



## SAR TEST REPORT

Test Report No. : 31AE0084-HO-02-B-R1

Applicant : SATO CORPORATION  
Type of Equipment : Wireless LAN Board  
Model No. : SMP-WL  
FCC ID : MMFSMP-WL  
Test regulation : FCC47CFR 2.1093  
FCC OET Bulletin 65, Supplement C (Edition 01-01)

Test Result : Complied  
Max SAR Measured : 0.571 W/kg

Simultaneous transmission : Complied

### SAR result

1. This test report shall not be reproduced in full or partial, without the written approval of UL Japan, Inc.
2. The results in this report apply only to the sample tested.
3. This sample tested is in compliance with the limits of the above regulation.
4. The test results in this report are traceable to the national or international standards.
5. This test report must not be used by the customer to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.
6. This report is a revised version of 31AE0084-HO-02-B. 31AE0084-HO-02-B is replaced with this report.

Date of test:

June 9 and 10, 2011

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NVLAP LAB CODE: 200572-0

This laboratory is accredited by the NVLAP LAB CODE 200572-0, U.S.A. The tests reported herein have been performed in accordance with its terms of accreditation. \*As for the range of Accreditation in NVLAP, you may refer to the WEB address, <http://www.ul.com/japan/jpn/pages/services/emc/about/ma rk1/index.jsp#nvlap>

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13-EM-F0429

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**SECTION 1: Customer information**

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**\*Remarks:**

SATO CORPORATION designates silex technology, Inc. as manufacturer of the product (Wireless LAN Board).

**SECTION 2: Equipment under test (E.U.T.)****2.1 Identification of E.U.T.**

Type of Equipment : Wireless LAN Board  
 Model No. : SMP-WL  
 Serial No. : 001  
 Rating : DC5V to 12V  
 Receipt Date of Sample : October 22, 2010  
 Country of Mass-production : Japan  
 Condition of EUT : Production prototype  
 (Not for Sale: This sample is equivalent to mass-produced items.)  
 Modification of EUT : No Modification by the test lab

**2.2 Product Description**

Model No: SMP-WL (referred to as the EUT in this report) is the Wireless LAN Board.

Equipment Type : Transceiver  
 Clock frequency : 12MHz  
 Method of Frequency Generation : Synthesizer  
 Operating voltage (inner) : DC3.3V, DC1.2V, DC1.8V

|                        | <b>IEEE802.11b</b>            | <b>IEEE802.11g</b>                 |
|------------------------|-------------------------------|------------------------------------|
| Frequency of operation | 2412-2462MHz                  | 2412-2462MHz                       |
| Type of modulation     | DSSS<br>(CCK, DQPSK, DBPSK)   | OFDM<br>(64QAM, 16QAM, QPSK, BPSK) |
| Channel spacing        | 5MHz                          | 5MHz                               |
| ITU Code               | G1D                           | D1D                                |
| Antenna type           | Multilayer Antenna Inverted-F | Multilayer Antenna Inverted-F      |
| Antenna Gain           | Antenna 1: 1.9dBi (Max)       | Antenna 2: 1.9dBi (Max)            |

## SECTION 3 : Test standard information

### 3.1 Requirements for compliance testing defined by the FCC

The US Federal Communications Commission has released the report and order "Guidelines for Evaluating the Environmental Effects of RF Radiation", ET Docket No. 93-62 in August 1996. The order requires routine SAR evaluation prior to equipment authorization of portable transmitter devices, including portable telephones. For consumer products, the applicable limit is 1.6 mW/g for an uncontrolled environment and 8.0 mW/g for an occupational/controlled environment as recommended by the ANSI/IEEE standard C95.1-1992. According to the Supplement C of OET Bulletin 65 "Evaluating Compliance with FCC Guide-lines for Human Exposure to Radio frequency Electromagnetic Fields", released on Jun 29, 2001 by the FCC, the device should be evaluated at maximum output power (radiated from the antenna) under "worst-case" conditions for normal or intended use, incorporating normal antenna operating positions, device peak performance frequencies and positions for maximum RF energy coupling.

1 Specific Absorption Rate (SAR) is a measure of the rate of energy absorption due to exposure to an RF transmitting source (wireless portable device).

