

MEASUREMENT/TECHNICAL REPORT
FCC Part 15 Subpart CIssued: September 21st, 2005

Name and Address of the Applicant:	CITIZEN SYSTEMS JAPAN CO.,LTD. 6-1-12, Tanashi-cho, Nishi-Tokyo-shi, Tokyo Japan 395-8577
Test Item:	Photo Printer integrating RFID module
Identification:	CW-01
Serial No.:	PP-50700001
FCC ID:	TLGH05A0
Sample Receipt Date:	August 10 th , 2005
Test Specification:	FCC Part 15 Subpart C, 15.225
Date of Testing:	August 14 th – 17 th , September 21 st 2005
Test Result:	PASS

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Tested by:	_____	21 st September, 2005
	D. Watanuki, Engineer	Date

Reviewed by:	_____	21 st September, 2005
	Y. Kawahara, Leader	Date

Notes:

1. This report should not be reproduced except in full, without the written approval of Cosmos Corporation.
2. All measurement data contained in this report may have uncertainty. A judgment for the limitation should be taken into the count.
3. The report in this report apply only to the sample tested.

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1. Description of Equipment Under Test

1.1 Product Description

Manufacturer	: CITIZEN SYSTEMS JAPAN CO.,LTD.
Model (referred to as the EUT)	: CW-01
Nominal Voltage	: AC 100-240V, 50/60Hz
Type of Modulation	: ACK 10%
Mode of Operation	: ☐ duplex ☐ 1/2 duplex ☒ simplex ☐ other
The type of the equipment	: ☒ Stand-alone ☐ Combined Equipment ☐ Plug –In Card ☐ Other
The type of the antenna	: ☒ Integral ☐ external ☐ Other
The type of power source	: ☒ AC mains ☐ Dedicated AC adapter (V) ☐ DC Voltage ☐ Battery
The type of battery (if applicable)	: N/A
Type of Operation	: ☐ Continuous ☐ Burst ☒ Intermittent
Stand by Mode	: ☐ Available ☒ N/A
Intended functions	: Photo printing with RFID
The bandwidth of the IF filters	: N/A
Method of Communication Link	: Software to make maximum speed transmitting
The operating frequency band	: 13.553 to 13.567 MHz
The thermal limitation	: 5 to 35 degree

1.2 Antenna Description

No.	Type Name	Gain	Antenna Type	Remarks
1	V720S-HMC73	-58.91 dBi	Printed Loop	Originally Integrated.
2	V720-D52P03	-	RFID Tag	Integrated in dedicated ink ribbon

No.1 antenna is initially integrated in EUT. No.2 tag is integrated in each replaceable ink ribbon dedicated to EUT. The sub clause (f) of 15.225 of Part.15 is not applied to the tag because it is passive type.

2. General Information

2.1 Test Methodology

All measurement subject to the present test report is carried out according to the procedures in ANSI C63.4:2003.

2.2 Test Facility

All measurement was performed in the following facility;

Cosmos Corporation EMC Lab. Ohnogi

(2-3571 Ohaza-iwatachi, Ohnogi, Watarai-cho, Watarai-gun, Mie-ken 516-2102, Japan) This site has been accepted in a letter dated November 2, 2004 from FCC.

Cosmos Corporation EMC Lab. No.1 (Only conducted emission under 15.207)

(543 Shimesasu, Watarai-cho, Watarai-gun, Mie-ken, 516-2119, Japan) This site has been fully described in a report dated May 23, 1996 submitted to FCC, and accepted in a letter dated July 10, 1996 (31040/SIT 1300F2). The registration has been renewed on April 21, 2005.

2.3 Traceability

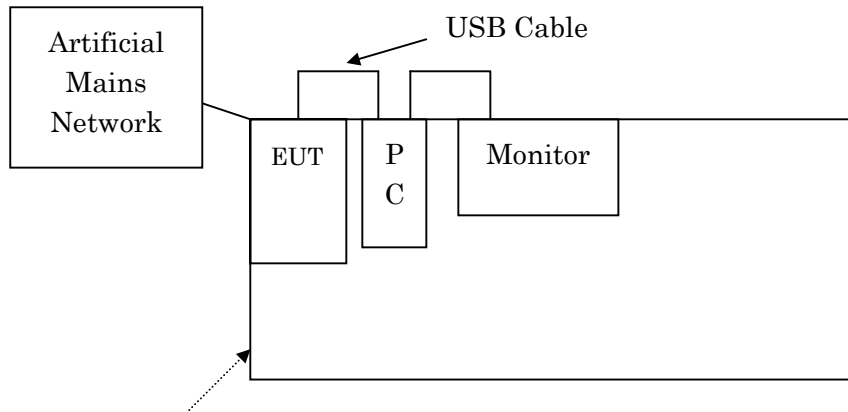
The calibration of measurement equipment used in the test subject to the present report is designed and operated to ensure that the measurement is traceable to national standards of measurement or equivalent abroad.

