# RADIO TEST REPORT

## Test Report No. : 11734002M-H-R2

| | | |
|---|---|---|
| **Applicant** | : | **G-Printec, Inc.** |
| **Type of Equipment** | : | **Card Printer** |
| **Model No.** | : | **CX-7000** |
| **Test regulation** | : | **FCC Part15 Subpart C: 2017** |
| **FCC ID** | : | **2AL3XG6J001** |
| **Test Result** | : | **Complied** |

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 above regulation.
4. The test results in this report are traceable to the national or international standards.
5. The opinions and the interpretations to the result of the description in this report are outside scopes where UL Japan has been accredited.
6. This test report covers Radio technical requirements. It does not cover administrative issues such as Manual or non-Radio test related Requirements. (if applicable)
7. This report is a revised version of 11734002M-H-R1.

**Date of test:** May 19, 22, 2014

**Representative test operator:**

Hiromitsu Tanabe
Engineer
Consumer Technology Division

**Approved by :**

Tomoyuki Yamashita
Engineer
Consumer Technology Division

☐ The testing in which "Non-accreditation" is displayed is outside the accreditation scopes in UL Japan.
☒ There is no testing item of "Non-accreditation"

# REVISION HISTORY

## Original Test Report No.: 11734002M-H

| Revision | Test report No. | Date | Page revised | Contents |
|---|---|---|---|---|
| - (Original) | 11734002M-H | August 25, 2017 | - | - |
| 1 | 11734002M-H-R1 | September 1, 2017 | All pages | Consistency of the spelling (model name) |
| 1 | 11734002M-H-R1 | September 1, 2017 | P.1, P.5 | Modification of the test regulation and the test specification |
| 2 | 11734002M-H-R2 | September 12, 2017 | P.5, P.7 | Add the comment |
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**UL Japan, Inc.**
**Kashima EMC Lab.**
1614, Mushihata, Katori-shi, Chiba-ken, 289-0341 Japan
Telephone: +81-478-88-6500
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**CONTENTS** **PAGE**

## SECTION 1: Customer information

| | | |
|---|---|---|
| Company Name | : | G-Printec, Inc. |
| Address | : | Kawasaki Tech Center 5F, 580-16 Horikawa-cho, Saiwai-ku, Kawasaki-shi, Kanagawa 212-0013 Japan |
| Telephone Number | : | +81-44-540-3242 |
| Facsimile Number | : | +81-44-540-3250 |
| Contact Person | : | Makoto Hayase |

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

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

| | | |
|---|---|---|
| Type of Equipment | : | Card Printer |
| Model Number | : | CX-7000 |
| Serial Number | : | Refer to clause 4.2 |
| Rating | : | AC100 V-120 V, 50/60 Hz, 3.5 A |
| Country of Mass-production | : | Thailand |
| Condition of EUT | : | Production model |
| Receipt Date of Sample | : | May 16, 2014 |
| Modification of EUT | : | No modification by the test lab. |

Model: CX-7000 (referred to as the EUT in this report) is a Card Printer.

| | | |
|---|---|---|
| Clock frequency(ies) in the system | : | 25 MHz (LAN), 48 MHz (USB), 33.3 MHz (CPU), 30 MHz (USB) |

<Radio part>

| | | |
|---|---|---|
| Equipment type | : | Transceiver |
| Frequency of operation | : | 13.56 MHz |
| Type of modulation | : | ASK |
| Antenna type | : | Loop |
| Antenna connector type | : | U.FL |
| ITU code | : | A1D |
| Operation temperature range | : | +15 deg.C.to +30 deg.C. |

### 2.3 difference from the base model

CX-7000·····Single-side printing type, Both-side printing type
XID 83XX Printer·····Single-side printing type, Both-side printing type
CX-D80·····Single-side printing type, Both-side printing type
SR200·····Single-side printing type
SR300·····Both-side printing type
SR300B·····Single-side printing type, Both-side printing type

The models: CX-7000, XID 83XX Printer, CX-D80, SR300 and SR300B are different from model name and plastic enclosure. However those electrical structures are all the same.
The difference between SR200 and SR300 is only their printing type (Single-side printing or Both-side printing).
SR300B is identical to Model CX-7000 except for brand name and model designation.

The test was performed with CX-7000 that is both-sides printing type.

# SECTION 3: Test specification, procedures & results

## 3.1 Test Specification

| | | |
|---|---|---|
| Test Specification | : | FCC Part 15 Subpart C: 2017<br>FCC Part 15 final revised on August 29, 2017 and effective September 28, 2017 |
| Title | : | FCC 47CFR Part15 Radio Frequency Device Subpart C Intentional Radiators<br>Section 15.207 Conducted limits<br>Section 15.225 Operation within the band 13.110-14.010 MHz. |

*The tests were performed by the test standard FCC Part 15 Subpart C: 2014 and ANSI C 63.4:2003.
Verifying the data in this test report based on the difference between FCC Part 15 Subpart C: 2014 and FCC Part 15 Subpart C: 2017, also between ANSI C 63.4:2003 and ANSI C 63.10:2013, it is judged that the EUT complies with FCC Part 15 Subpart C: 2017 and ANSI C 63.10:2013 without the additional test.

