EMI TEST REPORT

Test Report No. : 24HE0268-HO-1

Applicant	:	**SATO CORPORATION**
Type of Equipment	:	**RFID Reader/Writer Module**
Model No.	:	**TR3-C101**
Test standard	:	**FCC Part 15 Subpart C : 2004 Section 15.207 and 15.225**
FCC ID	:	**MMFSATOTR3**
Test Result	:	**Complied**

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

Date of test: May 28, June 7, 15 and 21, 2004

Tested by:

Kenichi Adachi
EMC Service

Makoto Kosaka
EMC Service

Approved by :

Naoki Sakamoto
Group Leader of
EMC Service

UL Apex Co., Ltd.
Head Office EMC Lab.
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN
Telephone : +81 596 24 8116
Facsimile : +81 596 24 8124

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SECTION 1: Client information

Company Name	:	SATO CORPORATION
Brand name	:	SATO
Address	:	1-207, Onari-cho, Omiya-ku, Saitama-shi, Saitama 330-0852 Japan
Telephone Number	:	+81-48-663-8118
Facsimile Number	:	+81-48-651-6662
Contact Person	:	Masayuki Sato

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

2.1 Identification of E.U.T.

Type of Equipment	:	RFID Reader/Writer Module
Model No.	:	TR3-C101
Serial No.	:	03051119
Rating	:	DC 5.0V
Country of Manufacture	:	Japan
Receipt Date of Sample	:	April 27, 2004
Condition of EUT	:	Engineering prototype (Not for Sale: This sample is equivalent to mass-produced items.)

2.2 Product Description

Model No: TR3-C101 is the RFID Reader/Writer Module.
This modular transmitter will be equipped only on Tabletop label printer, which is produced by SATO CORPORATION or the manufacturer consigned the production by SATO CORPORATION.

Equipment Type	:	Transceiver
Frequency of Operation	:	13.56 MHz
Type of modulation	:	Amplitude Modulation
Power control	:	No
Mode of operation	:	Simplex
Antenna Type	:	Loop Antenna
Method of Frequency Generation	:	Crystal
Operating Temperature	:	0 deg. C. to +55 deg. C.

FCC Part 15.31 (e)
The modular transmitter does not have its own power supply, but regulated power of 5.0V is supplied from host equipment Tabletop label printer. Therefore, the equipment meets this requirement.

FCC Part 15.203 Antenna requirement
The modular transmitter must comply with the antenna requirements of Section 15.203. The modular transmitter is installed in the end product by the professionals. Neither antenna nor cable is to be exchanged with any other replacement. Neither does the length of cable change.

SECTION 3: Test specification, procedures & results

3.1 Test Specification

Test Specification : FCC Part15 Subpart C : 2004

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– 14.010 MHz

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	Section 15.207	-	N/A	*See the worst margins(marked as shading) in the data sheet in APPENDIX 3 . .	Complied
2	Electric Field Strength of Fundamental Emission	ANSI C63.4:2003 13. Measurement of intentional radiators	Section 15.225(a)	Radiated	N/A		Complied
3	Spectrum Mask	ANSI C63.4:2003 13. Measurement of intentional radiators	Section 15.225(b)(c)	Radiated	N/A		Complied
4	-20dB Bandwidth	ANSI C63.4:2003 13. Measurement of intentional radiators	Section 15.215(c)	Radiated	N/A		Complied
5	Electric Field Strength of Spurious Emission	ANSI C63.4:2003 13. Measurement of intentional radiators	Section15.209, Section 15.225 (d)	Radiated	N/A		Complied
6	Frequency Tolerance	ANSI C63.4:2003 13. Measurement of intentional radiators	Section15.225(e)	Radiated	N/A		Complied

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

Uncertainty:

*In case of the margin below the EMC Head Office's uncertainty.
The data listed in this report meets the limits unless the uncertainty is taken into consideration.

Conducted Emission

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

Spurious Emission (Radiated)

The measurement uncertainty (with a 95% confidence level) for this test using Loop antenna is ±1.9dB(3m)/ ±1.8dB(10m).
The measurement uncertainty (with a 95% confidence level) for this test using Biconical antenna is ±4.5dB(3m)/ ±4.7dB(10m).
The measurement uncertainty (with a 95% confidence level) for this test using Logperiodic antenna is ±5.2dB(3m)/ ±3.8dB(10m).
The measurement uncertainty (with a 95% confidence level) for this test using Horn antenna is ±6.6dB.

Other test except Conducted Emission and Spurious Emission (Radiated)

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

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

3.3 Addition to standards

No.	Item	Test Procedure	Specification	Remarks	Deviation	Worst margin	Results
1	99% Occupied Band Width	RSS210(issue 5): 2001 + Amendment:2002 + Amendment2:2003 + Amendment3:2004	RSS210(issue 5): 2001 + Amendment:2002 + Amendment2:2003 + Amendment3:2004	Radiated	N/A	N/A	Complied

3.4 Confirmation

UL Apex Co., Ltd. hereby confirms that E.U.T., in the configuration tested, complies with the specifications FCC Part 15 Subpart C: 2004 Section 15.225.

