



## EMI TEST REPORT

Test Report No. : 24GE0192-HO-1

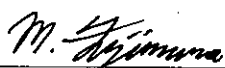
Applicant : SATO CORPORATION  
Type of Equipment : Wireless LAN SiP Module  
Model No. : WM-B-AG-02  
Test standard : FCC Part 15 Subpart C  
Section 15.207, Section 15.247 : 2003  
FCC ID : MMFMB200-W1  
Test Result : Complied

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:

March 11, 17, April 20 and May 12

Tested by:

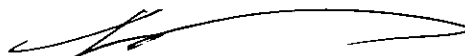


Mitsuru Fujimura  
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## **SECTION 1: Client information**

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 : Masahiko Nanri

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

### **2.1 Identification of E.U.T.**

Type of Equipment : Wireless LAN SiP Module  
Model No. : WM-B-AG-02  
Serial No. : 03UT02481658  
Country of Manufacture : Malaysia  
Rating : DC 3.3V  
Receipt Date of Sample : March 11, 2004  
Condition of EUT : Engineering Prototype  
(Not for Sale: This sample is equivalent to mass-produced items.)

### **2.2 Product Description**

SATO CORPORATION, Model No: WM-B-AG-02 is the Wireless LAN module.

#### **[IEEE 802.11b]**

Equipment Type : Transceiver  
Frequency of operation : 2412-2462MHz  
Type of modulation : DSSS  
Channel spacing : 5MHz  
Channel number : 11  
Antenna Type : chip Antenna  
Antenna connector Type : W, FL-LP-N  
Antenna Gain : 2.044 dBi  
ITU code : G1D  
Power Supply : DC3.3V  
Temperature of operation : +5 deg. C. to +35 deg. C.

#### **FCC 15.31 (e)**

The modular transmitter does not have its own power supply, but regulated power of 3.3V is supplied from host equipment Bar code 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.

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## SECTION 3: Test specification, procedures & results

### 3.1 Test Specification

Test Specification : FCC Part15 Subpart C : 2003

Title : FCC 47CFR Part15 Radio Frequency Device Subpart C Intentional Radiators  
Section 15.207 Conducted limits : 2003  
Section 15.247 Operation within the bands 902-928MHz,  
2400-2483.5MHz, and 5725-5850MHz : 2003

### 3.2 Procedures and results

#### [DSSS and other forms of modulation]

| No. | Item                                    | Test Procedure                                                     | Specification        | Remarks                | Deviation | Worst margin                                                              | Results  |
|-----|-----------------------------------------|--------------------------------------------------------------------|----------------------|------------------------|-----------|---------------------------------------------------------------------------|----------|
| 1   | Conducted emission                      | ANSI C63.4:2003<br>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   | 6dB Bandwidth                           | ANSI C63.4:2003<br>13. Measurement of intentional radiators        | Section 15.247(a)(2) | Conducted              | N/A       |                                                                           | Complied |
| 3   | Maximum Peak Output Power               | ANSI C63.4:2003<br>13. Measurement of intentional radiators        | Section 15.247(b)(3) | Conducted              | N/A       |                                                                           | Complied |
| 4   | Spurious Emission/Restricted Band Edges | ANSI C63.4:2003<br>13. Measurement of intentional radiators        | Section 15.247 (c)   | Conducted/<br>Radiated | N/A       |                                                                           | Complied |
| 5   | Restricted Band Edges                   | ANSI C63.4:2003<br>13. Measurement of intentional radiators        | Section 15.247 (c)   | Conducted              | N/A       |                                                                           | Complied |
| 6   | Power Density                           | ANSI C63.4:2003<br>13. Measurement of intentional radiators        | Section 15.247 (d)   | Conducted              | 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  $\pm 1.3\text{dB}$ .

#### Spurious Emission (Radiated)

The measurement uncertainty (with a 95% confidence level) for this test using Biconical antenna is  $\pm 4.5\text{dB}(3\text{m})/\pm 4.7\text{dB}(10\text{m})$ .

The measurement uncertainty (with a 95% confidence level) for this test using Logperiodic antenna is  $\pm 5.2\text{dB}(3\text{m})/\pm 3.8\text{dB}(10\text{m})$ .

The measurement uncertainty (with a 95% confidence level) for this test using Horn antenna is  $\pm 6.6\text{dB}$ .

#### Other test except Conducted Emission and Spurious Emission (Radiated)

The measurement uncertainty (with a 95% confidence level) for this test is  $\pm 3.0\text{dB}$ .

\*These tests were also referred to "Guidance on Measurement for Digital Transmission Systems Section15.247".

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

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### 3.3 Addition to standards

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

### 3.4 Test Location

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|                            | Listed date<br>(for FCC) | FCC<br>Registration<br>Number | IC<br>Registration<br>Number | Width x Depth x<br>Height (m) | Size of<br>reference ground<br>plane<br>(m) /<br>horizontal<br>conducting plane | Other<br>rooms   |
|----------------------------|--------------------------|-------------------------------|------------------------------|-------------------------------|---------------------------------------------------------------------------------|------------------|
| No.1 semi-anechoic chamber | February 01,<br>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,<br>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 shielded room.

### 3.5 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 and conducted testing was designed to exercise the various system components in a manner similar to typical use.

The sequence is used : [DSSS]

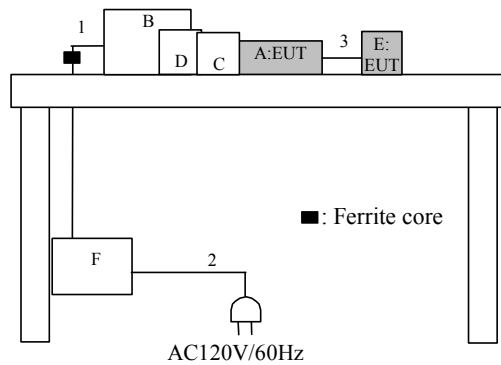
|                                |                 |
|--------------------------------|-----------------|
| Transmitting mode (CCK 11Mbps) |                 |
| Low Channel                    | :2412MHz (Ch1)  |
| Mid Channel                    | :2437MHz (Ch6)  |
| High Channel                   | :2462MHz (Ch11) |

The radio was transmitting at full power on the specified channels with the maximum allowed duty cycle and at a data rate of 11Mbps. Packet Type: Maximum, Payload : PN9.

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

## 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     | Remark                          |
|-----|-------------------------------|--------------|---------------|------------------|---------------------------------|
| A   | Wireless LAN module           | WM-B-AG-02   | 03UT02481658  | SATO CORPORATION | EUT,<br>FCC ID:<br>MMFMB200-W1  |
| B   | Notebook<br>Personal Computer | PAP301JC     | Y8038338      | TOSHIBA          | -                               |
| C   | CF-SPI Adaptor                | PCMK-G3X     | -             | SATO CORPORATION | -                               |
| D   | CF-PC card<br>Adaptor         | PCCF-ADP     | CMA1513776GS  | I O DATA         | -                               |
| E   | Antenna                       | -            | -             | SATO CORPORATION | EUT*1<br>FCC ID:<br>MMFMB200-W1 |
| F   | AC Adaptor                    | PA2501U      | 0273615       | TOSHIBA          | -                               |

\*1: Radiated Spurious emission only.

#### List of cables used

| No. | Name          | Length (m) | Shield | Backshell Material    |
|-----|---------------|------------|--------|-----------------------|
| 1   | DC cable      | 2.0        | N      | Polyvinyl chloride    |
| 2   | AC cable      | 1.0        | N      | Polyvinyl chloride    |
| 3   | Antenna cable | 0.05       | Y      | Polyvinyl chloride *1 |

\*1: Radiated spurious emission only.

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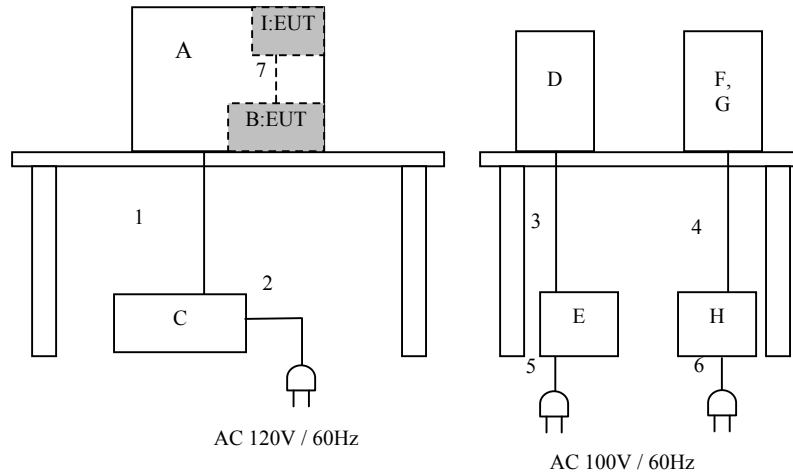
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#### 4.2.2 for Conducted emission



\* 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     | Remark                   |
|-----|---------------------------|----------------|----------------|------------------|--------------------------|
| A   | Barcode Printer           | MB200          | 206800001      | SATO CORPORATION | -                        |
| B   | Wireless LAN module       | WM-B-AG-02     | 03UT02481658   | SATO CORPORATION | EUT, FCC ID: MMFMB200-W1 |
| C   | AC Adapter                | SA130A-0930U-S | -              | SATO CORPORATION | -                        |
| D   | Wireless LAN Access Point | WLA-B11(2)A    | 36623144218862 | I O Data         | -                        |
| E   | AC Adapter                | B4A06D         | -              | I O Data         | -                        |
| F   | Pocket PC                 | CET0100A       | 101142447A1    | TOSHIBA          | -                        |
| G   | Wireless LAN card         | WLI-CF-S11G    | 16601421220445 | CONTEC           | -                        |
| H   | AC Adapter                | CEX0107A       | 0110-A-0036059 | TOSHIBA          | -                        |
| I   | Antenna                   | -              | -              | SATO CORPORATION | EUT, FCC ID: MMFMB200-W1 |

#### List of cables used

| No. | Name          | Length (m) | Shield | Backshell Material |
|-----|---------------|------------|--------|--------------------|
| 1   | DC cable      | 2.0        | N      | Polyvinyl chloride |
| 2   | AC cable      | 0.5        | N      | Polyvinyl chloride |
| 3   | DC cable      | 1.2        | N      | Polyvinyl chloride |
| 4   | DC cable      | 1.5        | N      | Polyvinyl chloride |
| 5   | AC cable      | 0.5        | N      | Polyvinyl chloride |
| 6   | AC cable      | 0.5        | N      | Polyvinyl chloride |
| 7   | Antenna cable | 0.05       | Y      | Polyvinyl chloride |

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## **[FHSS / DSSS and other forms of modulation's test requirements]**

### **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**

Remarks : Regarding Conducted Emission test, there is no change in the data among the channels, and therefore low channel .was tested as representative.

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## **SECTION 6: Spurious Emission 15.247(c)**

### **[Conducted]**

#### **Test Procedure**

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

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

### **[Radiated]**

#### **Test Procedure**

EUT was placed on a platform of nominal size, 1m by 1.5m, raised 80cm above the conducting ground plane.

The Radiated Electric Field Strength intensity has been measured in a Semi Anechoic Chamber with a ground plane and at a distance of 3m(Below 10GHz) and 1m(Upper 10GHz).

The height of the measuring 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 with the Test Receiver or the Spectrum Analyzer.

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.

The result also satisfied with the general limits specified in section 15.209(a).

|                 |               |                        |
|-----------------|---------------|------------------------|
| 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 Spurious emissions except Field strength of Fundamental and Harmonics could not be detected when the antenna board or antenna cable were not connected with the RF module board.

The configuration of the EUT was set up for the three axes of the antenna board.

The carrier level or, noise levels were measured at each position of all three axes X, Y and Z, and the position that has the maximum noise was determined.

With the position, the noise levels of all the frequencies was measured.