## 3.2 Procedures and results

| Item | Test Procedure | Specification | Worst margin | Results | Remarks |
|---|---|---|---|---|---|
| Conducted emission | ANSI C63.4:2003<br>7. AC powerline conducted emission measurements | Section 15.207 | 10.0dB<br>(against AV Limit)<br>Freq.: 28.1660MHz<br>Detector: QP<br>Phase: L | Complied | - |
| | <ISED> RSS-Gen 7.2.2 | <ISED> RSS-Gen 7.2.2 | | | |
| Electric Field Strength of Fundamental Emission | ANSI C63.4:2003<br>13. Measurement of intentional radiators | Section 15.225(a) | 73.3dB<br>Polarization: Vertical | Complied | Radiated |
| | <ISED> RSS-Gen 4.8, 4.11 | <ISED>RSS-210 A2.6 | | | |
| Electric field strength of Spurious emission (within the 13.110 MHz - 14.010 MHz band) | ANSI C63.4:2003<br>13. Measurement of intentional radiators | FCC 15.225 (b)(c) | 44.2dB<br>Freq.: 13.110MHz<br>Polarization: Vertical | Complied | Radiated |
| | <ISED>RSS-Gen 4.9, 4.11 | <ISED>RSS-210 A2.6 | | | |
| Electric field strength of Spurious emission (outside of the 13.110 MHz - 14.010 MHz band) | ANSI C63.4:2003<br>13. Measurement of intentional radiators | Section 15.209,<br>Section 15.225 (d) | 11.9dB<br>Freq.: 71.83MHz<br>Polarization: Vertical | Complied | Radiated |
| | <ISED>RSS-Gen 4.6, 4.11 | <ISED>RSS-210 A2.6 | | | |
| 20dB Bandwidth | ANSI C63.4:2003<br>13. Measurement of intentional radiators | Section15.215(c) | See data | Complied | Radiated |
| | <ISED> RSS-Gen 4.6.1 | <ISED> RSS-Gen 4.6.1 | | | |
| Frequency Tolerance | ANSI C63.4:2003<br>13. Measurement of intentional radiators | Section 15.225(e) | See data | Complied | Radiated |
| | <ISED>RSS-Gen 4.7, 7.2.6 | <ISED> RSS-210 A2.6 | | | |
| Note: UL Japan, Inc.'s EMI Work Procedures No. 13-EM-W0420 and 13-EM-W0422 | | | | | |

**FCC Part 15.31 (e)**
The tests were performed by adjusting the AC power since this EUT provides stable voltage (DC 3.3V) constantly to RF Module regardless of input voltage. Therefore, this EUT complies with the requirement.

**FCC Part 15.203/212 Antenna requirement**
It is impossible for end users to replace the antenna, because the antenna is mounted inside of the EUT. Therefore, the equipment complies with the antenna requirement of Section 15.203/212.

### 3.3 Addition to standard

| No. | Item | Test Procedure | Specification | Remarks | Deviation | Worst margin | Results |
|---|---|---|---|---|---|---|---|
| 1 | 99 % Occupied Band Width | RSS-Gen 4.6.1 | - | Radiated | N/A | N/A | N/A |

Other than above, no addition, exclusion nor deviation has been made from the standard.

### 3.4 Uncertainty

The following uncertainties have been calculated to provide a confidence level of 95% using a coverage factor k=2.

| Test Items | Frequency range | Uncertainty |
|---|---|---|
| **Conducted emission (AC Mains) AMN** | 0.15 MHz - 30 MHz | 2.8 dB |
| **Radiated emission (Measurement distance: 3 m)** | 0.009 MHz - 30 MHz | 2.7 dB |
| | 30 MHz - 1000 MHz | 5.9 dB |

**Conducted emission test**

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

**Radiated emission test**

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

### 3.5 Test Location

UL Japan, Inc.
Kashima EMC Lab.
1614 Mushihata, Katori-shi, Chiba-ken, 289-0341 JAPAN
Telephone number : +81 478 88 6500
Facsimile number : +81 478 82 3373
JAB Accreditation No. : RTL02610

| | ISED Registration No. | Width x Depth x Height (m) | Size of reference ground plane/horizontal conducting plane (m) | Maximum measurement distance |
|---|---|---|---|---|
| No.1 Open site | 4659A-1 | 6.0 x 5.5 x 2.5 | 20 x 40 | 10 m |
| No.2 Open site | 4659A-2 | 4.4 x 4.4 x 2.15 | 18 x 20 | 10 m |
| No.5 Open site | 4659A-5 | 8.6 x 7.1 x 2.4 | 18 x 23 | 10 m |
| No.1 Shielded room | 4659A-1 | 5.4 x 4.5 x 2.3 | - | - |
| No.2 Shielded room | 4659A-2 | 3.6 x 2.7 x 2.3 | - | - |
| No.3 Shielded room | - | 5.4 x 3.6 x 2.3 | - | - |
| No.4 Shielded Room | - | 6.1 x 6.1 x 3.1 | - | - |
| No.5 Shielded Room | 4659A-5 | 4.2 x 3.1 x 2.5 | - | - |
| No.3 Fully Anechoic Chamber | - | 7.0 x 3.5 x 3.5 | - | - |
| No.6 Semi-anechoic Chamber | 4659A-6 | 8.5 x 5.5 x 5.2 | - | 3 m |
| No.10 Semi-anechoic Chamber | 4659A-10 | 18.4 x 9.9 x 7.7 | - | 10 m |
| No.11 Semi-anechoic Chamber | 4659A-7 | 9.0 x 6.5 x 5.2 | - | 3 m |
| No.1 Measurement room | - | 5.0 x 3.7 x 2.6 | - | - |
| No.2 Measurement room | - | 4.3 x 4.4 x 2.7 | - | - |
| No.3 Measurement room | - | 4.5 x 5.3 x 2.7 | - | - |

### 3.6 Test set up, Test data, and Test instruments

Refer to APPENDIX.