3. Summary of Test Results

Section	Test Item	Limit	Result
15. 207	AC Power Conducted Emission	Limit: min.48dBuV	Pass
15. 209	Field Strength of Spurious Emission	Refer to 15. 209	Pass
15. 225	Maximum Output Power	15,848 uV/m @ 30 m	Pass
15. 225	Frequency Tolerance	± 0.01 %	Pass

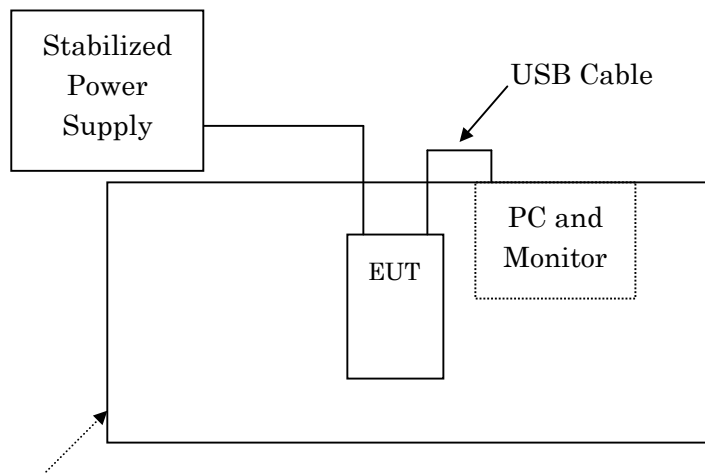
4. Test Configuration

4.1 Conducted Emission Measurement

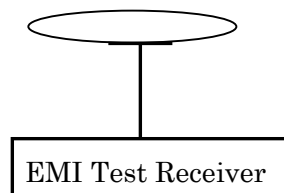


Non-conductive table, 0.8m high
Non-conductive board, 12mm thick

4.2 Radiated Measurement in 3m Anechoic Chamber



Non-conductive table, 0.8m high
above 30 MHz, 1m high below
30MHz.



Antenna (Loop, Biconical and Log-periodic)

* The support PC was placed under the non-conducted table to avoid screening RF emission of EUT.

4.3 Test Mode

In all test configurations above, EUT makes communication link between the integrated RFID module and a RFID tag in a dedicated ink ribbon with the maximum RF power by a special test program.

Maximum Output Power and Frequency Tolerance measurement were performed with an external stabilized AC power supply voltage varied between 85% and 115% of the nominal rated supply voltage 120 VAC.

Frequency Tolerance measurement is performed under the following extreme condition:

Temperature: - 20°C to +50°C (120 VAC)

Voltage: 102 to 138 VAC (Normal temperature)

5. Measurement Result

5.1 15. 207 AC Power Conducted Emission

5.1.1 Setting Remarks

- Configure the EUT System in accordance with ANSI C63.4-2003.
- A wooden test table (1.5m×1.0m, height 0.8m) was used.
- EUT's dedicated AC adapter connected to Artificial Mains Network (AMN).
- Other power cord of support equipment is connected to another AMN to isolate its emission from the measured emission of EUT.
- The measuring port of AMN for support equipment was terminated by the 50Ω
- Activate the EUT System and run the software prepared for the test, if necessary.
- Refer to test configuration figure 4.1.

5.1.2 Minimum Standard

(a) Except as shown in paragraphs (b) and (c) of this section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50 μH/50 ohms line impedance stabilization network (LISN).

Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

Frequency of Emission (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56 *	56 to 46 *
0.5-5	56	46
5-30	60	50

* Decreases with the logarithm of the frequency.

5.1.3 Result

EUT complies with the requirement.

Uncertainty of measurement : ± 2.26 dB
Temperature, Humidity : 30 °C, 49 %

5.1.4 Measured Data

Measured Value Table

***** Cosmos Corporation *****
<<Conducted Emission>>

11 August, 2005 20:10
047343ECEResult04. dat

Standard : CISPR22 Class B
Model : CW-01
Serial No. : PP-50700001
Operator : H. Onishi
Power : AC 120V , 60Hz
Temp, Humid : 30 deg, 49 %
Remark1 : Operated (Printing)
Remark2 : OMRON V720S-HMC73
Remark3 :
Remark4 :

