

Summary of the test results: Pass
Date: February 17, 2006

Test data: APPENDIX 2 Page 22
Test engineer : Makoto Hosaka

9 Dwell Time

Test Procedure

The Dwell time was measured with a spectrum analyzer connected to the antenna port.

Summary of the test results: Pass
Date: February 17, 2006

Test data: APPENDIX 2 Page 23 - 28
Test engineer : Makoto Hosaka

10 Maximum Peak Output Power

Test Procedure

The Maximum Peak Output Power was measured with a power meter connected to the antenna port.

Summary of the test results: Pass
Date: February 17, 2006

Test data: APPENDIX 2 Page 29
Test engineer : Makoto Hosaka

11 Out of Band Emissions (Antenna Port Conducted)

Test Procedure

The Out of Band Emissions was measured with a spectrum analyzer connected to the antenna port.

Summary of the test results: Pass
Date: February 17, 2006

Test data: APPENDIX 2 Page 30 - 35
Test engineer : Makoto Hosaka

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12 Out of Band Emissions (Radiated)

12.1 Operating environment

The test was carried out in an open site.

12.2 Test configuration

EUT was placed on a platform of nominal size, 0.5m by 0.5m, raised 80cm above the conducting ground plane. A drawing of the set up is shown in the photos of Appendix 1.

12.3 Test conditions

Frequency range : 30MHz - 10GHz
Test distance : 3m
EUT operation mode : Transmitting

12.4 Test procedure

The Radiated Electric Field Strength intensity has been measured with a ground plane and at a distance of 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.

In any 100kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator confirmed 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on a radiated measurement.

It was confirmed that spurious emission frequencies are 20dB or more lower than fundamental waves. These spurious emission frequencies are not the restricted band regulated in 15.205 (a). Refer to the data in page 45-50.

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

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

When using Spectrum analyzer, the test was made with adjusting span to zero by using peak hold.

Frequency	Below 1GHz	Above 1GHz
Instrument used	Test Receiver	Spectrum Analyzer
Detector	QP: BW 120kHz	PK: RBW: 1MHz/VBW: 1MHz
IF Bandwidth		AV: RBW: 1MHz/VBW: 10Hz

The equipment and its antenna were previously checked at each position of three axes X, Y and Z. Firstly, the antenna was fixed in Y-axis and position of the module was changed, then the module was fixed in the worst-case position and the antenna was searched for the worst position. The position in which the maximum noise occurred was chosen to put into measurement. See the table below and photographs in page 14. With the position, the noise levels of all the frequencies were measured.

Combinations of the worst case

	30-1000MHz		1-10GHz	
	Module	Antenna	Module	Antenna
Horizontal	Z	Y	X	X
Vertical	Z	Z	X	X

12.5 Results

Summary of the test results : Pass
Test data : APPENDIX 2 Page 36 - 50

Date: February 16, 2006 Test engineer : Makoto Hosaka

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APPENDIX 1: Photographs of test setup

Page 12	:	Conducted emission
Page 13	:	Radiated emission
Page 14	:	Pre check of worse-case position

APPENDIX 2: Test Data

Page 15 - 19	:	Conducted Emission
Page 20	:	Carrier Frequency Separation
Page 21	:	20dB Bandwidth
Page 22	:	Number of Hopping Frequency
Page 23 - 28	:	Dwell Time
Page 29	:	Maximum Peak Output Power
Page 30 - 35	:	Out of Band Emissions (Antenna Port Conducted)
Page 36 - 50	:	Out of Band Emissions (Radiated)
36-39	:	30-1000MHz
40-44	:	1-10GHz
45-50	:	2 nd harmonics
Page 51 - 52	:	Occupied Bandwidth

APPENDIX 3: Test instruments

Page 53	:	Test instruments
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Conducted emission



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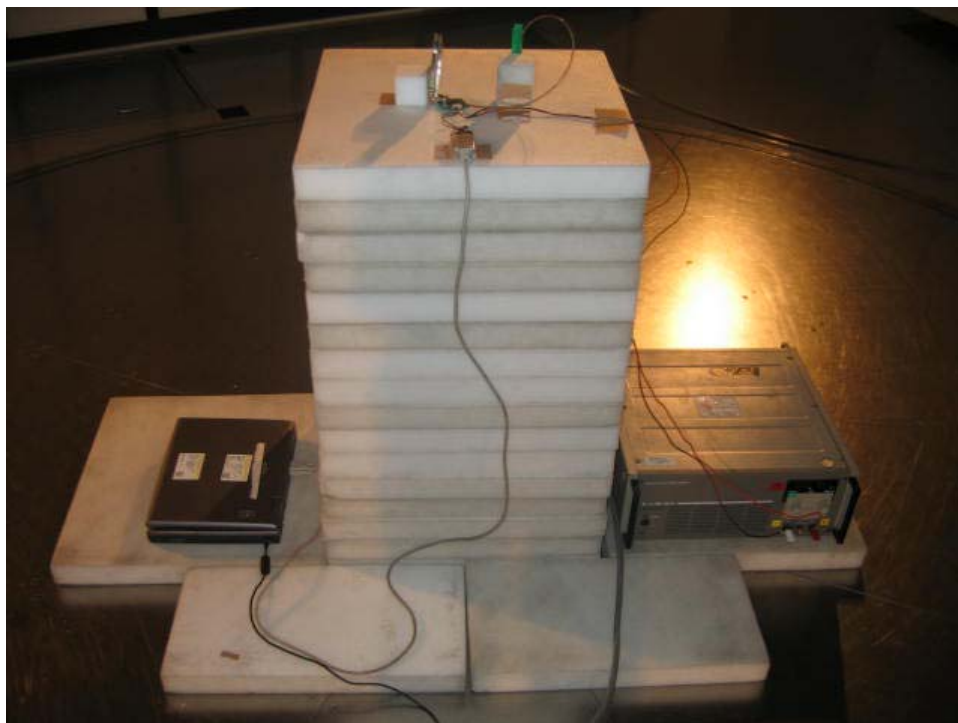
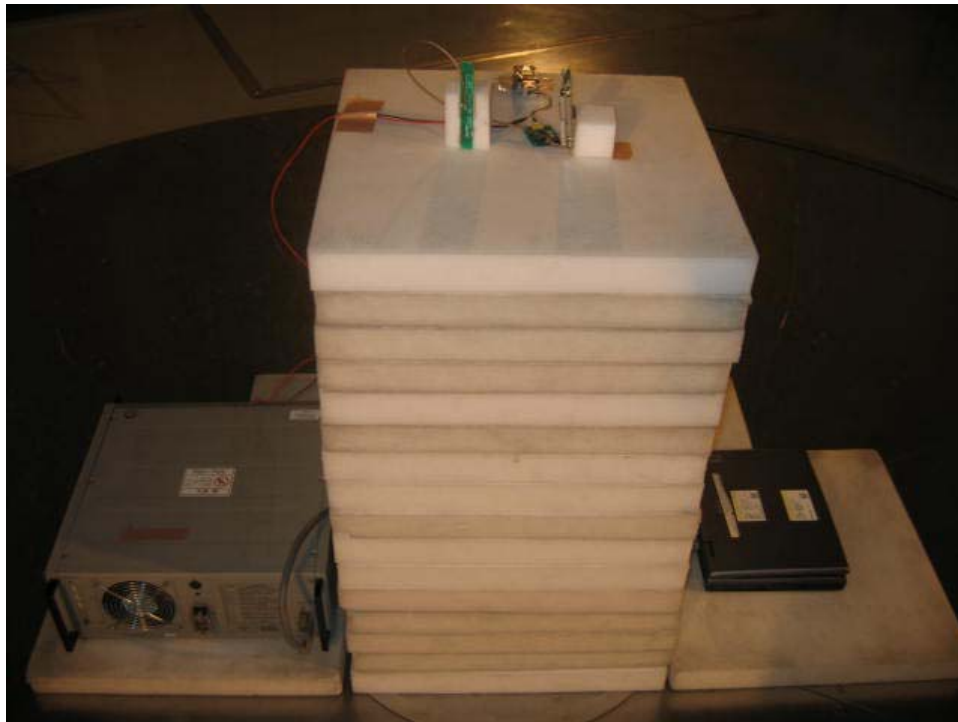
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Radiated emission



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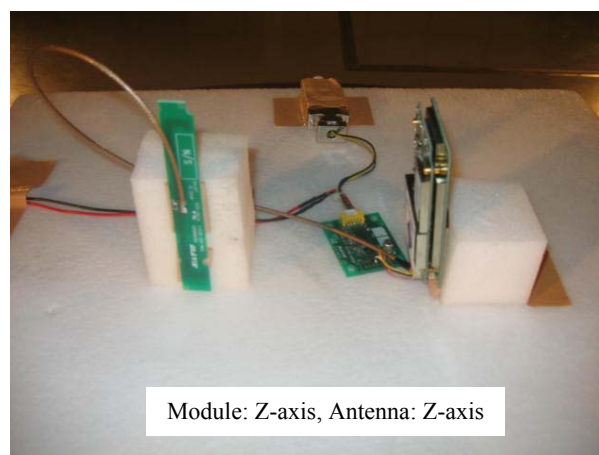
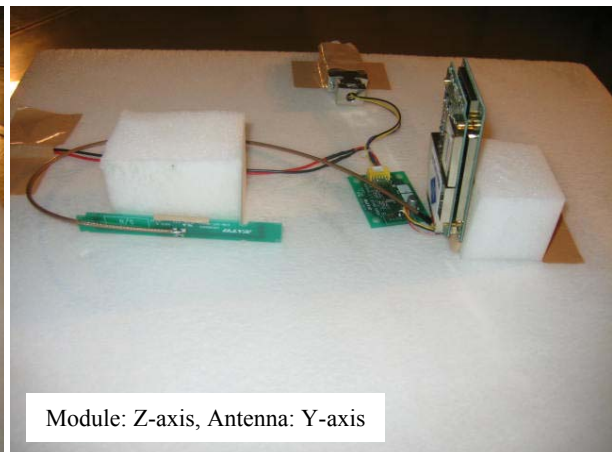
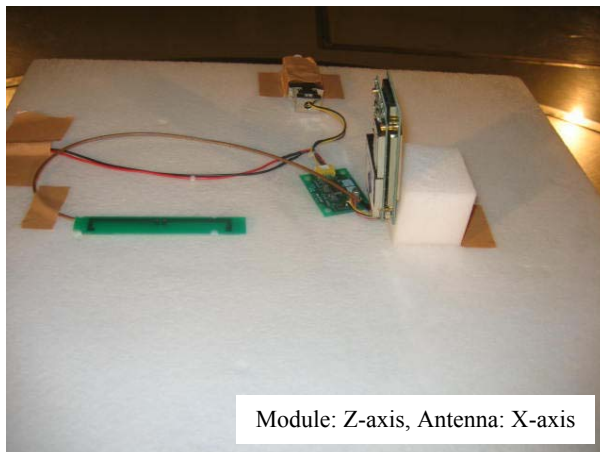
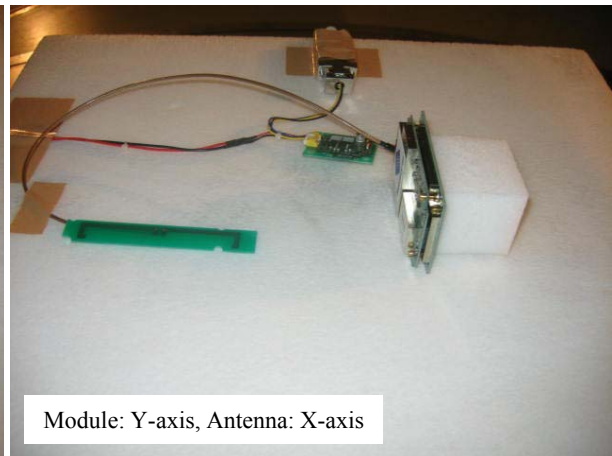
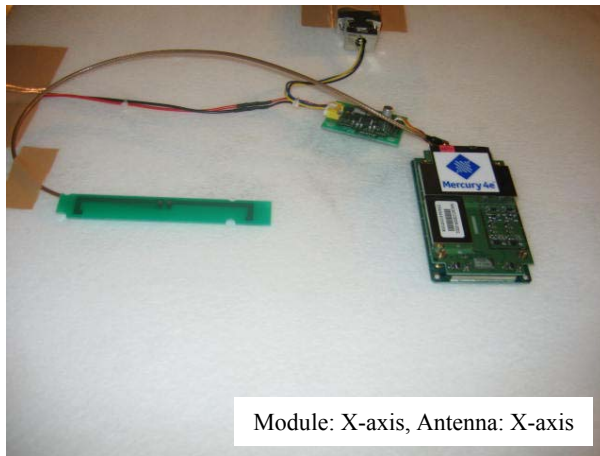
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Pre check of worse-case position



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DATA OF CONDUCTION TEST

UL Apex Co.,Ltd.
YAMAKITA No.1 SHIELD ROOM
Report No. : 26FE0133-YK

Applicant : SATO CORPORATION
Kind of Equipment : RFID Reader/Writer Module
Model No. : Mercury 4e
Serial No. : 05434E00E008
Power : AC120V/60Hz
Mode : Transmitting (902.990MHz)
Remarks :
Date : 2/28/2006
Phase : Single Phase
Temperature : 24 °C
Humidity : 44 %
Regulation : FCC Part15C § 15.207. (CISPR Pub. 22)

Engineer : Makoto Hosaka

No.	FREQ. [MHz]	READING (N)		READING (L1)		LISN FACTOR [dB]	CABLE LOSS [dB]	ATTEN. [dB]	RESULT		LIMITS		MARGIN	
		QP [dB μV]	AV [dB μV]	QP [dB μV]	AV [dB μV]				QP [dB]	AV [dB μV]	QP [dB μV]	AV [dB μV]	QP [dB]	AV [dB]
1.	0.1500	33.8	-	35.4	-	0.1	0.1	0.0	35.6	-	66.0	56.0	30.4	-
2.	0.2116	45.9	45.7	46.4	46.3	0.1	0.1	0.0	46.6	46.5	63.1	53.1	16.5	6.6
3.	0.2810	40.0	39.9	41.5	41.4	0.1	0.1	0.0	41.7	41.6	60.8	50.8	19.1	9.2
4.	1.5444	32.1	-	26.6	-	0.1	0.3	0.0	32.5	-	56.0	46.0	23.5	-
5.	5.7602	41.6	31.3	43.1	36.6	0.2	0.7	0.0	44.0	37.5	60.0	50.0	16.0	12.5
6.	6.8097	40.2	30.6	41.6	35.7	0.2	0.8	0.0	42.6	36.7	60.0	50.0	17.4	13.3
7.	18.4006	36.3	32.6	44.0	41.1	0.4	1.6	0.0	46.0	43.1	60.0	50.0	14.0	6.9

CALCULATION: READING + LISN FACTOR + CABLE LOSS + ATTEN.

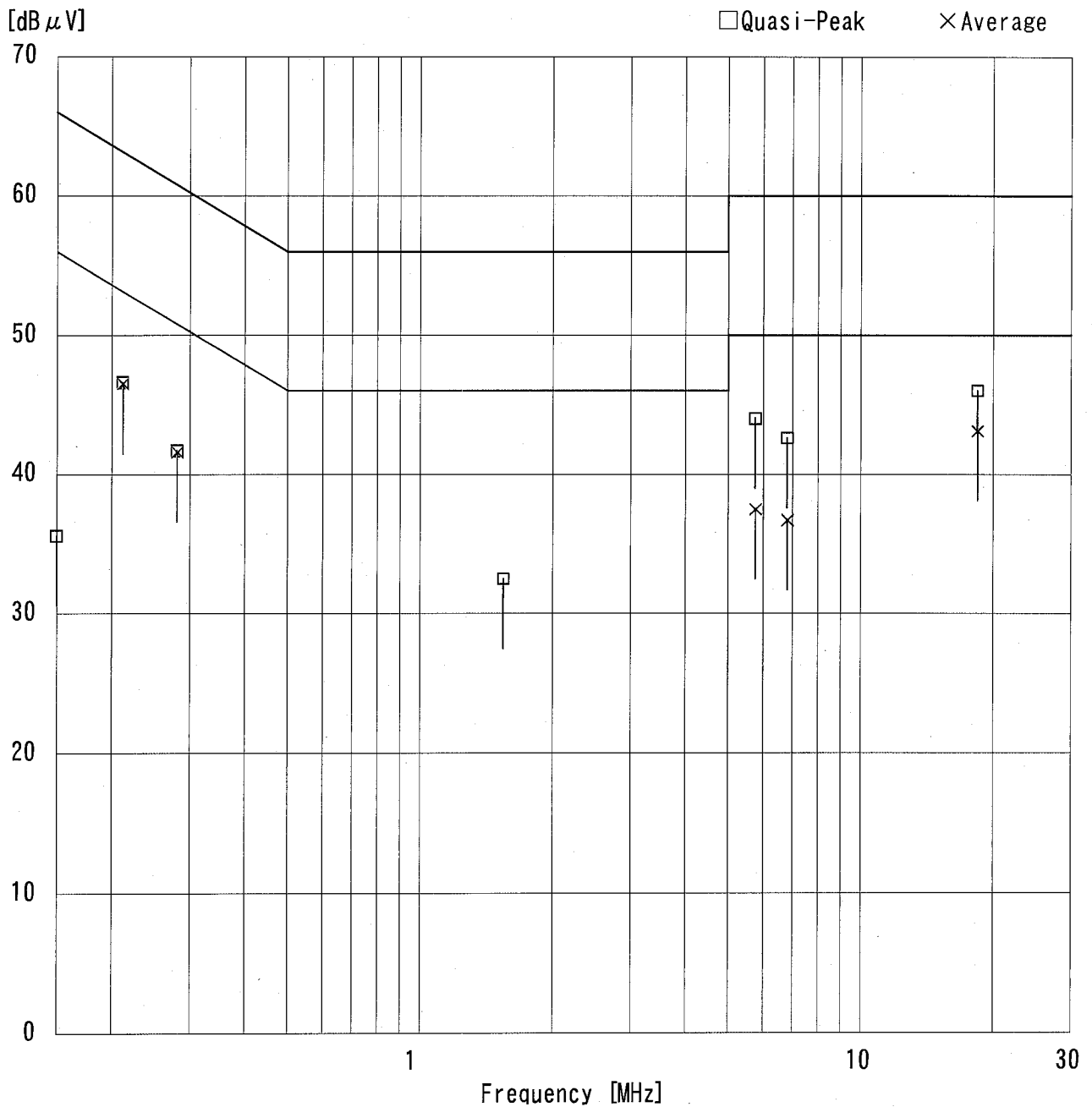
■ LISN : KLS-02 (NSLK8127) ■ COAXIAL CABLE: KCC-14/15/16/18
■ PULSE LIMITTER: KPL-01 (PL01) ■ EMI RECEIVER: KTR-02 (ESCS30)