# SECTION 4: Operation of E.U.T. during testing

## 4.1 Operating Modes

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

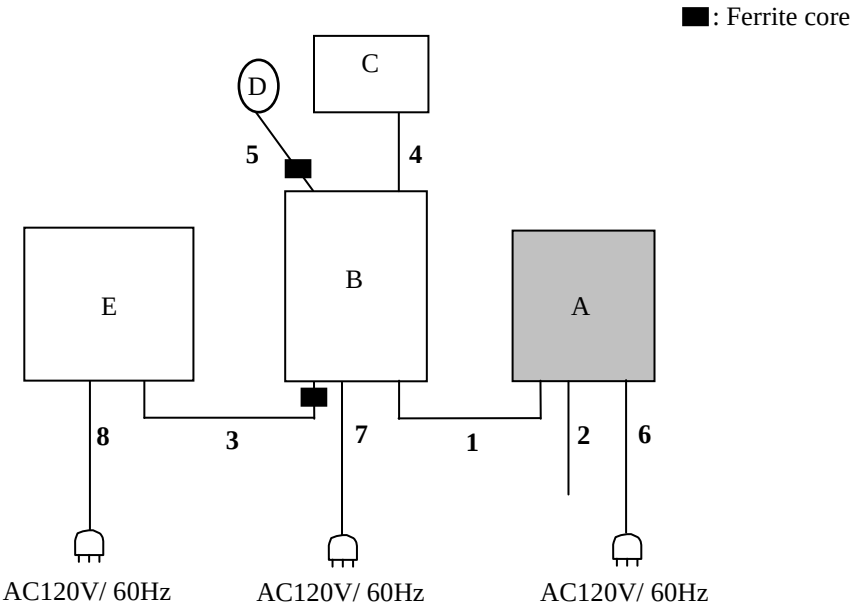
| Test item | Operating mode | Tested frequency |
|---|---|---|
| Conducted emission<br>Spurious emission | Transmitting<br><br>ISO/IEC 15693-2<br>• Modulation ASK100 %<br>• Data transfer rate 6.62 kbps | 13.56 MHz |

The EUT has the power settings by the software as follows;
Power settings: Setting is controlled by the firmware and cannot be changed.
Software: CX-7000 TEST TOOL

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

The all tests were performed on with tag that was worst case as a result of verifying the both of conditions with/without tag.

## 4.2 Configuration and peripherals




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

**Description of EUT and support equipment**

| No. | Item | Model number | Serial number | Manufacturer | Remarks |
|---|---|---|---|---|---|
| A | Card Printer | CX-7000 | 135V2080 | G-Printec, Inc. | EUT |
| B | PC | DC5100SFF | JPA61108Z4 | hp | - |
| C | Keyboard | KB-0316 | B942A0AGASP0LT | hp | - |
| D | Mouse | MO19KCA | 346C30433 | Microsoft | - |
| E | LCD Monitor | Hp1502 | CNC5030CMD | hp | - |

**List of cables used**

| No. | Item | Length(m) | Shield | | Remarks |
|---|---|---|---|---|---|
| | | | Cable | Connector | |
| 1 | USB | 2.0 | Shielded | Shielded | - |
| 2 | Ethernet | 1.0 | Shielded | Shielded | Cat.5e |
| 3 | VGA | 1.5 | Shielded | Shielded | - |
| 4 | Keyboard | 1.8 | Shielded | Shielded | - |
| 5 | Mouse | 1.6 | Shielded | Shielded | - |
| 6 | AC | 2.0 | Unshielded | Unshielded | EUT |
| 7 | AC | 2.0 | Unshielded | Unshielded | PC |
| 8 | AC | 1.8 | Unshielded | Unshielded | LCD Monitor |

## SECTION 5: Conducted emission

**Test Procedure and conditions**

EUT was placed on a urethane platform of nominal size, 1.0 m by 2.0 m, raised 0.8 m above the conducting ground plane. The rear of tabletop was located 40 cm 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 80 cm from any other grounded conducting surface. EUT was located 80 cm from a Line Impedance Stabilization Network (LISN)/ Artificial mains Network (AMN) and excess AC cable was bundled in center.

I/O cables that were connected to the peripherals were bundled in center. They were folded back and forth forming a bundle 30 cm to 40 cm long and were hanged at a 40 cm height to the ground plane. All unused 50 ohm connectors of the LISN (AMN) were resistivity terminated in 50 ohm 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. The EUT was connected to a LISN (AMN).
An overview sweep with peak detection has been performed.

The test results and limit are rounded off to one decimal place, so some differences might be observed.

**Detector** : **QP and CISPR AV**
**Measurement range** : **0.15 MHz - 30 MHz**
**Test data** : **APPENDIX**
**Test result** : **Pass**

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

Test Procedure

EUT was placed on a urethane platform of nominal size, 1.0 m by 2.0 m, raised 0.8 m above the conducting ground plane. The Radiated Electric Field Strength has been measured in a Semi Anechoic Chamber with a ground plane.

Frequency: From 9 kHz to 30 MHz
The EUT was rotated a full revolution in order to obtain the maximum value of the electric field intensity.
The measurements were performed for vertical polarization (antenna angle: 0deg.to 360deg.) and horizontal polarization.
*Refer to Figure 1 about Direction of the Loop Antenna.

Frequency: From 30 MHz to 1 GHz
The measuring antenna height varied between 1 and 4 m 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.

The test was made with the detector (RBW/VBW) in the following table.
When using Spectrum analyzer, the test was made with adjusting span to zero by using peak hold.

**Test Antennas are used as below;**

| Frequency | Below 30 MHz | 30 MHz to 200 MHz | 200 MHz to 1 GHz |
|---|---|---|---|
| Antenna Type | Loop | Biconical | Logperiodic |

| Frequency | From 9 kHz to 90 kHz and From 110 kHz to 150 kHz | From 90 kHz to 110 kHz | From 150 kHz to 490 kHz | From 490 kHz to 30 MHz | From 30 MHz to 1 GHz |
|---|---|---|---|---|---|
| Instrument used | Test Receiver | | | | |
| Detector | PK / AV | QP | PK / AV | QP | QP |
| IF Bandwidth | 200 Hz | 200 Hz | 9 kHz | 9 kHz | 120 kHz |
| Test Distance | 3 m *1) | 3 m *1) | 3 m *1) | 3 m *2) | 3 m |

*1) Distance Factor: 40 x log (3 m / 300 m) = -80 dB
*2) Distance Factor: 40 x log (3 m / 30 m) = -40 dB

Although these tests were performed other than open field test site, adequate comparison measurements were confirmed against 30 m open field test site. Therefore sufficient tests were made to demonstrate that the alternative site produces results that correlate with the ones of tests made in an open field based on KDB 414788.