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

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## **SECTION 7: Bandwidth, Section 15.247(a)(1)(2)**

### **Test Procedure**

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

|             |              |
|-------------|--------------|
| Test data   | : APPENDIX 3 |
| Test result | : Pass       |

## **SECTION 8: Maximum Peak Output Power, Section 15.247(b)(1)(3)**

### **Test Procedure**

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

The test for Peak Power was made with the Peak Power Sensor for the board spectrum.

|             |              |
|-------------|--------------|
| Test data   | : APPENDIX 3 |
| Test result | : Pass       |

## **SECTION 9: Peak Power Density, Section 15.247 (d)**

**[Conducted]**

### **Test Procedure**

The Peak Power Density was measured with a spectrum analyzer connected to the antenna port.

|             |   |            |
|-------------|---|------------|
| Test data   | : | APPENDIX 3 |
| Test result | : | Pass       |

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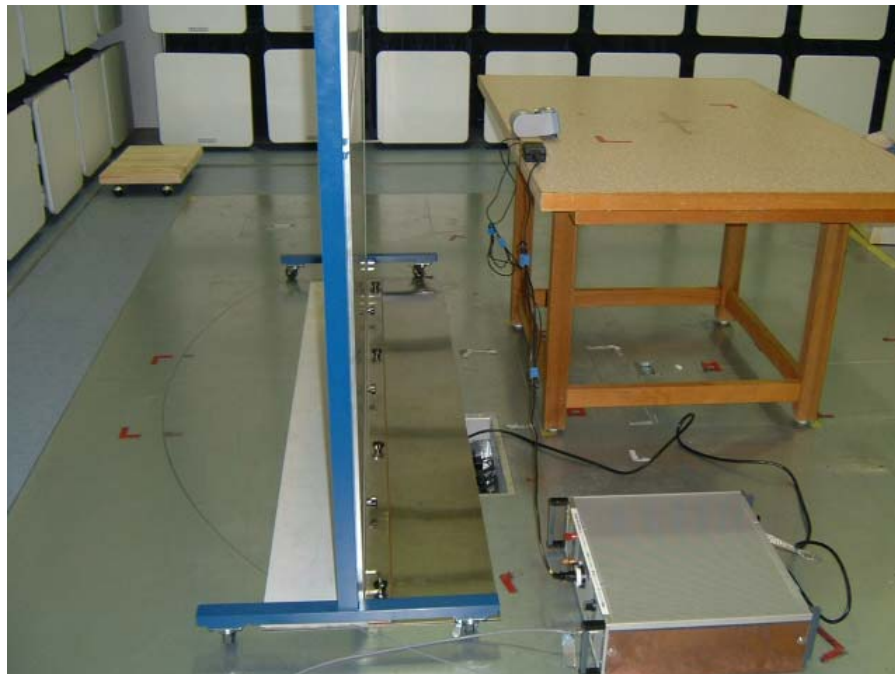
## **APPENDIX 1: Photographs of test setup**

### **Conducted Emission**

#### **Front**



#### **Rear**



**Spurious Emission (Radiated)**

**Front**



**Rear**

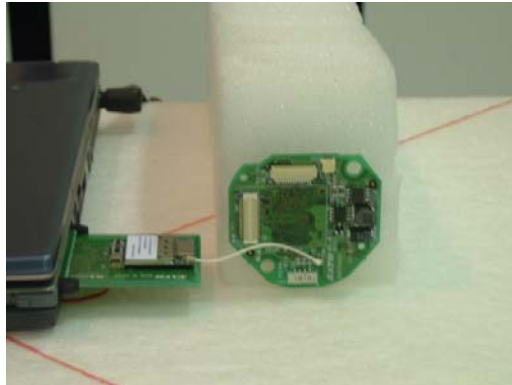


**Worst Case Position (X-axis:Horizontal / X-axis:Vertical)**

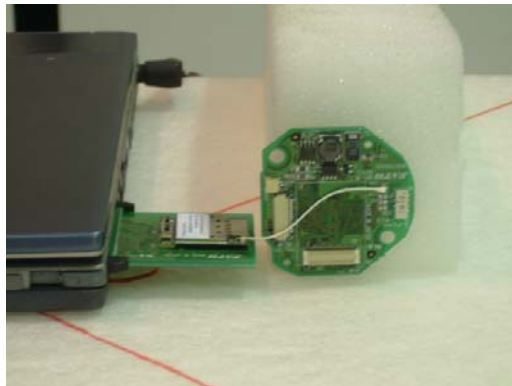
**X-axis**



**Y-axis**



**Z-axis**



## **APPENDIX 2:Test instruments**

### **EMI test equipment**

| Control No. | Instrument          | Manufacturer                | Model No                    | Test Item | Calibration Date *<br>Interval(month) |
|-------------|---------------------|-----------------------------|-----------------------------|-----------|---------------------------------------|
| MRENT-09    | Spectrum Analyzer   | Advantest                   | R3273                       | 2,4,5,6   | 2004/02/18 * 12                       |
| MAT-20      | Attenuator          | HIROSE ELECTRIC<br>CO.,LTD. | AT-110                      | 2,3,4,5,6 | 2004/01/28 * 12                       |
| MPM-04      | Power Meter         | Agilent                     | E4416A                      | 4         | 2004/03/03 * 12                       |
| MPSE-03     | Power sensor        | Agilent                     | E9327A                      | 4         | 2003/11/03 * 12                       |
| MAEC-02     | Anechoic Chamber    | TDK                         | Semi Anechoic<br>Chamber 3m | 3         | 2004/04/12 * 12                       |
| MTR-02      | Test Receiver       | Rohde & Schwarz             | ESCS30                      | 1,3       | 2004/02/03 * 12                       |
| MRENT-06    | Spectrum Analyzer   | Advantest                   | R3273                       | 1,3       | 2003/10/31 * 12                       |
| MCC-12      | Coaxial Cable       | Fujikura/Agilent            | -                           | 3         | 2004/02/24 * 12                       |
| MPA-02      | Pre Amplifier       | Agilent                     | 87405A                      | 3         | 2004/04/16 * 12                       |
| MAT-07      | Attenuator(6dB)     | Weinschel Corp              | 2                           | 3         | 2003/12/16 * 12                       |
| MBA-02      | Biconical Antenna   | Schwarzbeck                 | BBA9106                     | 3         | 2003/10/15 * 12                       |
| MLA-02      | Logperiodic Antenna | Schwarzbeck                 | USLP9143                    | 3         | 2003/10/15 * 12                       |
| MCC-04      | Microwave Cable     | Storm                       | 421-011                     | 3         | 2004/01/06 * 12                       |
| MPA-01      | Pre Amplifier       | Agilent                     | 8449B                       | 3         | 2004/02/06 * 12                       |
| MCC-24      | Microwave Cable     | Storm                       | -                           | 3         | 2004/05/01 * 12                       |
| MHA-06      | Horn Antenna        | Schwarzbeck                 | BBHA9120D                   | 3         | 2004/01/10 * 12                       |
| MHF-02      | High Pass Filter    | Tokimec                     | TF323DCA                    | 3         | 2003/09/19 * 12                       |
| MCC-13      | Coaxial Cable       | Fujikura/Agilent            | -                           | 1         | 2004/02/24 * 12                       |
| MLS-06      | LISN(AMN)           | Schwarzbeck                 | NSLK8127                    | 1         | 2004/02/17 * 12                       |

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

Test Item:

- 1: AC Main Conducted Emission
- 2: Antenna Terminal Conducted Spurious Emission
- 3: Radiated Spurious Emission
- 4: Maximum Peak Output Power
- 5: 6dB Bandwidth [DSSS]
- 6: Peak Output Power Density [DSSS]

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### APPENDIX 3: Data of EMI test

#### Conducted Emission

#### DATA OF CONDUCTED EMISSION TEST

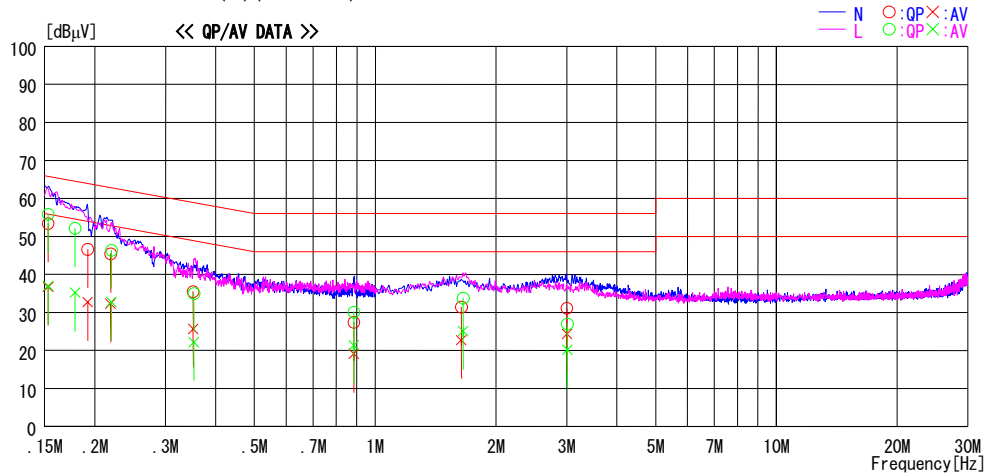
UL Apex Co., Ltd. Head Office EMC Lab. No.2 Semi Anechoic Chamber  
Date : 2004/03/17 02:02:09

Applicant : SATO CORPORATION  
Kind of EUT : W-LAN / BARCODE PRINTER  
Model No. : MB200  
Serial No. : 20680001

Report No. : 24GE0192-H0  
Power : AC120V / 60Hz  
Temp°C/Humi% : 23 / 40  
Operator : Mitsuru Fujimura

Mode / Remarks : Printing mode (Transmitting mode chL)

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



| NO | FREQ<br>[MHz] | READING      |              | C. F | RESULT       |              | LIMIT        |              | MARGIN     |            | PHASE |
|----|---------------|--------------|--------------|------|--------------|--------------|--------------|--------------|------------|------------|-------|
|    |               | QP<br>[dBμV] | AV<br>[dBμV] |      | QP<br>[dBμV] | AV<br>[dBμV] | QP<br>[dBμV] | AV<br>[dBμV] | QP<br>[dB] | AV<br>[dB] |       |
| 1  | 0.1530        | 53.3         | 36.6         | 0.1  | 53.4         | 36.7         | 65.8         | 55.8         | 12.4       | 19.1       | N     |
| 2  | 0.1920        | 46.5         | 32.6         | 0.1  | 46.6         | 32.7         | 63.9         | 53.9         | 17.3       | 21.2       | N     |
| 3  | 0.2190        | 45.3         | 32.2         | 0.1  | 45.4         | 32.3         | 62.9         | 52.9         | 17.5       | 20.6       | N     |
| 4  | 0.3520        | 35.4         | 25.6         | 0.1  | 35.5         | 25.7         | 58.9         | 48.9         | 23.4       | 23.2       | N     |
| 5  | 0.8840        | 27.3         | 19.0         | 0.1  | 27.4         | 19.1         | 56.0         | 46.0         | 28.6       | 26.9       | N     |
| 6  | 1.6390        | 31.1         | 22.4         | 0.3  | 31.4         | 22.7         | 56.0         | 46.0         | 24.6       | 23.3       | N     |
| 7  | 3.0070        | 30.7         | 23.9         | 0.4  | 31.1         | 24.3         | 56.0         | 46.0         | 24.9       | 21.7       | N     |
| 8  | 0.1530        | 55.7         | 36.9         | 0.1  | 55.8         | 37.0         | 65.8         | 55.8         | 10.0       | 18.8       | L     |
| 9  | 0.1785        | 52.0         | 35.1         | 0.1  | 52.1         | 35.2         | 64.6         | 54.6         | 12.5       | 19.4       | L     |
| 10 | 0.2200        | 46.3         | 32.7         | 0.1  | 46.4         | 32.8         | 62.8         | 52.8         | 16.4       | 20.0       | L     |
| 11 | 0.3530        | 34.9         | 22.1         | 0.1  | 35.0         | 22.2         | 58.9         | 48.9         | 23.9       | 26.7       | L     |
| 12 | 0.8840        | 30.0         | 21.2         | 0.1  | 30.1         | 21.3         | 56.0         | 46.0         | 25.9       | 24.7       | L     |
| 13 | 1.6570        | 33.5         | 24.8         | 0.3  | 33.8         | 25.1         | 56.0         | 46.0         | 22.2       | 20.9       | L     |
| 14 | 3.0160        | 26.6         | 19.8         | 0.4  | 27.0         | 20.2         | 56.0         | 46.0         | 29.0       | 25.8       | L     |