2 IEEE/ANSI Std. C95.1-1992 limits are used to determine compliance with FCC ET Docket 93-62.

#### **Supplement C (Edition 01-01) to OET Bulletin 65 (Edition 97-01):**

Supplement C (Edition 01-01) - Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radiofrequency Emissions

OET Bulletin 65 (Edition 97-01) - Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields

#### **IEEE Std 1528-2003:**

IEEE Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques Supplement C

In additions;

KDB 447498 D01(v04): Mobile and Portable Device RF Exposure Procedures and Equipment Authorization Policies

KDB 248227 (rev.1.2): SAR Measurement Procedures for 802.11a/b/g Transmitters

### **3.2 Procedure and result**

#### **TEST Outline**

This EUT is a limited module approval according to section 15.212(b). The procedure of SAR was measured according to the KDB447498 2).

The EUT (module and antenna) is installed at the barcode printer.

The kinds of barcode printer have MB200 and MB400 series. For the details, refer to the Appendix.1

The SAR was tested by the representative barcode printer of MB201i and MB400i.

| No. | Item           | Test Procedure                    | Limit           | Remarks         | Exclusion | Result   |
|-----|----------------|-----------------------------------|-----------------|-----------------|-----------|----------|
| 1   | Human Exposure | FCC OET BULLETIN 65, SUPPLEMENT C | FCC47CFR 2.1093 | SAR Measurement | N/A       | Complied |

Note: UL Japan, Inc. 's SAR Work Procedures 13-EM-W0429 and 13-EM-W0430

#### **1. Stand-alone SAR result**

##### **Maximum 1g SAR**

| Mode     | 1g SAR [W/kg] |
|----------|---------------|
| WLAN 11b | 0.571         |

**The 1g SAR was <0.8W/kg for all configurations.**

**Therefore according to the KDB447498 D01, the EUT was approved for used in multiple host platforms.**

**3.3 Exposure limit****(A) Limits for Occupational/Controlled Exposure (W/kg)**

| Spatial Average<br>(averaged over the whole body) | Spatial Peak<br>(averaged over any 1g of tissue) | Spatial Peak<br>(hands/wrists/feet/ankles averaged<br>over 10g) |
|---------------------------------------------------|--------------------------------------------------|-----------------------------------------------------------------|
| 0.4                                               | 8.0                                              | 20.0                                                            |

**(B) Limits for General population/Uncontrolled Exposure (W/kg)**

| Spatial Average<br>(averaged over the whole body) | Spatial Peak<br>(averaged over any 1g of tissue) | Spatial Peak<br>(hands/wrists/feet/ankles averaged<br>over 10g) |
|---------------------------------------------------|--------------------------------------------------|-----------------------------------------------------------------|
| 0.08                                              | 1.6                                              | 4.0                                                             |

**Occupational/Controlled Environments:** are defined as locations where there is exposure that may be incurred by people who are aware of the potential for exposure, (i.e. as a result of employment or occupation).

**General Population/Uncontrolled Environments:** are defined as locations where there is the exposure of individuals who have no knowledge or control of their exposure.

**NOTE: GENERAL POPULATION/UNCONTROLLED EXPOSURE  
SPATIAL PEAK(averaged over any 1g of tissue) LIMIT  
1.6 W/kg**

**3.4 Test Location**

\*Shielded room for SAR testings

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## SECTION 4 : Description of the operating mode

### 4.1 Operating modes

| Mode                                                                                                                                                                                                                                                                                                                                                                                                                   | Duty cycle<br>or<br>Multi class(GSM) | Packet DATA | Testing item |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|-------------|--------------|
| IEEE 802.11b                                                                                                                                                                                                                                                                                                                                                                                                           | 100%                                 | PN9         | Power , SAR  |
| IEEE 802.11g                                                                                                                                                                                                                                                                                                                                                                                                           | 100%                                 | PN9         | Power        |
| <b>WLAN</b>                                                                                                                                                                                                                                                                                                                                                                                                            |                                      |             |              |
| Power of the EUT was set by the software as follows;<br>Software name & version: Atheros Test Command<br>Power settings: 11b: 1-13ch      15dBm<br>11g: 1ch-10ch      15dBm<br>11ch      13dBm<br>*This setting of software is the worst case.<br>Any conditions under the normal use do not exceed the condition of setting.<br>In addition, end users cannot change the settings of the output power of the product. |                                      |             |              |

## 4.2 SAR testing operating modes

The frequency band and the modulation used in this test are shown as a following.