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Applicant : SATO CORPORATION
Kind of Equipment : RFID Reader/Writer Module
Model No. : Mercury 4e
Serial No. : 05434E00E008
Power : AC120V/60Hz
Mode : Transmitting (902.990MHz)
Remarks :
Date : 2/28/2006
Phase : Single Phase
Temperature : 24 °C
Humidity : 44 %
Regulation : FCC Part15C § 15.207. (CISPR Pub. 22)

Engineer : Makoto Hosaka



DATA OF CONDUCTION TEST CHART

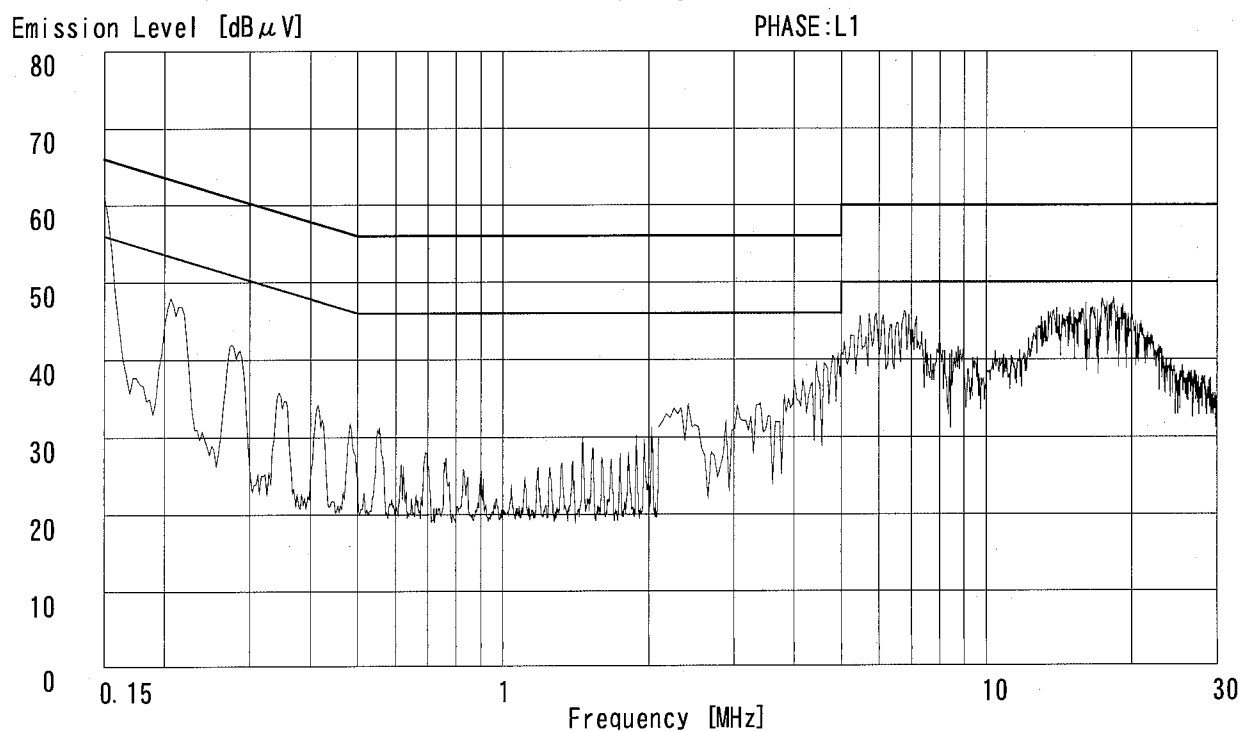
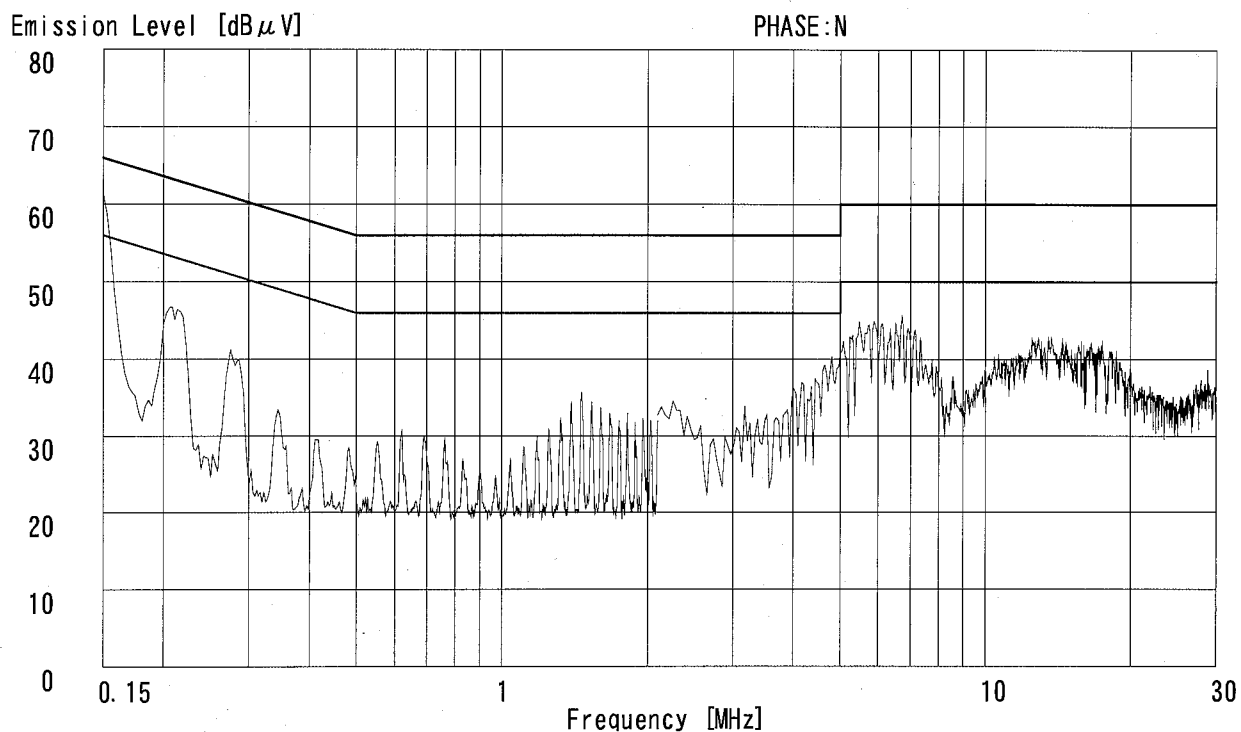
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Remarks :
Date : 2/28/2006
Phase : Single Phase
Temperature : 24 °C
Humidity : 44 %
Regulation 1 : FCC Part15C § 15.207. (CISPR Pub. 22)
Regulation 2 : None

Engineer : Makoto Hosaka



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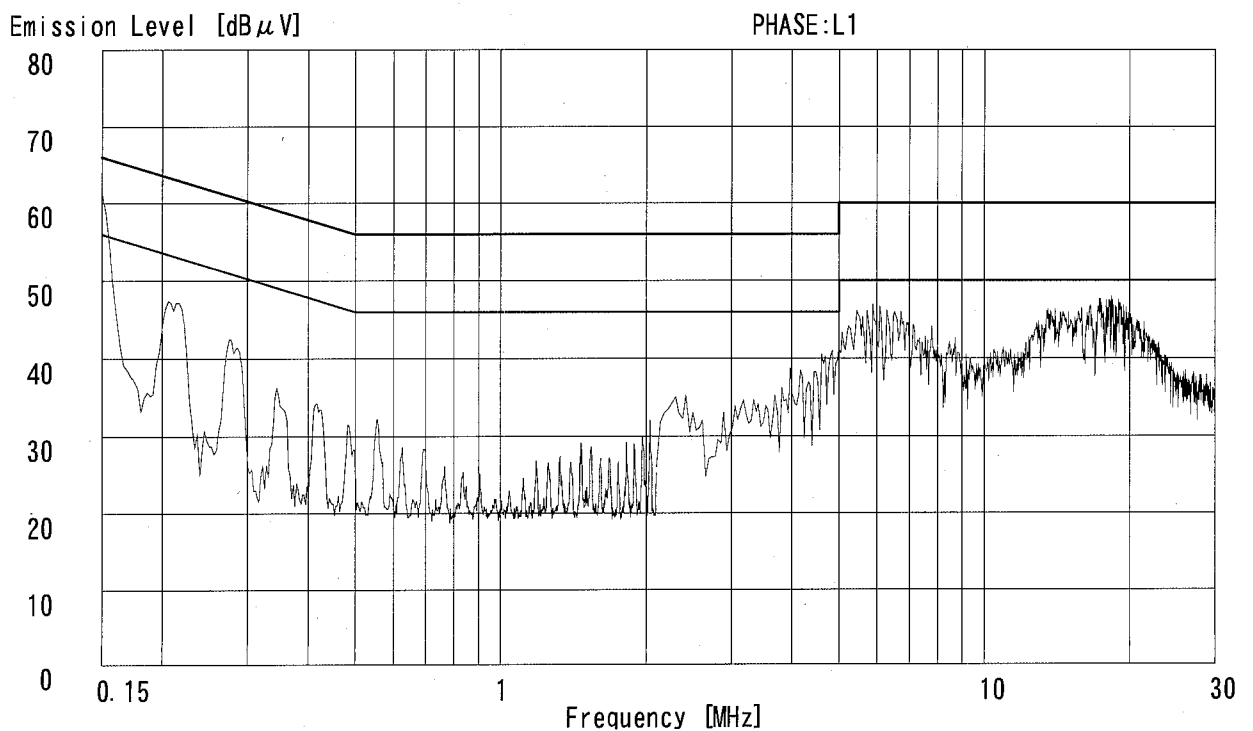
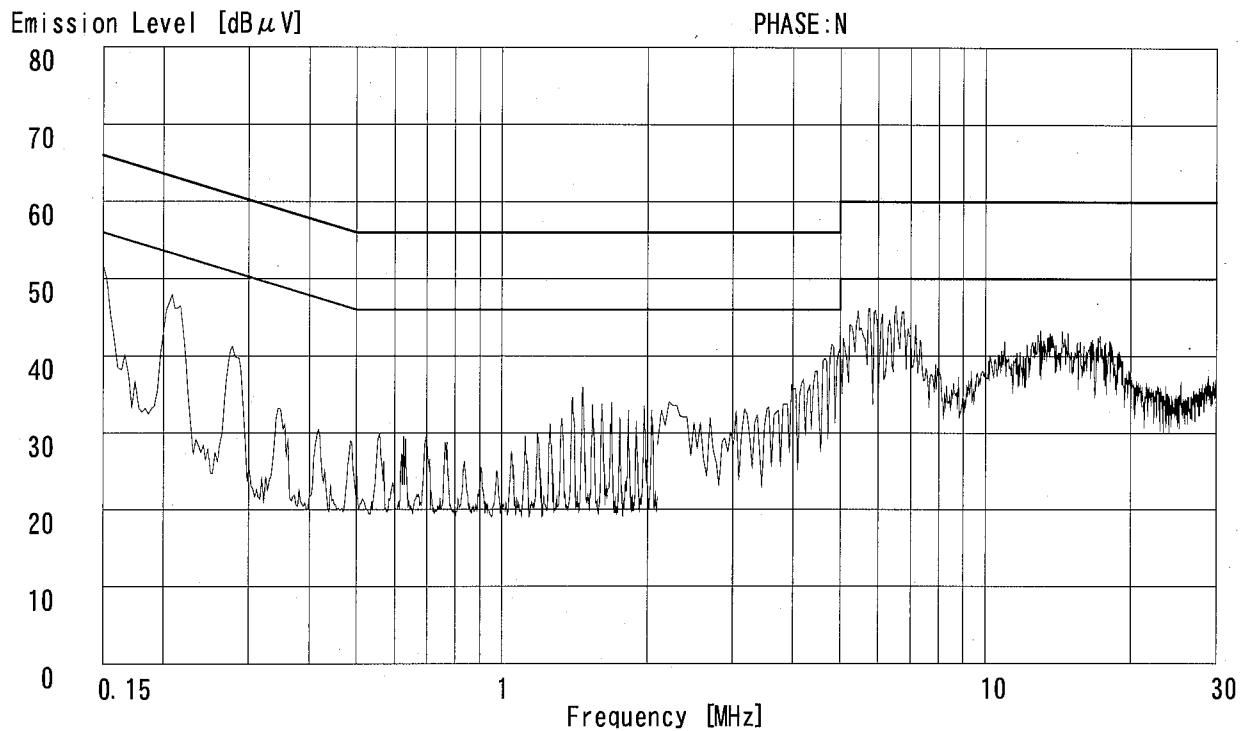
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Power : AC120V/60Hz
Mode : Transmitting (915.120MHz)
Remarks :
Date : 2/28/2006
Phase : Single Phase
Temperature : 24 °C
Humidity : 44 %
Regulation 1 : FCC Part15C § 15.207. (CISPR Pub. 22)
Regulation 2 : None

Engineer : Makoto Hosaka



Page:

DATA OF CONDUCTION TEST CHART

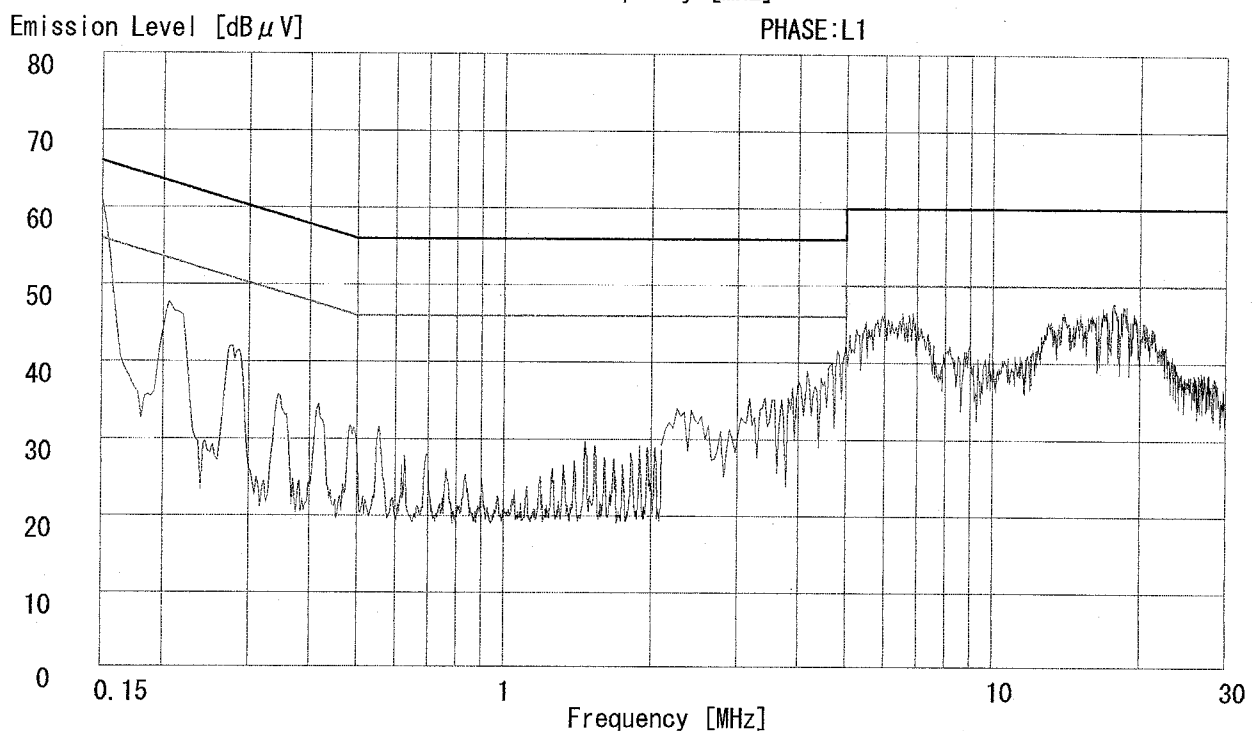
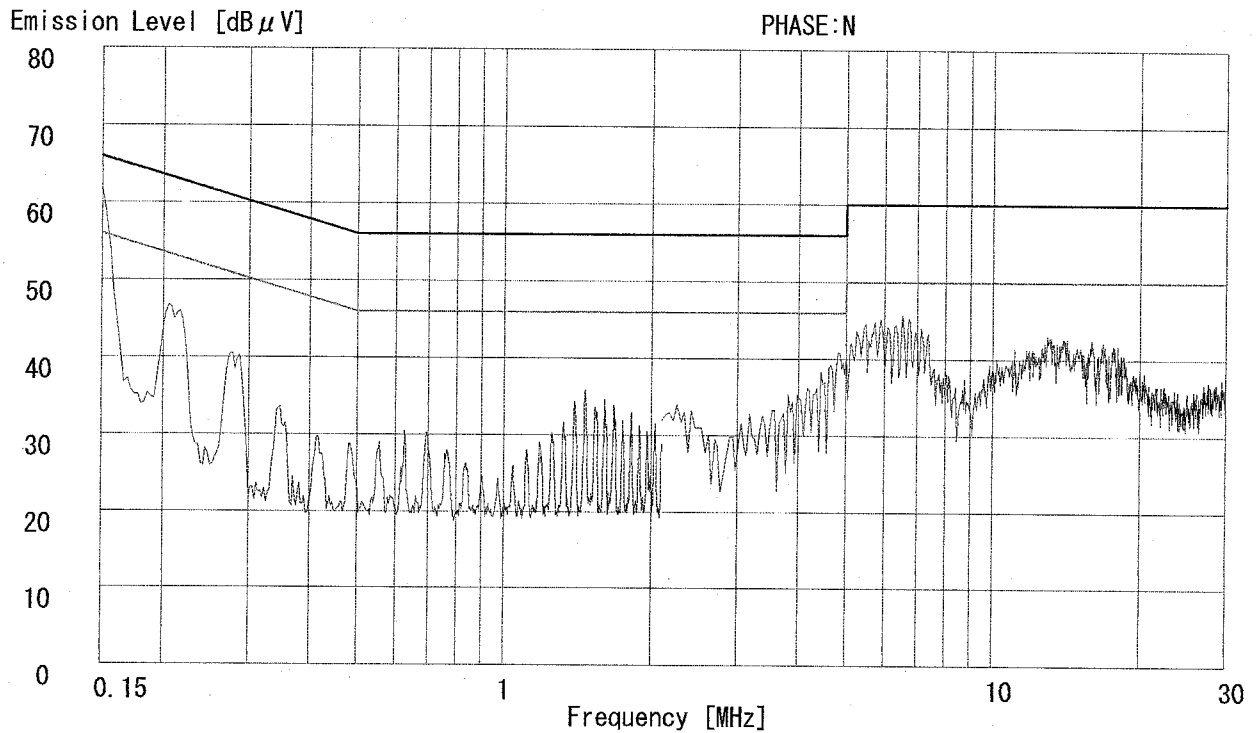
UL Apex Co.,Ltd.