Final Result

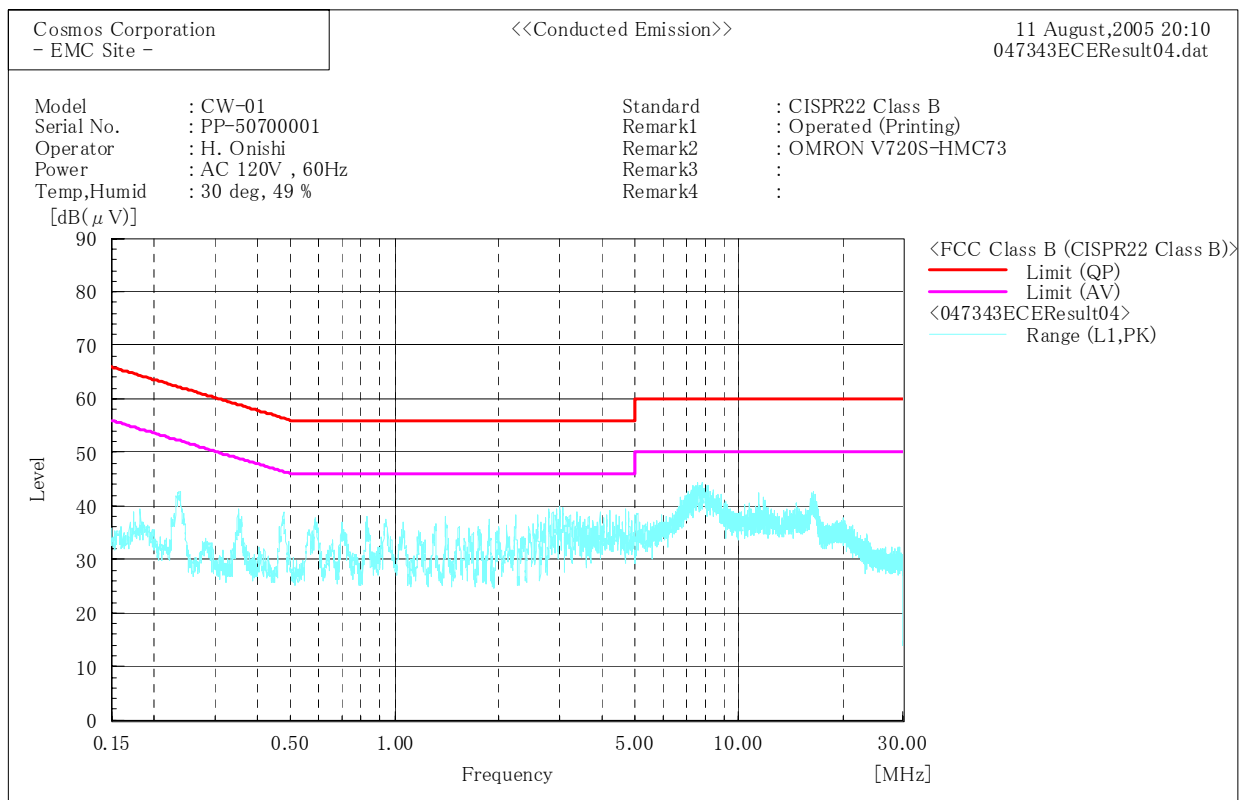
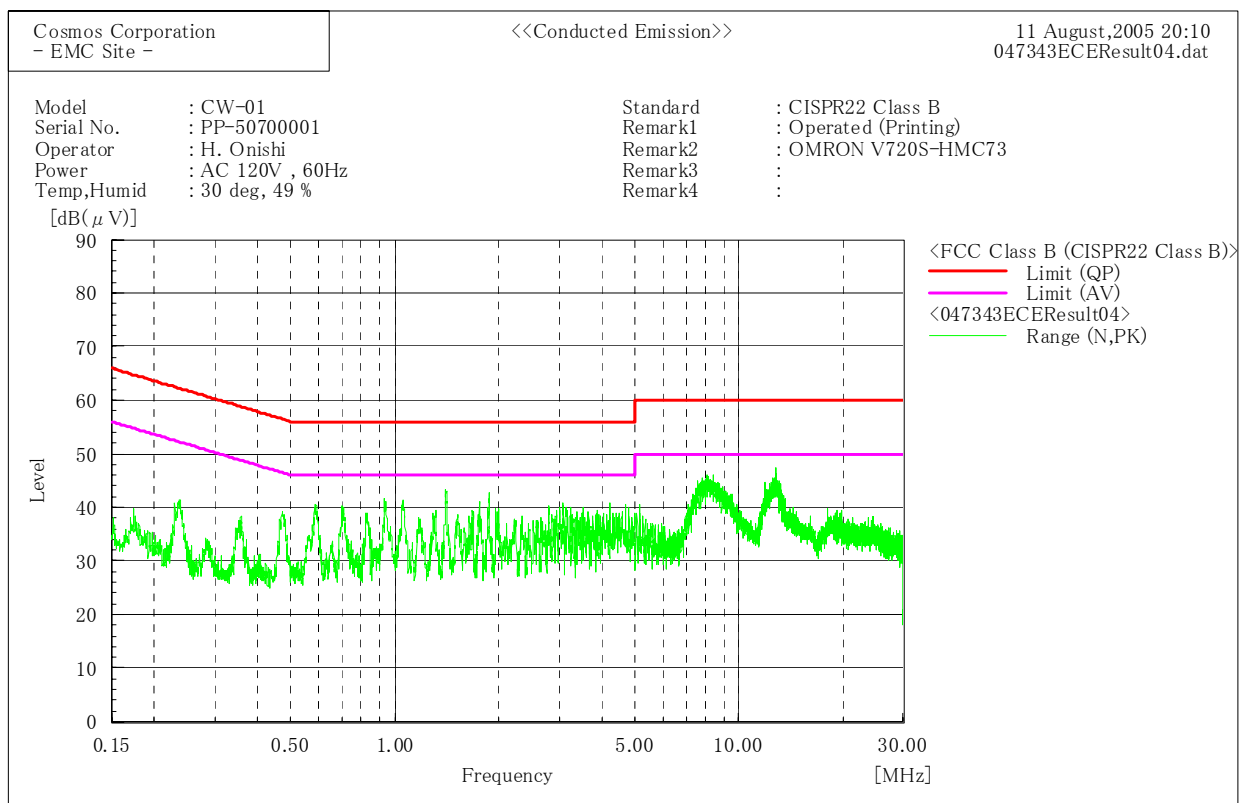
--- N Phase ---