### 1. IEEE802.11b

Frequency band : 2412MHz-2462MHz

Channel : 1ch(2412MHz),6ch(2437MHz),11ch(2462MHz)

Modulation : 11b DBPSK(1Mbps)

Crest factor : 1

\*For the port1:The 11g BPSK mode was maximum average power. However, the SAR is not required for 11g/n mode because the maximum average output power for 11b mode is less than 1/4dB higher than that measured 11g/n mode.

\*For the port2:The 11b DBPSK mode was maximum average power. The power of other mode (11g) was lower than 11b DBPSK mode.

### [IEEE802.11b] Rate Check Port1

| Rate<br>[Mbps] | Frequency<br>[MHz] | P/M<br>Reading [dBm] |      | Cable<br>Loss<br>[dB] | Atten.<br>[dB] | Result |       |       |       |
|----------------|--------------------|----------------------|------|-----------------------|----------------|--------|-------|-------|-------|
|                |                    | PK                   | AVG  |                       |                | [dBm]  |       | [mW]  |       |
| 1.0            | 2437               | 6.49                 | 3.51 | 1.10                  | 10.08          | 17.67  | 14.69 | 58.48 | 29.44 |
| 2.0            | 2437               | 6.46                 | 3.40 | 1.10                  | 10.08          | 17.64  | 14.58 | 58.08 | 28.71 |
| 5.5            | 2437               | 6.29                 | 3.34 | 1.10                  | 10.08          | 17.47  | 14.52 | 55.85 | 28.31 |
| 11.0           | 2437               | 6.48                 | 3.44 | 1.10                  | 10.08          | 17.66  | 14.62 | 58.34 | 28.97 |

### IEEE802.11b 1Mbps port1

| Ch | Frequency<br>[MHz] | P/M<br>Reading [dBm] |      | Cable<br>Loss<br>[dB] | Atten.<br>[dB] | Result |       |       |       |
|----|--------------------|----------------------|------|-----------------------|----------------|--------|-------|-------|-------|
|    |                    | PK                   | AVG  |                       |                | [dBm]  |       | [mW]  |       |
| 1  | 2412               | 5.64                 | 2.82 | 1.10                  | 10.08          | 16.82  | 14.00 | 48.08 | 25.12 |
| 6  | 2437               | 6.49                 | 3.51 | 1.10                  | 10.08          | 17.67  | 14.69 | 58.48 | 29.44 |
| 11 | 2462               | 6.16                 | 3.43 | 1.11                  | 10.08          | 17.35  | 14.62 | 54.33 | 28.97 |

Maximum AVG power

### [IEEE802.11g] Rate Check Port1

| Rate<br>[Mbps] | Frequency<br>[MHz] | P/M<br>Reading [dBm] |      | Cable<br>Loss<br>[dB] | Atten.<br>[dB] | Result |       |        |       |
|----------------|--------------------|----------------------|------|-----------------------|----------------|--------|-------|--------|-------|
|                |                    | PK                   | AVG  |                       |                | [dBm]  |       | [mW]   |       |
| 6.0            | 2437               | 10.66                | 3.70 | 1.10                  | 10.08          | 24.44  | 14.88 | 277.97 | 30.76 |
| 9.0            | 2437               | 10.54                | 3.67 | 1.10                  | 10.08          | 24.29  | 14.85 | 268.53 | 30.55 |
| 12.0           | 2437               | 10.81                | 3.70 | 1.10                  | 10.08          | 24.59  | 14.88 | 287.74 | 30.76 |
| 18.0           | 2437               | 10.48                | 3.61 | 1.10                  | 10.08          | 24.17  | 14.79 | 261.22 | 30.13 |
| 24.0           | 2437               | 10.73                | 3.47 | 1.10                  | 10.08          | 24.28  | 14.65 | 267.92 | 29.17 |
| 36.0           | 2437               | 10.53                | 3.48 | 1.10                  | 10.08          | 24.09  | 14.66 | 256.45 | 29.24 |
| 48.0           | 2437               | 10.47                | 3.42 | 1.10                  | 10.08          | 23.97  | 14.60 | 249.46 | 28.84 |
| 54.0           | 2437               | 10.75                | 3.47 | 1.10                  | 10.08          | 24.30  | 14.65 | 269.15 | 29.17 |