YAMAKITA No.1 SHIELD ROOM

Report No. : 26FE0133-YK

Applicant : SATO CORPORATION
Kind of Equipment : RFID Reader/Writer Module
Model No. : Mercury 4e
Serial No. : 05434E00E008
Power : AC120V/60Hz
Mode : Transmitting (927.186MHz)
Remarks :
Date : 2/28/2006
Phase : Single Phase
Temperature : 24 °C
Humidity : 44 %
Regulation 1 : FCC Part15C § 15.207. (CISPR Pub.22)
Regulation 2 : None

Engineer : Makoto Hosaka

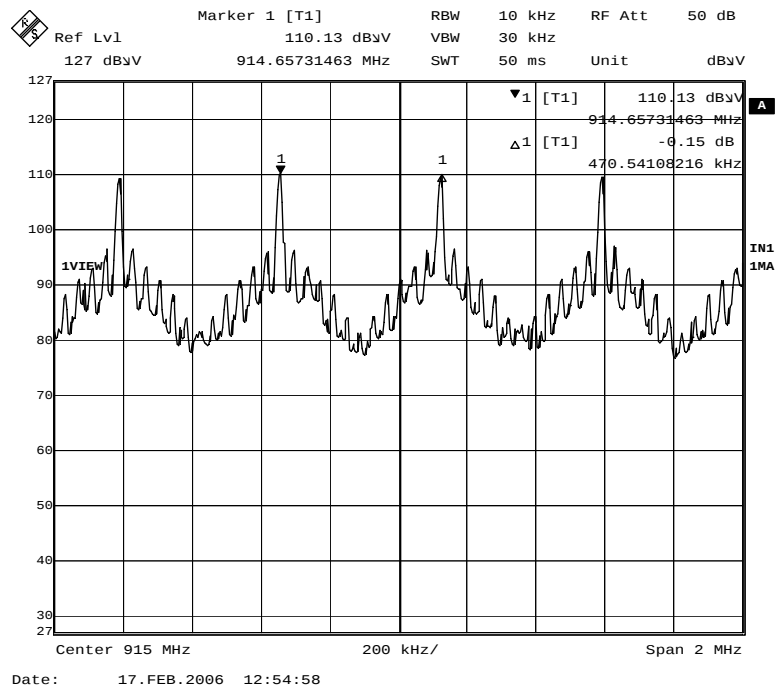


Page:

Channel Separation: FCC 15.247(a)(1)

COMPANY	: SATO CORPORATION	UL Apex Co.,Ltd. Yamakita No.2 Shielded Room
EQUIPMENT	: RFID Reader/Writer Module	REPORT NO : 26FE0133-YK-F1
MODEL NUMBER	: Mercury 4e	REGULATION : Fcc Part15SubpartC 247(a)(1)
SERIAL NUMBER	: 05434E00E008	DATE : 2006/2/17
FCC ID	: MMFRWMTM1	TEMP./HUMI : 25deg.C./38%
POWER	: DC5.3V	TEST MODE : Transmitting
		ENGINEER : Makoto Hosaka

1. Hopping:470.54kHz

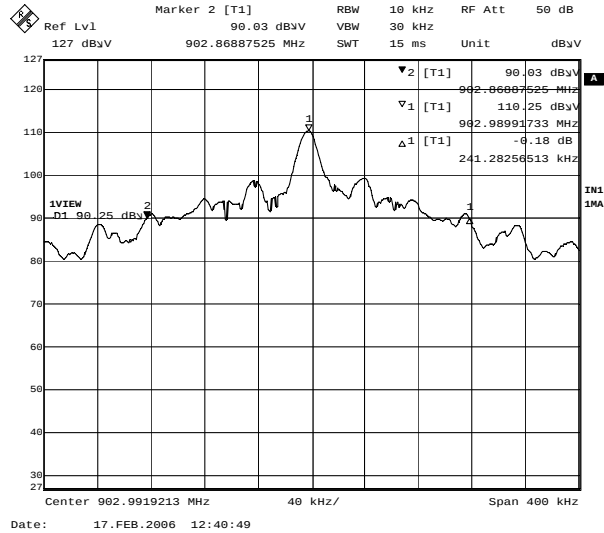


20dB Bandwidth: FCC 15.247(a)(1)

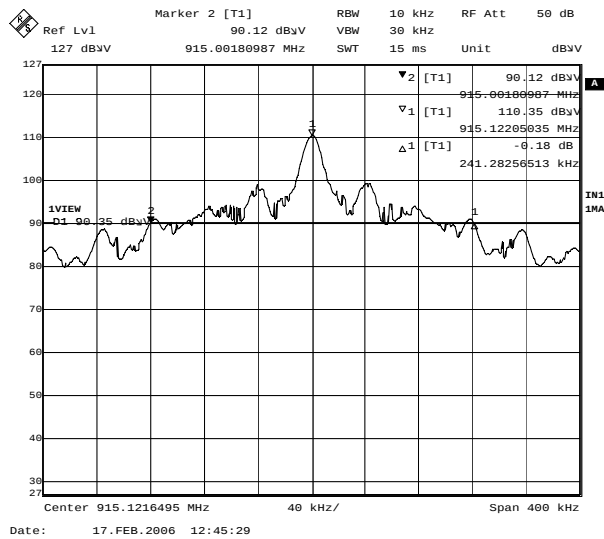
COMPANY : SATO CORPORATION
EQUIPMENT : RFID Reader/Writer Module
MODEL NUMBER: Mercury 4e
SERIAL NUMBER: 05434E00E008
FCC ID : MMFRWMTM1
POWER : DC5.3V

UL Apex Co.,Ltd. Yamakita No.2 Shielded Room
REPORT NO : 26FE0133-YK-F1
REGULATION : Fcc Part15SubpartC 247(a)(1)
DATE : 2006/2/17
TEMP./HUMI : 25deg.C./38%
TEST MODE : Transmitting (Hopping off)
ENGINEER : Makoto Hosaka

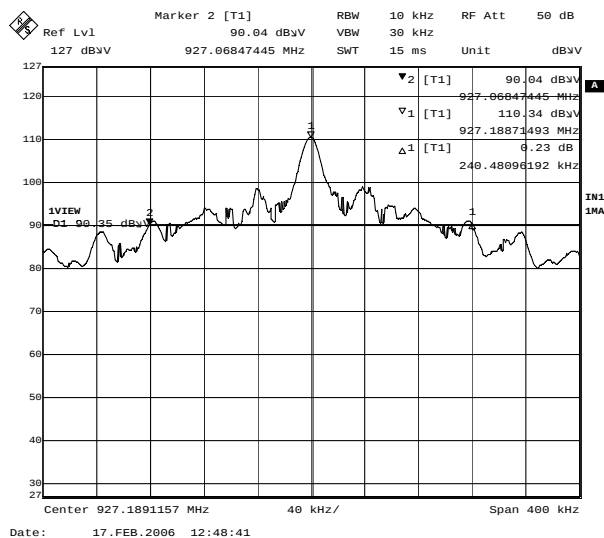
1. ch : 902.99MHz/20dB Bandwidth:241.28kHz



2. ch : 915.12MHz/20dB Bandwidth:241.28kHz



3. ch : 927.186MHz/20dB Bandwidth:240.48kHz

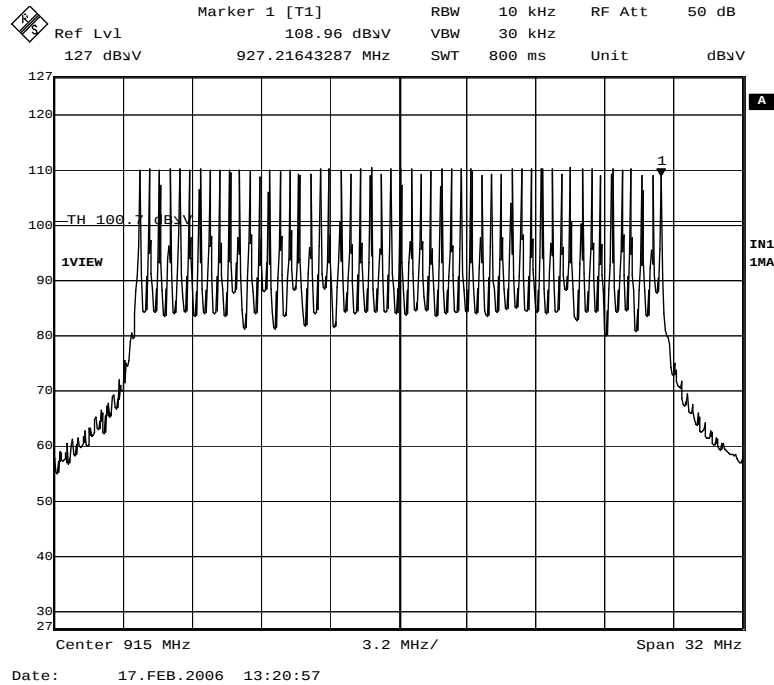


Channel Utilization: FCC 15.247(a)(1)(i)

COMPANY	: SATO CORPORATION	UL Apex Co.,Ltd. Yamakita No.2 Shielded Room
EQUIPMENT	: RFID Reader/Writer Module	REPORT NO : 26FE0133-YK-F1
MODEL NUMBER	: Mercury 4e	REGULATION : Fcc Part15SubpartC 247(a)(1)(i)
SERIAL NUMBER	: 05434E00E008	DATE : 2006/2/17
FCC ID	: MMFRWMTM1	TEMP./HUMI : 25deg.C./38%
POWER	: DC5.3V	TEST MODE : Transmitting
		ENGINEER : Makoto Hosaka

Hopping: 53ch

1.



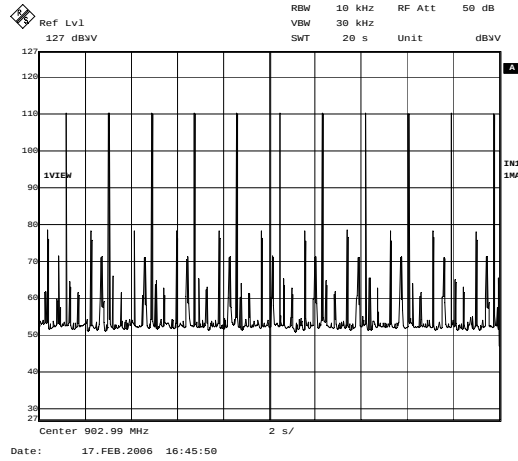
Dwell Time: FCC 15.247(a)(1)(i)

COMPANY : SATO CORPORATION
EQUIPMENT : RFID Reader/Writer Module
MODEL NUMBER: Mercury 4e
SERIAL NUMBER: 05434E00E008
FCC ID : MMFRWMTM1
POWER : DC5.3V

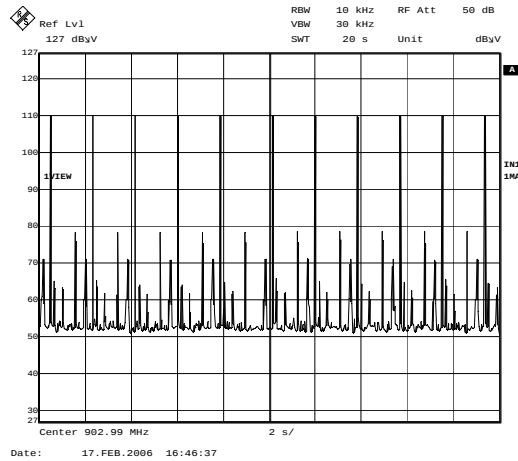
UL Apex Co.,Ltd. Yamakita No.2 Shielded Room
REPORT NO : 26FE0133-YK-F1
REGULATION : Fcc Part15SubpartC 247(a)(1)(i)
DATE : 2006/2/17
TEMP./HUMI : 25deg.C./38%
TEST MODE : Transmitting
ENGINEER : Makoto Hosaka

Hopping: 902.99MHz

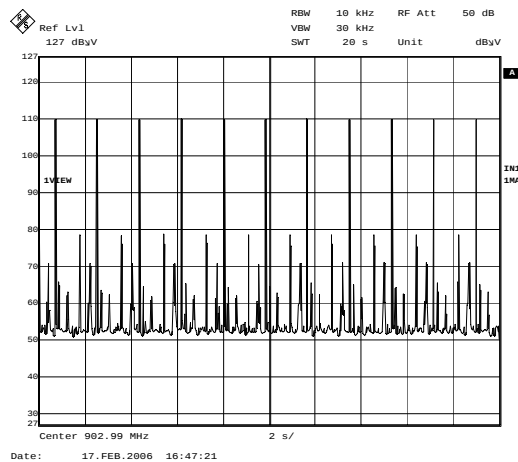
Count 1



Count 2



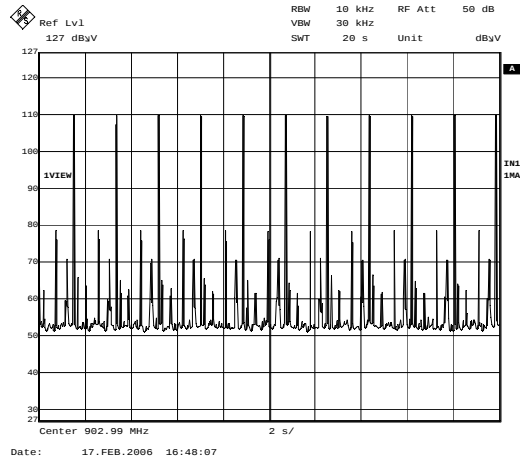
Count 3



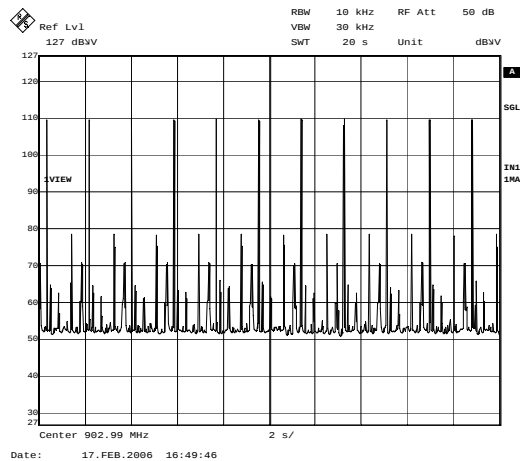
Dwell Time: FCC 15.247(a)(1)(i)

COMPANY : SATO CORPORATION
 EQUIPMENT : RFID Reader/Writer Module
 MODEL NUMBER: Mercury 4e
 SERIAL NUMBER: 05434E00E008
 FCC ID : MMFRWMTM1
 POWER : DC5.3V
 Count 4

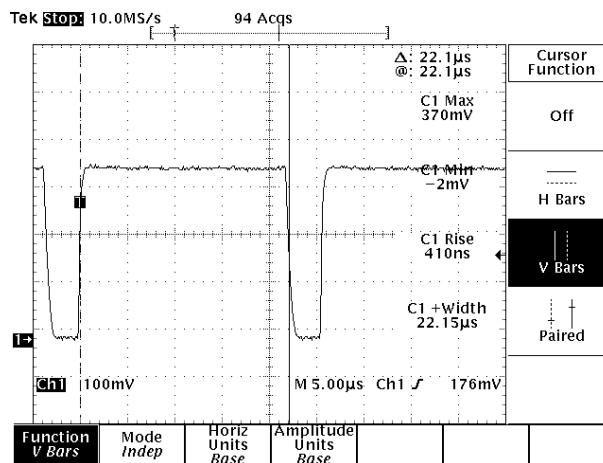
UL Apex Co.,Ltd. Yamakita No.2 Shielded Room
 REPORT NO : 26FE0133-YK-F1
 REGULATION : Fcc Part15SubpartC 247(a)(1)(i)
 DATE : 2006/2/17
 TEMP./HUMI : 25deg.C./38%
 TEST MODE : Transmitting
 ENGINEER : Makoto Hosaka



Count 5



Duty cycle(Hopping)



$$\begin{aligned} \text{Dwell time} &= (\text{Count 1} + \text{Count 2} + \text{Count 3} + \text{Count 4} + \text{Count 5}) / 5 * T_{on} \\ &= (11 + 11 + 11 + 11 + 11) / 5 * (22.1 \times 10^{-3}) [\text{ms}] \\ &= 0.2431 [\text{ms}] \end{aligned}$$