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

	Listed date (for NVLAP)	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	February 01, 2002	313583	IC4247	19.2 x 11.2 x 7.7m	7.0 x 6.0m	Preparation room
No.2 semi-anechoic chamber	June 05, 2002	846015	IC4247-2	7.5 x 5.8 x 5.2m	4.0 x 4.0m	-
No.3 shielded room	-	-	-	4.7 x 7.5 x 2.7m	4.7 x 7.5m	-
No.4 measurement room	-	-	-	3.1 x 5.0 x 2.7m	N/A	-

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

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

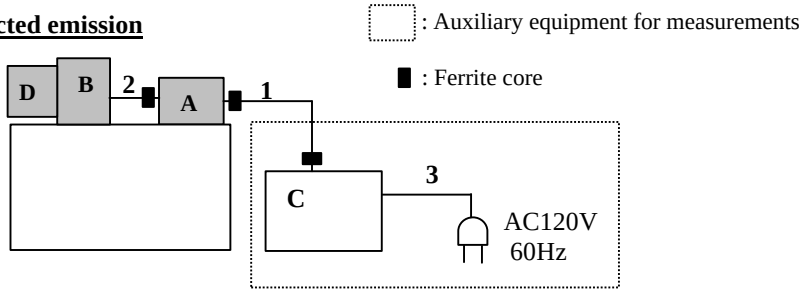
The sequence is used : Running mode (Communication mode (Transmitting))

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

Frequency Tolerance:
Temperature for the extreme tests : 0deg.C.(minimum) to + 55deg.C.(maximum)
Voltage for the extreme tests : DC 5.0V
*This EUT provides stable voltage (DC5.0V) constantly to RF Module regardless of input voltage.

4.2 Configuration and peripherals

4.2.1 Except for Conducted emission



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

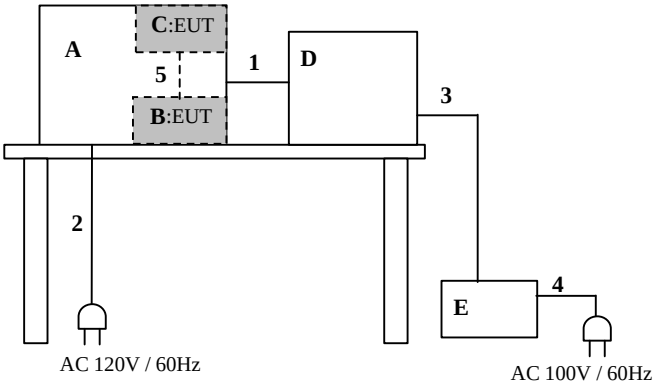
Description of EUT and Support equipment

No.	Item	Model number	Serial number	Manufacturer	FCC ID	Remark
A	RFID module	TR3-C101	03051119	SATO CORPORATION	MMFSATOTR3	EUT
B	ANTENNA UNIT	TR3-A301-3	1	SATO CORPORATION	MMFSATOTR3	EUT
C	Tabletop label printer	CL412e	21190091	SATO CORPORATION	-	-
D	IC Tag	-	-	SATO CORPORATION	MMFSATOTR3	EUT

List of cables used

No.	Name	Length (m)	Shield	Backshell Material
1	I/F CABLE	0.9	N	Polyvinyl chloride
2	ANTENNA CABLE	0.3	Y	Polyvinyl chloride
3	AC CORD	2	N	Polyvinyl chloride

4.2.2 for Conducted emission



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

Description of EUT and Support equipment

No.	Item	Model number	Serial number	Manufacturer	FCC ID	Remark
A	Tabletop label printer	CL412e	21190091	SATO CORPORATION	-	
B	RFID module	TR3-C101	03051119	SATO CORPORATION	MMFSATOTR3	EUT
C	Antenna Unit	TR3-A301-3	1	SATO CORPORATION	MMFSATOTR3	EUT
D	Personal Computer	CF-L1EA	0DKSB09673	Panasonic	-	
E	AC Adapter	CF-AA1639	000451726A	Panasonic	-	

List of cables used

No.	Name	Length (m)	Shield	Backshell Material
1	IEEE1284 cable	1.7	Y	Polyvinyl chloride
2	AC CORD	3	N	Polyvinyl chloride
3	DC cable	2	N	Polyvinyl chloride
4	AC cable	2	N	Polyvinyl chloride
5	ANTENNA CABLE	0.3	Y	Polyvinyl chloride