### IEEE802.11g 6Mbps Port1

| Ch | Frequency<br>[MHz] | P/M<br>Reading [dBm] |      | Cable<br>Loss<br>[dB] | Atten.<br>[dB] | Result |       |        |       |
|----|--------------------|----------------------|------|-----------------------|----------------|--------|-------|--------|-------|
|    |                    | PK                   | AVG  |                       |                | [dBm]  |       | [mW]   |       |
| 1  | 2412               | 10.45                | 2.78 | 1.10                  | 10.08          | 21.63  | 13.96 | 145.55 | 24.89 |
| 6  | 2437               | 10.66                | 3.70 | 1.10                  | 10.08          | 21.84  | 14.88 | 152.76 | 30.76 |
| 11 | 2462               | 10.11                | 1.60 | 1.11                  | 10.08          | 21.30  | 12.79 | 134.90 | 19.01 |

Maximum AVG power

\*\*: SAR is not required for 802.11g channels when the maximum average output power is less than 1/4dB higher than that measured on the corresponding 802.11b channels.

Sample Calculation:

Result = Reading + Cable Loss (no used) + Attenuator

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**[IEEE802.11b] Rate Check Port2**

| Rate<br>[Mbps] | Frequency<br>[MHz] | P/M<br>Reading [dBm] |      | Cable<br>Loss<br>[dB] | Atten.<br>[dB] | Result |       |       |       |
|----------------|--------------------|----------------------|------|-----------------------|----------------|--------|-------|-------|-------|
|                |                    | PK                   | AVG  |                       |                | [dBm]  |       | [mW]  |       |
| 1.0            | 2437               | 6.56                 | 3.86 | 1.10                  | 10.08          | 17.74  | 15.04 | 59.43 | 31.92 |
| 2.0            | 2437               | 6.41                 | 3.67 | 1.10                  | 10.08          | 17.59  | 14.85 | 57.41 | 30.55 |
| 5.5            | 2437               | 6.43                 | 3.56 | 1.10                  | 10.08          | 17.61  | 14.74 | 57.68 | 29.79 |
| 11.0           | 2437               | 6.45                 | 3.62 | 1.10                  | 10.08          | 17.63  | 14.80 | 57.94 | 30.20 |

**IEEE802.11b 1Mbps port2**

| Ch | Frequency<br>[MHz] | P/M<br>Reading [dBm] |      | Cable<br>Loss<br>[dB] | Atten.<br>[dB] | Result |       |       |       |
|----|--------------------|----------------------|------|-----------------------|----------------|--------|-------|-------|-------|
|    |                    | PK                   | AVG  |                       |                | [dBm]  |       | [mW]  |       |
| 1  | 2412               | 5.62                 | 2.88 | 1.10                  | 10.08          | 16.80  | 14.06 | 47.86 | 25.47 |
| 6  | 2437               | 6.56                 | 3.86 | 1.10                  | 10.08          | 17.74  | 15.04 | 59.43 | 31.92 |
| 11 | 2462               | 6.35                 | 3.63 | 1.11                  | 10.08          | 17.54  | 14.82 | 56.75 | 30.34 |