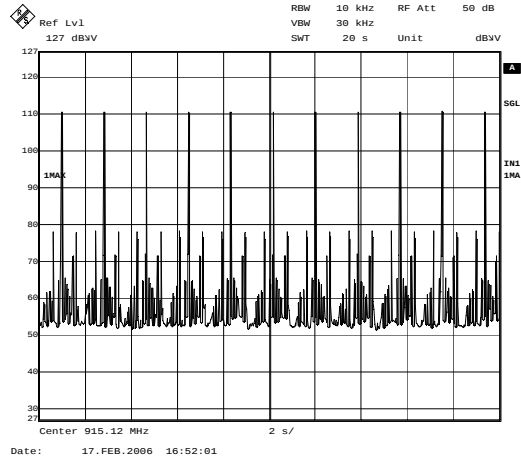
Dwell Time: FCC 15.247(a)(1)(i)

COMPANY : SATO CORPORATION
EQUIPMENT : RFID Reader/Writer Module
MODEL NUMBER: Mercury 4e
SERIAL NUMBER: 05434E00E008
FCC ID : MMFRWMTM1
POWER : DC5.3V

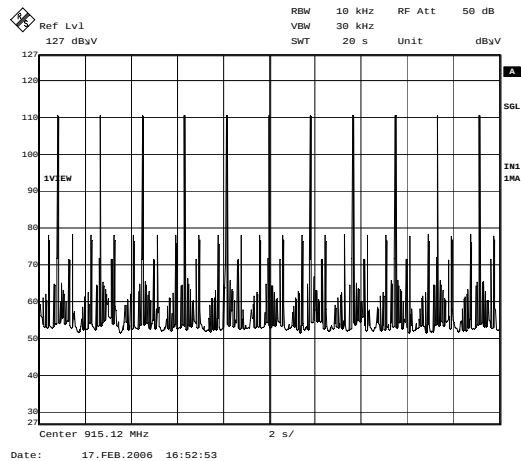
UL Apex Co.,Ltd. Yamakita No.2 Shielded Room
REPORT NO : 26FE0133-YK-F1
REGULATION : Fcc Part15SubpartC 247(a)(1)(i)
DATE : 2006/2/17
TEMP./HUMI : 25deg.C./38%
TEST MODE : Transmitting
ENGINEER : Makoto Hosaka

Hopping: 915.12MHz

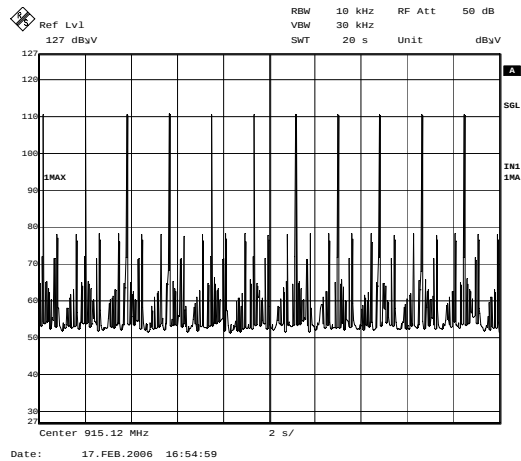
Count 1



Count 2



Count 3

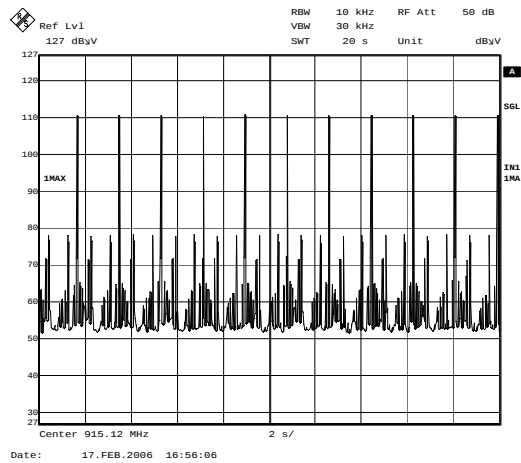


Dwell Time: FCC 15.247(a)(1)(i)

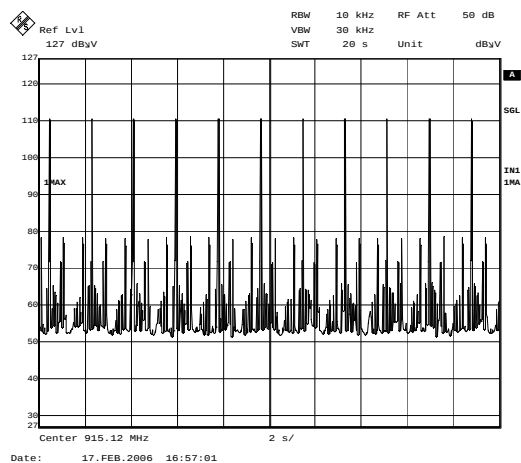
COMPANY : SATO CORPORATION
EQUIPMENT : RFID Reader/Writer Module
MODEL NUMBER: Mercury 4e
SERIAL NUMBER: 05434E00E008
FCC ID : MMFRWMTM1
POWER : DC5.3V

UL Apex Co.,Ltd. Yamakita No.2 Shielded Room
REPORT NO : 26FE0133-YK-F1
REGULATION : Fcc Part15SubpartC 247(a)(1)(i)
DATE : 2006/2/17
TEMP./HUMI : 25deg.C./38%
TEST MODE : Transmitting
ENGINEER : Makoto Hosaka

Count 4



Count 5



$$\begin{aligned} \text{Dwell time} &= (\text{Count 1} + \text{Count 2} + \text{Count 3} + \text{Count 4} + \text{Count 5}) / 5 * \text{Ton} \\ &= (11 + 11 + 11 + 11 + 11) / 5 * (22.1 \times 10^{-3}) [\text{ms}] \\ &= 0.2431 [\text{ms}] \end{aligned}$$

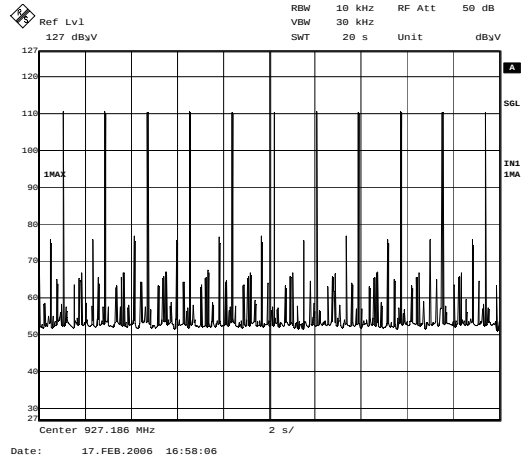
Dwell Time: FCC 15.247(a)(1)(i)

COMPANY : SATO CORPORATION
EQUIPMENT : RFID Reader/Writer Module
MODEL NUMBER: Mercury 4e
SERIAL NUMBER: 05434E00E008
FCC ID : MMFRWMTM1
POWER : DC5.3V

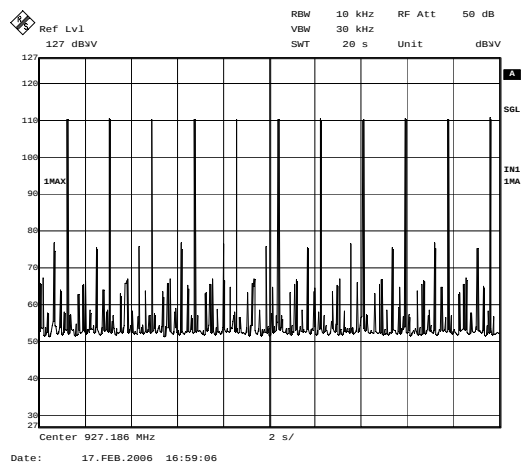
UL Apex Co.,Ltd. Yamakita No.2 Shielded Room
REPORT NO : 26FE0133-YK-F1
REGULATION : Fcc Part15SubpartC 247(a)(1)(i)
DATE : 2006/2/17
TEMP./HUMI : 25deg.C./38%
TEST MODE : Transmitting
ENGINEER : Makoto Hosaka

Hopping: 927.186MHz

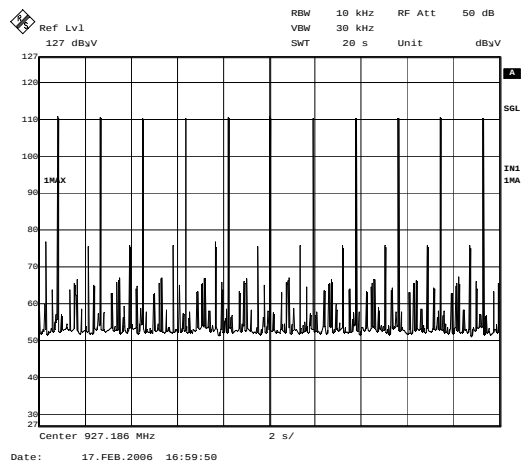
Count 1



Count 2



Count 3

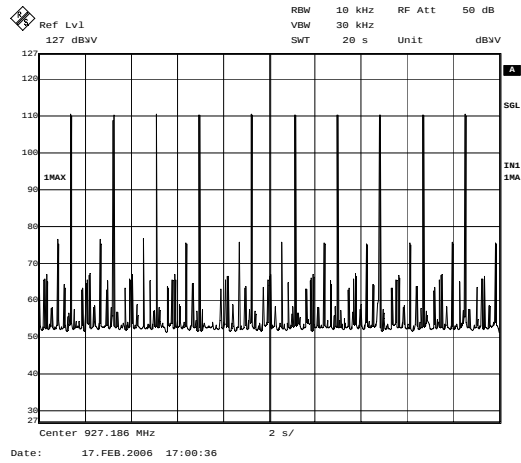


Dwell Time: FCC 15.247(a)(1)(i)

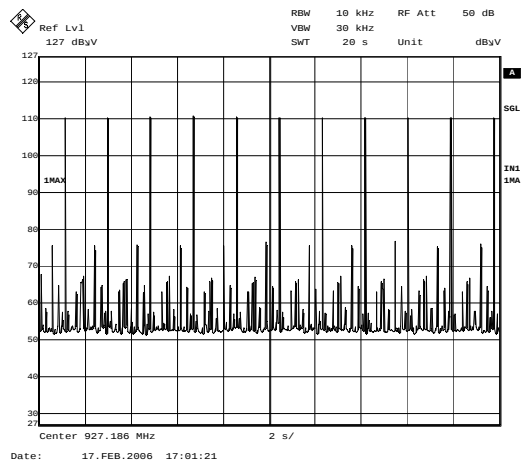
COMPANY : SATO CORPORATION
EQUIPMENT : RFID Reader/Writer Module
MODEL NUMBER: Mercury 4e
SERIAL NUMBER: 05434E00E008
FCC ID : MMFRWMTM1
POWER : DC5.3V

UL Apex Co.,Ltd. Yamakita No.2 Shielded Room
REPORT NO : 26FE0133-YK-F1
REGULATION : Fcc Part15SubpartC 247(a)(1)(i)
DATE : 2006/2/17
TEMP./HUMI : 25deg.C./38%
TEST MODE : Transmitting
ENGINEER : Makoto Hosaka

Count 4



Count 5



$$\begin{aligned} \text{Dwell time} &= (\text{Count 1} + \text{Count 2} + \text{Count 3} + \text{Count 4} + \text{Count 5}) / 5 * \text{Ton} \\ &= (11 + 11 + 11 + 10 + 11) / 5 * (22.1 \times 10^{-3}) [\text{ms}] \\ &= 0.23868 [\text{ms}] \end{aligned}$$

Maximum Peak Conducted Output Power

UL Apex Co.,Ltd
YAMAKITA No.2 Shielded Room

COMPANY : SATO CORPORATION
EQUIPMENT : RFID Reader/Writer Module
MODEL NUMBE: Mercury 4e
SERIAL NUMBE: 05434E00E008
FCC ID : MMFRWMTM1
POWER : DC5.3V
TEST MODE : Transmitting

REPORT NO : 26FE0133-YK-F1
REGULATION : Fcc Part15SubpartC 247(b)(2)
DATE : 2006/2/17
TEMP./HUMI : 25deg.C./38%

ENGINEER : Makoto Hosaka

CH	FREQ [GHz]	P/M Reading [dBm]	Cable+Attenuator Loss [dB]	Results [dBm]	Limit (1W) [dBm]	MARGIN [dB]
Low	902.99	3.90	20.58	24.48	30.0	5.53
Mid	915.12	3.90	20.58	24.48	30.0	5.53
High	927.19	3.90	20.68	24.58	30.0	5.43
Hopping	-	4.06	20.56	24.62	30.0	5.39

Limit: 1W=30dBm

Cable loss: KCC-D7+KAT10-S1+KAT10-S2+Client's cable

P/M: Power Meter

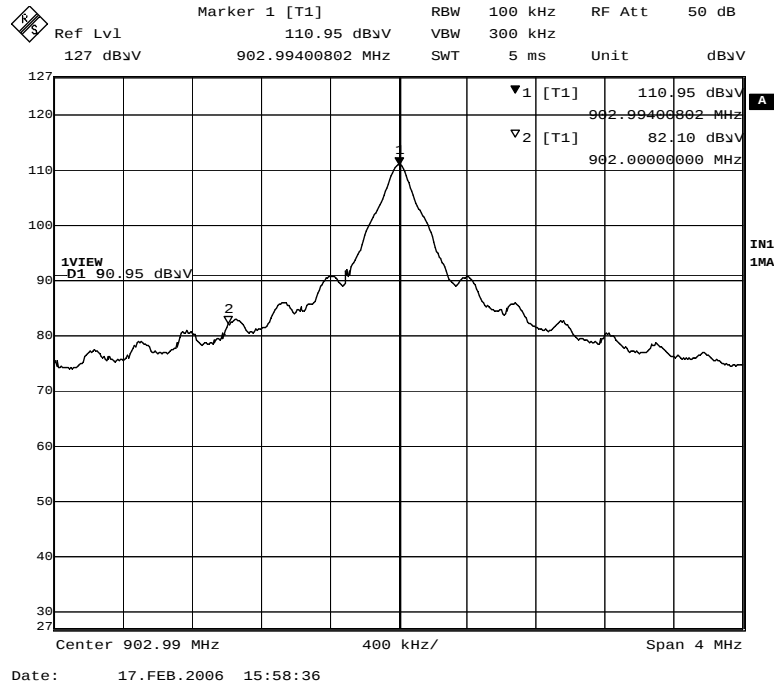
Out of Band Emission(Antenna Terminal Conducted): FCC 15.247(d)

COMPANY : SATO CORPORATION
EQUIPMENT : RFID Reader/Writer Module
MODEL NUMBER: Mercury 4e
SERIAL NUMBER: 05434E00E008
FCC ID : MMFRWMTM1
POWER : DC5.3V

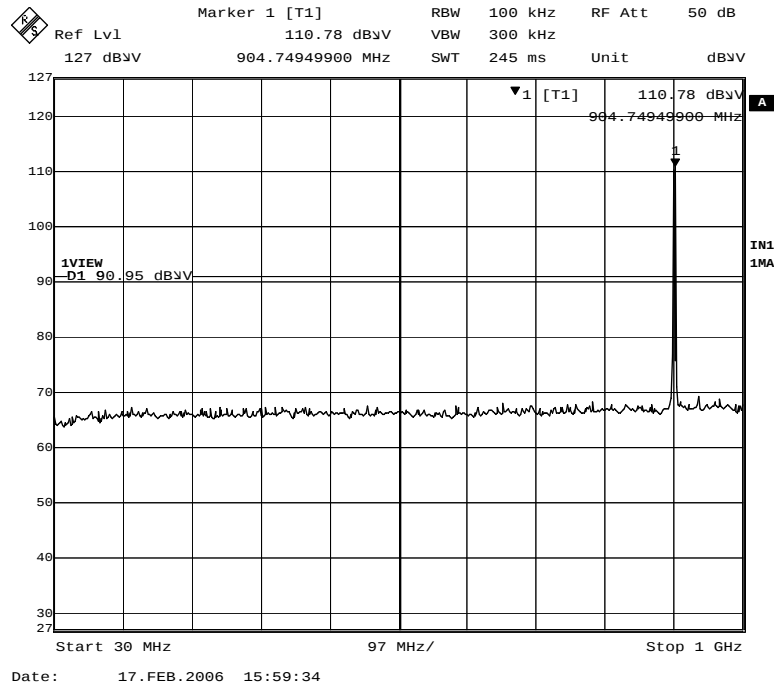
UL Apex Co.,Ltd. Yamakita No.2 Shielded Room
REPORT NO : 26FE0133-YK-F1
REGULATION : Fcc Part15SubpartC 247(d)
DATE : 2006/2/17
TEMP./HUMI : 25deg.C./38%
TEST MODE : Transmitting (Hopping off)
ENGINEER : Makoto Hosaka

Ch:902.99MHz

1.



2.