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



## Conducted Emission

### DATA OF CONDUCTED EMISSION TEST

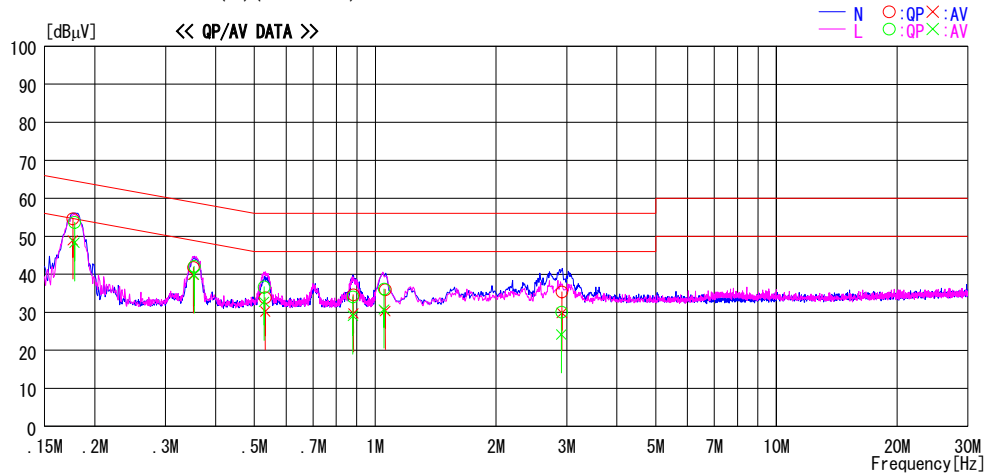
UL Apex Co., Ltd. Head Office EMC Lab. No2 Semi Anechoic Chamber  
Date : 2004/03/17 02:40:52

Applicant : SATO CORPORATION  
Kind of EUT : W-LAN / BARCODE PRINTER  
Model No. : MB200  
Serial No. : 20680001

Report No. : 24GE0192-HO  
Power : AC120V / 60Hz  
Temp°C/Humi% : 23 / 40  
Operator : Mitsuru Fujimura

Mode / Remarks : Standby mode

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



| NO | FREQ<br>[MHz] | READING      |              | C. F<br>[dB] | RESULT       |              | LIMIT        |              | MARGIN     |            | PHASE |
|----|---------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|------------|------------|-------|
|    |               | QP<br>[dBμV] | AV<br>[dBμV] |              | QP<br>[dBμV] | AV<br>[dBμV] | QP<br>[dBμV] | AV<br>[dBμV] | QP<br>[dB] | AV<br>[dB] |       |
| 1  | 0.1763        | 54.5         | 48.8         | 0.1          | 54.6         | 48.9         | 64.7         | 54.7         | 10.1       | 5.8        | N     |
| 2  | 0.3522        | 41.7         | 39.8         | 0.1          | 41.8         | 39.9         | 58.9         | 48.9         | 17.1       | 9.0        | N     |
| 3  | 0.5321        | 33.7         | 30.0         | 0.2          | 33.9         | 30.2         | 56.0         | 46.0         | 22.1       | 15.8       | N     |
| 4  | 0.8823        | 34.5         | 29.6         | 0.1          | 34.6         | 29.7         | 56.0         | 46.0         | 21.4       | 16.3       | N     |
| 5  | 1.0592        | 35.8         | 30.1         | 0.2          | 36.0         | 30.3         | 56.0         | 46.0         | 20.0       | 15.7       | N     |
| 6  | 2.9201        | 35.0         | 29.5         | 0.4          | 35.4         | 29.9         | 56.0         | 46.0         | 20.6       | 16.1       | N     |
| 7  | 0.1780        | 53.5         | 48.2         | 0.1          | 53.6         | 48.3         | 64.6         | 54.6         | 11.0       | 6.3        | L     |
| 8  | 0.3538        | 42.0         | 39.8         | 0.1          | 42.1         | 39.9         | 58.9         | 48.9         | 16.8       | 9.0        | L     |
| 9  | 0.5285        | 36.5         | 32.5         | 0.2          | 36.7         | 32.7         | 56.0         | 46.0         | 19.3       | 13.3       | L     |
| 10 | 0.8800        | 34.0         | 29.0         | 0.1          | 34.1         | 29.1         | 56.0         | 46.0         | 21.9       | 16.9       | L     |
| 11 | 1.0515        | 35.9         | 30.5         | 0.2          | 36.1         | 30.7         | 56.0         | 46.0         | 19.9       | 15.3       | L     |
| 12 | 2.9135        | 29.7         | 23.8         | 0.4          | 30.1         | 24.2         | 56.0         | 46.0         | 25.9       | 21.8       | L     |

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

**6dB Bandwidth(DSSS and other forms of modulation)**

UL Apex Co., Ltd.  
Head Office EMC Lab. No.3 Measurement room

Company : SATO CORPORATION  
Equipment : W-LAN module for W-LAN/BARCODE PRINTER  
Model : WM-B-AG-02  
Sample No. : 03UT02481658  
Power : DC 3.3V (AC120V/60Hz)  
Mode : Transmitting (IEEE 802.11b) Burst Frame mode  
: 11Mbps

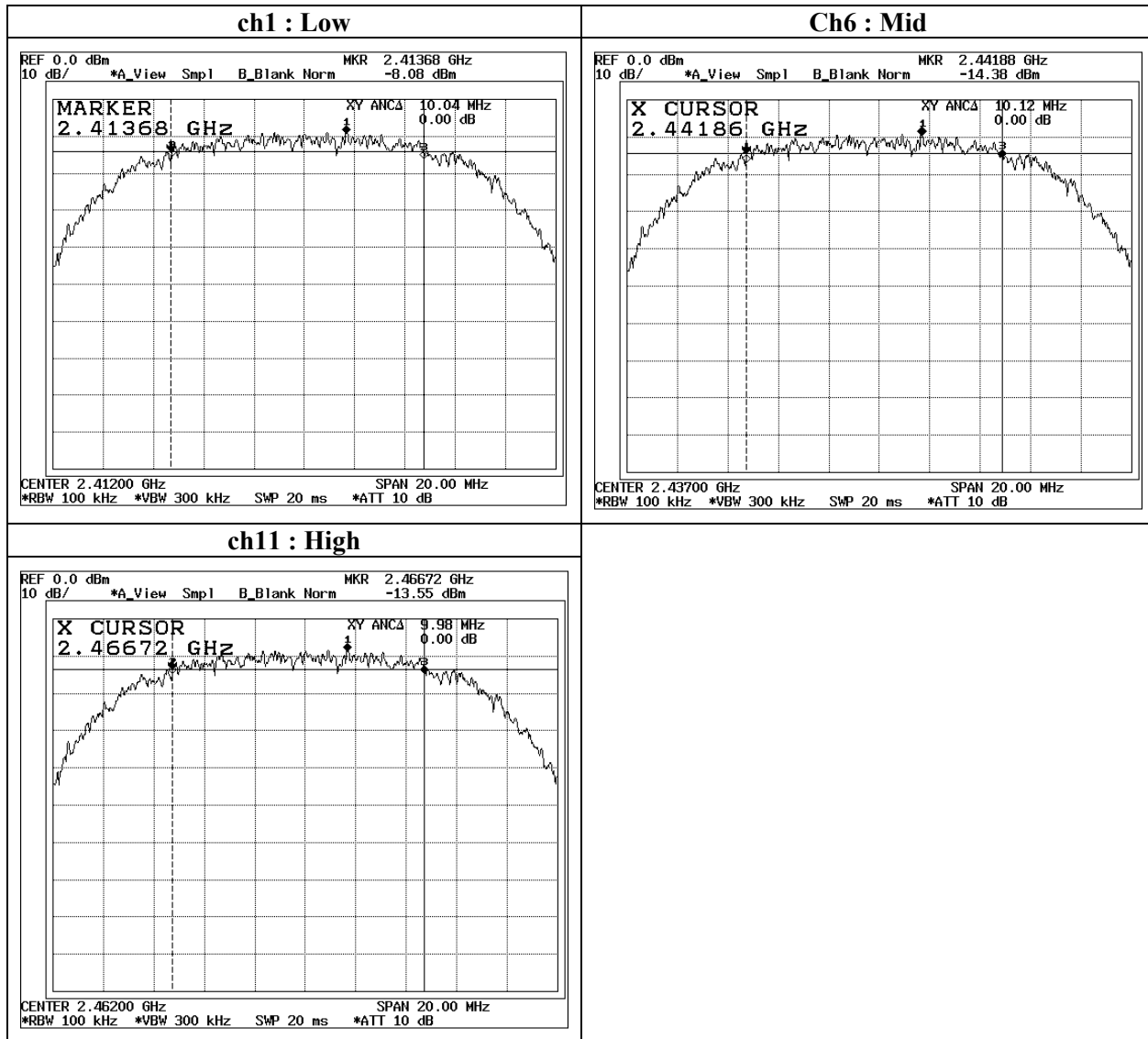
REPORT NO : 24GE0192-HO  
REGULATION : Fcc Part15 Subpart C 15.247(a)  
TEST DISTANCE : -  
DATE : March 11,2004  
TEMPERATURE : 21 deg.C  
HUMIDITY : 46 %

ENGINEER : Kenichi Adachi

| CH       | FREQ   | 6dB Bandwidth | Limit |
|----------|--------|---------------|-------|
|          | [MHz]  | [MHz]         | [kHz] |
| Low(1)   | 2412.0 | 10.04         | 500.0 |
| Mid(6)   | 2437.0 | 10.12         | 500.0 |
| High(11) | 2462.0 | <b>9.98</b>   | 500.0 |

Test Instruments : MRENT-09, MAT-20 (10dB)

**6dB Bandwidth(DSSS and other forms of modulation)**



## Maximum Peak OutPut Power (DSSS and other forms of modulation)

UL Apex Co., Ltd.  
Head Office EMC Lab. No.3 Measurement room

|            |                                                |               |                                     |
|------------|------------------------------------------------|---------------|-------------------------------------|
| Company    | : SATO CORPORATION                             | REPORT NO     | : 24GE0192-HO                       |
| Equipment  | : W-LAN module for W-LAN/BARCODE PRINTER       | REGULATION    | : Fcc Part15 Subpart C 15.247(b)(3) |
| Model      | : WM-B-AG-02                                   | TEST DISTANCE | : -                                 |
| Sample No. | : 03UT02481658                                 | DATE          | : March 11, 2004                    |
| Power      | : DC 3.3V (AC120V/60Hz)                        | TEMPERATURE   | : 21 deg.C                          |
| Mode       | : Transmitting (IEEE 802.11b) Burst Frame mode | HUMIDITY      | : 46 %                              |
|            | : 11Mbps                                       | ENGINEER      | : Kenichi Adachi                    |

### Power Meter

| ch       | FREQ<br>[MHz] | P/M (Peak)<br>Reading<br>[dBm] | Cable<br>Loss<br>[dB] | ATTEN.<br>[dB] | Result<br>[dBm] | Limit<br>(1W)<br>[dBm] | Margin<br>[dB] |
|----------|---------------|--------------------------------|-----------------------|----------------|-----------------|------------------------|----------------|
| Low(1)   | 2412.0        | 4.38                           | 0.8                   | 10.0           | 15.2            | 30.0                   | 14.8           |
| Mid(6)   | 2437.0        | 4.31                           | 0.8                   | 10.0           | 15.1            | 30.0                   | 14.9           |
| High(11) | 2462.0        | 4.68                           | 0.8                   | 10.0           | <b>15.5</b>     | 30.0                   | <b>14.5</b>    |

(Test Instruments)  
(MPM-04, MPSE-03, MAT-20)

Sample Calculation:  
Result = Reading + (Cable+ATTEN.)Loss

Remarks : This item was measured with cable that borrowed from the applicant. (Cable loss: 0.8dB)