:Maximum AVG power

**[IEEE802.11g] Rate Check Port2**

| Rate<br>[Mbps] | Frequency<br>[MHz] | P/M<br>Reading [dBm] |      | Cable<br>Loss<br>[dB] | Atten.<br>[dB] | Result |       |        |       |
|----------------|--------------------|----------------------|------|-----------------------|----------------|--------|-------|--------|-------|
|                |                    | PK                   | AVG  |                       |                | [dBm]  |       | [mW]   |       |
| 6.0            | 2437               | 10.84                | 3.75 | 1.10                  | 10.08          | 24.67  | 14.93 | 293.09 | 31.12 |
| 9.0            | 2437               | 10.46                | 3.57 | 1.10                  | 10.08          | 24.11  | 14.75 | 257.63 | 29.85 |
| 12.0           | 2437               | 10.95                | 3.76 | 1.10                  | 10.08          | 24.79  | 14.94 | 301.30 | 31.19 |
| 18.0           | 2437               | 10.69                | 3.70 | 1.10                  | 10.08          | 24.47  | 14.88 | 279.90 | 30.76 |
| 24.0           | 2437               | 10.81                | 3.52 | 1.10                  | 10.08          | 24.41  | 14.70 | 276.06 | 29.51 |
| 36.0           | 2437               | 10.69                | 3.49 | 1.10                  | 10.08          | 24.26  | 14.67 | 266.69 | 29.31 |
| 48.0           | 2437               | 10.64                | 3.42 | 1.10                  | 10.08          | 24.14  | 14.60 | 259.42 | 28.84 |
| 54.0           | 2437               | 10.83                | 3.47 | 1.10                  | 10.08          | 24.38  | 14.65 | 274.16 | 29.17 |

**IEEE802.11g 6Mbps Port2**

| Ch | Frequency<br>[MHz] | P/M<br>Reading [dBm] |      | Cable<br>Loss<br>[dB] | Atten.<br>[dB] | Result |       |        |       |
|----|--------------------|----------------------|------|-----------------------|----------------|--------|-------|--------|-------|
|    |                    | PK                   | AVG  |                       |                | [dBm]  |       | [mW]   |       |
| 1  | 2412               | 10.64                | 3.10 | 1.10                  | 10.08          | 21.82  | 14.28 | 152.05 | 26.79 |
| 6  | 2437               | 10.84                | 3.75 | 1.10                  | 10.08          | 22.02  | 14.93 | 159.22 | 31.12 |
| 11 | 2462               | 9.98                 | 2.15 | 1.11                  | 10.08          | 21.17  | 13.34 | 130.92 | 21.58 |

:Maximum AVG power

\*\* : SAR is not required for 802.11g channels when the maximum average output power is less than 1/4dB higher than that measured on the corresponding 802.11b channels.

Sample Calculation:

Result = Reading + Cable Loss (no used) + Attenuator

#### **4.3 Confirmation before SAR testing**

##### **Correlation of Output Power between EMC and SAR tests**

It was checked that the antenna port power was correlated within 0~+5% (FCC requirements)

SAR power is equal to DATA of EMC test based on the following reason.

- EMC and SAR tests are performed with the same test sample (S/N:001) under the same condition.
- EMC and SAR tests are performed at the same laboratory.

#### **4.4 Confirmation after SAR testing**

It was checked that the power drift [W] is within +/-5%. The verification of power drift during the SAR test is that DASY5 system calculates the power drift by measuring the E-field at the same location at beginning and the end of the scan measurement for each test position.

DASY5 system calculation Power drift value[dB] =  $20\log(E_a)/(E_b)$

Before SAR testing :  $E_b$ [V/m]

After SAR testing :  $E_a$ [V/m]

Limit of power drift[W] = +/-5%

$X[\text{dB}] = 10\log[P] = 10\log(1.05/1) = 10\log(1.05) - 10\log(1) = 0.212\text{dB}$

from E-field relations with power.

$p = E^2/\eta = E^2/$

Therefore, The correlation of power and the E-field

$X[\text{dB}] = 10\log(P) = 10\log(E^2) = 20\log(E)$

Therefore,

The calculated power drift of DASY5 System must be the less than +/-0.212dB.

## **SECTION 5 : Description of the Body setup**

### **5.1 Test position**

The EUT (module and antenna) is installed in the barcode printer. (MB200 and MB400 series).

The two models has body exposure configuration since the device is close to the body while on the user is operating.

For the details, refer to the Appendix.1

(1) Front :

The measurement was performed at touch the front of EUT to Flat Phantom.

(2) Rear :

The measurement was performed at touch the rear of EUT to Flat Phantom.

(3) Right side :

The measurement was performed at touch the right side of EUT to Flat Phantom.

(4) Left side :

The measurement was performed at touch the left side of EUT to Flat Phantom.