SECTION 5: Conducted Emission, Section 15.207

Test Procedure

EUT was placed on a platform of nominal size, 1m by 1.5m, raised 80cm above the conducting ground plane.
The rear of tabletop was located 40cm to the vertical conducting plane. The rear of EUT, including peripherals aligned and flushed with rear of tabletop. All other surfaces of tabletop were at least 80cm from any other grounded conducting surface. EUT was located 80cm from a Line Impedance Stabilization Network (LISN)/ Artificial mains Network (AMN) and excess AC cable was bundled in center .
1) For the tests on EUT with other peripherals (as a whole system)
I/O cable and AC 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.
2) For the tests on EUT itself (as a stand alone equipment)
Each EUT current-carrying power lead, except the ground (safety) lead, was individually connected through a LISN /(AMN) to the input power source. All unused 50ohm connectors of the LISN(AMN) were resistively terminated in 50ohm when not connected to the measuring equipment.
The AC Mains Terminal Continuous disturbance Voltage has been measured with the EUT in a Semi Anechoic Chamber or a Measurement Room.
The EUT was connected to a LISN (AMN).
An overview sweep with peak detection has been performed.
The measurements have been performed with CISPR quasi-peak and Average detector (IF BW 9 kHz).
Measurement range: 0.15-30MHz

Test data : APPENDIX 3
Test result : Pass

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

5.1 Operating environment

The test was carried out in a No.1 semi Anechoic Chamber(below 30MHz), and No.2 semi anechoic chamber (above 30MHz).

Temperature & Humidity : See data

5.2 Test configuration

EUT was placed on a platform of nominal size, 1m by 1.5m, raised 80cm above the conducting ground plane.
The EUT was set on the center of the tabletop and the peripheral was aligned and flushed with rear of tabletop.
Test was made with the Loop antenna positioned in 0° to 180° of the polarization.
Test was made with the Biconical, and Logperiodic antenna positioned in both the horizontal and vertical planes of polarization. The center of the Loop antenna was 1 m height from the ground plane.
The Biconical, and Logperiodic antenna was varied in height above the conducting ground plane to obtain the maximum signal strength.A drawing of the set up is shown in the photos of APPENDIX 1.

5.3 Test conditions

Frequency range	: 9kHz -30MHz	: 30MHz-1000MHz
Test distance	: 10m	: 3 m
EUT position	: Tabletop	: Tabletop
EUT operating mode	: Transmitting	: Transmitting

5.4 Test procedure

The Radiated Electric Field Strength intensity has been measured on a semi anechoic chamber with a ground plane and at a distance of 10m (9kHz-30MHz) and 3m (30-1000MHz).
Measurements were performed with quasi-peak, average and peak detector.
The measuring antenna height was varied between 1 to 4m and EUT was rotated a full revolution in order to obtain the maximum value of the electric field intensity (30-1000MHz).
The measurements were performed for 0° to 180° (Loop antenna) or vertical and horizontal (Biconical and Logperiodic antenna) antenna polarization.
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

Remarks : 13.553MHz and 13.567MHz(Bandedges)
IF Bandwidth 1kHz, Detector Type peak.
This is a reference data for the confirmation of complied Bandedges.

Distance Factor : Part 15 Section 15.31 (f)(2) (9kHz-30MHz)
[Limit at 10m]=[Limit at 300m]-40 x log (10[m]/300[m])
[Limit at 10m]=[Limit at 30m]-40 x log (10[m]/30[m])

Pre-scanning measurement was conducted by shifting the three axes (X, Y and Z) of the position of the RF Module Board and the Antenna. There was no change in the level of spurious and fundamental wave when shifting the three axes of the position of RF Module Board; however, there was a change in the level of spurious and fundamental wave when shifting the three axes of the Antenna position. The formal testing was scanned to detect the maximum level of spurious and fundamental wave by shifting the three axes of the Antenna position.