## Radiated Spurious Emission(DSSS and other forms of modulation )

### DATA OF RADIATED EMISSION TEST

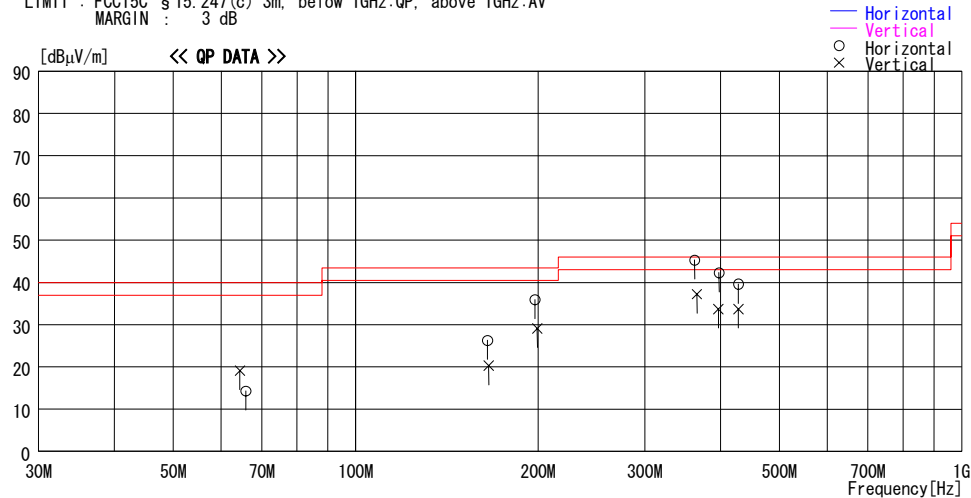
UL Apex Co., Ltd. Head Office EMC Lab. No.2 Semi Anechoic Chamber  
Date : 2004/05/12 20:29:20

Applicant : SATO CORPORATION  
Kind of EUT : Wireless LAN SiP Module  
Model No. : WM-B-AG-02  
Serial No. : 03UT02481658

Report No. : 24GE0192-HO  
Power : DC3.3V  
Temp°C/Humi% : 26°C / 42%  
Operator : Kenichi Adachi

Mode / Remarks : 30M-1GHz\_Tx 2412 DATA PANA X-Axis

LIMIT : FCC15C § 15.247(c) 3m, below 1GHz:QP, above 1GHz:AV  
MARGIN : 3 dB



| No.                    | FREQ<br>[MHz] | READING<br>QP<br>[dBμV] | ANT<br>FACTOR<br>[dB/m] | LOSS<br>[dB] | GAIN<br>[dB] | RESULT<br>[dBμV/m] | LIMIT<br>[dBμV/m] | MARGIN<br>[dB] | ANTENNA<br>[cm] | TABLE<br>[DEG] |
|------------------------|---------------|-------------------------|-------------------------|--------------|--------------|--------------------|-------------------|----------------|-----------------|----------------|
| ----- Horizontal ----- |               |                         |                         |              |              |                    |                   |                |                 |                |
| 1                      | 65.926        | 23.2                    | 7.3                     | 6.9          | 23.1         | 14.3               | 40.0              | 25.7           | 237             | 123            |
| 2                      | 164.997       | 26.5                    | 15.4                    | 7.6          | 23.2         | 26.3               | 43.5              | 17.2           | 185             | -1             |
| 3                      | 197.725       | 34.4                    | 16.7                    | 7.8          | 23.0         | 35.9               | 43.5              | 7.6            | 100             | 149            |
| 4                      | 362.400       | 42.7                    | 16.7                    | 8.6          | 22.7         | 45.3               | 46.0              | 0.7            | 100             | 335            |
| 5                      | 398.009       | 38.1                    | 18.2                    | 8.8          | 22.8         | 42.3               | 46.0              | 3.7            | 100             | 218            |
| 6                      | 428.136       | 34.9                    | 18.3                    | 9.1          | 22.7         | 39.6               | 46.0              | 6.4            | 260             | 302            |
| ----- Vertical -----   |               |                         |                         |              |              |                    |                   |                |                 |                |
| 7                      | 64.431        | 27.8                    | 7.5                     | 6.9          | 23.1         | 19.1               | 40.0              | 20.9           | 100             | 146            |
| 8                      | 165.778       | 20.4                    | 15.5                    | 7.6          | 23.2         | 20.3               | 43.5              | 23.2           | 100             | 239            |
| 9                      | 199.410       | 27.5                    | 16.8                    | 7.8          | 23.0         | 29.1               | 43.5              | 14.4           | 100             | 225            |
| 10                     | 365.700       | 34.6                    | 16.8                    | 8.6          | 22.8         | 37.2               | 46.0              | 8.8            | 314             | 238            |
| 11                     | 396.637       | 29.5                    | 18.2                    | 8.8          | 22.8         | 33.7               | 46.0              | 12.3           | 238             | 262            |
| 12                     | 428.152       | 29.0                    | 18.3                    | 9.1          | 22.7         | 33.7               | 46.0              | 12.3           | 147             | 225            |

CHART:WITHOUT FACTOR ANT TYPE : -30MHz LOOP, 30-300MHz BICONICAL, 300MHz-1000MHz LOGPERIODIC, 1000MHz- HORN  
CALCULATION : READING + ANT FACTOR + LOSS(CABLE+ATTEN.) - AMP. GAIN

Page:

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MF060b(10.04.03)

## Radiated Spurious Emission(DSSS and other forms of modulation)

### DATA OF RADIATED EMISSION TEST

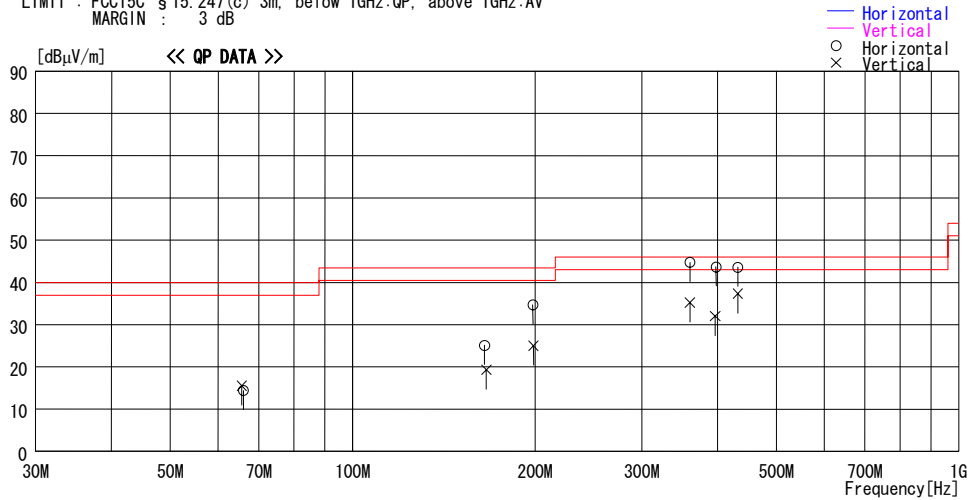
UL Apex Co., Ltd. Head Office EMC Lab. No.2 Semi Anechoic Chamber  
Date : 2004/05/12 22:16:36

Applicant : SATO CORPORATION  
Kind of EUT : Wireless LAN SIP Module  
Model No. : WM-B-AG-02  
Serial No. : 03UT02481658

Report No. : 24GE0192-HO  
Power : DC3.3V  
Temp°C/Humi% : 26°C / 42%  
Operator : Kenichi Adachi

Mode / Remarks : 30M-1GHz\_Tx 2437 DATA PANA X-Axis

LIMIT : FCC15C § 15.247(c) 3m, below 1GHz:QP, above 1GHz:AV  
MARGIN : 3 dB



| No.                    | FREQ<br>[MHz] | READING<br>QP<br>[dB $\mu$ V] | ANT<br>FACTOR<br>[dB/m] | LOSS<br>[dB] | GAIN<br>[dB] | RESULT<br>[dB $\mu$ V/m] | LIMIT<br>[dB $\mu$ V/m] | MARGIN<br>[dB] | ANTENNA<br>[cm] | TABLE<br>[DEG] |
|------------------------|---------------|-------------------------------|-------------------------|--------------|--------------|--------------------------|-------------------------|----------------|-----------------|----------------|
| ----- Horizontal ----- |               |                               |                         |              |              |                          |                         |                |                 |                |
| 1                      | 66.079        | 23.3                          | 7.3                     | 6.9          | 23.1         | 14.4                     | 40.0                    | 25.6           | 112             | 261            |
| 2                      | 165.126       | 25.2                          | 15.5                    | 7.6          | 23.2         | 25.1                     | 43.5                    | 18.4           | 174             | 194            |
| 3                      | 198.436       | 33.1                          | 16.8                    | 7.8          | 23.0         | 34.7                     | 43.5                    | 8.8            | 173             | 163            |
| 4                      | 360.011       | 42.2                          | 16.6                    | 8.6          | 22.7         | 44.7                     | 46.0                    | 1.3            | 100             | 161            |
| 5                      | 397.990       | 39.5                          | 18.2                    | 8.8          | 22.8         | 43.7                     | 46.0                    | 2.3            | 100             | 201            |
| 6                      | 432.077       | 38.9                          | 18.3                    | 9.1          | 22.7         | 43.6                     | 46.0                    | 2.4            | 100             | 201            |
| ----- Vertical -----   |               |                               |                         |              |              |                          |                         |                |                 |                |
| 7                      | 65.642        | 24.3                          | 7.4                     | 6.9          | 23.1         | 15.5                     | 40.0                    | 24.5           | 100             | 188            |
| 8                      | 166.267       | 19.4                          | 15.5                    | 7.6          | 23.2         | 19.3                     | 43.5                    | 24.2           | 118             | 234            |
| 9                      | 198.780       | 23.4                          | 16.8                    | 7.8          | 23.0         | 25.0                     | 43.5                    | 18.5           | 100             | 67             |
| 10                     | 359.997       | 32.7                          | 16.6                    | 8.6          | 22.7         | 35.2                     | 46.0                    | 10.8           | 308             | 236            |
| 11                     | 396.555       | 27.8                          | 18.2                    | 8.8          | 22.8         | 32.0                     | 46.0                    | 14.0           | 100             | 285            |
| 12                     | 432.076       | 32.6                          | 18.3                    | 9.1          | 22.7         | 37.3                     | 46.0                    | 8.7            | 114             | 227            |

CHART:WITHOUT FACTOR ANT TYPE: -30MHz LOOP, 30-300MHz BICONICAL, 300MHz-1000MHz LOGPERIODIC, 1000MHz- HORN  
CALCULATION : READING + ANT FACTOR + LOSS(CABLE+ATTEN.) - AMP. GAIN

Page:

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MF060b(10.04.03)

## Radiated Spurious Emission(DSSS and other forms of modulation)

### DATA OF RADIATED EMISSION TEST

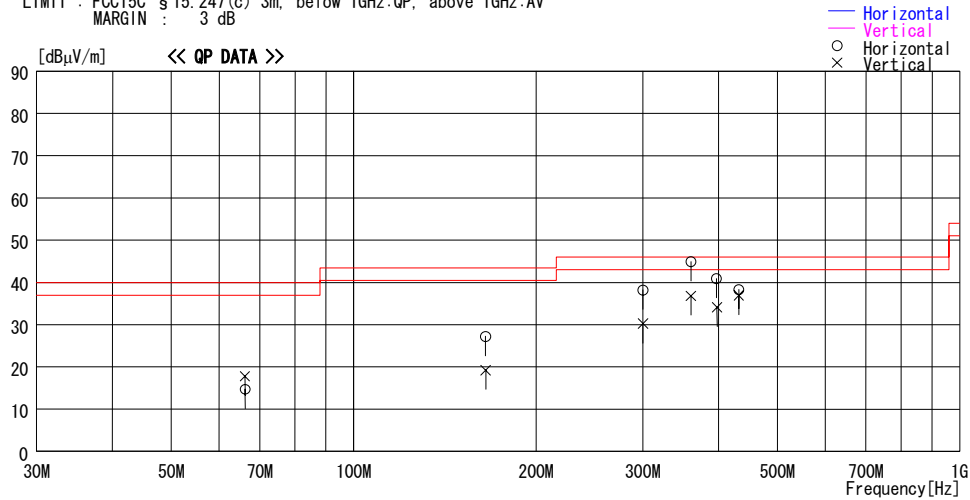
UL Apex Co., Ltd. Head Office EMC Lab. No.2 Semi Anechoic Chamber  
Date : 2004/05/12 23:46:01