(5) Top :

The measurement was performed at touch the top of EUT to Flat Phantom.

(6) Bottom :

The measurement was performed at touch the bottom of EUT to Flat Phantom.

Refer to the Appendix 1.

## SECTION 6 : Test surrounding

### 6.1 Measurement uncertainty

The uncertainty budget has been determined for the DASY5 measurement system according to the SPEAG documents[6] and is given in the following Table.

| Error Description                    | Uncertainty value $\pm$ % | Probability distribution | divisor    | (ci) 1g | Standard Uncertainty (1g)      | vi or veff |
|--------------------------------------|---------------------------|--------------------------|------------|---------|--------------------------------|------------|
| <b>Measurement System</b>            |                           |                          |            |         |                                |            |
| Probe calibration                    | $\pm 6.55$                | Normal                   | 1          | 1       | $\pm 6.55$                     | $\infty$   |
| Axial isotropy of the probe          | $\pm 4.7$                 | Rectangular              | $\sqrt{3}$ | 0.7     | $\pm 1.9$                      | $\infty$   |
| Spherical isotropy of the probe      | $\pm 9.6$                 | Rectangular              | $\sqrt{3}$ | 0.7     | $\pm 3.9$                      | $\infty$   |
| Boundary effects                     | $\pm 2.0$                 | Rectangular              | $\sqrt{3}$ | 1       | $\pm 1.2$                      | $\infty$   |
| Probe linearity                      | $\pm 4.7$                 | Rectangular              | $\sqrt{3}$ | 1       | $\pm 2.7$                      | $\infty$   |
| Detection limit                      | $\pm 1.0$                 | Rectangular              | $\sqrt{3}$ | 1       | $\pm 0.6$                      | $\infty$   |
| Readout electronics                  | $\pm 0.3$                 | Normal                   | 1          | 1       | $\pm 0.3$                      | $\infty$   |
| Response time                        | $\pm 0.8$                 | Rectangular              | $\sqrt{3}$ | 1       | $\pm 0.5$                      | $\infty$   |
| Integration time                     | $\pm 2.6$                 | Rectangular              | $\sqrt{3}$ | 1       | $\pm 1.5$                      | $\infty$   |
| RF ambient Noise                     | $\pm 3.0$                 | Rectangular              | $\sqrt{3}$ | 1       | $\pm 1.7$                      | $\infty$   |
| RF ambient Reflections               | $\pm 3.0$                 | Rectangular              | $\sqrt{3}$ | 1       | $\pm 1.7$                      | $\infty$   |
| Probe Positioner                     | $\pm 0.8$                 | Rectangular              | $\sqrt{3}$ | 1       | $\pm 0.5$                      | $\infty$   |
| Probe positioning                    | $\pm 9.9$                 | Rectangular              | $\sqrt{3}$ | 1       | $\pm 5.7$                      | $\infty$   |
| Max.SAR Eval.                        | $\pm 4.0$                 | Rectangular              | $\sqrt{3}$ | 1       | $\pm 2.3$                      | $\infty$   |
| <b>Test Sample Related</b>           |                           |                          |            |         |                                |            |
| Device positioning                   | $\pm 2.9$                 | Normal                   | 1          | 1       | $\pm 2.9$                      | 39         |
| Device holder uncertainty            | $\pm 3.6$                 | Normal                   | 1          | 1       | $\pm 3.6$                      | 4          |
| Power drift                          | $\pm 5.0$                 | Rectangular              | $\sqrt{3}$ | 1       | $\pm 2.9$                      | $\infty$   |
| <b>Phantom and Setup</b>             |                           |                          |            |         |                                |            |
| Phantom uncertainty                  | $\pm 4.0$                 | Rectangular              | $\sqrt{3}$ | 1       | $\pm 2.3$                      | $\infty$   |
| Liquid conductivity (target)         | $\pm 5.0$                 | Rectangular              | $\sqrt{3}$ | 0.64    | $\pm 1.8$                      | $\infty$   |
| Liquid conductivity (meas.)          | $\pm 5.0$                 | Rectangular              | 1          | 0.64    | $\pm 3.2$                      | $\infty$   |
| Liquid permittivity (target)         | $\pm 5.0$                 | Rectangular              | $\sqrt{3}$ | 0.6     | $\pm 1.7$                      | $\infty$   |
| Liquid permittivity (meas.)          | $\pm 5.0$                 | Rectangular              | 1          | 0.6     | $\pm 3.0$                      | $\infty$   |
|                                      |                           |                          |            |         |                                |            |
| <b>Combined Standard Uncertainty</b> |                           |                          |            |         | <b><math>\pm 13.356</math></b> |            |
| <b>Expanded Uncertainty (k=2)</b>    |                           |                          |            |         | <b><math>\pm 26.7</math></b>   |            |