No.	Frequency	Reading QP	Reading AV	c.f	Result QP	Result AV	Limit QP	Limit AV	Margin QP	Margin AV
	[MHz]	[dB(μ V)]	[dB(μ V)]	[dB]	[dB(μ V)]	[dB(μ V)]	[dB(μ V)]	[dB(μ V)]	[dB]	[dB]
1	0.472	27.1	22.8	10.8	37.9	33.6	56.5	46.5	18.7	12.9
2	0.935	26.9	21.8	10.9	37.8	32.7	56.0	46.0	18.3	13.4
3	1.406	28.1	22.0	11.0	39.1	33.0	56.0	46.0	16.9	13.0
4	1.875	23.2	19.5	11.1	34.3	30.6	56.0	46.0	21.7	15.4
5	8.005	27.1	26.7	11.8	38.9	38.5	60.0	50.0	21.1	11.5
6	12.735	28.3	19.9	12.3	40.6	32.2	60.0	50.0	19.5	17.8

--- L1 Phase ---

No.	Frequency	Reading QP	Reading AV	c.f	Result QP	Result AV	Limit QP	Limit AV	Margin QP	Margin AV
	[MHz]	[dB(μ V)]	[dB(μ V)]	[dB]	[dB(μ V)]	[dB(μ V)]	[dB(μ V)]	[dB(μ V)]	[dB]	[dB]
1	0.237	29.8	27.6	10.7	40.5	38.3	62.2	52.2	21.7	13.9
2	0.472	25.2	18.9	10.8	36.0	29.7	56.5	46.5	20.5	16.8
3	0.830	23.0	17.0	10.9	33.9	27.9	56.0	46.0	22.1	18.1
4	1.402	24.0	19.0	11.0	35.0	30.0	56.0	46.0	21.0	16.0
5	3.020	22.8	14.8	11.2	34.0	26.0	56.0	46.0	22.1	20.0
6	7.586	29.4	20.7	11.8	41.2	32.5	60.0	50.0	18.8	17.5

Peak Hold Wave Form



5.2 15. 209 Transmitter Radiated Emissions**5.2.1 Setting Remarks**

- The data lists in “5.2.4 Measured Data “ list the significant emission frequencies, measured levels, correction factor (includes cable and antenna corrections), the corrected reading, plus the limit.
- In the frequency range between 9kHz to 1 GHz, the Electric Field Strength was measured in accordance with ANSI C63.4: 2003 and CISPR22: 1997.
- The test setup was made in accordance with ANSI C63.4: 2003.
- The antenna was measured at 1-4m height for 30MHz to 1GHz.
- The EUT was placed on the non-conductive table in the center of turntable. The height of this table was 0.8m above 30MHz and 1m below 30MHz.
- The measurement was carried out with both horizontal and vertical antenna polarization.
- The highest radiation from the equipment was recorded.
- Below 30MHz, a loop antenna was used at 1m height.
- By varying the configuration of the test sample and the cable routing, it was attempted to maximize the emission.
- The test receiver with Quasi Peak and Average detector is in compliance with CISPR 16-1:1993.
- 9-90 kHz, 110-490 kHz are based on measurements employing an average detector.
- The spectrum analyzer was set-up as following;

(Frequency range : 9kHz - 30 MHz)

- ✓ Resolution bandwidth : 10 kHz
- ✓ Video bandwidth : 100 kHz
- ✓ Detector function : Peak
- ✓ Trace Mode : Max Hold

(Frequency range : 30 - 1000 MHz)

- ✓ Resolution bandwidth : 100 kHz
- ✓ Video bandwidth : 300 kHz
- ✓ Detector function : Peak
- ✓ Trace Mode : Max Hold

- EMI Test Receiver analyzer was set-up as following (Quasi-Peak Detector);

- ✓ IF bandwidth : 200 Hz (9kHz - 150kHz)
- ✓ IF bandwidth : 9 kHz (150kHz - 30MHz)
- ✓ IF bandwidth : 120 kHz (30MHz - 1GHz)

- Refer to test configuration figure 4.2.

5.2.2 Minimum Standard

(d) The field strength of any emissions appearing outside of the 13.110-14.010 MHz band shall not exceed the general radiated emission limits in § 15.209.

5.2.3 Result

EUT complies with the requirement.