These tests were performed in semi anechoic chamber. Therefore the measured level of emissions may be higher than if measurements were made without a ground plane.
However test results were confirmed to pass against standard limit.

The test was made on EUT at the normal use position.

The test results and limit are rounded off to one decimal place, so some differences might be observed.

**Measurement range** : **9 kHz - 1 GHz**
**Test data** : **APPENDIX 1**
**Test result** : **Pass**

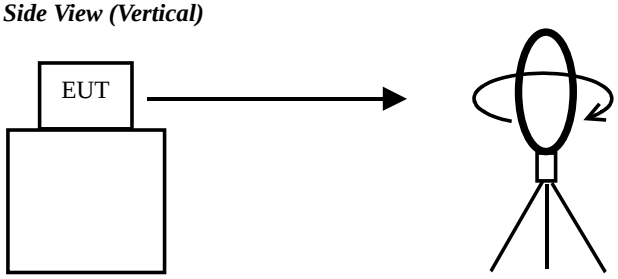
## SECTION 7: Other test

| Test | Span | RBW | VBW | Sweep | Detector | Trace | Instrument used |
|---|---|---|---|---|---|---|---|
| 20 dB Bandwidth | 20 kHz | 1 kHz | 3 kHz | Auto | Peak | Max Hold | Spectrum Analyzer |
| 99 % Occupied Bandwidth | Enough width to display emission skirts | 1 to 5 % of OBW | Three times of RBW | Auto | Peak | Max Hold *1) | Spectrum Analyzer |
| Frequency Tolerance | - | - | - | - | - | - | Frequency counter *2) |
| *1) The measurement was performed with Max Hold since the duty cycle was not 100 %. Peak hold was applied as Worst-case measurement. *2) The measurement was performed with Marker Frequency Counter Function. | | | | | | | |

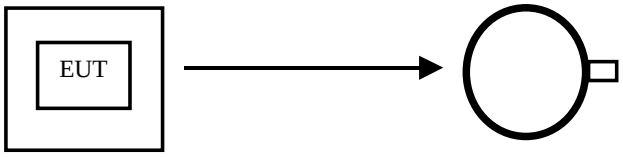
**Test data** : **APPENDIX**
**Test result** : **Pass**

**Figure 1: Direction of the Loop Antenna**

***Side View (Vertical)***

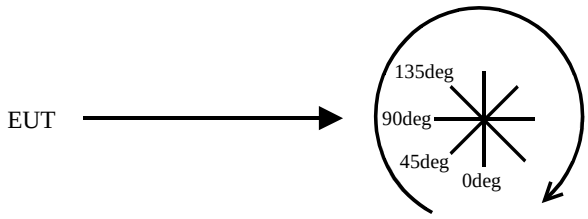



***Top View (Horizontal)***




Antenna was not rotated.

***Top View (Vertical)***




Front side: 0 deg.
Forward direction: clockwise

# Conducted Emission Test

(0.15MHz - 30MHz at Mains Ports)

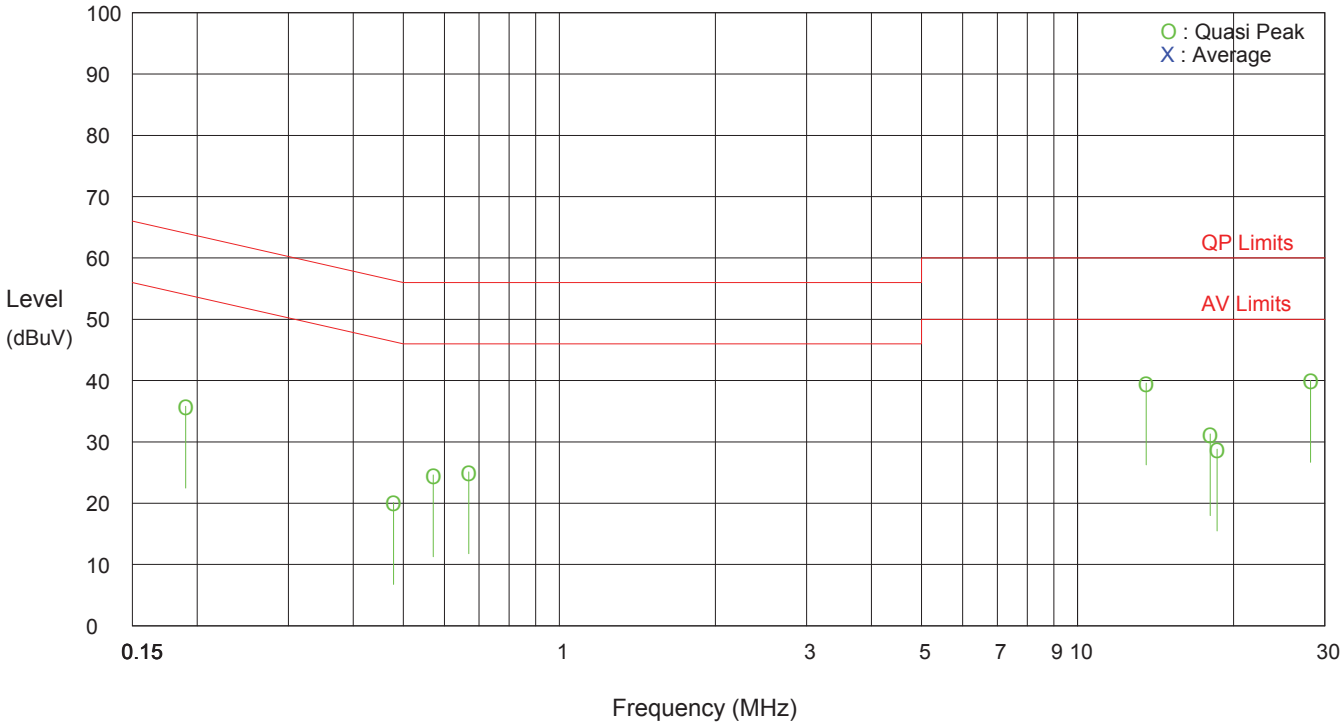
Report No. : 11734002M
Tested Date : 2014/05/19
Temperature : 22℃
Humidity : 46 %
Atmos.Press. : 1012 hPa