## SECTION 7 : Measurement results

### 7.1 WLAN SAR

#### 1. Method of measurement

The SAR was performed that the EUT (module and antenna) was installed in the model name MB201i barcode printer. The MB200 series has two installed antennas.

Step1. The searching for the worst position

The test was performed in mode of the maximum output power by each antenna port.

Step2. The changing to the other channels

The test was performed at the worst position in Step.1

Note:

The SAR is not required for 11g/n mode because the maximum average output power for 11b mode is less than 1/4dB higher than that measured 11g/n mode.

#### 2. Results of SAR

Model : SMP-WL

Modulation : DSSS

Serial No. : 001

Crest factor : 1

Date : June 9, 2011

June 10, 2011

Liquid Depth (cm) : 15.0

15.0

Parameters :  $\epsilon_r = 50.4$ ,  $\sigma = 2.02$

$\epsilon_r = 51.1$ ,  $\sigma = 2.02$

Ambient temperature (deg.c.) : 24.5

24.5

Liquid temperature (deg.c.) : 23.5

23.5

Relative Humidity (%) : 56

58

Measured By

Miyo Kishimoto

Miyo Kishimoto

Measured By: Harjo Radhikote Harjo Radhikote

| BODY SAR MEASUREMENT RESULTS |       |            |         |                       |            |                    |                                |
|------------------------------|-------|------------|---------|-----------------------|------------|--------------------|--------------------------------|
| Frequency                    |       | Modulation | Phantom | EUT Set-up Conditions |            |                    | SAR(1g)<br>[W/kg]              |
| Channel                      | [MHz] |            |         | Antenna               | Position   | Separation<br>[mm] | Maximum value<br>of multi-peak |
| Step.1 Position searching    |       |            |         |                       |            |                    |                                |
| 6                            | 2437  | 11b DBPSK  | Flat    | 1                     | Front      | 0                  | 0.011                          |
| 6                            | 2437  | 11b DBPSK  | Flat    | 1                     | Rear       | 0                  | 0.036                          |
| 6                            | 2437  | 11b DBPSK  | Flat    | 1                     | Right side | 0                  | 0.571                          |
| 6                            | 2437  | 11b DBPSK  | Flat    | 1                     | Left side  | 0                  | 0.00889                        |
| 6                            | 2437  | 11b DBPSK  | Flat    | 1                     | Top        | 0                  | 0.00898                        |
| 6                            | 2437  | 11b DBPSK  | Flat    | 1                     | Bottom     | 0                  | 0.024                          |
| 6                            | 2437  | 11b DBPSK  | Flat    | 2                     | Front      | 0                  | 0.011                          |
| 6                            | 2437  | 11b DBPSK  | Flat    | 2                     | Rear       | 0                  | 0.064                          |
| 6                            | 2437  | 11b DBPSK  | Flat    | 2                     | Right side | 0                  | 0.030                          |
| 6                            | 2437  | 11b DBPSK  | Flat    | 2                     | Left side  | 0                  | 0.245                          |
| 6                            | 2437  | 11b DBPSK  | Flat    | 2                     | Top        | 0                  | 0.013                          |
| 6                            | 2437  | 11b DBPSK  | Flat    | 2                     | Bottom     | 0                  | 0.103                          |
| Step.2 Channel Changing      |       |            |         |                       |            |                    |                                |
| 1                            | 2412  | 11b DBPSK  | Flat    | 1                     | Right side | 0                  | 0.489                          |
| 11                           | 2462  | 11b DBPSK  | Flat    | 1                     | Right side | 0                  | 0.530                          |

### 3. Method of measurement

The SAR was performed that the EUT (module and antenna) was installed in the model name MB400i barcode printer. The MB400 series has one installed antenna.