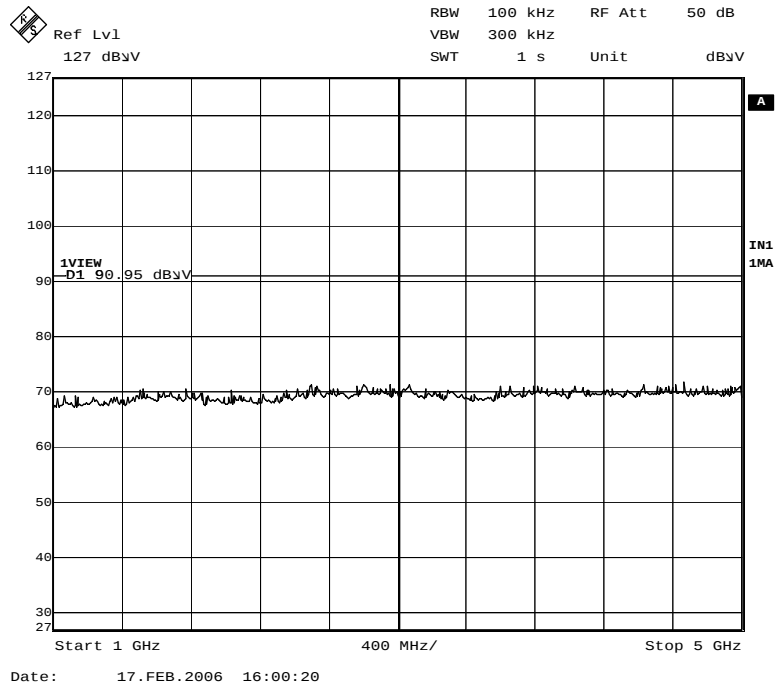


Out of Band Emission(Antenna Terminal Conducted): FCC 15.247(d)

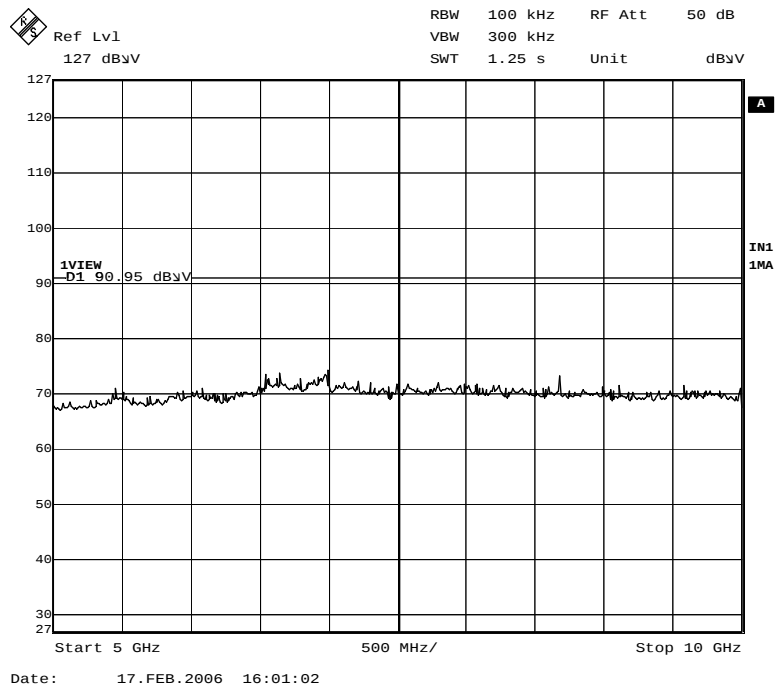
COMPANY : SATO CORPORATION
EQUIPMENT : RFID Reader/Writer Module
MODEL NUMBER: Mercury 4e
SERIAL NUMBER: 05434E00E008
FCC ID : MMFRWMTM1
POWER : DC5.3V

UL Apex Co.,Ltd. Yamakita No.2 Shielded Room
REPORT NO : 26FE0133-YK-F1
REGULATION : Fcc Part15SubpartC 247(d)
DATE : 2006/2/17
TEMP./HUMI : 25deg.C./38%
TEST MODE : Transmitting (Hopping off)
ENGINEER : Makoto Hosaka

3.



4.



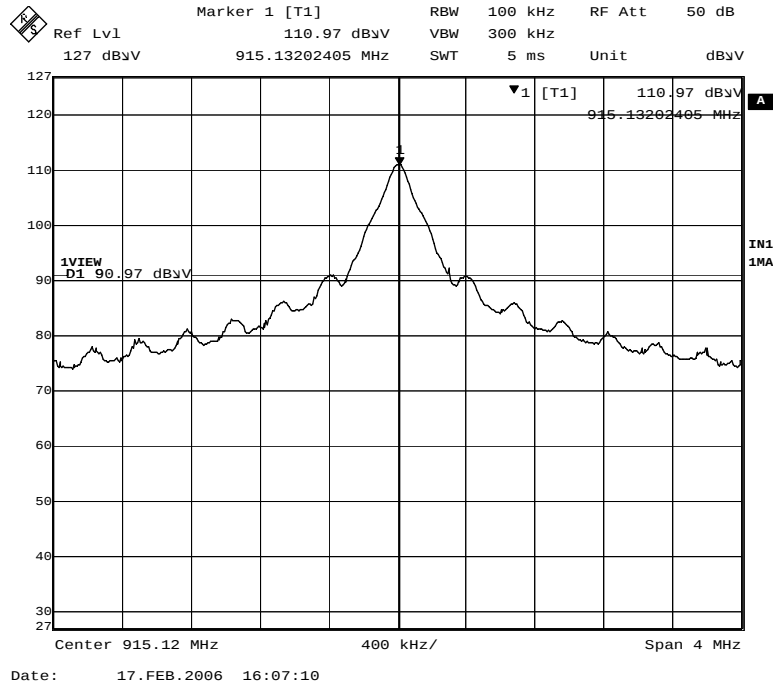
Out of Band Emission(Antenna Terminal Conducted): FCC 15.247(d)

COMPANY : SATO CORPORATION
EQUIPMENT : RFID Reader/Writer Module
MODEL NUMBER: Mercury 4e
SERIAL NUMBER: 05434E00E008
FCC ID : MMFRWMTM1
POWER : DC5.3V

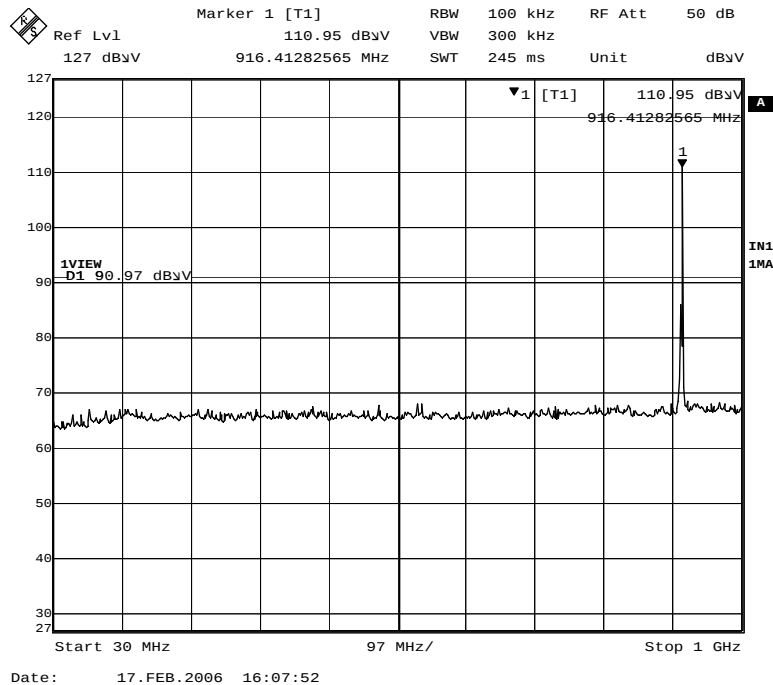
UL Apex Co.,Ltd. Yamakita No.2 Shielded Room
REPORT NO : 26FE0133-YK-F1
REGULATION : Fcc Part15SubpartC 247(d)
DATE : 2006/2/17
TEMP./HUMI : 25deg.C./38%
TEST MODE : Transmitting (Hopping off)
ENGINEER : Makoto Hosaka

Ch:915.12MHz

1.



2.

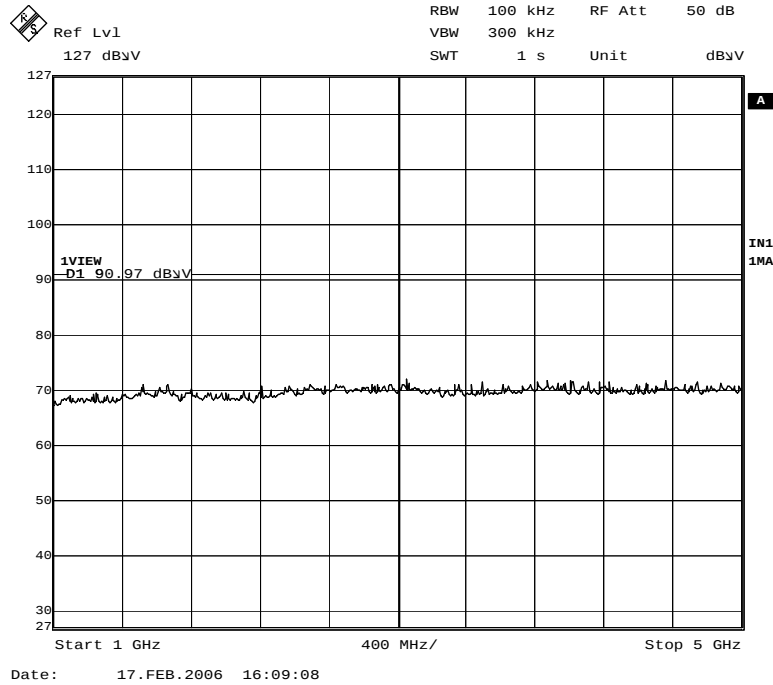


Out of Band Emission(Antenna Terminal Conducted): FCC 15.247(d)

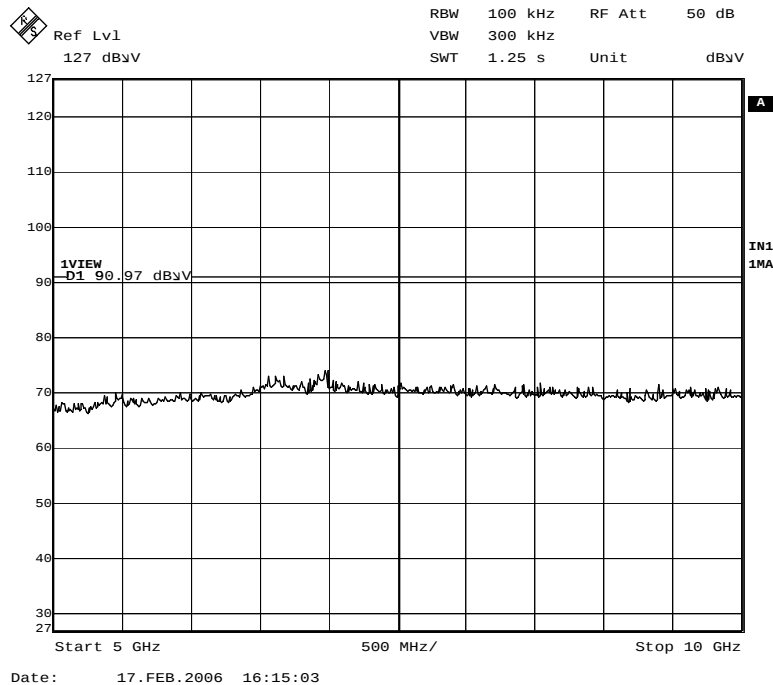
COMPANY : SATO CORPORATION
EQUIPMENT : RFID Reader/Writer Module
MODEL NUMBER: Mercury 4e
SERIAL NUMBER: 05434E00E008
FCC ID : MMFRWMTM1
POWER : DC5.3V

UL Apex Co.,Ltd. Yamakita No.2 Shielded Room
REPORT NO : 26FE0133-YK-F1
REGULATION : Fcc Part15SubpartC 247(d)
DATE : 2006/2/17
TEMP./HUMI : 25deg.C./38%
TEST MODE : Transmitting (Hopping off)
ENGINEER : Makoto Hosaka

3.



4.



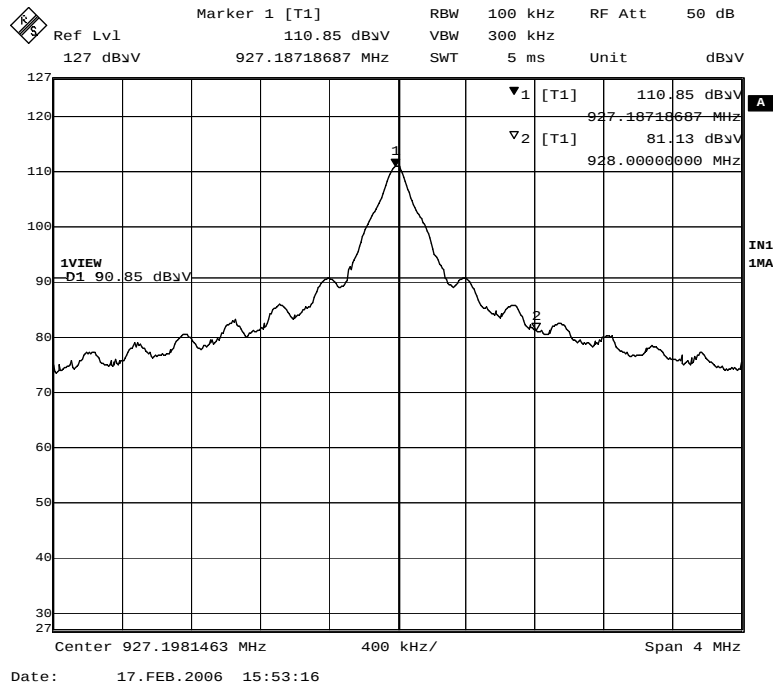
Out of Band Emission(Antenna Terminal Conducted): FCC 15.247(d)

COMPANY : SATO CORPORATION
EQUIPMENT : RFID Reader/Writer Module
MODEL NUMBER: Mercury 4e
SERIAL NUMBER: 05434E00E008
FCC ID : MMFRWMTM1
POWER : DC5.3V

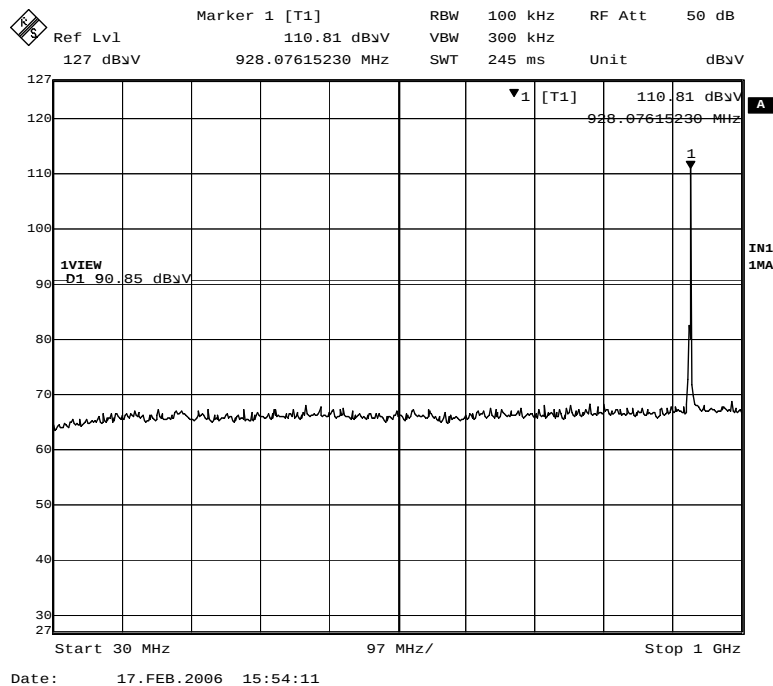
UL Apex Co.,Ltd. Yamakita No.2 Shielded Room
REPORT NO : 26FE0133-YK-F1
REGULATION : Fcc Part15SubpartC 247(d)
DATE : 2006/2/17
TEMP./HUMI : 25deg.C./38%
TEST MODE : Transmitting (Hopping off)
ENGINEER : Makoto Hosaka

Ch11:927.186MHz

1.



2.

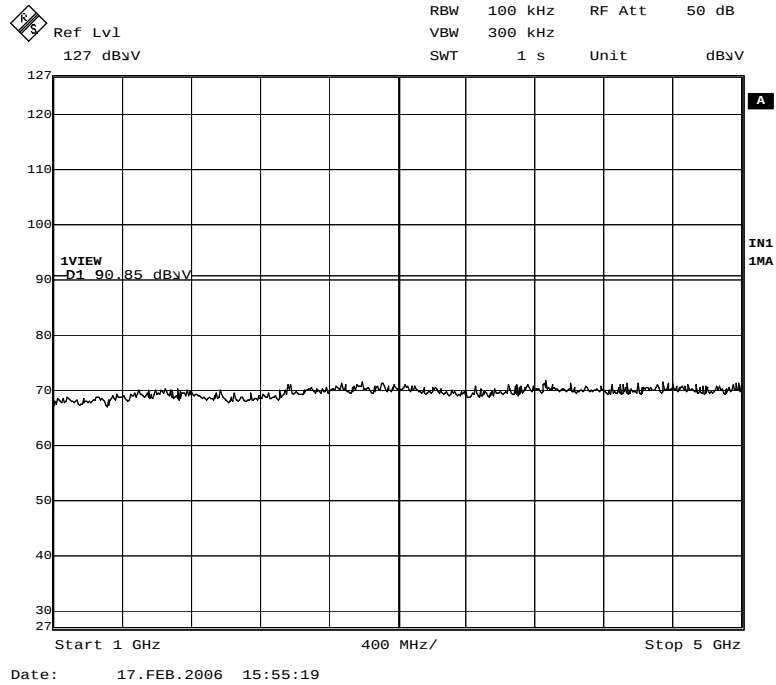


Out of Band Emission(Antenna Terminal Conducted): FCC 15.247(d)

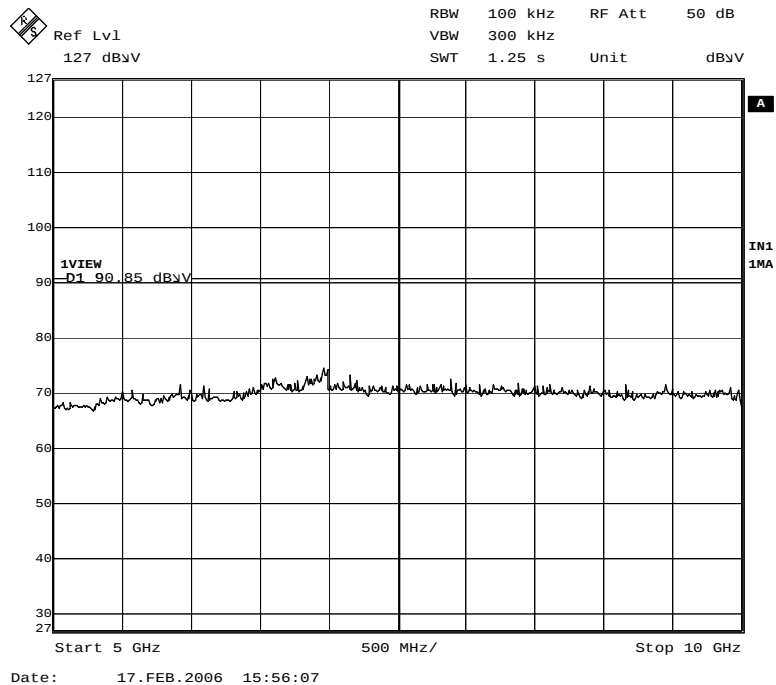
COMPANY : SATO CORPORATION
EQUIPMENT : RFID Reader/Writer Module
MODEL NUMBER: Mercury 4e
SERIAL NUMBER: 05434E00E008
FCC ID : MMFRWMTM1
POWER : DC5.3V

UL Apex Co.,Ltd. Yamakita No.2 Shielded Room
REPORT NO : 26FE0133-YK-F1
REGULATION : Fcc Part15SubpartC 247(d)
DATE : 2006/2/17
TEMP./HUMI : 25deg.C./38%
TEST MODE : Transmitting (Hopping off)
ENGINEER : Makoto Hosaka

3.