Test place : Kashima EMC Lab. No.6 Semi-anechoic Chamber
Standard : FCC Part15C (0.15MHz-30MHz)

Tested by : Hiromitsu Tanabe

| No. | Frequency (MHz) | N QP (dBuV) | N AV (dBuV) | L QP (dBuV) | L AV (dBuV) | Correction Factor (dB) | Result QP (dBuV) | Result AV (dBuV) | Limits QP (dBuV) | Limits AV (dBuV) | Margin QP (dB) | Margin AV (dB) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.1901 | 25.7 | - | 25.3 | - | 10.1 | 35.8 | - | 64.0 | 54.0 | 28.2 | - |
| 2 | 0.4787 | 10.0 | - | 10.0 | - | 10.1 | 20.1 | - | 56.4 | 46.4 | 36.3 | - |
| 3 | 0.5711 | 14.5 | - | 13.9 | - | 10.1 | 24.6 | - | 56.0 | 46.0 | 31.4 | - |
| 4 | 0.6687 | 15.0 | - | 14.3 | - | 10.1 | 25.1 | - | 56.0 | 46.0 | 30.9 | - |
| 5 | 13.5600 | 28.5 | - | 27.3 | - | 11.1 | 39.6 | - | 60.0 | 50.0 | 20.4 | - |
| 6 | 18.0242 | 18.7 | - | 20.0 | - | 11.3 | 31.3 | - | 60.0 | 50.0 | 28.7 | - |
| 7 | 18.5858 | 17.5 | - | 17.3 | - | 11.3 | 28.8 | - | 60.0 | 50.0 | 31.2 | - |
| 8 | 28.1660 | 26.3 | - | 28.3 | - | 11.7 | 40.0 | - | 60.0 | 50.0 | 20.0 | - |

Result = Reading(higher data of N or L) + Correction Factor(AMN factor + cable loss)



# Data of Electric field strength of Fundamental emission and Spurious emission within the band: FCC15.225(a)(b)(c)

Kashima EMC Lab.
No.6 Semi-Anechoic Chamber

| | |
|---|---|
| Regulation: | FCC Part15 SubpartC 15.225 |
| Test Distance: | 3m |
| Date: | May 19, 2014 |
| Temperature: | 22 deg.C |
| Humidity: | 1012 %RH |
| Tested by: | Hiromitsu Tanabe |

Mode: Transmitting

Remarks:

**Fundamental emission**

| No. | FREQ | Test Receiver Reading | | Antenna Factor | LOSS | AMP GAIN | Distance factor | RESULT | | LIMIT (30m) | MARGIN | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Hor | Ver | | | | | Hor | Ver | | Hor | Ver |
| | [MHz] | [dBuV] | [dBuV] | [dB/m] | [dB] | [dB] | [dB] | [dBuV/m] | [dBuV/m] | [dBuV/m] | [dB] | [dB] |
| 1 | 13.560 | 20.5 | 30.7 | 19.6 | 0.3 | 0.0 | -40.0 | 0.4 | 10.6 | 83.9 | 83.5 | 73.3 |

Calculation:Result[dBuV/m]=Reading[dBuV]+Ant.Fac[dB/m]+Loss(Cable+ATT)[dB]-Gain(AMP)[dB]+Distance factor[dB]
Distance factor: 40 x log (3m/30m) = -40 dB
Limits (30m) ((reference) worst carrier @3m)
・13.553MHz to 13.567MHz : 83.9dBuV/m (FCC 15.225(a)) 50.6 dBuV/m

**Spurious emission within the band**

| No. | FREQ | Test Receiver Reading | | Antenna Factor | LOSS | AMP GAIN | Distance factor | RESULT | | LIMIT (30m) | MARGIN | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Hor | Ver | | | | | Hor | Ver | | Hor | Ver |
| | [MHz] | [dBuV] | [dBuV] | [dB/m] | [dB] | [dB] | [dB] | [dBuV/m] | [dBuV/m] | [dBuV/m] | [dB] | [dB] |
| 1 | 13.110 | - | 5.4 | 19.6 | 0.3 | 0.0 | -40.0 | - | -14.7 | 29.5 | - | 44.2 |
| 2 | 13.410 | - | 5.4 | 19.6 | 0.3 | 0.0 | -40.0 | - | -14.7 | 40.5 | - | 55.2 |
| 3 | 13.553 | 8.2 | 14.3 | 19.6 | 0.3 | 0.0 | -40.0 | -11.9 | -5.8 | 50.4 | 62.3 | 56.2 |
| 4 | 13.567 | 7.2 | 12.6 | 19.6 | 0.3 | 0.0 | -40.0 | -12.9 | -7.5 | 50.4 | 63.3 | 57.9 |
| 5 | 13.710 | - | 5.4 | 19.6 | 0.3 | 0.0 | -40.0 | - | -14.7 | 40.5 | - | 55.2 |
| 6 | 14.010 | - | 5.4 | 19.6 | 0.3 | 0.0 | -40.0 | - | -14.7 | 29.5 | - | 44.2 |

Calculation:Result[dBuV/m]=Reading[dBuV]+Ant.Fac[dB/m]+Loss(Cable+ATT)[dB]-Gain(AMP)[dB]+Distance factor[dB]

Outside filed strength frequencies
・Fc±7kHz:13.553MHz to 13.567MHz
・Fc±150kHz:13.410MHz to 13.710MHz
・Fc±450kHz:13.110MHz to 14.010MHz
Fc = 13.56MHz