Uncertainty of measurement result: ± 3.64 dB

Temperature, Humidity : Refer to each data table

5.2.4 Measured Data

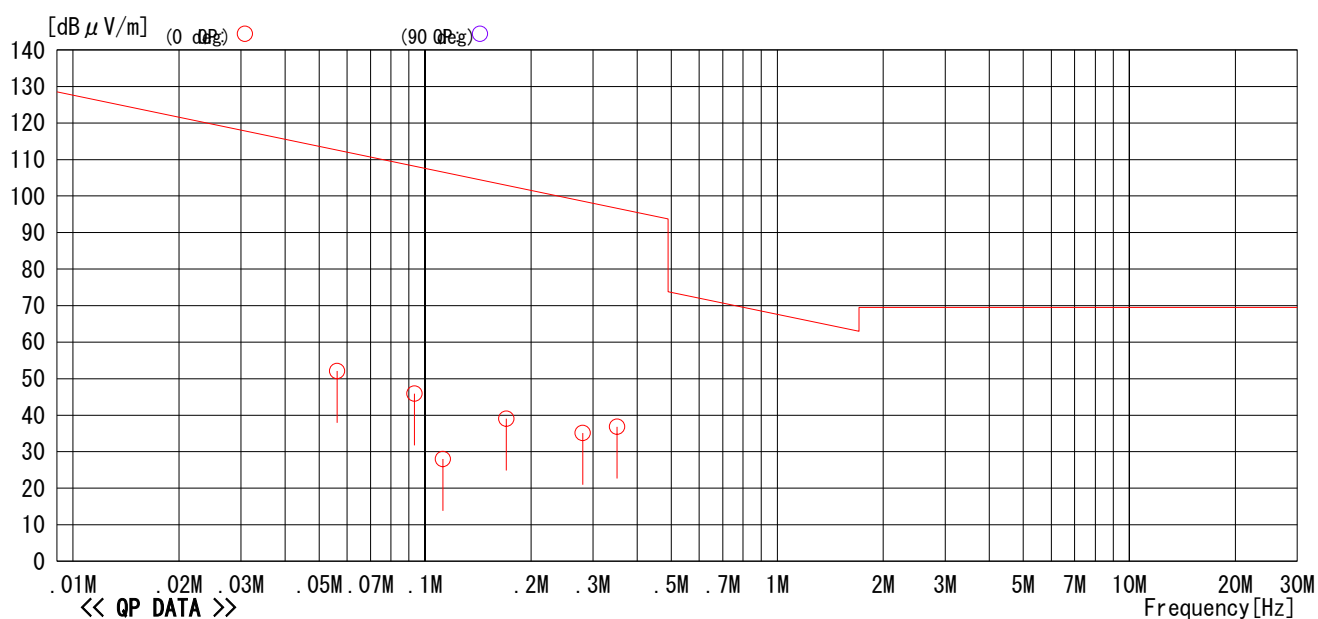
9kHz to 30MHz

Model Name : CW-01
 Serial No. :
 Operator : K. Yamashita
 Power Supply : AC 120V, 60Hz

Job No. : CJ05-047343E
 Temp./Humi. : 24deg. 61%
 Condition : Operated
 Remark : V720S-HMC73

Memo :

LIMIT : FCC Part15 SubpartC 15.209 9KHz-30MHz



No	Freq.	Reading	Ant. Fac	Loss	Result	Limit	Margin	Antenna	Angle
	[MHz]	[dBuV]	[dB/m]	[dB]	[dBuV/m]	[dBuV/m]	[dB]		[deg]
1	0.05626	33.1	19.0	0.0	52.1	112.6	60.5	0deg	262
2	0.09337	26.8	19.0	0.1	45.9	108.2	62.3	0deg	260
3	0.11221	8.9	19.0	0.1	28.0	106.6	78.6	0deg	251
4	0.17021	19.8	19.0	0.2	39.0	103.0	64.0	0deg	97
5	0.28045	15.9	19.0	0.2	35.1	98.6	63.5	0deg	266
6	0.35125	17.6	19.0	0.2	36.8	96.7	59.9	0deg	107

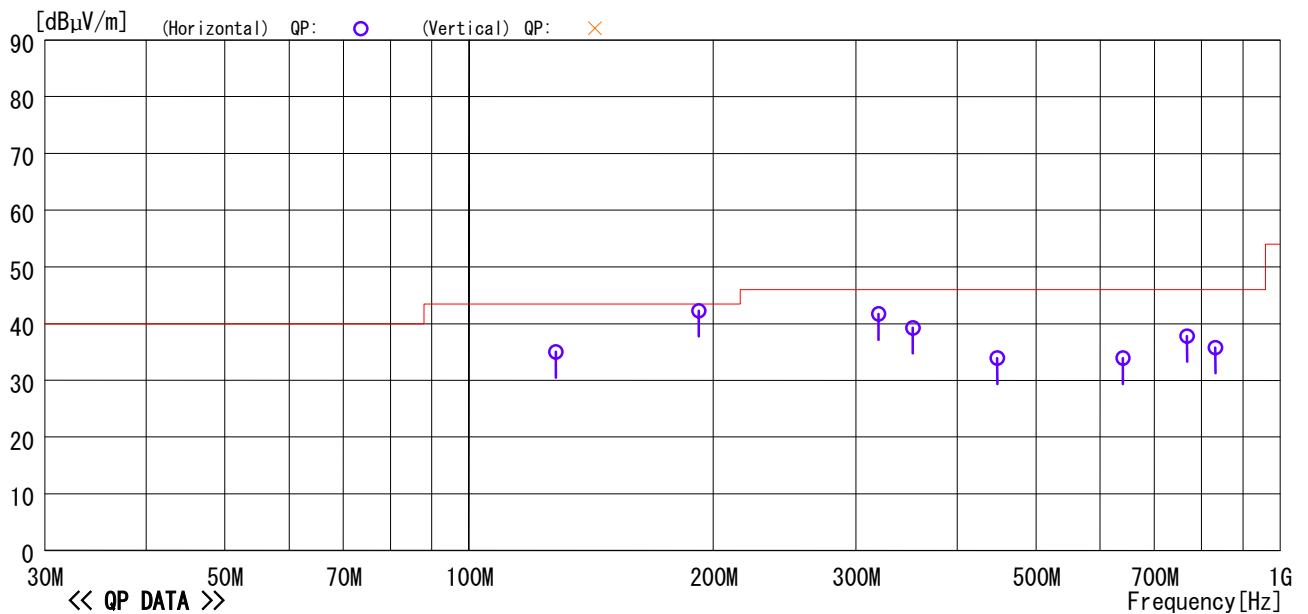
30MHz to 1GHz

Model Name : CW-01
 Serial No. :
 Operator : K. Yamashita
 Power Supply : AC120V, 60Hz

Job No : CJ05-07343E
 Temp./Humi. : 24°C/45%
 Condition : Operated
 Remark : V720S-HMC73