4.



DATA OF RADIATION TEST

UL Apex Co.,Ltd.

YAMAKITA No.1 ANECHOIC CHAMBER

Report No. : 26FE0133-YK

Applicant : SATO CORPORATION
 Kind of Equipment : RFID Reader/Writer Module
 Model No. : Mercury 4e
 Serial No. : 05434E00E008
 Power : DC5.3V
 Mode : Transmitting (902.990MHz)
 Remarks :
 Date : 2/16/2006
 Test Distance : 3 m
 Temperature : 24 °C
 Humidity : 43 %
 Regulation : FCC Part15C § 15.209

Engineer : Makoto Hosaka

No.	FREQ. [MHz]	ANT TYPE	READING		ANT FACTOR [dB/m]	AMP GAIN [dB]	CABLE LOSS [dB]	ATTEN. [dB]	RESULT		LIMITS [dB μ V/m]	MARGIN	
			HOR [dB μ V]	VER [dB μ V]					HOR [dB μ V/m]	VER [dB μ V/m]		HOR [dB]	VER [dB]
1.	66.65	BB	28.4	45.2	8.0	27.6	1.6	6.0	16.4	33.2	40.0	23.6	6.8
2.	133.29	BB	30.0	31.1	14.2	27.3	2.4	6.0	25.3	26.4	43.5	18.2	17.1
3.	199.92	BB	31.6	34.3	17.1	27.0	2.9	6.0	30.6	33.3	43.5	12.9	10.2
4.	300.00	BB	37.1	37.8	14.8	27.0	3.7	6.0	34.6	35.3	46.0	11.4	10.7
5.	399.84	BB	27.5	31.9	18.0	27.3	4.9	6.0	29.1	33.5	46.0	16.9	12.5
6.	614.00	BB	21.4	21.7	19.7	28.1	5.4	6.0	24.4	24.7	46.0	21.6	21.3
7.	959.24	BB	31.7	29.9	23.4	27.4	6.9	6.0	40.6	38.8	46.0	5.4	7.2

CALCULATION: READING + ANT. FACTOR + CABLE LOSS - AMP. GAIN + ATTEN.

■ ANTENNA: KBA-03 (BBA9106) 30-299.99MHz/KLA-03 (USLP9143) 300-1000MHz
 ■ AMP: KAF-05 (8447D) ■ RECEIVER: KTR-01 (ES140) ■ CABLE: KCC-30/31/32/34

DATA OF RADIATION TEST

UL Apex Co.,Ltd.

YAMAKITA No.1 ANECHOIC CHAMBER

Report No. : 26FE0133-YK

Applicant : SATO CORPORATION
 Kind of Equipment : RFID Reader/Writer Module
 Model No. : Mercury 4e
 Serial No. : 05434E00E008
 Power : DC5.3V
 Mode : Transmitting (902.990MHz)
 Remarks : PK RBW:1MHz, VBW:1MHz
 Date : 2/16/2006
 Test Distance : 3 m
 Temperature : 24 °C
 Humidity : 43 %
 Regulation : FCC Part15C s 15.209 (PK Detection) 1-26GHz:3m/26-40GHz:1m

Engineer : Makoto Hosaka

No.	FREQ. [MHz]	ANT TYPE	READING		ANT FACTOR [dB/m]	AMP GAIN [dB]	CABLE LOSS [dB]	ATTEN. [dB]	RESULT		LIMITS [dB μ V/m]	MARGIN	
			HOR [dB μ V]	VER [dB μ V]					HOR [dB μ V/m]	VER [dB μ V/m]		HOR [dB]	VER [dB]
1.	2708.97	BB	48.5	46.5	29.4	37.1	5.6	0.0	46.4	44.4	74.0	27.6	29.6
2.	3611.96	BB	42.6	42.7	30.5	36.9	6.2	0.0	42.4	42.5	74.0	31.6	31.5
3.	4514.95	BB	41.8	43.2	32.1	36.6	7.0	0.0	44.3	45.7	74.0	29.7	28.3
4.	5417.94	BB	41.2	42.3	34.2	36.5	7.3	0.0	46.2	47.3	74.0	27.8	26.7
5.	6320.93	BB	41.2	43.1	35.4	36.7	8.5	0.0	48.4	50.3	74.0	25.6	23.7
6.	7223.92	BB	42.2	41.6	36.4	36.8	7.9	0.0	49.7	49.1	74.0	24.3	24.9
7.	8126.91	BB	38.3	39.2	37.1	36.9	9.0	0.0	47.5	48.4	74.0	26.5	25.6
8.	9029.90	BB	39.3	40.4	37.4	37.1	10.0	0.0	49.6	50.7	74.0	24.4	23.3

CALCULATION: READING + ANT. FACTOR + CABLE LOSS - AMP. GAIN + ATTEN.

■ ANTENNA: KHA-02 (1-18GHz)

■ AMP: KAF-02 (8449B) ■ SPECTRUM ANALYZER: KSA-04 ■ CABLE: KCC-D14/D15

DATA OF RADIATION TEST

UL Apex Co.,Ltd.

YAMAKITA No.1 ANECHOIC CHAMBER

Report No. : 26FE0133-YK

Applicant : SATO CORPORATION
 Kind of Equipment : RFID Reader/Writer Module
 Model No. : Mercury 4e
 Serial No. : 05434E00E008
 Power : DC5.3V
 Mode : Transmitting (902.990MHz)
 Remarks : AV RBW:1MHz, VBW:10Hz
 Date : 2/16/2006
 Test Distance : 3 m
 Temperature : 24 °C
 Humidity : 43 %
 Regulation : FCC Part15C § 15.209 (AV Detection) 1-26GHz:3m/26-40GHz:1m

Engineer : Makoto Hosaka

No.	FREQ. [MHz]	ANT TYPE	READING		ANT FACTOR [dB/m]	AMP GAIN [dB]	CABLE LOSS [dB]	ATTEN. [dB]	RESULT		LIMITS [dB μ V/m]	MARGIN	
			HOR [dB μ V]	VER [dB μ V]					HOR [dB μ V/m]	VER [dB μ V/m]		HOR [dB]	VER [dB]
1.	2708.97	BB	41.5	38.1	29.4	37.1	5.6	0.0	39.4	36.0	54.0	14.6	18.0
2.	3611.96	BB	32.1	32.3	30.5	36.9	6.2	0.0	31.9	32.1	54.0	22.1	21.9
3.	4514.95	BB	31.6	34.2	32.1	36.6	7.0	0.0	34.1	36.7	54.0	19.9	17.3
4.	5417.94	BB	31.6	32.7	34.2	36.5	7.3	0.0	36.6	37.7	54.0	17.4	16.3
5.	6320.93	BB	31.5	34.7	35.4	36.7	8.5	0.0	38.7	41.9	54.0	15.3	12.1
6.	7223.92	BB	32.1	32.1	36.4	36.8	7.9	0.0	39.6	39.6	54.0	14.4	14.4
7.	8126.91	BB	28.5	28.8	37.1	36.9	9.0	0.0	37.7	38.0	54.0	16.3	16.0
8.	9029.90	BB	29.6	30.0	37.4	37.1	10.0	0.0	39.9	40.3	54.0	14.1	13.7

CALCULATION: READING + ANT. FACTOR + CABLE LOSS - AMP. GAIN + ATTEN.

■ ANTENNA: KHA-02 (1-18GHz)

■ AMP: KAF-02 (8449B) ■ SPECTRUM ANALYZER: KSA-04 ■ CABLE: KCC-D14/D15

DATA OF RADIATION TEST

UL Apex Co.,Ltd.

YAMAKITA No.1 ANECHOIC CHAMBER

Report No. : 26FE0133-YK

Applicant : SATO CORPORATION
Kind of Equipment : RFID Reader/Writer Module
Model No. : Mercury 4e
Serial No. : 05434E00E008
Power : DC5.3V
Mode : Transmitting (915.120MHz)
Remarks :
Date : 2/16/2006
Test Distance : 3 m
Temperature : 24 °C
Humidity : 43 %
Regulation : FCC Part15C § 15.209

Engineer : Makoto Hosaka

No.	FREQ. [MHz]	ANT TYPE	READING		ANT FACTOR [dB/m]	AMP GAIN [dB]	CABLE LOSS [dB]	ATTEN. [dB]	RESULT		LIMITS [dB μ V/m]	MARGIN	
			HOR [dB μ V]	VER [dB μ V]					HOR [dB μ V/m]	VER [dB μ V/m]		HOR [dB]	VER [dB]
1.	66.64	BB	28.5	44.7	8.0	27.6	1.6	6.0	16.5	32.7	40.0	23.5	7.3
2.	133.29	BB	31.3	33.0	14.2	27.3	2.4	6.0	26.6	28.3	43.5	16.9	15.2
3.	199.93	BB	34.9	38.7	17.1	27.0	2.9	6.0	33.9	37.7	43.5	9.6	5.8
4.	300.00	BB	36.8	38.2	14.8	27.0	3.7	6.0	34.3	35.7	46.0	11.7	10.3
5.	399.84	BB	24.8	32.4	18.0	27.3	4.9	6.0	26.4	34.0	46.0	19.6	12.0
6.	971.38	BB	31.8	29.2	23.7	27.5	7.0	6.0	41.0	38.4	54.0	13.0	15.6

CALCULATION: READING + ANT.FACTOR + CABLE LOSS - AMP.GAIN + ATTEN.

■ ANTENNA: KBA-03 (BBA9106) 30-299.99MHz/KLA-03 (USLP9143) 300-1000MHz

■ AMP: KAF-05 (8447D) ■ RECEIVER: KTR-01 (ESI40) ■ CABLE: KCC-30/31/32/34

DATA OF RADIATION TEST

UL Apex Co.,Ltd.

YAMAKITA No.1 ANECHOIC CHAMBER

Report No. : 26FE0133-YK

Applicant : SATO CORPORATION
 Kind of Equipment : RFID Reader/Writer Module
 Model No. : Mercury 4e
 Serial No. : 05434E00E008
 Power : DC5.3V
 Mode : Transmitting (915.120MHz)
 Remarks : PK RBW:1MHz, VBW:1MHz
 Date : 2/16/2006
 Test Distance : 3 m
 Temperature : 24 °C
 Humidity : 43 %
 Regulation : FCC Part15C s 15.209 (PK Detection) 1-26GHz:3m/26-40GHz:1m

Engineer : Makoto Hosaka

No.	FREQ. [MHz]	ANT TYPE	READING		ANT FACTOR [dB/m]	AMP GAIN [dB]	CABLE LOSS [dB]	ATTEN. [dB]	RESULT		LIMITS [dB μV/m]	MARGIN	
			HOR [dB μV]	VER [dB μV]					HOR [dB μV/m]	VER [dB μV/m]		HOR [dB]	VER [dB]
1.	2745.36	BB	48.9	46.0	29.5	37.2	5.7	0.0	46.9	44.0	74.0	27.1	30.0
2.	3660.48	BB	44.9	43.6	30.7	36.8	6.2	0.0	45.0	43.7	74.0	29.0	30.3
3.	4575.60	BB	41.5	42.5	32.3	36.6	7.0	0.0	44.2	45.2	74.0	29.8	28.8
4.	5490.72	BB	42.2	43.0	34.3	36.5	7.4	0.0	47.4	48.2	74.0	26.6	25.8
5.	6405.84	BB	41.7	42.7	35.7	36.7	8.5	0.0	49.2	50.2	74.0	24.8	23.8
6.	7320.96	BB	41.8	42.1	36.6	36.8	8.3	0.0	49.9	50.2	74.0	24.1	23.8
7.	8236.08	BB	41.3	40.8	37.2	36.8	9.1	0.0	50.8	50.3	74.0	23.2	23.7
8.	9151.20	BB	41.3	41.3	37.6	37.1	9.9	0.0	51.7	51.7	74.0	22.3	22.3

CALCULATION: READING + ANT. FACTOR + CABLE LOSS - AMP. GAIN + ATTEN.

■ ANTENNA:KHA-02 (1-18GHz)

■ AMP:KAF-02 (8449B) ■ SPECTRUM ANALYZER:KSA-04 ■ CABLE:KCC-D14/D15

Page:

DATA OF RADIATION TEST

UL Apex Co.,Ltd.

YAMAKITA No.1 ANECHOIC CHAMBER

Report No. : 26FE0133-YK

Applicant : SATO CORPORATION
 Kind of Equipment : RFID Reader/Writer Module
 Model No. : Mercury 4e
 Serial No. : 05434E00E008
 Power : DC5.3V
 Mode : Transmitting (915.120MHz)
 Remarks : AV RBW:1MHz, VBW:10Hz
 Date : 2/16/2006
 Test Distance : 3 m
 Temperature : 24 °C
 Humidity : 43 %
 Regulation : FCC Part15C § 15.209 (AV Detection) 1-26GHz:3m/26-40GHz:1m

Engineer : Makoto Hosaka

No.	FREQ. [MHz]	ANT TYPE	READING		ANT FACTOR [dB/m]	AMP GAIN [dB]	CABLE LOSS [dB]	ATTEN. [dB]	RESULT		LIMITS [dB μ V/m]	MARGIN	
			HOR [dB μ V]	VER [dB μ V]					HOR [dB μ V/m]	VER [dB μ V/m]		HOR [dB]	VER [dB]
1.	2745.36	BB	41.8	38.3	29.5	37.2	5.7	0.0	39.8	36.3	54.0	14.2	17.7
2.	3660.48	BB	35.5	33.6	30.7	36.8	6.2	0.0	35.6	33.7	54.0	18.4	20.3
3.	4575.60	BB	32.0	33.2	32.3	36.6	7.0	0.0	34.7	35.9	54.0	19.3	18.1
4.	5490.72	BB	31.1	33.5	34.3	36.5	7.4	0.0	36.3	38.7	54.0	17.7	15.3
5.	6405.84	BB	31.7	33.5	35.7	36.7	8.5	0.0	39.2	41.0	54.0	14.8	13.0
6.	7320.96	BB	32.2	32.2	36.6	36.8	8.3	0.0	40.3	40.3	54.0	13.7	13.7
7.	8236.08	BB	30.9	30.7	37.2	36.8	9.1	0.0	40.4	40.2	54.0	13.6	13.8
8.	9151.20	BB	31.7	31.9	37.6	37.1	9.9	0.0	42.1	42.3	54.0	11.9	11.7

CALCULATION: READING + ANT. FACTOR + CABLE LOSS - AMP. GAIN + ATTEN.

■ ANTENNA: KHA-02 (1-18GHz)

■ AMP: KAF-02 (8449B) ■ SPECTRUM ANALYZER: KSA-04 ■ CABLE: KCC-D14/D15

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DATA OF RADIATION TEST

UL Apex Co.,Ltd.

YAMAKITA No.1 ANECHOIC CHAMBER

Report No. : 26FE0133-YK

Applicant : SATO CORPORATION
Kind of Equipment : RFID Reader/Writer Module
Model No. : Mercury 4e
Serial No. : 05434E00E008
Power : DC5.3V
Mode : Transmitting (927.186MHz)
Remarks :
Date : 2/16/2006
Test Distance : 3 m
Temperature : 24 °C
Humidity : 43 %
Regulation : FCC Part15C § 15.209

Engineer : Makoto Hosaka

No.	FREQ. [MHz]	ANT TYPE	READING		ANT FACTOR [dB/m]	AMP GAIN [dB]	CABLE LOSS [dB]	ATTEN. [dB]	RESULT		LIMITS [dB μ V/m]	MARGIN	
			HOR [dB μ V]	VER [dB μ V]					HOR [dB μ V/m]	VER [dB μ V/m]		HOR [dB]	VER [dB]
1.	66.64	BB	28.7	43.4	8.0	27.6	1.6	6.0	16.7	31.4	40.0	23.3	8.6
2.	133.29	BB	31.6	33.7	14.2	27.3	2.4	6.0	26.9	29.0	43.5	16.6	14.5
3.	199.93	BB	30.9	35.2	17.1	27.0	2.9	6.0	29.9	34.2	43.5	13.6	9.3
4.	300.00	BB	36.8	38.1	14.8	27.0	3.7	6.0	34.3	35.6	46.0	11.7	10.4
5.	399.84	BB	27.2	33.1	18.0	27.3	4.9	6.0	28.8	34.7	46.0	17.2	11.3
6.	960.00	BB	22.5	23.0	23.5	27.4	6.9	6.0	31.5	32.0	46.0	14.5	14.0
7.	983.44	BB	32.0	31.8	23.9	27.5	7.0	6.0	41.4	41.2	54.0	12.6	12.8

CALCULATION: READING + ANT. FACTOR + CABLE LOSS - AMP. GAIN + ATTEN.