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 3**
Test result : **Pass**

SECTION 8: 99% Occupied Bandwidth

Test Procedure

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

Test data : **APPENDIX 3**
Test result : **Pass**

SECTION 9: Frequency Tolerance

Test Procedure

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

Test data : **APPENDIX 3**
Test result : **Pass**

APPENDIX 1: Photographs of test setup

Conducted emission

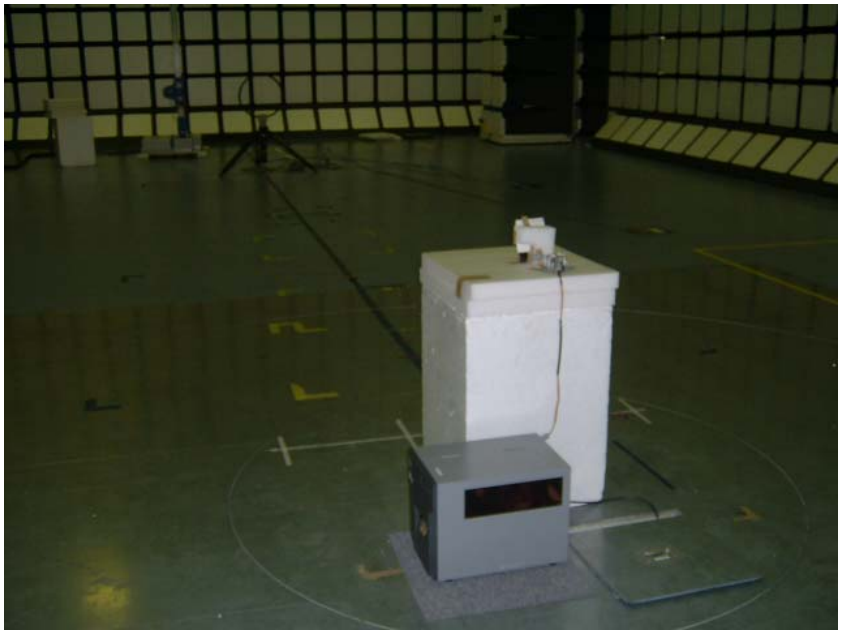
Front

Rear

Radiated emission

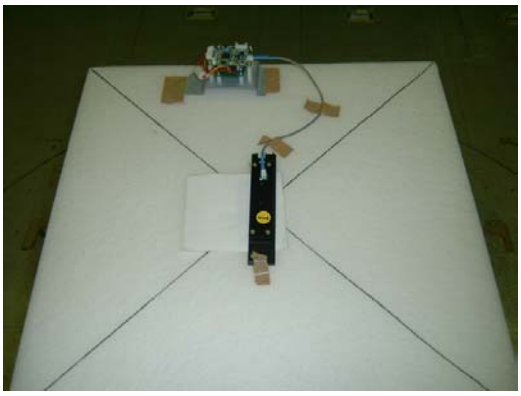
Front

Rear

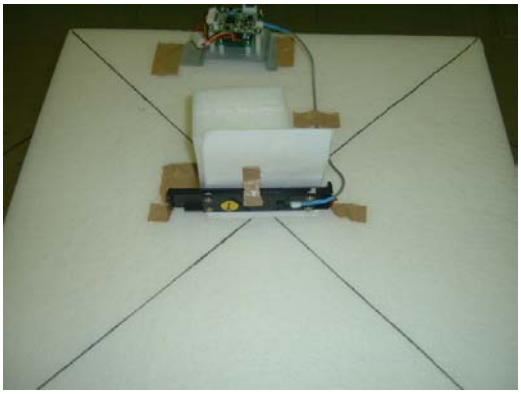


Worst Case Position (Z-axis)

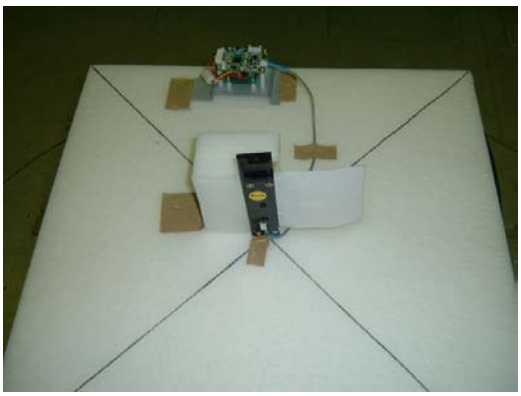
X-axis



Y-axis



Z-axis



APPENDIX 2: Test instruments

Control No.	Instrument	Manufacturer	Model No	Test Item	Calibration Date * Interval(month)
MAEC-01	Anechoic Chamber	TDK	Semi Anechoic Chamber 10m	RE	2003/12/27 * 12
MCH-01	Temperature and Humidity Chamber	Tabai Espec	PL-2KP	FT	2003/12/18 * 12
MTR-01	Test Receiver	Rohde & Schwarz	ESI40	RE	2003/11/12 * 12
MCC-03	Coaxial Cable	Fujikura/Suhner/Agilent/TSJ	-	RE	2003/12/24 * 12
MPA-04	Pre Amplifier	Agilent	8447D	RE	2004/05/25 * 12
MAT-06	Attenuator(6dB)	Weinschel Corp	2	RE	2003/12/16 * 12
MAT-10	Attenuator(10dB)	Weinschel Corp	2	RE	2003/12/16 * 12
MCC-07	coaxial cable	-	-	RE	2004/01/26 * 12
MCC-08	coaxial cable	-	-	RE	2004/01/26 * 12
MLPA-01	Loop Antenna	Rohde & Schwarz	HFH2-Z2	RE	2004/01/08 * 12
MAEC-02	Anechoic Chamber	TDK	Semi Anechoic Chamber 3m	RE / CE	2004/04/12 * 12
MTR-02	Test Receiver	Rohde & Schwarz	ESCS30	RE / CE	2004/02/03 * 12
MRENT-09	Spectrum Analyzer	Advantest	R3273	RE / CE / FT	2004/02/18 * 12
MCC-12	Coaxial Cable	Fujikura/Agilent	-	RE	2004/02/24 * 12
MPA-02	Pre Amplifier	Agilent	87405A	RE	2004/04/16 * 12
MAT-07	Attenuator(6dB)	Weinschel Corp	2	RE	2003/12/16 * 12
MBA-02	Biconical Antenna	Schwarzbeck	BBA9106	RE	2003/10/15 * 12
MLA-02	Logperiodic Antenna	Schwarzbeck	USLP9143	RE	2003/10/15 * 12
MLS-06	LISN(AMN)	Schwarzbeck	NSLK8127	CE (EUT)	2004/02/17 * 12
MLS-07	LISN(AMN)	Schwarzbeck	NSLK8127	CE (AE)	2004/02/17 * 12
MTA-06	Termination	MCL	BTRM-50	CE	2004/02/16 * 12