Memo : 30MHz-300MHz BC:VHBB 9124, 300MHz-1GHz LP:UHALP 9108 A1

LIMIT : FCC 15.209 3m



No	Freq.	Reading	Ant. Fac	Loss	Gain	Result	Limit	Margin	Pola.	Height	Angle	Ant
	[MHz]	[dB μ V]	[dB/m]	[dB]	[dB]	[dB μ V/m]	[dB μ V/m]	[dB]	[H/V]	[cm]	[deg]	Type
1	128.001	47.6	11.3	5.1	29.0	35.0	43.5	8.5	Hori.	258	104	BC
2	191.999	51.0	14.3	5.8	28.8	42.3	43.5	1.2	Hori.	177	87	BC
3	319.995	49.7	14.2	6.6	28.8	41.7	46.0	4.3	Hori.	100	129	LP
4	352.596	46.7	14.7	6.7	28.8	39.3	46.0	6.7	Hori.	100	362	LP
5	447.991	38.2	16.7	7.3	28.3	33.9	46.0	12.1	Hori.	100	237	LP
6	639.985	34.9	19.2	8.2	28.4	33.9	46.0	12.1	Hori.	100	156	LP
7	767.981	36.6	20.1	8.9	27.8	37.8	46.0	8.2	Hori.	100	321	LP
8	831.981	33.8	21.0	9.1	28.1	35.8	46.0	10.2	Hori.	100	107	LP

5.3 Maximum Carrier Output Power

5.3.1 Setting Remarks

- Refer to 5.2.1
- The EUT was placed on the non-conductive table in the center of turntable. The height of this table was 1m.
- The measurement was carried out with both horizontal and vertical antenna polarization.
- The highest radiation from the equipment was recorded.
- The test receiver with Quasi Peak and Average detector is in compliance with CISPR 16-1:1993.
- The spectrum analyzer was set-up as following;
 - ✓ Frequency Span : Appropriate to determine carrier frequency.
 - ✓ Resolution bandwidth : Appropriate to determine carrier frequency.
 - ✓ Video bandwidth : Appropriate to determine carrier frequency.
 - ✓ Sweep : Auto
 - ✓ Detector function : Peak
 - ✓ Trace Mode : Max Hold
- EMI Test Receiver analyzer was set-up as following (Quasi-Peak Detector);
 - ✓ IF bandwidth : 9 kHz
- Refer to test configuration figure 4.2.

5.3.2 Minimum Standard

- (a) The field strength of any emissions within the band 13.553-13.567 MHz shall not exceed 15,848 microvolts/meter at 30 meters.
- (b) Within the bands 13.410-13.553 MHz and 13.567-13.710 MHz, the field strength of any emissions shall not exceed 334 microvolts/meter at 30 meters.
- (c) Within the bands 13.110-13.410 MHz and 13.710-14.010 MHz the field strength of any emissions shall not exceed 106 microvolts/meter at 30 meters.

5.3.3 Result

EUT complies with the requirement.

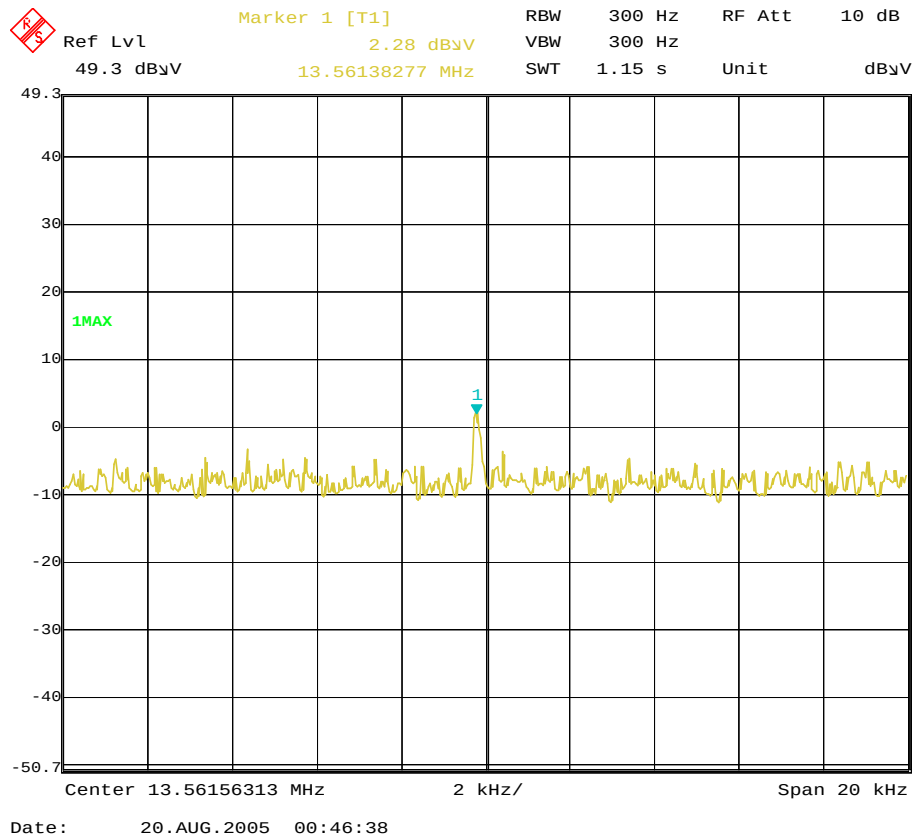
Uncertainty of measurement result: ± 3.64 dB
Temperature, Humidity : 24 °C, 61%