Limits (30m)
・13.410MHz to 13.553MHz and 13.567MHz to 13.710MHz : 50.4dBuV/m (FCC 15.225(b))
・13.110MHz to 13.410MHz and 13.710MHz to 14.010MHz : 40.5dBuV/m (FCC 15.225(c))
・Below 13.110MHz and Above 14.010MHz : 29.5dBuV/m (FCC 15.225(d)and FCC 15.209)

# Radiated Emission

Kashima EMC Lab.
No.6 Semi-Anechoic Chamber

Regulation: FCC Part15 SubpartC 15.225
Test Distance 3m
Date: May 19, 2014
Temperature: 22 deg.C
Humidity: 1012 %RH
Tested by: Hiromitsu Tanabe

Mode: Transmitting

| Polarity | Frequency [MHz] | Detector | Reading [dBuV] | Ant.Fac. [dB/m] | Loss [dB] | Gain [dB] | Distance factor[dB] | Result [dBuV/m] | Limit [dBuV/m] | Margin [dB] | Height [cm] | Angle [deg.] | Remark |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Hori. | 59.56 | QP | 32.1 | 8.9 | 4.3 | 28.4 | | 16.9 | 40.0 | 23.1 | 250 | 255 | at 3m |
| Hori. | 71.83 | QP | 38.0 | 9.4 | 4.5 | 28.3 | | 23.6 | 40.0 | 16.4 | 250 | 55 | at 3m |
| Hori. | 126.43 | QP | 30.0 | 10.5 | 5.0 | 28.1 | | 17.4 | 43.5 | 26.1 | 200 | 200 | at 3m |
| Hori. | 250.01 | QP | 43.5 | 11.3 | 6.0 | 27.5 | | 33.3 | 46.0 | 12.7 | 140 | 190 | at 3m |
| Hori. | 375.00 | QP | 34.0 | 14.5 | 6.9 | 27.9 | | 27.5 | 46.0 | 18.5 | 100 | 350 | at 3m |
| Hori. | 465.00 | QP | 23.0 | 16.2 | 7.4 | 28.5 | | 18.1 | 46.0 | 27.9 | 100 | 0 | at 3m |
| Vert. | 27.12 | QP | 1.5 | 22.8 | 0.4 | 0.0 | -40.0 | -15.3 | 29.5 | 44.8 | 100 | 0 | at 3m |
| Vert. | 30.00 | QP | 32.7 | 14.4 | 3.9 | 28.4 | | 22.6 | 40.0 | 17.4 | 100 | 245 | at 3m |
| Vert. | 33.00 | QP | 30.3 | 13.1 | 4.0 | 28.4 | | 19.0 | 40.0 | 21.0 | 100 | 180 | at 3m |
| Vert. | 59.56 | QP | 40.7 | 8.9 | 4.3 | 28.4 | | 25.5 | 40.0 | 14.5 | 100 | 210 | at 3m |
| Vert. | 71.83 | QP | 42.5 | 9.4 | 4.5 | 28.3 | | 28.1 | 40.0 | **11.9** | 100 | 0 | at 3m |
| Vert. | 81.36 | QP | 36.0 | 9.5 | 4.6 | 28.3 | | 21.8 | 40.0 | 18.2 | 100 | 340 | at 3m |
| Vert. | 250.01 | QP | 39.7 | 11.3 | 6.0 | 27.5 | | 29.5 | 46.0 | 16.5 | 100 | 30 | at 3m |
| Vert. | 375.00 | QP | 32.0 | 14.5 | 6.9 | 27.9 | | 25.5 | 46.0 | 20.5 | 100 | 170 | at 3m |
| Vert. | 465.00 | QP | 24.3 | 16.2 | 7.4 | 28.5 | | 19.4 | 46.0 | 26.6 | 100 | 243 | at 3m |

Result = Reading + Ant Factor + Loss (Cable+Attenuator) - Gain(Amprifier) + Distance Factor
*Other frequency noises omitted in this report were not seen or have enough margin (more than 20dB).

# Data of Frequency Tolerance: FCC 15.225(e)

Kashima EMC Lab.
No.6 site

Regulation: FCC Part15 SubpartC 15.225

Date: May 22, 2014
Temperature: 23 deg.C
Humidity: 30 %RH
Mode: Transmitting Tested by: Hiromitsu Tanabe

**Temperature Variation: 50deg.C**

| Test Conditions | Original Frequency (MHz) | Measured Frequency (MHz) | Frequency Error (MHz) | Frequency Tolerance (%) | Limit (%) |
|---|---|---|---|---|---|
| startup | 13.56 | 13.56000 | 0.00000 | 0.00000 | 0.01 |
| after 2minutes | 13.56 | 13.55998 | -0.00002 | -0.00015 | 0.01 |
| after 5minutes | 13.56 | 13.55997 | -0.00003 | -0.00022 | 0.01 |
| after 10minutes | 13.56 | 13.55996 | -0.00004 | -0.00029 | 0.01 |

**Temperature Variation: 40deg.C**

| Test Conditions | Original Frequency (MHz) | Measured Frequency (MHz) | Frequency Error (MHz) | Frequency Tolerance (%) | Limit (%) |
|---|---|---|---|---|---|
| startup | 13.56 | 13.56002 | 0.00002 | 0.00015 | 0.01 |
| after 2minutes | 13.56 | 13.56001 | 0.00001 | 0.00007 | 0.01 |
| after 5minutes | 13.56 | 13.56001 | 0.00001 | 0.00007 | 0.01 |
| after 10minutes | 13.56 | 13.56000 | 0.00000 | 0.00000 | 0.01 |

**Temperature Variation: 30deg.C**

| Test Conditions | Original Frequency (MHz) | Measured Frequency (MHz) | Frequency Error (MHz) | Frequency Tolerance (%) | Limit (%) |
|---|---|---|---|---|---|
| startup | 13.56 | 13.56007 | 0.00007 | 0.00052 | 0.01 |
| after 2minutes | 13.56 | 13.56006 | 0.00006 | 0.00044 | 0.01 |
| after 5minutes | 13.56 | 13.56006 | 0.00006 | 0.00044 | 0.01 |
| after 10minutes | 13.56 | 13.56005 | 0.00005 | 0.00037 | 0.01 |