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

Test Item:

CE: Conducted emission,
RE: Radiated emission,
FT: Frequency Tolerance

APPENDIX 3: Data of EMI test

Conducted emission

DATA OF CONDUCTED EMISSION TEST

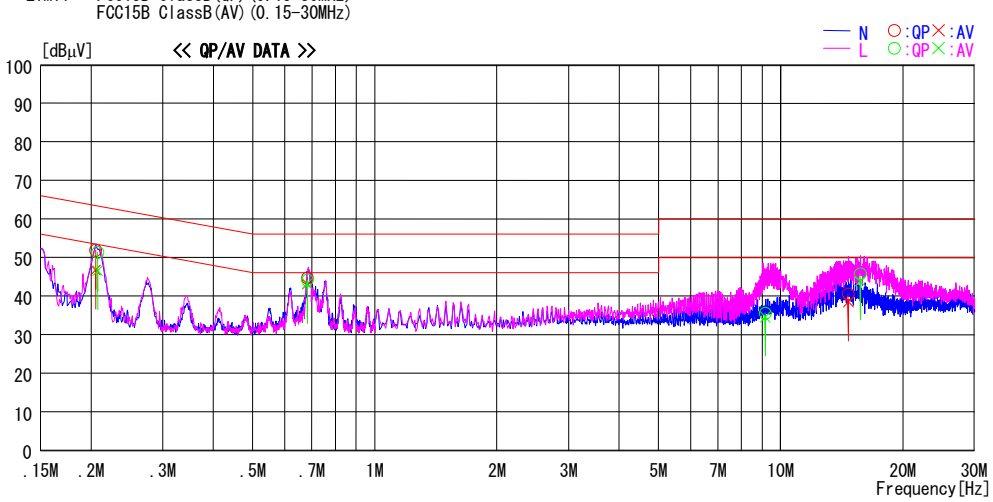
UL Apex Co., Ltd. Head Office EMC Lab. No.2 Semi Anechoic Chamber
Date : 2004/05/28 03:09:57

Applicant : SATO CORPORATION
Kind of EUT : BAR CODE PRINTER
Model No. : CL412e
Serial No. : 21190091

Report No. : 24HE0268-HO
Power : AC120V / 60Hz
Temp./Humi. : 24 deg.C/ 51 %
Operator : Kenichi Adachi

Mode / Remarks : Running Mode

LIMIT : FCC15B ClassB(QP)(0.15-30MHz)
FCC15B ClassB(AV)(0.15-30MHz)



NO	FREQ	READING QP	READING AV	C.F	RESULT QP	RESULT AV	LIMIT QP	LIMIT AV	MARGIN QP	MARGIN AV	PHASE
	[MHz]	[dBμV]	[dBμV]	[dB]	[dBμV]	[dBμV]	[dBμV]	[dBμV]	[dB]	[dB]	
1	0.2050	51.8	46.7	0.0	51.8	46.7	63.4	53.4	11.6	6.7	N
2	0.6808	44.5	42.9	0.1	44.6	43.0	56.0	46.0	11.4	3.0	N
3	14.6438	39.3	37.2	1.2	40.5	38.4	60.0	50.0	19.5	11.6	N
4	0.2072	51.3	46.5	0.0	51.3	46.5	63.3	53.3	12.0	6.8	L
5	0.6810	44.0	43.0	0.1	44.1	43.1	56.0	46.0	11.9	2.9	L
6	9.1269	34.5	33.5	1.0	35.5	34.5	60.0	50.0	24.5	15.5	L
7	15.6685	44.5	42.6	1.2	45.7	43.8	60.0	50.0	14.3	6.2	L

CHART:WITHOUT FACTOR,Peak hold data.Data is uncorrected.
Except for the above table : adequate margin data below the limits.