5.3.4 Measured Data

Frequency (MHz)	Correction Factor (dB)	Reading (dBuV)	Peak Power (dBuV/m)	Limit (dBuV/m)	Margin (dB)
13.110	19.3	4.5	23.8	60.5	36.7
13.410	19.2	4.5	23.7	60.5	36.8
13.553	19.2	4.5	23.7	70.7	47.0
13.561 (Carrier)	19.2	7.9	27.1	104.0	76.9
13.567	19.2	4.5	23.7	70.7	47.0
13.710	19.2	4.5	23.7	60.5	36.8
14.010	19.2	4.5	23.7	60.5	36.8

* Correction Factor = Cable Loss (dB) + Antenna Factor (dB)

Carrier Spectrum



5.4 Frequency Tolerance

5.4.1 Setting Remarks

- Refer to setting remarks 5.3.1.
- Refer to test configuration figure 4.2.
- With an environmental test chamber, EUT is exposed in extreme temperatures until its temperature is stabilized. (Approximately 30 minutes) Then EUT is on with nominal AC voltage, or installed a fully charged battery.

5.4.2 Minimum Standard

(e) The frequency tolerance of the carrier signal shall be maintained within $\pm 0.01\%$ of the operating frequency over a temperature variation of -20 degrees to $+50$ degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C. For battery operated equipment, the equipment tests shall be performed using a new battery.

5.4.3 Result

EUT complies with the requirement.

Uncertainty of measurement result: ± 1 Hz

5.4.4 Measured Data

Temperature	Nominal Frequency (MHz)	Measured Frequency (MHz)	Limit	Result
- 20°C	13.560	13.561	$\pm 0.01\%$	+ 0.007%
25°C	13.560	13.561	$\pm 0.01\%$	+ 0.007%
50°C	13.560	13.561	$\pm 0.01\%$	+ 0.007%