**Temperature Variation: 20deg.C**

| Test Conditions | Original Frequency (MHz) | Measured Frequency (MHz) | Frequency Error (MHz) | Frequency Tolerance (%) | Limit (%) |
|---|---|---|---|---|---|
| startup | 13.56 | 13.56011 | 0.00011 | 0.00081 | 0.01 |
| after 2minutes | 13.56 | 13.56011 | 0.00011 | 0.00081 | 0.01 |
| after 5minutes | 13.56 | 13.56011 | 0.00011 | 0.00081 | 0.01 |
| after 10minutes | 13.56 | 13.56011 | 0.00011 | 0.00081 | 0.01 |

# Data of Frequency Tolerance: FCC 15.225(e)

Kashima EMC Lab.
No.6 site

Regulation: FCC Part15 SubpartC 15.225

Date: May 22, 2014
Temperature: 23 deg.C
Humidity: 30 %RH
Mode: Transmitting Tested by: Hiromitsu Tanabe

**Temperature Variation: 10deg.C**

| Test Conditions | Original Frequency (MHz) | Measured Frequency (MHz) | Frequency Error (MHz) | Frequency Tolerance (%) | Limit (%) |
|---|---|---|---|---|---|
| startup | 13.56 | 13.56016 | 0.00016 | 0.00118 | 0.01 |
| after 2minutes | 13.56 | 13.56016 | 0.00016 | 0.00118 | 0.01 |
| after 5minutes | 13.56 | 13.56016 | 0.00016 | 0.00118 | 0.01 |
| after 10minutes | 13.56 | 13.56016 | 0.00016 | 0.00118 | 0.01 |

**Temperature Variation: 0deg.C**

| Test Conditions | Original Frequency (MHz) | Measured Frequency (MHz) | Frequency Error (MHz) | Frequency Tolerance (%) | Limit (%) |
|---|---|---|---|---|---|
| startup | 13.56 | 13.56025 | 0.00025 | 0.00184 | 0.01 |
| after 2minutes | 13.56 | 13.56025 | 0.00025 | 0.00184 | 0.01 |
| after 5minutes | 13.56 | 13.56025 | 0.00025 | 0.00184 | 0.01 |
| after 10minutes | 13.56 | 13.56024 | 0.00024 | 0.00177 | 0.01 |

**Temperature Variation: -10deg.C**

| Test Conditions | Original Frequency (MHz) | Measured Frequency (MHz) | Frequency Error (MHz) | Frequency Tolerance (%) | Limit (%) |
|---|---|---|---|---|---|
| startup | 13.56 | 13.56028 | 0.00028 | 0.00206 | 0.01 |
| after 2minutes | 13.56 | 13.56028 | 0.00028 | 0.00206 | 0.01 |
| after 5minutes | 13.56 | 13.56028 | 0.00028 | 0.00206 | 0.01 |
| after 10minutes | 13.56 | 13.56028 | 0.00028 | 0.00206 | 0.01 |

**Temperature Variation: -20deg.C**

| Test Conditions | Original Frequency (MHz) | Measured Frequency (MHz) | Frequency Error (MHz) | Frequency Tolerance (%) | Limit (%) |
|---|---|---|---|---|---|
| startup | 13.56 | 13.56029 | 0.00029 | 0.00214 | 0.01 |
| after 2minutes | 13.56 | 13.56029 | 0.00029 | 0.00214 | 0.01 |
| after 5minutes | 13.56 | 13.56029 | 0.00029 | 0.00214 | 0.01 |
| after 10minutes | 13.56 | 13.56029 | 0.00029 | 0.00214 | 0.01 |

# Data of Frequency Tolerance: FCC 15.225(e)

Kashima EMC Lab.
No.6 site

Regulation: FCC Part15 SubpartC 15.225

Date: May 22, 2014
Temperature: 23 deg.C
Humidity: 30 %RH
Mode: Transmitting
Tested by: Hiromitsu Tanabe

**Input Voltage:AC102V (85%)**
**Temperature Variation: 20deg.C**

| Test Conditions | Original Frequency (MHz) | Measure Frequency (MHz) | Frequency Error (MHz) | Frequency Tolerance (%) | Limit (%) |
|---|---|---|---|---|---|
| startup | 13.56 | 13.56011 | 0.00011 | 0.00081 | 0.01 |
| after 2minutes | 13.56 | 13.56011 | 0.00011 | 0.00081 | 0.01 |
| after 5minutes | 13.56 | 13.56011 | 0.00011 | 0.00081 | 0.01 |
| after 10minutes | 13.56 | 13.56011 | 0.00011 | 0.00081 | 0.01 |

**Input Voltage:AC138V (115%)**
**Temperature Variation: 20deg.C**

| Test Conditions | Original Frequency (MHz) | Measure Frequency (MHz) | Frequency Error (MHz) | Frequency Tolerance (%) | Limit (%) |
|---|---|---|---|---|---|
| startup | 13.56 | 13.56011 | 0.00011 | 0.00081 | 0.01 |
| after 2minutes | 13.56 | 13.56011 | 0.00011 | 0.00081 | 0.01 |
| after 5minutes | 13.56 | 13.56011 | 0.00011 | 0.00081 | 0.01 |
| after 10minutes | 13.56 | 13.56011 | 0.00011 | 0.00081 | 0.01 |