Radiated emission(Fundamental emission and Spectrum Mask)

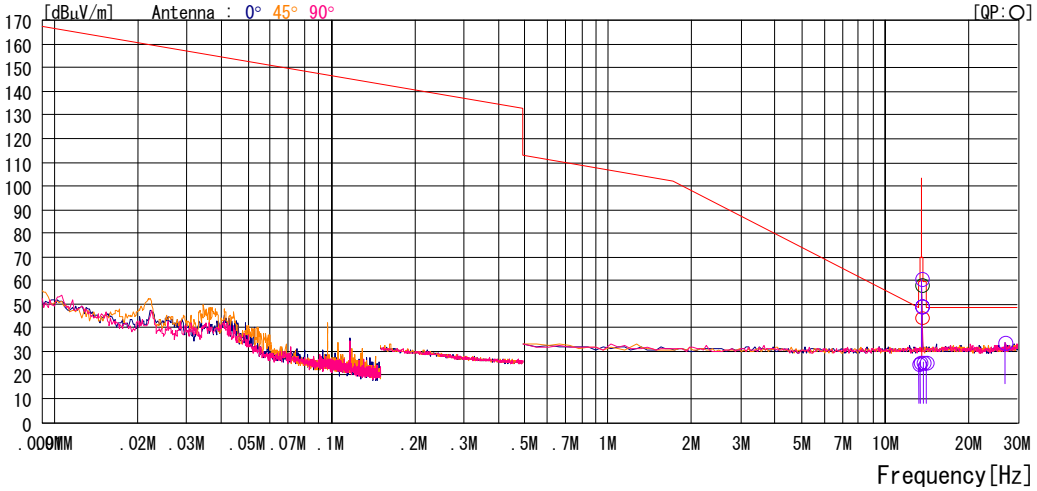
DATA OF MAGNETIC RADIATED EMISSION TEST

UL Apex Co.,LTD. Head Office EMC Lab. No.1 Semi Anechoic Chamber
Date : 2004/06/07 21:04:34

Applicant	: Sato Corporation	Report No.	: 24HE0268-HO
Kind of EUT	: RFID Module	Power	: AC120V / 60Hz
Model No.	: TR3-C101	Temp. / Humi.	: 26 deg.C. / 60 %
Serial No.	: 03051119	Operator	: Kenichi Adachi

Mode / Remarks : 9kHz-30MHz Tx,Rx Max_Axis(Z-axis)

LIMIT : FCC15C §15.225(a)(b)(c)(d) 10m



No.	FREQ [MHz]	READING QP [dBμV]	ANT FACTOR [dB]	LOSS [dB]	RESULT [dBμV/m]	LIMIT [dBμV/m]	MARGIN [dB]	ANTENNA	TABLE [DEG]
1	13.560	41.1	20.2	-17.0	44.3	103.0	58.7	0°	175
2	13.560	55.0	20.2	-17.0	58.3	103.0	44.7	45°	315
3	13.110	21.9	20.1	-17.0	25.0	48.6	23.6	90°	285
4	13.410	22.0	20.2	-17.0	25.2	59.5	34.3	90°	285
5	13.553	45.9	20.2	-17.0	49.1	69.5	20.4	90°	285
6	13.560	57.5	20.2	-17.0	60.7	103.0	42.3	90°	285
7	13.567	46.0	20.2	-17.0	49.2	69.5	20.3	90°	285
8	13.710	22.0	20.2	-17.0	25.2	59.5	34.3	90°	285
9	14.010	21.9	20.2	-17.0	25.1	48.6	23.5	90°	285
10	27.120	29.3	20.8	-16.4	33.7	48.6	14.9	90°	206

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

Page:

Radiated emission (Spurious emission : above 30MHz)

DATA OF RADIATED EMISSION TEST

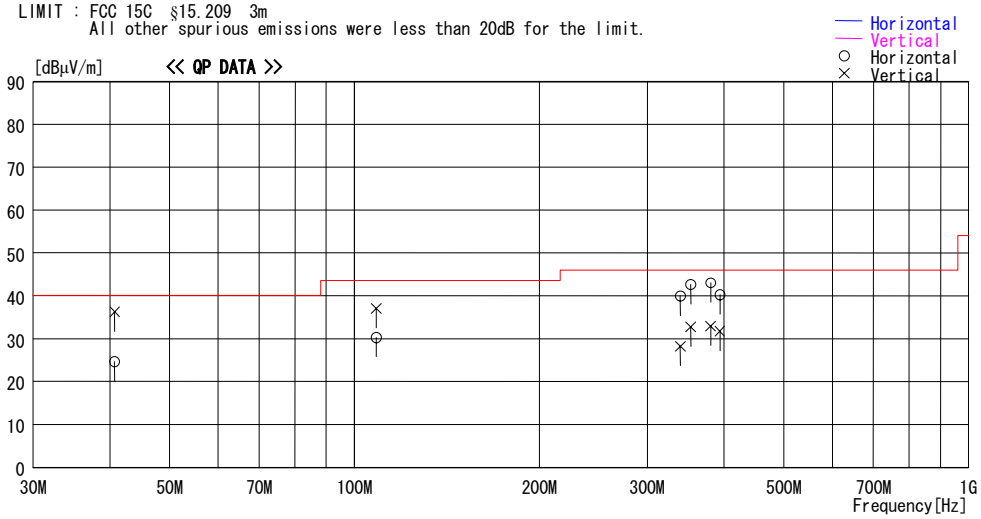
UL Apex Co., Ltd. Head Office EMC Lab. No.2 Semi Anechoic Chamber
Date : 2004/06/15 12:22:02