Applicant : SATO CORPORATION  
Kind of EUT : Wireless LAN SiP Module  
Model No. : WM-B-AG-02  
Serial No. : 03UT02481658

Report No. : 24GE0192-HO  
Power : DC3.3V  
Temp°C/Humi% : 26°C / 42%  
Operator : Kenichi Adachi

Mode / Remarks : 30M-1GHz\_Tx 2462 DATA PANA X-Axis

LIMIT : FCC15C § 15.247(c) 3m, below 1GHz:QP, above 1GHz:AV  
MARGIN : 3 dB



| No.                    | FREQ<br>[MHz] | READING<br>QP<br>[dBμV] | ANT<br>FACTOR<br>[dB/m] | LOSS<br>[dB] | GAIN<br>[dB] | RESULT<br>[dBμV/m] | LIMIT<br>[dBμV/m] | MARGIN<br>[dB] | ANTENNA<br>[cm] | TABLE<br>[DEG] |
|------------------------|---------------|-------------------------|-------------------------|--------------|--------------|--------------------|-------------------|----------------|-----------------|----------------|
| ----- Horizontal ----- |               |                         |                         |              |              |                    |                   |                |                 |                |
| 1                      | 66.173        | 23.6                    | 7.3                     | 6.9          | 23.1         | 14.7               | 40.0              | 25.3           | 382             | 112            |
| 2                      | 164.998       | 27.4                    | 15.4                    | 7.6          | 23.2         | 27.2               | 43.5              | 16.3           | 187             | 173            |
| 3                      | 299.994       | 32.4                    | 20.3                    | 8.3          | 22.8         | 38.2               | 46.0              | 7.8            | 126             | 159            |
| 4                      | 360.000       | 42.4                    | 16.6                    | 8.6          | 22.7         | 44.9               | 46.0              | 1.1            | 100             | 188            |
| 5                      | 396.595       | 36.7                    | 18.2                    | 8.8          | 22.8         | 40.9               | 46.0              | 5.1            | 100             | 222            |
| 6                      | 432.079       | 33.6                    | 18.3                    | 9.1          | 22.7         | 38.3               | 46.0              | 7.7            | 100             | 222            |
| ----- Vertical -----   |               |                         |                         |              |              |                    |                   |                |                 |                |
| 7                      | 66.173        | 26.7                    | 7.3                     | 6.9          | 23.1         | 17.8               | 40.0              | 22.2           | 100             | 185            |
| 8                      | 165.282       | 19.3                    | 15.5                    | 7.6          | 23.2         | 19.2               | 43.5              | 24.3           | 259             | 360            |
| 9                      | 299.996       | 24.4                    | 20.3                    | 8.3          | 22.8         | 30.2               | 46.0              | 15.8           | 186             | 240            |
| 10                     | 360.000       | 34.3                    | 16.6                    | 8.6          | 22.7         | 36.8               | 46.0              | 9.2            | 286             | 244            |
| 11                     | 398.011       | 29.9                    | 18.2                    | 8.8          | 22.8         | 34.1               | 46.0              | 11.9           | 100             | 182            |
| 12                     | 432.082       | 32.2                    | 18.3                    | 9.1          | 22.7         | 36.9               | 46.0              | 9.1            | 131             | 226            |

CHART:WITHOUT FACTOR ANT TYPE: -30MHz LOOP, 30-300MHz BICONICAL, 300MHz-1000MHz LOGPERIODIC, 1000MHz- HORN  
CALCULATION : READING + ANT FACTOR + LOSS(CABLE+ATTEN.) - AMP. GAIN

Page:

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MF060b(10.04.03)

## Radiated Spurious Emission(DSSS and other forms of modulation)

### DATA OF SPURIOUS EMISSIONS(1GHz to 26GHz)

UL Apex Co., Ltd.  
Head Office EMC Lab. No.2 Semi Anechoic Chamber

Company : SATO Corporation  
Equipment : Wireless LAN SiP Module  
Model : WM-B-AG-02  
Sample No. : 03UT02481658  
Power : DC 3.3V  
Mode : Transmitting (IEEE 802.11b ), Main Antenna  
: Continuous Tx mode, QPSK, 11Mbps  
: CH1: 2412MHz

REPORT NO : 24GE0192-HO  
REGULATION : Fcc Part15 Subpart C 15.247(b)(3)  
TEST DISTANCE : 3/1m  
DATE : Apr 20, 2004  
TEMPERATURE : 26deg.C  
HUMIDITY : 42%  
ENGINEER : Kenichi Adachi

#### PK DETECT (RBW & VBW 1MHz)

| No.                                                                                         | FREQ<br>[MHz] | T/R READING |          | ANT<br>Factor<br>[dB/m] | AMP<br>GAIN<br>[dB] | CABLE<br>LOSS<br>[dB] | ATT<br>or<br>Filter<br>[dB] | RESULT   |          | Limit<br>[dBuV/m] | MARGIN |      |
|---------------------------------------------------------------------------------------------|---------------|-------------|----------|-------------------------|---------------------|-----------------------|-----------------------------|----------|----------|-------------------|--------|------|
|                                                                                             |               | HOR         | VER      |                         |                     |                       |                             | HOR      | VER      |                   | HOR    | VER  |
|                                                                                             |               | [dBuV/m]    | [dBuV/m] |                         |                     |                       |                             | [dBuV/m] | [dBuV/m] |                   | [dB]   | [dB] |
| Test distance 3meters RESULT=Reading + ANT Factor - Amp Gain + CABLE LOSS + Band Pass       |               |             |          |                         |                     |                       |                             |          |          |                   |        |      |
| 1                                                                                           | 2390.0        | 42.2        | 41.7     | 30.8                    | 36.3                | 6.2                   | 9.8                         | 52.7     | 52.2     | 74.0              | 21.3   | 21.8 |
| 2                                                                                           | 4824.0        | 44.2        | 43.0     | 35.4                    | 36.1                | 9.0                   | 1.0                         | 53.5     | 52.3     | 74.0              | 20.5   | 21.7 |
| 3                                                                                           | 7236.0        | 40.3        | 41.8     | 38.0                    | 35.6                | 11.2                  | 0.5                         | 54.4     | 55.9     | 74.0              | 19.6   | 18.1 |
| 4                                                                                           | 9648.0        | 41.2        | 40.8     | 37.5                    | 36.3                | 12.9                  | 0.5                         | 55.8     | 55.4     | 74.0              | 18.2   | 18.6 |
| Test distance 1meter RESULT=Reading + ANT Factor - Amp Gain + CABLE LOSS + Band Pass - Dfac |               |             |          |                         |                     |                       |                             |          |          |                   |        |      |
| 5                                                                                           | 12060.0       | 41.5        | 41.3     | 41.1                    | 35.7                | 14.4                  | 0.5                         | 52.3     | 52.1     | 74.0              | 21.7   | 21.9 |
| 6                                                                                           | 14472.0       | 40.3        | 40.3     | 41.0                    | 34.6                | 15.3                  | 0.6                         | 53.1     | 53.1     | 74.0              | 20.9   | 20.9 |
| 7                                                                                           | 16884.0       | 43.3        | 43.2     | 46.0                    | 35.5                | 17.3                  | 0.4                         | 62.0     | 61.9     | 74.0              | 12.0   | 12.1 |
| 8                                                                                           | 19296.0       | 44.7        | 44.6     | 39.6                    | 34.9                | 18.7                  | 0.9                         | 59.5     | 59.4     | 74.0              | 14.5   | 14.6 |
| 9                                                                                           | 21708.0       | 44.1        | 44.0     | 40.7                    | 35.3                | 20.0                  | 0.6                         | 60.6     | 60.5     | 74.0              | 13.4   | 13.5 |
| 10                                                                                          | 24120.0       | 43.1        | 43.0     | 40.0                    | 36.0                | 20.7                  | 1.6                         | 59.9     | 59.8     | 74.0              | 14.1   | 14.2 |

#### AV DETECT (RBW 1MHz VBW 10Hz)

| No.                                                                                         | FREQ<br>[MHz] | T/R READING |          | ANT<br>Factor<br>[dB/m] | AMP<br>GAIN<br>[dB] | CABLE<br>LOSS<br>[dB] | ATT<br>or<br>Filter<br>[dB] | RESULT   |          | Limit<br>[dBuV/m] | MARGIN |      |
|---------------------------------------------------------------------------------------------|---------------|-------------|----------|-------------------------|---------------------|-----------------------|-----------------------------|----------|----------|-------------------|--------|------|
|                                                                                             |               | HOR         | VER      |                         |                     |                       |                             | HOR      | VER      |                   | HOR    | VER  |
|                                                                                             |               | [dBuV/m]    | [dBuV/m] |                         |                     |                       |                             | [dBuV/m] | [dBuV/m] |                   | [dB]   | [dB] |
| Test distance 3meters RESULT=Reading + ANT Factor - Amp Gain + CABLE LOSS + Band Pass       |               |             |          |                         |                     |                       |                             |          |          |                   |        |      |
| 1                                                                                           | 2390.0        | 32.2        | 31.7     | 30.8                    | 36.3                | 6.2                   | 9.8                         | 42.7     | 42.2     | 54.0              | 11.3   | 11.8 |
| 2                                                                                           | 4824.0        | 32.7        | 32.1     | 35.4                    | 36.1                | 9.0                   | 1.0                         | 42.0     | 41.4     | 54.0              | 12.0   | 12.6 |
| 3                                                                                           | 7236.0        | 29.4        | 29.5     | 38.0                    | 35.6                | 11.2                  | 0.5                         | 43.5     | 43.6     | 54.0              | 10.5   | 10.4 |
| 4                                                                                           | 9648.0        | 30.0        | 30.0     | 37.5                    | 36.3                | 12.9                  | 0.5                         | 44.6     | 44.6     | 54.0              | 9.4    | 9.4  |
| Test distance 1meter RESULT=Reading + ANT Factor - Amp Gain + CABLE LOSS + Band Pass - Dfac |               |             |          |                         |                     |                       |                             |          |          |                   |        |      |
| 5                                                                                           | 12060.0       | 30.6        | 30.5     | 41.1                    | 35.7                | 14.4                  | 0.5                         | 41.4     | 41.3     | 54.0              | 12.6   | 12.7 |
| 6                                                                                           | 14472.0       | 29.5        | 29.7     | 41.0                    | 34.6                | 15.3                  | 0.6                         | 42.3     | 42.5     | 54.0              | 11.7   | 11.5 |
| 7                                                                                           | 16884.0       | 32.5        | 32.5     | 46.0                    | 35.5                | 17.3                  | 0.4                         | 51.2     | 51.2     | 54.0              | 2.8    | 2.8  |
| 8                                                                                           | 19296.0       | 32.1        | 32.3     | 39.6                    | 34.9                | 18.7                  | 0.9                         | 46.9     | 47.1     | 54.0              | 7.1    | 6.9  |
| 9                                                                                           | 21708.0       | 32.4        | 32.2     | 40.7                    | 35.3                | 20.0                  | 0.6                         | 48.9     | 48.7     | 54.0              | 5.1    | 5.3  |
| 10                                                                                          | 24120.0       | 32.1        | 32.1     | 40.0                    | 36.0                | 20.7                  | 1.6                         | 48.9     | 48.9     | 54.0              | 5.1    | 5.1  |

Test Distance 1.0m : Distance Factor(Dfac) =  $20\log(3/1.0) = 9.5\text{dB}$

\*Except for the above table : All other spurious emissions were less than 20dB for the limit.

\*In the frequency over the fifth harmonic, the noise from the EUT was not seen. The data above is its base noise.

\*The limit values at frequencies excepting restricted bands indicated in 15.205 are values 20dB below lower

UL Apex Co., Ltd.