Step 1. The searching for the worst position

The test was performed in mode of the maximum output power of antenna port 2

Step 2. The changing to the other channels

The test was performed at the worst position in Step 1

Note:

The SAR is not required for 11g/n mode because the maximum average output power for 11b mode is less than 1/4dB higher than that measured 11g/n mode.

### 4. Results of SAR

Model : SMP-WL

Modulation : DSSS

Serial No. : 001

Crest factor : 1

Date : June 10, 2011  
 Liquid Depth (cm) : 15.0  
 Parameters :  $\epsilon_r = 51.1$ ,  $\sigma = 2.02$   
 Ambient temperature (deg.c.) : 24.5  
 Liquid temperature (deg.c.) : 23.5  
 Relative Humidity (%) : 58  
 Measured By : Miyo Kishimoto

| BODY SAR MEASUREMENT RESULTS |       |            |         |                       |            |                    |                                |
|------------------------------|-------|------------|---------|-----------------------|------------|--------------------|--------------------------------|
| Frequency                    |       | Modulation | Phantom | EUT Set-up Conditions |            |                    | SAR(1g)<br>[W/kg]              |
| Channel                      | [MHz] |            |         | Antenna               | Position   | Separation<br>[mm] | Maximum value<br>of multi-peak |
| Step.1 Position searching    |       |            |         |                       |            |                    |                                |
| 6                            | 2437  | 11b DBPSK  | Flat    | 2                     | Front      | 0                  | 0.034                          |
| 6                            | 2437  | 11b DBPSK  | Flat    | 2                     | Rear       | 0                  | 0.061                          |
| 6                            | 2437  | 11b DBPSK  | Flat    | 2                     | Right side | 0                  | 0.307                          |
| 6                            | 2437  | 11b DBPSK  | Flat    | 2                     | Left side  | 0                  | 0.00513                        |
| 6                            | 2437  | 11b DBPSK  | Flat    | 2                     | Top        | 0                  | 0.016                          |
| 6                            | 2437  | 11b DBPSK  | Flat    | 2                     | Bottom     | 0                  | 0.040                          |
| Step.2 Channel Changing      |       |            |         |                       |            |                    |                                |
| 6                            | 2437  | 11b DBPSK  | Flat    | 2                     | Right side | 0                  | 0.242                          |
| 6                            | 2437  | 11b DBPSK  | Flat    | 2                     | Right side | 0                  | 0.265                          |

## 5. Method of measurement

It was performed to confirm of the separation testing.

### Step3. Change to the separation

The device is moved away from the phantom in 5mm increments from the touching.

A single-point SAR is measured until the SAR is less than 50% of that measured at the touching position.

A single- point SAR evaluation was evaluated by the peak SAR (Extrapolated).

As the result, a single-point SAR at 5mm separation position is checked that it was less than 50% from SAR at the touching position

| BODY SAR MEASUREMENT RESULTS             |       |            |         |                       |            |                    |                      |                   |
|------------------------------------------|-------|------------|---------|-----------------------|------------|--------------------|----------------------|-------------------|
| Frequency                                |       | Modulation | Phantom | EUT Set-up Conditions |            |                    | Single-SAR<br>[W/kg] | SAR(1g)<br>[W/kg] |
| Channel                                  | [MHz] |            |         | Antenna               | Position   | Separation<br>[mm] |                      |                   |
| Step.3 Change to the separation (MB201i) |       |            |         |                       |            |                    |                      |                   |
| 6                                        | 2437  | 11b DBPSK  | Flat    | 1                     | Right side | 0                  | 1.497                | 0.571             |
| 6                                        | 2437  | 11b DBPSK  | Flat    | 1                     | Right side | 5                  | 0.278                | 0.126             |
| Step.3 Change to the separation (MB400i) |       |            |         |                       |            |                    |                      |                   |
| 6                                        | 2437  | 11b DBPSK  | Flat    | 2                     | Right side | 0                  | 0.586                | 0.307             |
| 6                                        | 2437  | 11b DBPSK  | Flat    | 2                     | Right side | 5                  | 0.274                | 0.150             |