Applicant : Sato Corporation
Kind of EUT : RFID module
Model No. : TR3-C101
Serial No. : 03051119

Report No. : 24HE0268-HO
Power : AC120V / 60Hz
Temp. / Humi. : 25 deg.C. / 57 %
Operator : Kenichi Adachi

Mode / Remarks : Tx, Rx, Max_Axis (Z-axis)

LIMIT : FCC 15C §15.209 3m
All other spurious emissions were less than 20dB for the limit.



No.	FREQ [MHz]	READING QP [dBμV]	ANT FACTOR [dB/m]	LOSS [dB]	GAIN [dB]	RESULT [dBμV/m]	LIMIT [dBμV/m]	MARGIN [dB]	ANTENNA [cm]	TABLE [DEG]
----- Horizontal ------										
1	40.685	27.8	13.4	6.6	23.2	24.6	40.0	15.4	280	197
2	108.487	34.5	11.4	7.3	22.9	30.3	43.5	13.2	280	123
3	339.007	38.5	15.7	8.5	22.8	39.9	46.0	6.1	100	267
4	352.563	40.5	16.3	8.5	22.7	42.6	46.0	3.4	100	255
5	379.690	39.7	17.4	8.7	22.8	43.0	46.0	3.0	100	277
6	393.246	36.2	18.0	8.8	22.8	40.2	46.0	5.8	100	258
----- Vertical ------										
7	40.683	39.4	13.4	6.6	23.2	36.2	40.0	3.8	100	279
8	108.484	41.2	11.4	7.3	22.9	37.0	43.5	6.5	100	165
9	339.002	26.8	15.7	8.5	22.8	28.2	46.0	17.8	116	201
10	352.566	30.6	16.3	8.5	22.7	32.7	46.0	13.3	140	166
11	379.682	29.6	17.4	8.7	22.8	32.9	46.0	13.1	126	164
12	393.248	27.7	18.0	8.8	22.8	31.7	46.0	14.3	126	306

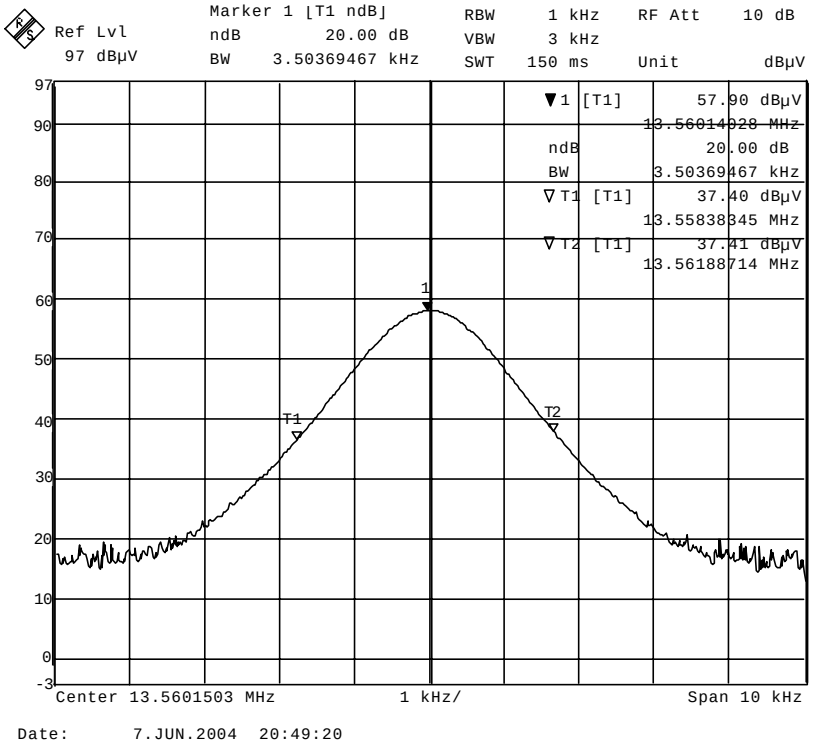
CHART:WITH FACTOR ANT TYPE : -30MHz LOOP, 30-300MHz BICONICAL, 300MHz-1000MHz LOGPERIODIC, 1000MHz- HORN
CALCULATION:RESULT = READING + ANT FACTOR + LOSS(CABLE+ATTEN.) - GAIN(AMP)