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MF060b(10.04.03)



## Radiated Spurious Emission(DSSS and other forms of modulation ) DATA OF SPURIOUS EMISSIONS(1GHz to 26GHz)

UL Apex Co., Ltd.  
Head Office EMC Lab. No.2 Semi Anechoic Chamber

Company : SATO Corporation  
Equipment : Wireless LAN SiP Module  
Model : WM-B-AG-02  
Sample No. : 03UT02481658  
Power : DC 3.3V  
Mode : Transmitting (IEEE 802.11b ) , Main Antenna  
: Continuous Tx mode, QPSK, 11Mbps  
: CH6: 2437MHz

REPORT NO : 24GE0192-HO  
REGULATION : Fcc Part15 Subpart C 15.247(b)(3)  
TEST DISTANCE: 3/1m  
DATE : Apr 20, 2004  
TEMPERATURE : 26deg.C  
HUMIDITY : 42%  
ENGINEER : Kenichi Adachi

### PK DETECT (RBW & VBW 1MHz)

| No.                                                                                         | FREQ<br>[MHz] | T/R READING     |                 | ANT<br>Factor<br>[dB/m] | AMP<br>GAIN<br>[dB] | CABLE<br>LOSS<br>[dB] | ATT<br>or<br>Filter<br>[dB] | RESULT          |                 | Limit<br>[dBuV/m] | MARGIN         |             |
|---------------------------------------------------------------------------------------------|---------------|-----------------|-----------------|-------------------------|---------------------|-----------------------|-----------------------------|-----------------|-----------------|-------------------|----------------|-------------|
|                                                                                             |               | HOR<br>[dBuV/m] | VER<br>[dBuV/m] |                         |                     |                       |                             | HOR<br>[dBuV/m] | VER<br>[dBuV/m] |                   | PK<br>[dBuV/m] | HOR<br>[dB] |
| Test distance 3meters RESULT=Reading + ANT Factor - Amp Gain + CABLE LOSS + Band Pass       |               |                 |                 |                         |                     |                       |                             |                 |                 |                   |                |             |
| 1                                                                                           | 4874.0        | 42.3            | 44.0            | 35.6                    | 36.1                | 9.1                   | 1.0                         | 51.9            | 53.6            | 74.0              | 22.1           | 20.4        |
| 2                                                                                           | 7311.0        | 39.4            | 39.7            | 38.1                    | 35.7                | 11.2                  | 0.5                         | 53.5            | 53.8            | 74.0              | 20.5           | 20.2        |
| 3                                                                                           | 9748.0        | 40.3            | 41.9            | 37.3                    | 36.3                | 12.9                  | 0.5                         | 54.7            | 56.3            | 74.0              | 19.3           | 17.7        |
| Test distance 1meter RESULT=Reading + ANT Factor - Amp Gain + CABLE LOSS + Band Pass - Dfac |               |                 |                 |                         |                     |                       |                             |                 |                 |                   |                |             |
| 4                                                                                           | 12185.0       | 40.8            | 40.7            | 41.4                    | 35.6                | 14.4                  | 0.5                         | 52.0            | 51.9            | 74.0              | 22.0           | 22.1        |
| 5                                                                                           | 14622.0       | 40.0            | 40.5            | 41.5                    | 34.8                | 15.5                  | 0.6                         | 53.3            | 53.8            | 74.0              | 20.7           | 20.2        |
| 6                                                                                           | 17059.0       | 44.0            | 44.3            | 46.4                    | 35.4                | 17.4                  | 0.4                         | 63.3            | 63.6            | 74.0              | 10.7           | 10.4        |
| 7                                                                                           | 19496.0       | 43.5            | 43.3            | 39.2                    | 34.9                | 18.8                  | 1.0                         | 58.1            | 57.9            | 74.0              | 15.9           | 16.1        |
| 8                                                                                           | 21933.0       | 43.6            | 43.6            | 40.5                    | 35.0                | 20.2                  | 0.9                         | 60.7            | 60.7            | 74.0              | 13.3           | 13.3        |
| 9                                                                                           | 24370.0       | 44.2            | 44.5            | 40.1                    | 36.6                | 20.8                  | 2.2                         | 61.2            | 61.5            | 74.0              | 12.8           | 12.5        |

### AV DETECT (RBW 1MHz VBW 10Hz)

| No.                                                                                         | FREQ    | T/R READING |      | ANT    | AMP  | CABLE | ATT<br>or<br>Filter | RESULT   |      | Limit    | MARGIN |      |
|---------------------------------------------------------------------------------------------|---------|-------------|------|--------|------|-------|---------------------|----------|------|----------|--------|------|
|                                                                                             | [MHz]   | HOR         | VER  | Factor | GAIN | LOSS  | [dB]                | HOR      | VER  | AV       | HOR    | VER  |
|                                                                                             |         | [dBuV/m]    |      | [dB/m] | [dB] | [dB]  |                     | [dBuV/m] |      | [dBuV/m] |        | [dB] |
| Test distance 3meters RESULT=Reading + ANT Factor - Amp Gain + CABLE LOSS + Band Pass       |         |             |      |        |      |       |                     |          |      |          |        |      |
| 1                                                                                           | 4874.0  | 33.3        | 36.1 | 35.6   | 36.1 | 9.1   | 1.0                 | 42.9     | 45.7 | 54.0     | 11.1   | 8.3  |
| 2                                                                                           | 7311.0  | 30.0        | 30.0 | 38.1   | 35.7 | 11.2  | 0.5                 | 44.1     | 44.1 | 54.0     | 9.9    | 9.9  |
| 3                                                                                           | 9748.0  | 30.5        | 30.4 | 37.3   | 36.3 | 12.9  | 0.5                 | 44.9     | 44.8 | 54.0     | 9.1    | 9.2  |
| Test distance 1meter RESULT=Reading + ANT Factor - Amp Gain + CABLE LOSS + Band Pass - Dfac |         |             |      |        |      |       |                     |          |      |          |        |      |
| 4                                                                                           | 12185.0 | 30.2        | 30.1 | 41.4   | 35.6 | 14.4  | 0.5                 | 41.4     | 41.3 | 54.0     | 12.6   | 12.7 |
| 5                                                                                           | 14622.0 | 29.6        | 29.5 | 41.5   | 34.8 | 15.5  | 0.6                 | 42.9     | 42.8 | 54.0     | 11.1   | 11.2 |
| 6                                                                                           | 17059.0 | 32.3        | 32.3 | 46.4   | 35.4 | 17.4  | 0.4                 | 51.6     | 51.6 | 54.0     | 2.4    | 2.4  |
| 7                                                                                           | 19496.0 | 32.2        | 32.6 | 39.2   | 34.9 | 18.8  | 1.0                 | 46.8     | 47.2 | 54.0     | 7.2    | 6.8  |
| 8                                                                                           | 21933.0 | 31.7        | 32.4 | 40.5   | 35.0 | 20.2  | 0.9                 | 48.8     | 49.5 | 54.0     | 5.2    | 4.5  |
| 9                                                                                           | 24370.0 | 33.0        | 33.1 | 40.1   | 36.6 | 20.8  | 2.2                 | 50.0     | 50.1 | 54.0     | 4.0    | 3.9  |

Test Distance 1.0m : Distance Factor(Dfac) = 20log(3/1.0) = 9.5dB

\*Except for the above table : All other spurious emissions were less than 20dB for the limit.

\*In the frequency over the fifth harmonic, the noise from the EUT was not seen. The data above is its base noise.

\*The limit values at frequencies excepting restricted bands indicated in 15.205 are values 20dB below lower

## Radiated Spurious Emission(DSSS and other forms of modulation)

### DATA OF SPURIOUS EMISSIONS(1GHz to 26GHz)

UL Apex Co., Ltd.  
Head Office EMC Lab. No.2 Semi Anechoic Chamber

Company : SATO Corporation  
Equipment : Wireless LAN SiP Module  
Model : WM-B-AG-02  
Sample No. : 03UT02481658  
Power : DC 3.3V  
Mode : Transmitting (IEEE 802.11b) , Main Antenna  
: Continuous Tx mode, QPSK, 11Mbps  
: CH11: 2462MHz

REPORT NO : 24GE0192-HO  
REGULATION : Fcc Part15 Subpart C 15.247(b)(3)  
TEST DISTANCE: 3/1m  
DATE : Apr 20, 2004  
TEMPERATURE : 26deg.C  
HUMIDITY : 42%  
ENGINEER : Kenichi Adachi

#### PK DETECT (RBW & VBW 1MHz)

| No.                                                                                         | FREQ<br>[MHz] | T/R READING |          | ANT<br>Factor<br>[dB/m] | AMP<br>GAIN<br>[dB] | CABLE<br>LOSS<br>[dB] | ATT<br>or<br>Filter<br>[dB] | RESULT   |          | Limit<br>PK<br>[dBuV/m] | MARGIN |      |
|---------------------------------------------------------------------------------------------|---------------|-------------|----------|-------------------------|---------------------|-----------------------|-----------------------------|----------|----------|-------------------------|--------|------|
|                                                                                             |               | HOR         | VER      |                         |                     |                       |                             | HOR      | VER      |                         | HOR    | VER  |
|                                                                                             |               | [dBuV/m]    | [dBuV/m] |                         |                     |                       |                             | [dBuV/m] | [dBuV/m] |                         | [dB]   | [dB] |
| Test distance 3meters RESULT=Reading + ANT Factor - Amp Gain + CABLE LOSS + Band Pass       |               |             |          |                         |                     |                       |                             |          |          |                         |        |      |
| 1                                                                                           | 2483.5        | 44.3        | 44.6     | 31.0                    | 36.2                | 6.3                   | 9.8                         | 55.2     | 55.5     | 74.0                    | 18.8   | 18.5 |
| 2                                                                                           | 4924.0        | 43.4        | 45.5     | 35.9                    | 36.1                | 9.1                   | 1.0                         | 53.3     | 55.4     | 74.0                    | 20.7   | 18.6 |
| 3                                                                                           | 7386.0        | 41.0        | 41.4     | 38.3                    | 35.7                | 11.3                  | 0.5                         | 55.4     | 55.8     | 74.0                    | 18.6   | 18.2 |
| 4                                                                                           | 9848.0        | 42.0        | 41.8     | 37.1                    | 36.3                | 13.0                  | 0.5                         | 56.3     | 56.1     | 74.0                    | 17.7   | 17.9 |
| Test distance 1meter RESULT=Reading + ANT Factor - Amp Gain + CABLE LOSS + Band Pass - Dfac |               |             |          |                         |                     |                       |                             |          |          |                         |        |      |
| 5                                                                                           | 12310.0       | 40.6        | 40.5     | 41.7                    | 35.6                | 14.5                  | 0.5                         | 52.2     | 52.1     | 74.0                    | 21.8   | 21.9 |
| 6                                                                                           | 14772.0       | 41.0        | 40.9     | 42.1                    | 34.9                | 15.6                  | 0.6                         | 54.9     | 54.8     | 74.0                    | 19.1   | 19.2 |
| 7                                                                                           | 17234.0       | 43.1        | 43.3     | 46.7                    | 35.3                | 17.5                  | 0.3                         | 62.8     | 63.0     | 74.0                    | 11.2   | 11.0 |
| 8                                                                                           | 19696.0       | 44.2        | 45.0     | 39.6                    | 35.4                | 18.9                  | 1.0                         | 58.8     | 59.6     | 74.0                    | 15.2   | 14.4 |
| 9                                                                                           | 22158.0       | 44.3        | 45.4     | 40.6                    | 35.0                | 20.2                  | 1.4                         | 62.0     | 63.1     | 74.0                    | 12.0   | 10.9 |
| 10                                                                                          | 24620.0       | 45.8        | 46.3     | 40.2                    | 36.8                | 20.9                  | 2.6                         | 63.2     | 63.7     | 74.0                    | 10.8   | 10.3 |