■ ANTENNA: KBA-03 (BBA9106) 30-299.99MHz/KLA-03 (USLP9143) 300-1000MHz

■ AMP: KAF-05 (8447D) ■ RECEIVER: KTR-01 (ESI40) ■ CABLE: KCC-30/31/32/34

DATA OF RADIATION TEST

UL Apex Co.,Ltd.

YAMAKITA No.1 ANECHOIC CHAMBER

Report No. : 26FE0133-YK

Applicant : SATO CORPORATION
 Kind of Equipment : RFID Reader/Writer Module
 Model No. : Mercury 4e
 Serial No. : 05434E00E008
 Power : DC5.3V
 Mode : Transmitting (927.186MHz)
 Remarks : PK RBW:1MHz, VBW:1MHz
 Date : 2/16/2006
 Test Distance : 3 m
 Temperature : 24 °C
 Humidity : 43 %
 Regulation : FCC Part15C s 15.209(PK Detection)1-26GHz:3m/26-40GHz:1m

Engineer : Makoto Hosaka

No.	FREQ. [MHz]	ANT TYPE	READING		ANT FACTOR [dB/m]	AMP GAIN [dB]	CABLE LOSS [dB]	ATTEN. [dB]	RESULT		LIMITS [dB μ V/m]	MARGIN	
			HOR [dB μ V]	VER [dB μ V]					HOR [dB μ V/m]	VER [dB μ V/m]		HOR [dB]	VER [dB]
1.	2781.56	BB	48.0	48.7	29.6	37.2	5.7	0.0	46.1	46.8	74.0	27.9	27.2
2.	3708.74	BB	43.9	43.7	30.9	36.8	6.2	0.0	44.2	44.0	74.0	29.8	30.0
3.	4635.93	BB	41.5	43.2	32.5	36.6	7.0	0.0	44.4	46.1	74.0	29.6	27.9
4.	5563.12	BB	41.9	44.1	34.3	36.5	7.5	0.0	47.2	49.4	74.0	26.8	24.6
5.	6490.30	BB	40.8	41.4	35.9	36.7	8.5	0.0	48.5	49.1	74.0	25.5	24.9
6.	7417.49	BB	41.0	41.9	36.8	36.8	8.6	0.0	49.6	50.5	74.0	24.4	23.5
7.	8344.67	BB	40.7	41.8	37.3	36.8	9.3	0.0	50.5	51.6	74.0	23.5	22.4
8.	9271.86	BB	42.2	41.8	37.8	37.1	9.8	0.0	52.7	52.3	74.0	21.3	21.7

CALCULATION: READING + ANT. FACTOR + CABLE LOSS - AMP. GAIN + ATTEN.

■ ANTENNA: KHA-02 (1-18GHz)

■ AMP: KAF-02 (8449B) ■ SPECTRUM ANALYZER: KSA-04 ■ CABLE: KCC-D14/D15

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DATA OF RADIATION TEST

UL Apex Co.,Ltd.

YAMAKITA No.1 ANECHOIC CHAMBER

Report No. : 26FE0133-YK

Applicant : SATO CORPORATION
 Kind of Equipment : RFID Reader/Writer Module
 Model No. : Mercury 4e
 Serial No. : 05434E00E008
 Power : DC5.3V
 Mode : Transmitting (927.186MHz)
 Remarks : AV RBW:1MHz, VBW:10Hz
 Date : 2/16/2006
 Test Distance : 3 m
 Temperature : 24 °C
 Humidity : 43 %
 Regulation : FCC Part15C § 15.209 (AV Detection) 1-26GHz:3m/26-40GHz:1m

Engineer : Makoto Hosaka

No.	FREQ. [MHz]	ANT TYPE	READING		ANT FACTOR [dB/m]	AMP GAIN [dB]	CABLE LOSS [dB]	ATTEN. [dB]	RESULT		LIMITS [dB μ V/m]	MARGIN	
			HOR [dB μ V]	VER [dB μ V]					HOR [dB μ V/m]	VER [dB μ V/m]		HOR [dB]	VER [dB]
1.	2781.56	BB	41.8	42.3	29.6	37.2	5.7	0.0	39.9	40.4	54.0	14.1	13.6
2.	3708.74	BB	33.7	34.4	30.9	36.8	6.2	0.0	34.0	34.7	54.0	20.0	19.3
3.	4635.93	BB	32.0	32.8	32.5	36.6	7.0	0.0	34.9	35.7	54.0	19.1	18.3
4.	5563.12	BB	31.2	35.4	34.3	36.5	7.5	0.0	36.5	40.7	54.0	17.5	13.3
5.	6490.30	BB	31.0	31.5	35.9	36.7	8.5	0.0	38.7	39.2	54.0	15.3	14.8
6.	7417.49	BB	31.8	32.1	36.8	36.8	8.6	0.0	40.4	40.7	54.0	13.6	13.3
7.	8344.67	BB	30.6	31.5	37.3	36.8	9.3	0.0	40.4	41.3	54.0	13.6	12.7
8.	9271.86	BB	31.7	31.4	37.8	37.1	9.8	0.0	42.2	41.9	54.0	11.8	12.1

CALCULATION: READING + ANT. FACTOR + CABLE LOSS - AMP. GAIN + ATTEN.

■ ANTENNA: KHA-02 (1-18GHz)

■ AMP: KAF-02 (8449B) ■ SPECTRUM ANALYZER: KSA-04 ■ CABLE: KCC-D14/D15

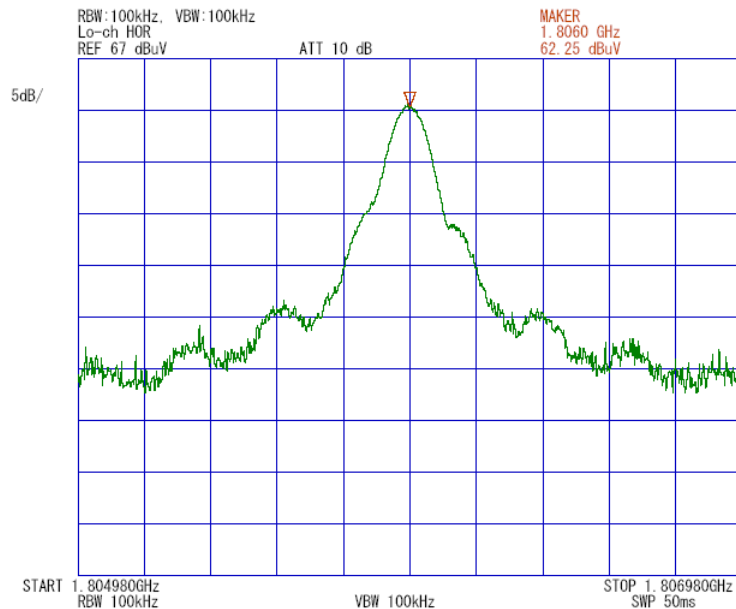
Out of Band Emission(Radiated): FCC 15.247(d)

COMPANY : SATO CORPORATION
EQUIPMENT : RFID Reader/Writer Module
MODEL NUMBER: Mercury 4e
SERIAL NUMBER: 05434E00E008
FCC ID : MMFRWMTM1
POWER : DC5.3V

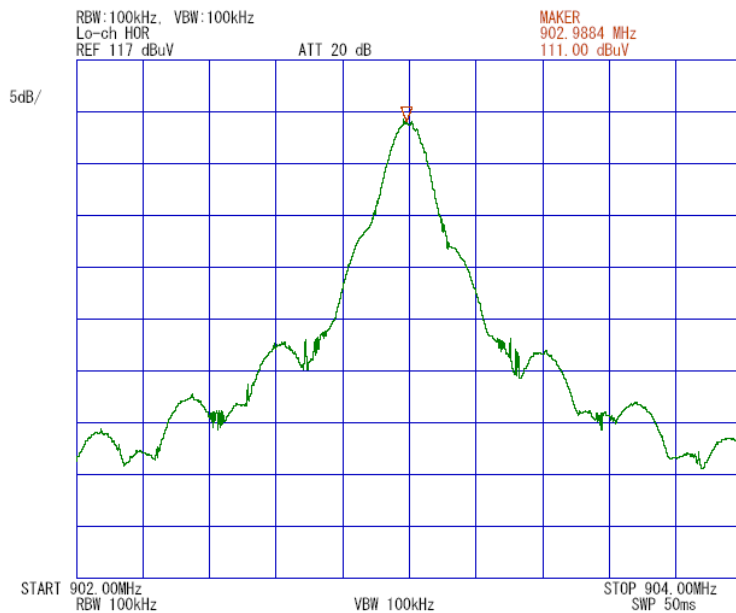
UL Apex Co.,Ltd. Yamakita No.2 Shielded Room
REPORT NO : 26FE0133-YK-F1
REGULATION : Fcc Part15SubpartC 247(d)
DATE : 2006/2/16
TEMP./HUMI : 24deg.C./43%
TEST MODE : Transmitting (Hopping off)
ENGINEER : Makoto Hosaka

Ch:902.99MHz

1. Spurious emission (1806.0MHz- Horizontal)



2. Fundamental(902.99MHz-Horizontal)

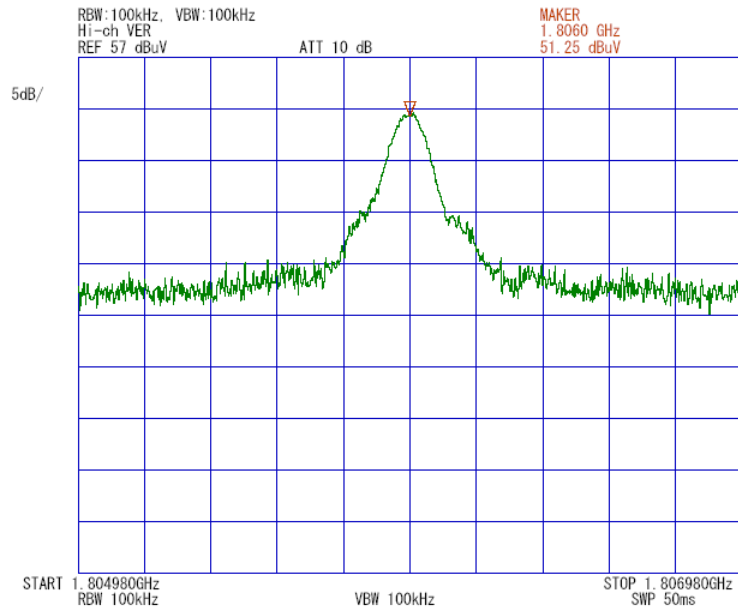


Out of Band Emission(Radiated): FCC 15.247(d)

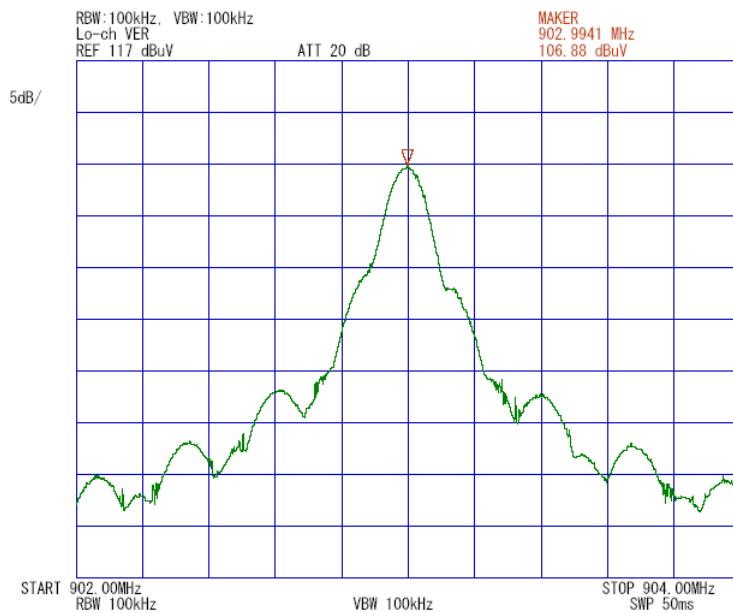
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EQUIPMENT : RFID Reader/Writer Module
MODEL NUMBER: Mercury 4e
SERIAL NUMBER: 05434E00E008
FCC ID : MMFRWMTM1
POWER : DC5.3V

UL Apex Co.,Ltd. Yamakita No.2 Shielded Room
REPORT NO : 26FE0133-YK-F1
REGULATION : Fcc Part15SubpartC 247(d)
DATE : 2006/2/16
TEMP./HUMI : 24deg.C./43%
TEST MODE : Transmitting (Hopping off)
ENGINEER : Makoto Hosaka

3. Spurious emission(1806.0MHz- Vertical)



4. Fundamental(902.99MHz-Vertical)



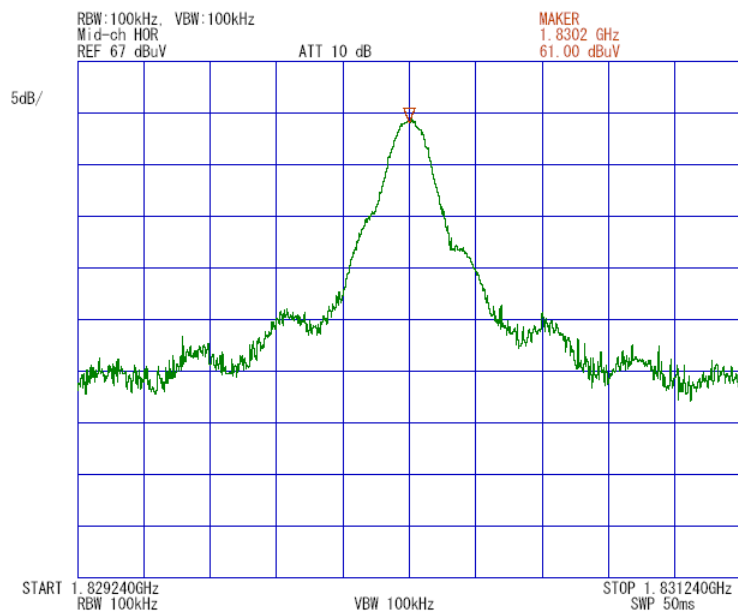
Out of Band Emission(Radiated): FCC 15.247(d)

COMPANY : SATO CORPORATION
EQUIPMENT : RFID Reader/Writer Module
MODEL NUMBER: Mercury 4e
SERIAL NUMBER: 05434E00E008
FCC ID : MMFRWMTM1
POWER : DC5.3V

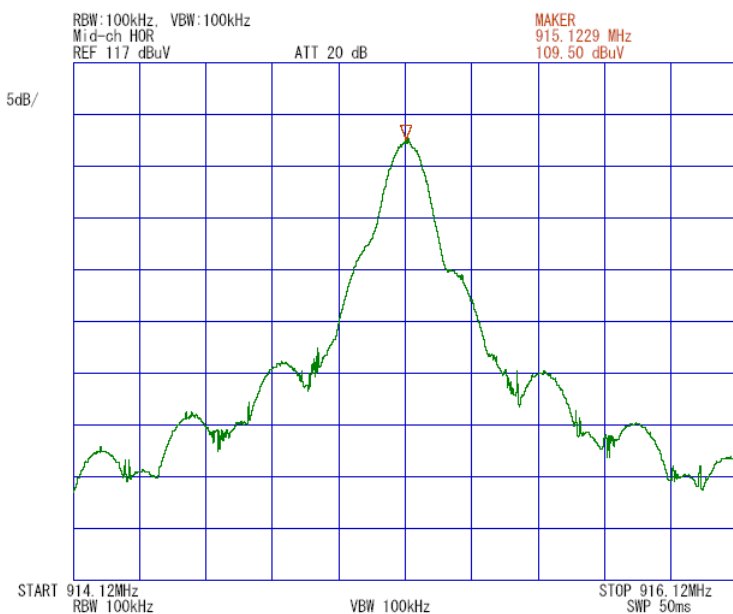
UL Apex Co.,Ltd. Yamakita No.2 Shielded Room
REPORT NO : 26FE0133-YK-F1
REGULATION : Fcc Part15SubpartC 247(d)
DATE : 2006/2/16
TEMP./HUMI : 24deg.C./43%
TEST MODE : Transmitting (Hopping off)
ENGINEER : Makoto Hosaka

Ch:915.12MHz

1. Spurious emission(1830.2MHz- Horizontal)



2. Fundamental(915.12MHz-Horizontal)

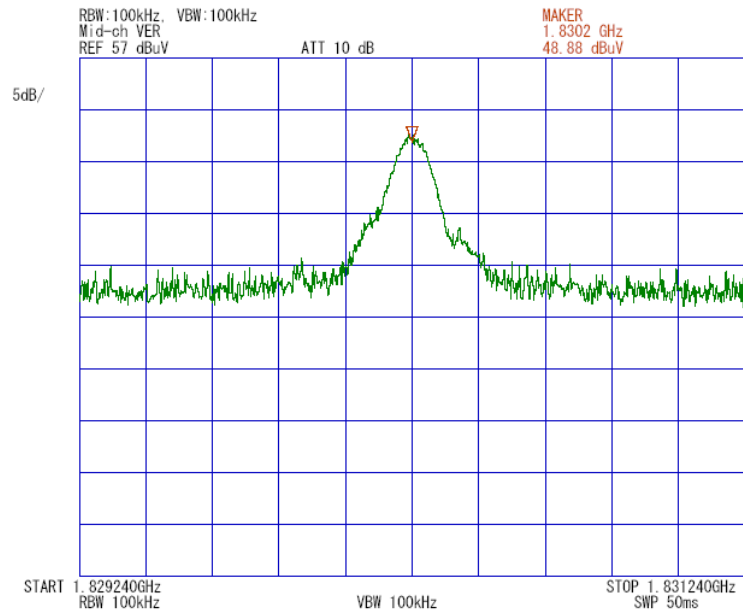


Out of Band Emission(Radiated): FCC 15.247(d)