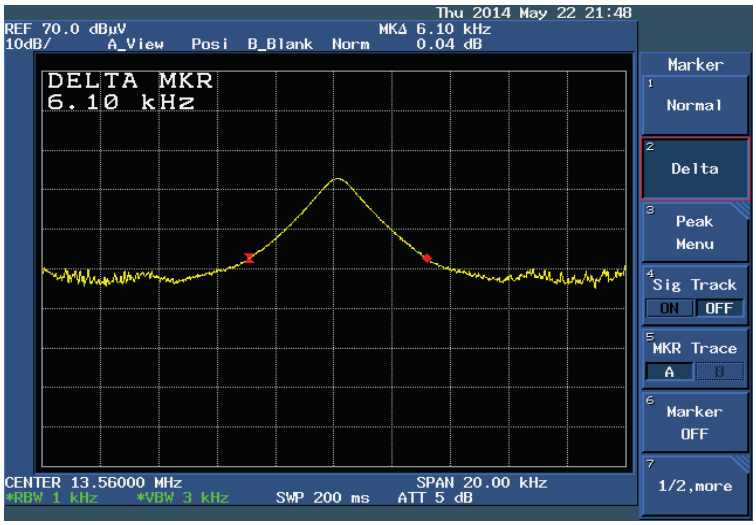
# 20dB bandwidth & 99% Occupied bandwidth: FCC 15.215 / RSS-Gen

Kashima EMC Lab.
No.6 site

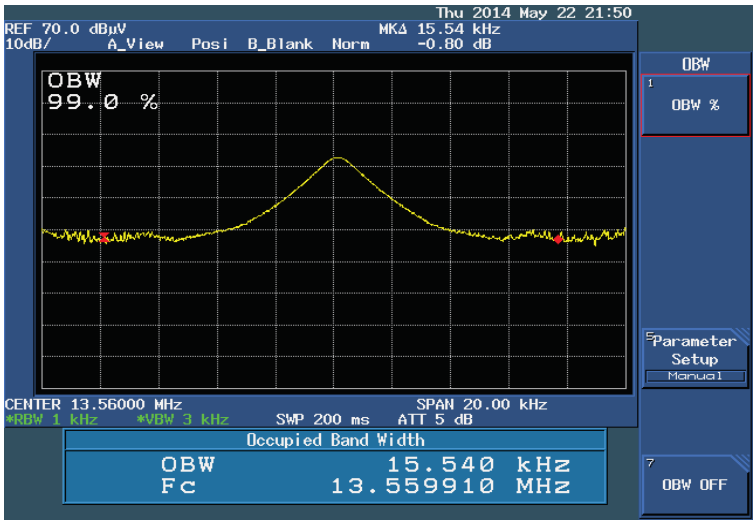
Regulation: FCC Part15 Subpart C 15.215

Date: May 22, 2014
Temperature: 23 deg.C
Humidity: 30 %RH
Mode: Transmitting
Tested by: Hiromitsu Tanabe

**20dB Bandwidth:** 6.10 kHz




**99% Occupied Bandwidth:** 15.540 kHz



# APPENDIX 2: Test Instruments

### No.6 Test site (Conducted Emission)

| Instrument | Manufacturer | Model | Internal Code | Cal. Date | Due Date |
|---|---|---|---|---|---|
| Test Receiver | Rohde & Schwarz | ESCI | RCV06 | 2013/10/02 | 2014/10/31 |
| AMN | Rohde & Schwarz | ESH3-Z5 | LSN08 | 2013/07/19 | 2014/07/31 |
| AMN (for EUT) | Rohde & Schwarz | ESH3-Z5 | LSN11 | 2013/07/19 | 2014/07/31 |
| Spectrum Analyzer | Hewlett Packard | 8567A | SPR13 | 2013/10/14 | 2014/10/31 |
| Coaxial Cable | Fujikura | 5D-2W | 6CSAC | 2013/08/09 | 2014/08/31 |

### No.6 Test site (Radiated Emission: 9kHz – 30MHz)

| Instrument | Manufacturer | Model | Internal Code | Cal. Date | Due Date |
|---|---|---|---|---|---|
| Loop Antenna | Rohde & Schwarz | HFH2-Z2 | LPA01 | 2013/06/25 | 2014/06/30 |
| Coaxial Cable | Fujikura | 3D-2W | MG5m | 2013/05/10 | 2014/05/31 |
| Test Receiver | Rohde & Schwarz | ESHS10 | RCH02 | 2014/03/13 | 2015/03/31 |

### No.6 Test site (Radiated Emission: 30MHz – 1000MHz)

| Instrument | Manufacturer | Model | Internal Code | Cal. Date | Due Date |
|---|---|---|---|---|---|
| Test Receiver | Rohde & Schwarz | ESCI | RCV06 | 2013/10/02 | 2014/10/31 |
| Biconical Antenna | Schwarzbeck | VHBB 9124 | BCA07 | 2013/05/27 | 2014/05/31 |
| Logperiodic Antenna | Schwarzbeck | VULP 9118-B | LGA07 | 2013/05/27 | 2014/05/31 |
| Spectrum Analyzer | Hewlett Packard | 8567A | SPR13 | 2013/10/14 | 2014/10/31 |
| Pre-Amplifier | Hewlett Packard | 8447D | PRA01 | 2013/08/08 | 2014/08/31 |
| Coaxial Cable | SUHNER | RG 214/U | 6R3m | 2013/08/09 | 2014/08/31 |

### No.6 Test site (Test Fixture tests)

| Instrument | Manufacturer | Model | Internal Code | Cal. Date | Due Date |
|---|---|---|---|---|---|
| Spectrum Analyzer | ADVANTEST | R3162 | SPTG02 | 2013/05/10 | 2014/05/31 |
| Frequency Counter | Anritsu | MF2412B | FRC01 | 2013/07/29 | 2014/07/31 |
| Temperature Chamber | ESPEC | PR-4KPH | TMPC02 | 2013/11/22 | 2015/11/30 |
| MULTIMETER | FLUKE | FLK-83-V | MTM38 | 2013/10/09 | 2014/10/31 |
| Coaxial Cable | SUHNER | SUCOFLEX104 | MWC6m01 | 2013/07/08 | 2014/07/31 |
| Search Coil | Langer | LF-R 400 | EMP05 | - | - |