#### AV DETECT (RBW 1MHz VBW 10Hz)

| No.                                                                                         | FREQ<br>[MHz] | T/R READING |          | ANT<br>Factor<br>[dB/m] | AMP<br>GAIN<br>[dB] | CABLE<br>LOSS<br>[dB] | ATT<br>or<br>Filter<br>[dB] | RESULT   |          | Limit<br>AV<br>[dBuV/m] | MARGIN |      |
|---------------------------------------------------------------------------------------------|---------------|-------------|----------|-------------------------|---------------------|-----------------------|-----------------------------|----------|----------|-------------------------|--------|------|
|                                                                                             |               | HOR         | VER      |                         |                     |                       |                             | HOR      | VER      |                         | HOR    | VER  |
|                                                                                             |               | [dBuV/m]    | [dBuV/m] |                         |                     |                       |                             | [dBuV/m] | [dBuV/m] |                         | [dB]   | [dB] |
| Test distance 3meters RESULT=Reading + ANT Factor - Amp Gain + CABLE LOSS + Band Pass       |               |             |          |                         |                     |                       |                             |          |          |                         |        |      |
| 1                                                                                           | 2483.5        | 33.0        | 33.2     | 31.0                    | 36.2                | 6.3                   | 9.8                         | 43.9     | 44.1     | 54.0                    | 10.1   | 9.9  |
| 2                                                                                           | 4924.0        | 34.4        | 38.2     | 35.9                    | 36.1                | 9.1                   | 1.0                         | 44.3     | 48.1     | 54.0                    | 9.7    | 5.9  |
| 3                                                                                           | 7386.0        | 30.2        | 30.1     | 38.3                    | 35.7                | 11.3                  | 0.5                         | 44.6     | 44.5     | 54.0                    | 9.4    | 9.5  |
| 4                                                                                           | 9848.0        | 31.0        | 31.1     | 37.1                    | 36.3                | 13.0                  | 0.5                         | 45.3     | 45.4     | 54.0                    | 8.7    | 8.6  |
| Test distance 1meter RESULT=Reading + ANT Factor - Amp Gain + CABLE LOSS + Band Pass - Dfac |               |             |          |                         |                     |                       |                             |          |          |                         |        |      |
| 5                                                                                           | 12310.0       | 29.9        | 29.8     | 41.7                    | 35.6                | 14.5                  | 0.5                         | 41.5     | 41.4     | 54.0                    | 12.5   | 12.6 |
| 6                                                                                           | 14772.0       | 29.1        | 29.0     | 42.1                    | 34.9                | 15.6                  | 0.6                         | 43.0     | 42.9     | 54.0                    | 11.0   | 11.1 |
| 7                                                                                           | 17234.0       | 32.3        | 32.1     | 46.7                    | 35.3                | 17.5                  | 0.3                         | 52.0     | 51.8     | 54.0                    | 2.0    | 2.2  |
| 8                                                                                           | 19696.0       | 32.8        | 32.7     | 39.6                    | 35.4                | 18.9                  | 1.0                         | 47.4     | 47.3     | 54.0                    | 6.6    | 6.7  |
| 9                                                                                           | 22158.0       | 32.8        | 32.5     | 40.6                    | 35.0                | 20.2                  | 1.4                         | 50.5     | 50.2     | 54.0                    | 3.5    | 3.8  |
| 10                                                                                          | 24620.0       | 33.8        | 33.9     | 40.2                    | 36.8                | 20.9                  | 2.6                         | 51.2     | 51.3     | 54.0                    | 2.8    | 2.7  |

Test Distance 1.0m : Distance Factor(Dfac) = 20log(3/1.0) = 9.5dB

\*Except for the above table : All other spurious emissions were less than 20dB for the limit.

\*In the frequency over the fifth harmonic, the noise from the EUT was not seen. The data above is its base noise.

\*The limit values at frequencies excepting restricted bands indicated in 15.205 are values 20dB below lower  
(PK:88.1dBuV/AV:83.5dBuV) peak output powers (PK:108.1dBuV/AV:103.5dBuV) at each channel ⇒ 今回必要なし

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Head Office EMC Lab.

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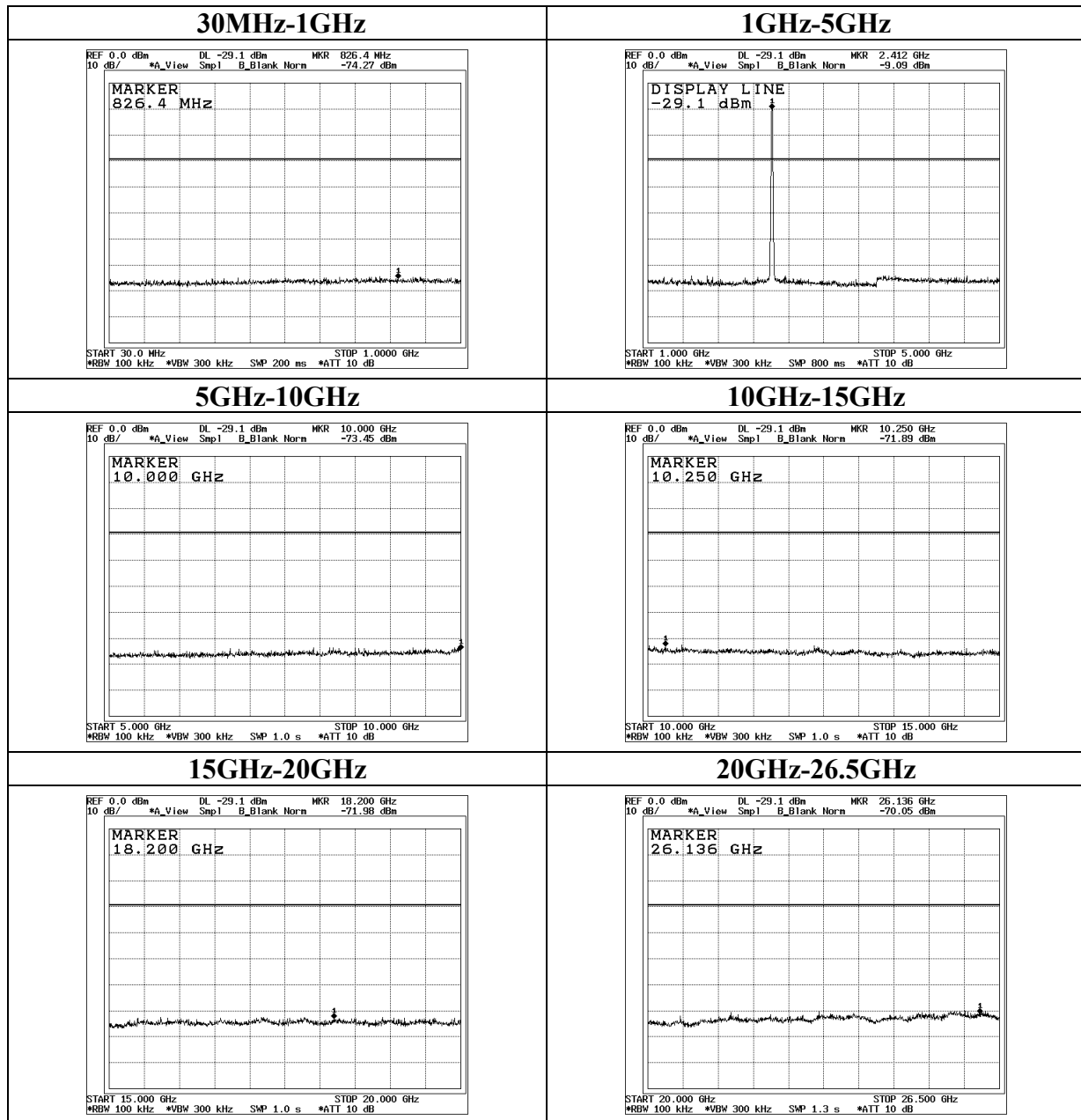
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Facsimile : +81 596 24 8124

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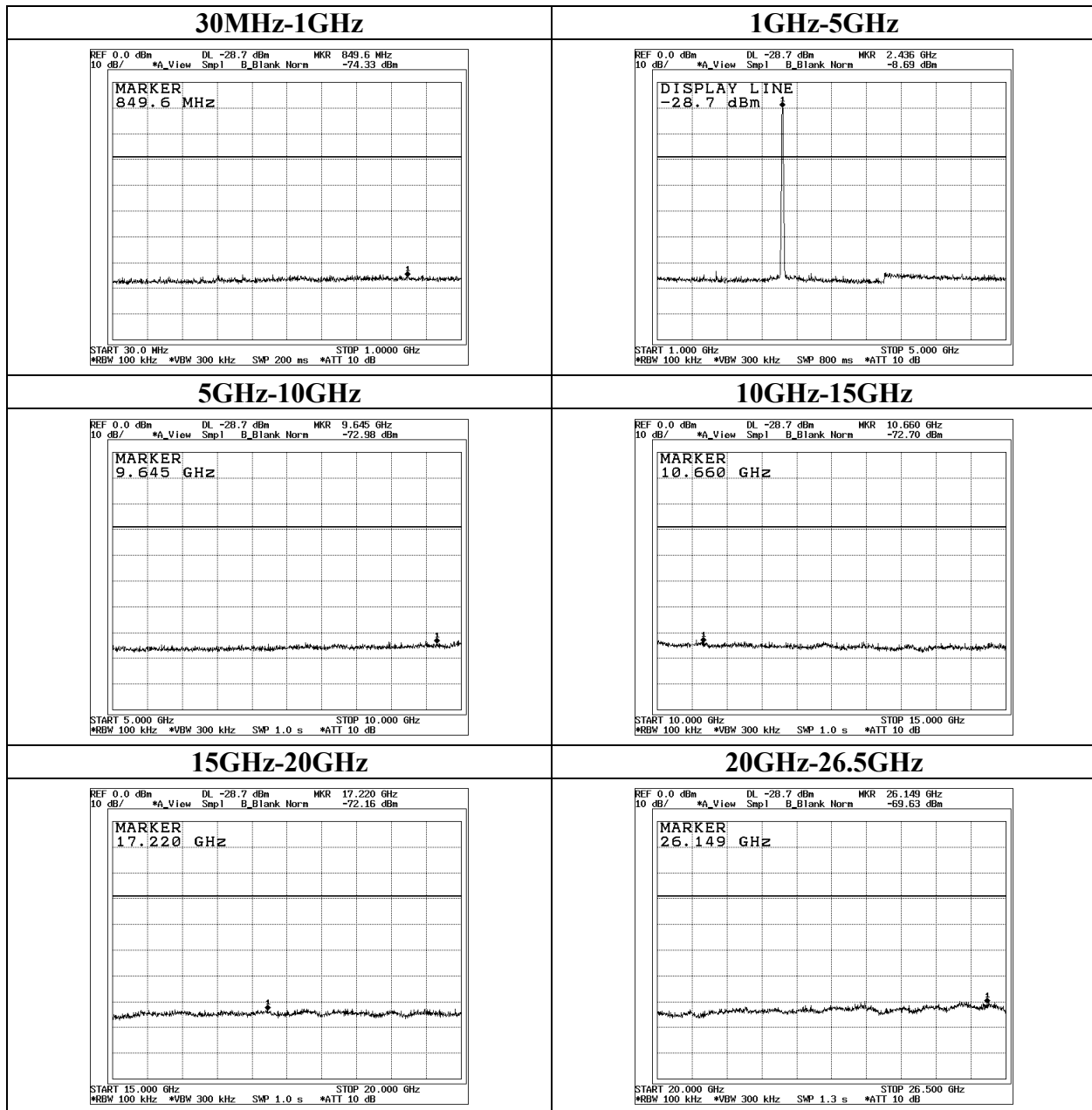
**Conducted Spurious Emission(DSSS and other forms of modulation)**