–20dB Bandwidth

UL Apex Co., Ltd.
No1 SEMI ANECHOIC CHAMBER

COMPANY	:	Sato Corporation	REPORT NO	:	24HE0268-HO
EQUIPMENT	:	RFID module	REGULATION	:	FCC 15.215(c)
MODEL	:	TR3-C101	TEST DISTANCE	:	10m
S/ N	:	03051119	DATE	:	06/07/2004
POWER	:	AC120V / 60Hz	TEMPERATURE	:	26 deg. C
MODE	:	TRANSMITTING	HUMIDITY	:	60%
			ENGINEER	:	Kenichi Adachi

FREQ [MHz]	-20dB Bandwidth [kHz]
13.56	3.50

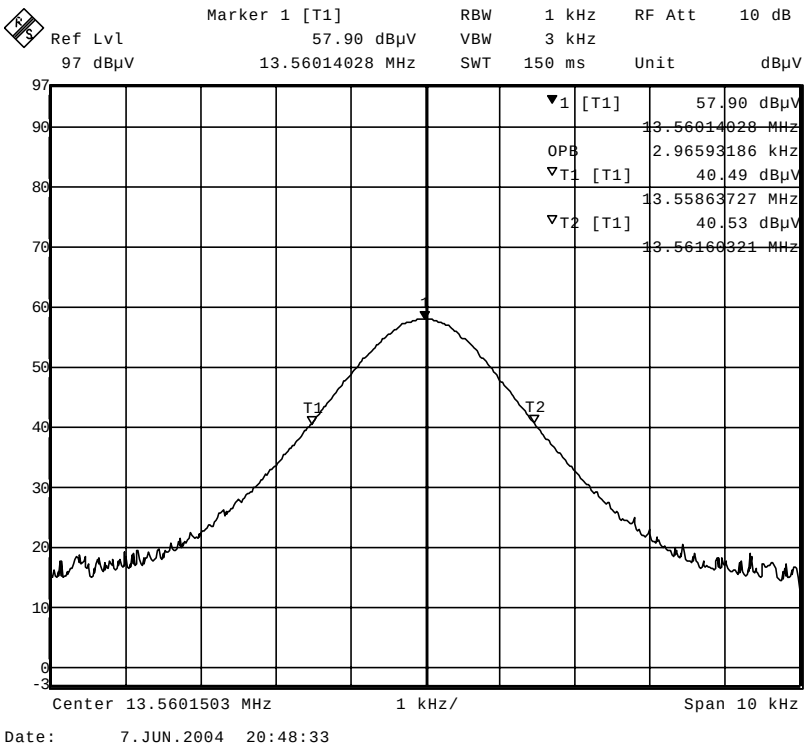


99% Occpied Bandwidth

UL Apex Co., Ltd.
No1 SEMI ANECHOIC CHAMBER

COMPANY	:	Sato Corporation	REPORT NO	:	24HE0268-HO
EQUIPMENT	:	RFID module	REGULATION	:	RSS-210
MODEL	:	TR3-C101	TEST DISTANCE	:	10m
S/ N	:	03051119	DATE	:	06/07/2004
POWER	:	AC 120V / 60Hz	TEMPERATURE	:	26 deg. C
MODE	:	TRANSMITTING	HUMIDITY	:	60%
			ENGINEER	:	Kenichi Adachi

FREQ [MHz]	99% Occpied Bandwidth [kHz]
13.56	2.97



Frequency Tolerance

UL Apex Co., Ltd.
No.3 Measurement room

COMPANY	:	Sato Corporation	REPORT NO	:	24HE0268-HO
EQUIPMENT	:	RFID module	REGULATION	:	FCC 15.225 (e)
MODEL	:	TR3-C101	TEST DISTANCE	:	-
S/ N	:	03051119	DATE	:	06/21/2004
POWER	:	AC120V / 60Hz	TEMPERATURE	:	22 deg. C
MODE	:	TRANSMITTING	HUMIDITY	:	49%
			ENGINEER	:	Makoto Kosaka

Test Condition	Test Timing	FREQ [MHz]	Result	Limit	Margin
T nom 20℃ Vnom AC120V	Power on	13.560104	0.000767%	0.010000%	0.009233%
	on 2min.	13.560104	0.000767%	0.010000%	0.009233%
	on 5min.	13.560103	0.000760%	0.010000%	0.009240%
	on 10min.	13.560103	0.000760%	0.010000%	0.009240%
T min -20℃ Vnom AC120V	Power on	13.559983	-0.000125%	0.010000%	0.009875%
	on 2min.	13.560002	0.000015%	0.010000%	0.009985%
	on 5min.	13.560006	0.000044%	0.010000%	0.009956%
	on 10min.	13.560006	0.000044%	0.010000%	0.009956%
T max 50℃ Vnom AC120V	Power on	13.560108	0.000796%	0.010000%	0.009204%
	on 2min.	13.560112	0.000826%	0.010000%	0.009174%
	on 5min.	13.560115	0.000848%	0.010000%	0.009152%
	on 10min.	13.560116	**0.000855%**	0.010000%	**0.009145%**

Limit : 13.56 MHz +/-0.01 %