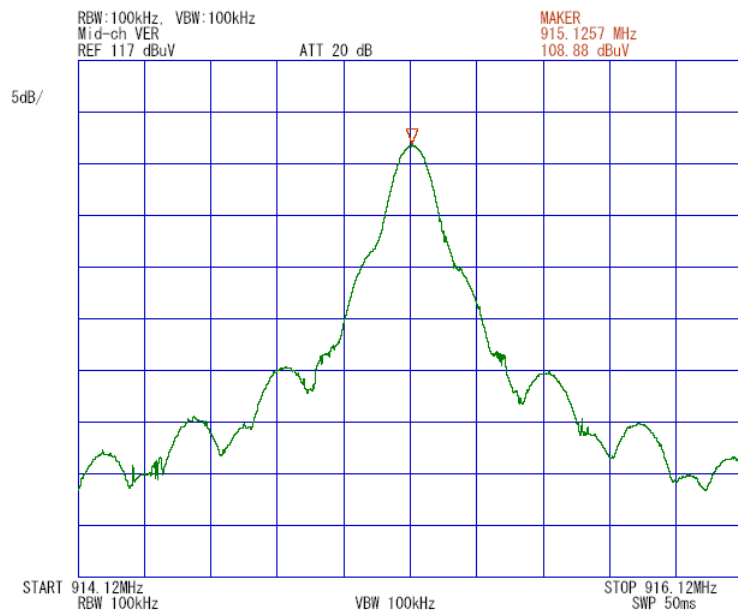
COMPANY : SATO CORPORATION
EQUIPMENT : RFID Reader/Writer Module
MODEL NUMBER: Mercury 4e
SERIAL NUMBER: 05434E00E008
FCC ID : MMFRWMTM1
POWER : DC5.3V

UL Apex Co.,Ltd. Yamakita No.2 Shielded Room
REPORT NO : 26FE0133-YK-F1
REGULATION : Fcc Part15SubpartC 247(d)
DATE : 2006/2/16
TEMP./HUMI : 24deg.C./43%
TEST MODE : Transmitting (Hopping off)
ENGINEER : Makoto Hosaka

3. Spurious emission(1830.2MHz- Vertical)



4. Fundamental(915.12MHz-Vertical)



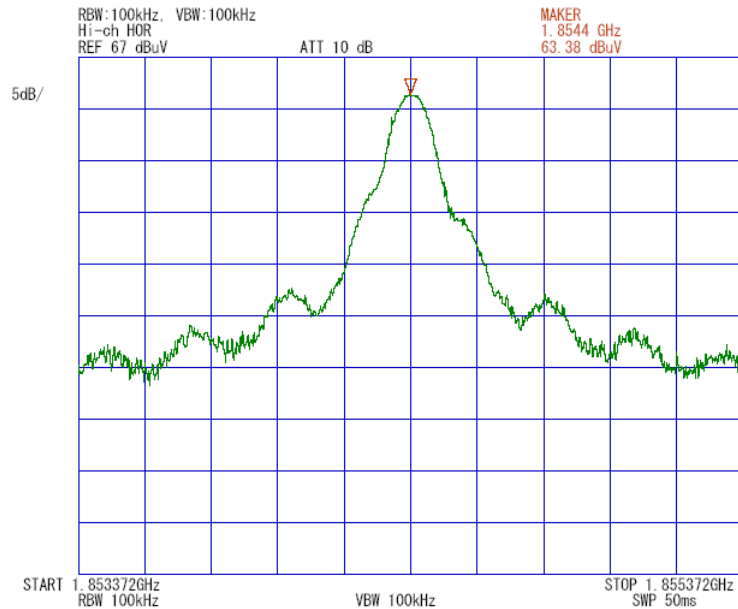
Out of Band Emission(Radiated): FCC 15.247(d)

COMPANY : SATO CORPORATION
EQUIPMENT : RFID Reader/Writer Module
MODEL NUMBER: Mercury 4e
SERIAL NUMBER: 05434E00E008
FCC ID : MMFRWMTM1
POWER : DC5.3V

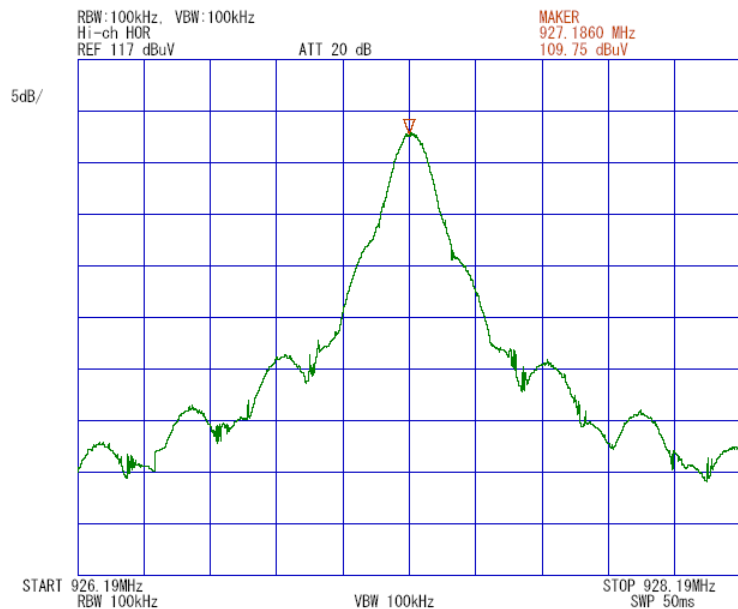
UL Apex Co.,Ltd. Yamakita No.2 Shielded Room
REPORT NO : 26FE0133-YK-F1
REGULATION : Fcc Part15SubpartC 247(d)
DATE : 2006/2/16
TEMP./HUMI : 24deg.C./43%
TEST MODE : Transmitting (Hopping off)
ENGINEER : Makoto Hosaka

Ch11:927.186MHz

1. Spurious emission(1854.4MHz- Horizontal)



2. Fundamental(927.186MHz-Horizontal)

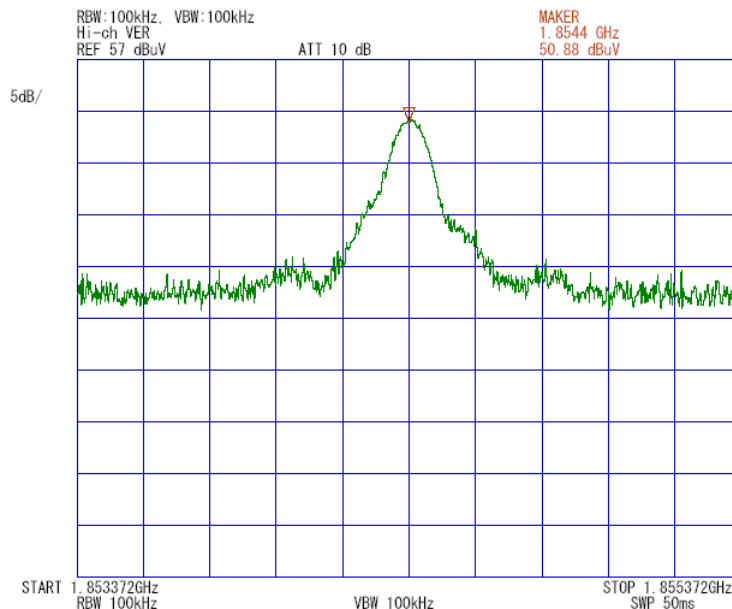


Out of Band Emission(Radiated): FCC 15.247(d)

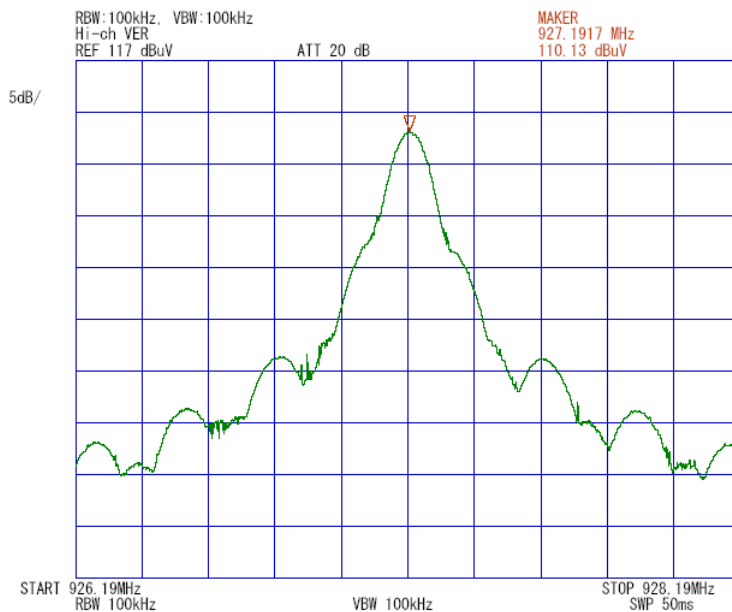
COMPANY : SATO CORPORATION
EQUIPMENT : RFID Reader/Writer Module
MODEL NUMBER: Mercury 4e
SERIAL NUMBER: 05434E00E008
FCC ID : MMFRWMTM1
POWER : DC5.3V

UL Apex Co.,Ltd. Yamakita No.2 Shielded Room
REPORT NO : 26FE0133-YK-F1
REGULATION : Fcc Part15SubpartC 247(d)
DATE : 2006/2/16
TEMP./HUMI : 24deg.C./43%
TEST MODE : Transmitting (Hopping off)
ENGINEER : Makoto Hosaka

3. Spurious emission(1854.4MHz- Vertical)



4. Fundamental(927.186MHz-Vertical)



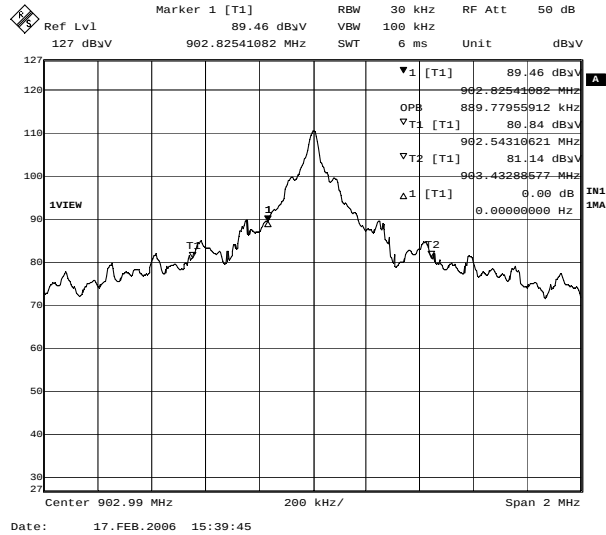
Occupied Bandwidth(99%)

COMPANY : SATO CORPORATION
EQUIPMENT : RFID Reader/Writer Module
MODEL NUMBER: Mercury 4e
SERIAL NUMBER: 05434E00E008
FCC ID : MMFRWMTM1
POWER : DC5.3V

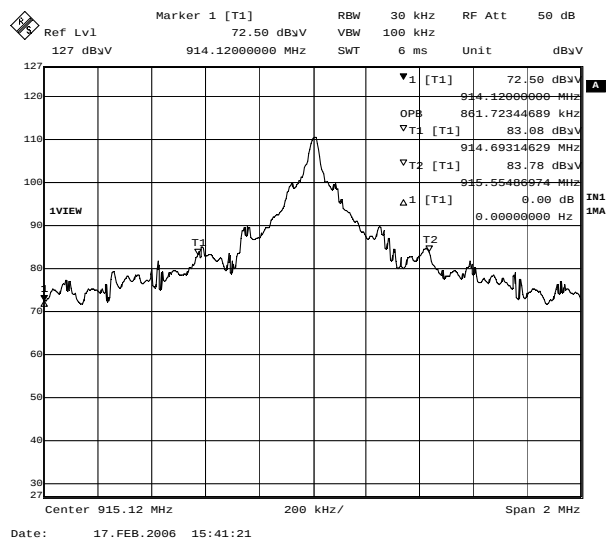
UL Apex Co.,Ltd. Yamakita No.2 Shielded Room
REPORT NO : 26FE0133-YK-F1

DATE : 2006/2/17
TEMP/HUMI : 25deg.C./38%
TEST MODE : Transmitting
ENGINEER : Makoto Hosaka

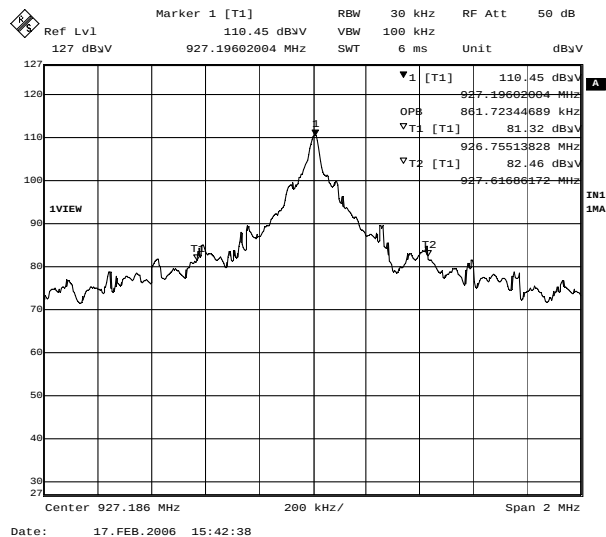
1. ch : 902.990MHz/Occupied Bandwidth:869.78kHz



2. ch : 915.120MHz/Occupied Bandwidth:861.72kHz



3. ch : 927.186MHz/Occupied Bandwidth:861.72kHz

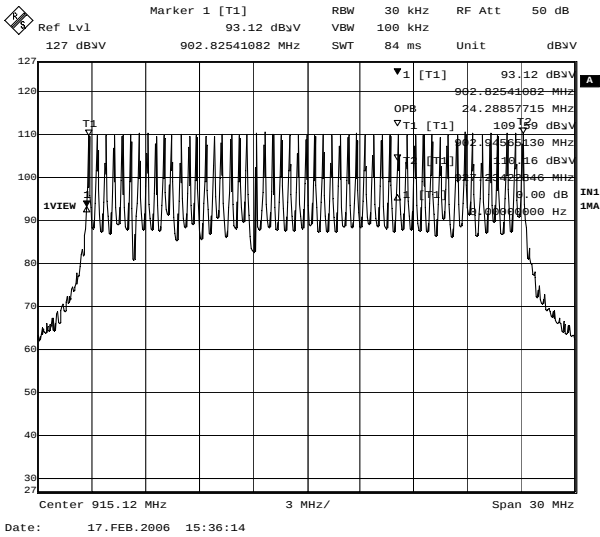


Occupied Bandwidth(99%)

COMPANY : SATO CORPORATION
EQUIPMENT : RFID Reader/Writer Module
MODEL NUMBER: Mercury 4e
SERIAL NUMBER: 05434E00E008
FCC ID : MMFRWMTM1
POWER : DC5.3V

UL Apex Co.,Ltd. Yamakita No.2 Shielded Room
REPORT NO : 26FE0133-YK-F1
DATE : 2006/2/17
TEMP./HUMI : 25deg.C./38%
TEST MODE : Transmitting
ENGINEER : Makoto Hosaka

4. Hopping/Occupied Bandwidth:24.29MHz



Test Report No : 26FE0133-YK-F1

APPENDIX 3 Test Instruments

EMI test equipment

Control No.	Instrument	Manufacturer	Model No	Test Item	Calibration Date * Interval(month)
KAEC-01(NSA)	Anechoic Chamber	JSE	Semi 3m	RE	2005/09/03 * 12
KAF-02	Pre Amplifier	Hewlett Packard	8449B	RE	2005/04/28 * 12
KAF-05	Pre Amplifier	Agilent	8447D	RE	2005/05/11 * 12
KAT10-S1	Attenuator	Agilent	8449D 010	RE	2005/04/12 * 12
KAT10-S2	Attenuator	Agilent	8490D 010	RE	2005/11/10 * 12
KAT6-01	Attenuator	INMET	18N-6dB	RE	2005/04/07 * 12
KBA-03	Biconical Antenna	Schwarzbeck	BBA9106	RE	2006/01/17 * 12
KCC-14/15/16 /18/KPL-01	Coaxial Cable/Pulse Limiter	Fujikura/Suhner/PMM	5D-2W/8D-2W/S042 72B/S04272B/PL01	CE	2005/06/14 * 12
KCC-30/31/32 /34	Coaxial Cable	Fujikura/Suhner	5D-2W/S04272B	RE	2005/12/22 * 12
KCC-D7	Coaxial Cable	Advantest	A01002	AT	2005/04/12 * 12
KCC-D14/D15	Coaxial cable	Suhner	SUCOFLEX 104	RE	2005/12/28 * 12
KDT-01	Coaxial Crystal Detector	Agilent	8473C	AT	Pre Check
KHA-01	Horn Antenna	A.H.Systems	SAS-200/571	RE	2005/08/20 * 12
KLA-03	Logperiodic Antenna	Schwarzbeck	USLP9143	RE	2006/01/17 * 12
KLS-01	LISN(AMN)	Schwarzbeck	NSLK8126	CE	2005/05/10 * 12
KLS-02	LISN(AMN)	Schwarzbeck	NSLK8127	CE (EUT)	2005/10/12 * 12
KSA-01	Spectrum Analyzer	Advantest	R3365	CE	2005/07/06 * 12
KSA-04	Spectrum Analyzer	Advantest	R3271A	RE	2005/09/13 * 12
KTM-01	Terminator	TME	CT-01BP	CE	2005/04/07 * 12
KTR-01	Test Receiver	Rohde & Schwarz	ESI40	RE/AT	2005/08/05 * 12
KTR-02	Test Receiver	Rohde & Schwarz	ESCS30	CE	2005/11/10 * 12
KFL-07	High Pass Filter	K&L MICROWAVE	11SH10-2000/U8000 -0/0	RE	2005/04/12 * 12
KST-09	Digitizing Oscilloscope	Tektronix	TDS420A	AT	2005/08/31 * 12

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

Test Item:

- CE: Conducted Emission
- RE: Out of Band Emission (Radiated)
- AT: Antenna terminal conducted test
 - 1: Carrier Frequency Separation
 - 2: 20dB Bandwidth
 - 3: Number of Hopping Frequency
 - 4: Dwell Time
 - 5: Maximum Peak Output Power
 - 6: Out of Band Emission (Conducted)