**Ch : Low**



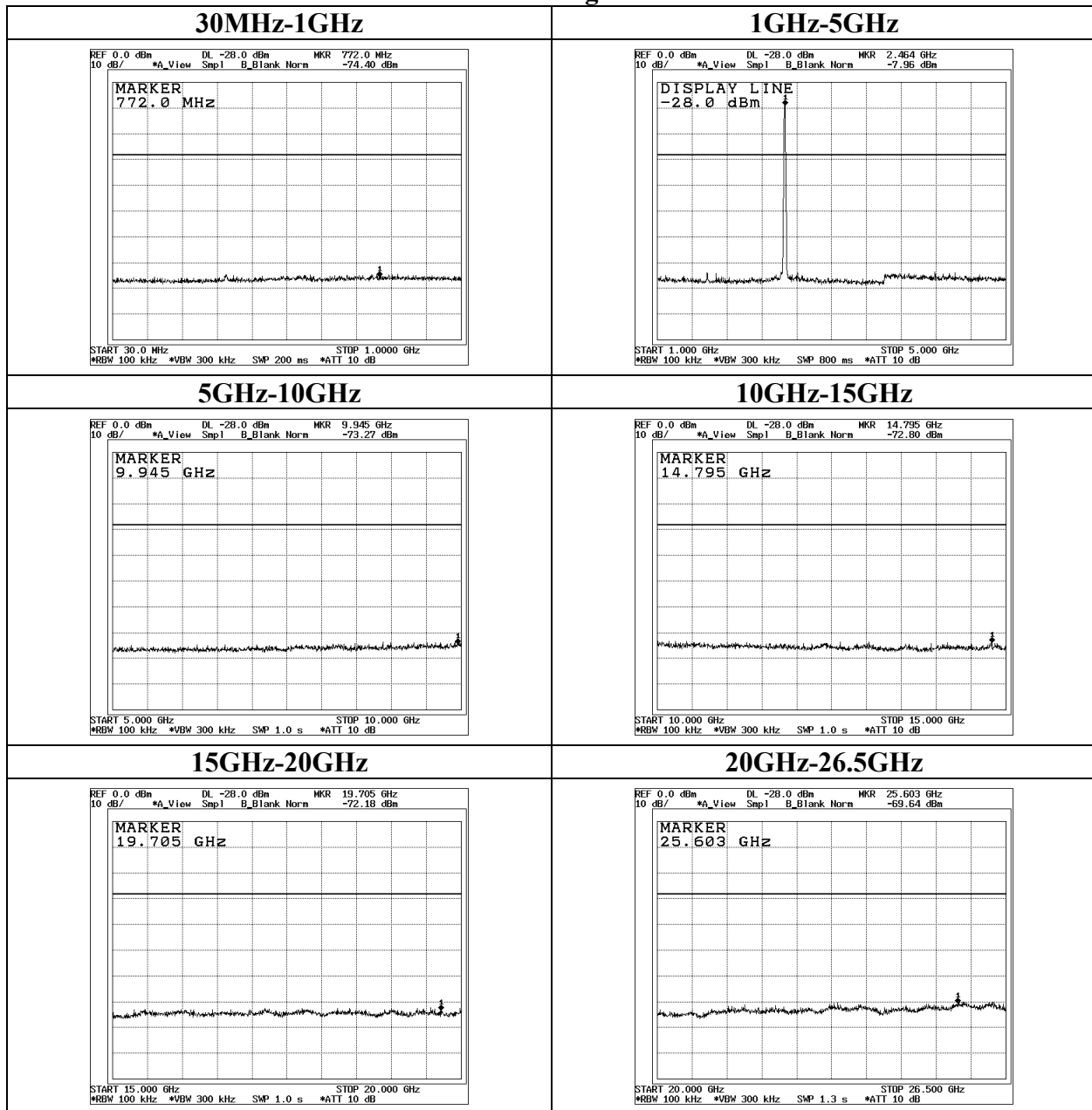
## Conducted Spurious Emission(DSSS and other forms of modulation)

Ch : Mid

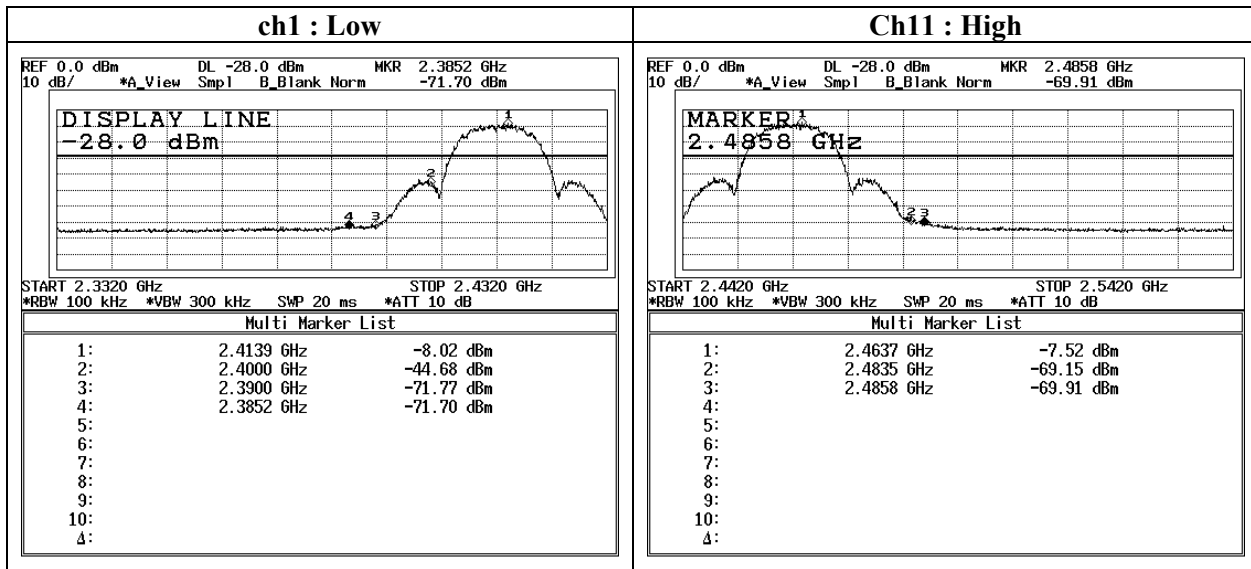


## Conducted Spurious Emission(DSSS and other forms of modulation)

Ch : High



**Conducted emission Band Edge compliance (DSSS and other forms of modulation)**



**Power Density (DSSS and other forms of modulation )**

UL Apex Co., Ltd.  
Head Office EMC Lab. No.3 Measurement Room

|            |                                                |               |                                  |
|------------|------------------------------------------------|---------------|----------------------------------|
| COMPANY    | : SATO CORPORATION                             | REGULATION    | : Fcc Part15 Subpart C 15.247(d) |
| EQUIPMENT  | : W-LAN module for W-LAN/BARCODE PRINTER       | TEST DISTANCE | : -                              |
| MODEL      | : WM-B-AG-02                                   | DATE          | : March 11, 2004                 |
| SAMPLE NO. | : 03UT02481658                                 | TEMPERATURE   | : 21 deg.C                       |
| POWER      | : DC 3.3V (AC120V/60Hz)                        | HUMIDITY      | : 46 %                           |
| MODE       | : Transmitting (IEEE 802.11b) Burst Frame mode | ENGINEER      | : Kenichi Adachi                 |
|            | : 11Mbps                                       |               |                                  |

| Ch   | Freq.<br>[MHz] | Reading<br>[dBm] | Cable<br>Loss<br>[dB] | Atten.<br>[dB] | Result<br>[dBm] | Limit<br>[dBm] | Margin<br>[dB] |
|------|----------------|------------------|-----------------------|----------------|-----------------|----------------|----------------|
| ch1  | 2412.3         | -19.91           | 0.8                   | 10.0           | -9.1            | 8.0            | 17.1           |
| ch6  | 2437.3         | -20.75           | 0.8                   | 10.0           | -10.0           | 8.0            | 18.0           |
| ch11 | 2462.3         | -19.82           | 0.8                   | 10.0           | <b>-9.0</b>     | 8.0            | <b>17.0</b>    |

Sample Calculation:

Result = Reading + Cable Loss + Attenuator

\* Atten. was not used for factor 0.0dB of the above table.

Test Instruments : MRENT-09, MAT-20

Remarks : This item was measured with cable that borrowed from the applicant. (Cable loss: 0.8dB)

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**UL Apex Co., Ltd.**

**Head Office EMC Lab.**

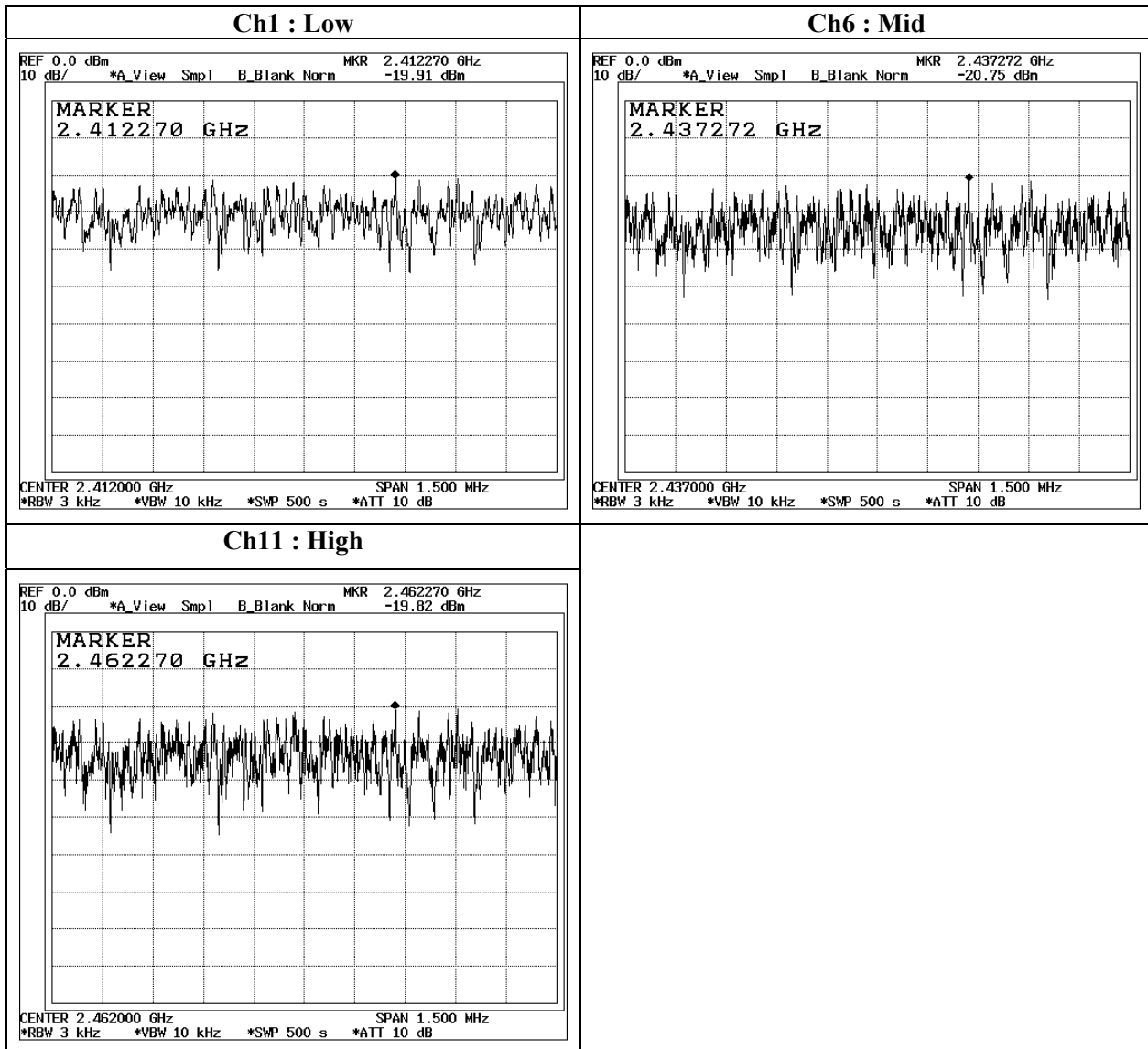
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**Power Density(DSSS and other forms of modulation)**





**99%Occupied Bandwidth(DSSS and other forms of modulation)**

UL Apex Co., Ltd.  
Head Office EMC Lab. No.3 Measurement room

Company : SATO CORPORATION  
Equipment : W-LAN module for W-LAN/BARCODE PRINTER  
Model : WM-B-AG-02  
Sample No. : 03UT02481658  
Power : DC 3.3V (AC120V/60Hz)  
Mode : Transmitting (IEEE 802.11b) Burst Frame mode  
: 11Mbps

REPORT NO : 24GE0192-HO  
REGULATION : RSS-210 (issue 5)  
TEST DISTANCE : -  
DATE : March 11, 2004  
TEMPERATURE : 21 deg.C  
HUMIDITY : 46 %  
  
ENGINEER : Kenichi Adachi

IEEE802.11b, Rate: 11Mbps

| ch       | FREQ<br>[MHz] | 99% Occupied<br>Bandwidth<br>[MHz] |
|----------|---------------|------------------------------------|
| Low(1)   | 2412.0        | 15.30                              |
| Mid(6)   | 2437.0        | <b>15.35</b>                       |
| High(11) | 2462.0        | 15.30                              |

Test Instruments: MRENT-09, MAT-20

### 99% Occupied Bandwidth