6. Photos

6.1 Setup Photo (Conducted Emission)

Front View

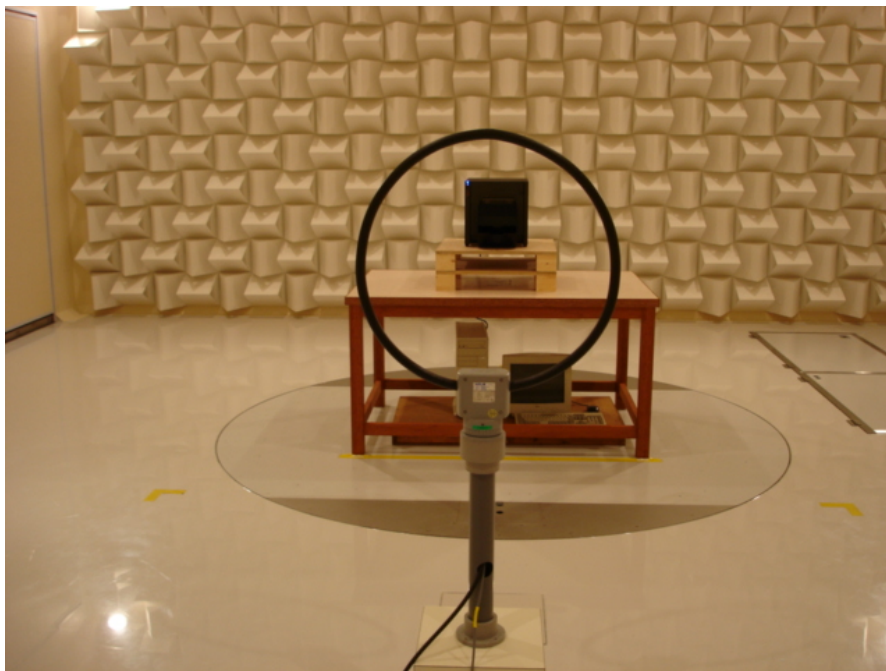


Side View

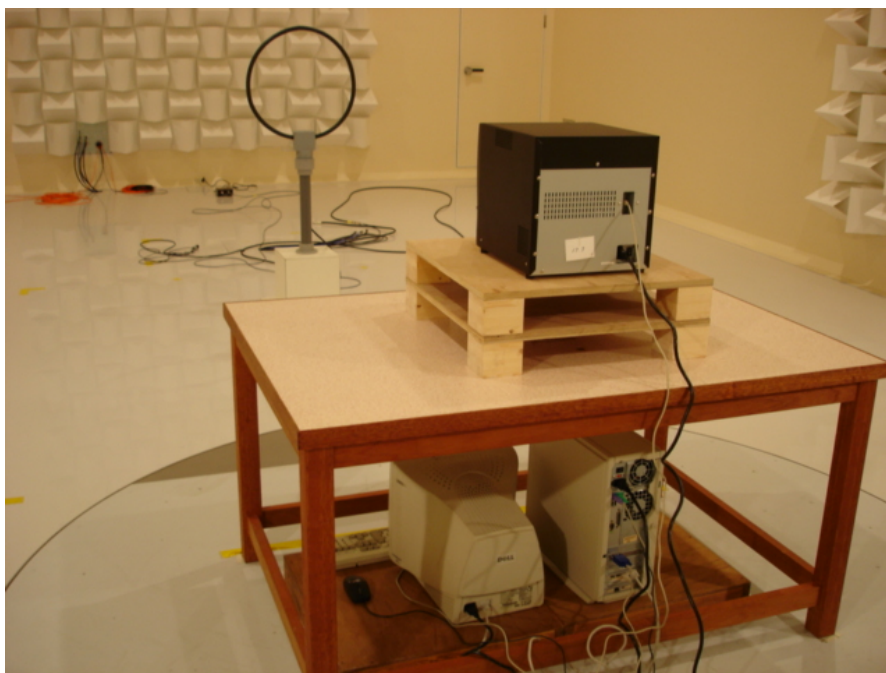


6.2 Setup Photo (Radiated Emission)

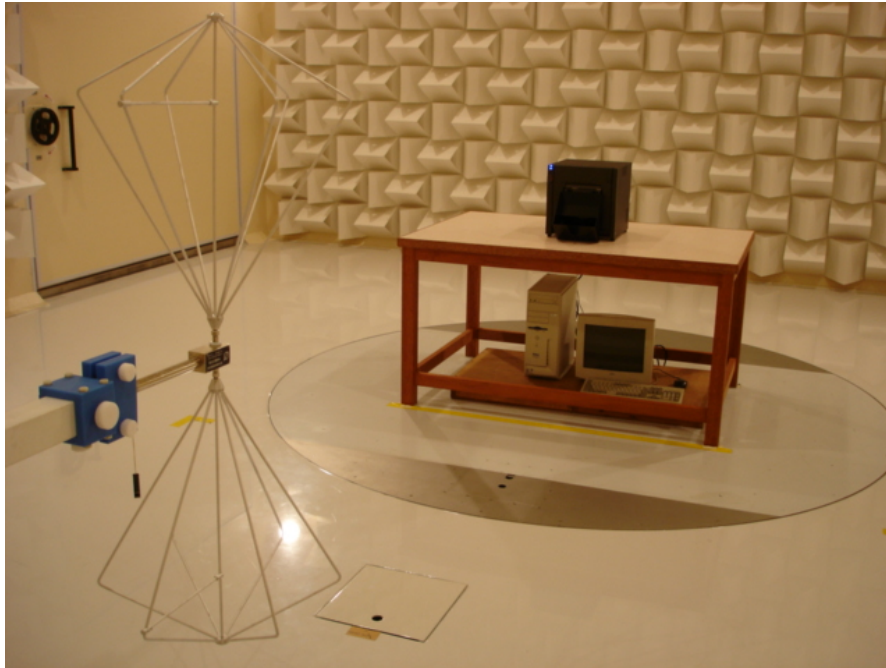
Front View (9kHz - 30MHz)



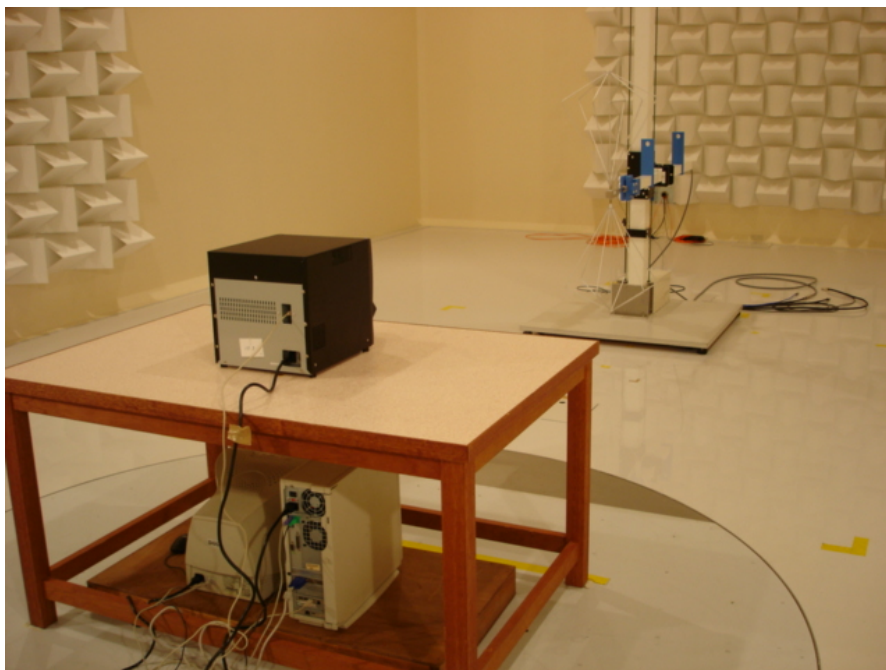
Rear View (9kHz - 30MHz)



Front View (Above 30MHz)



Rear View (Above 30MHz)



7. List of Test Measurement Instruments

7.1 Conducted Emission

Instruments	Manufacturer	Model / Type	Serial No.	Calibration Date Next Calibration
Spectrum Analyzer	ROHDE & SCHWARZ	FSA	828100/005 827831/007	July, 2005 July, 2006
EMI Test Receiver	ROHDE & SCHWARZ	ESHS10	842121/012	July, 2005 July, 2006
Artificial-Mains Network	ROHDE & SCHWARZ	ESH2-Z5 (for EUT)	842210/010	May, 2005 May, 2006
Artificial-Mains Network	CHASE Electronics Limited	MN2050B (for peripheral)	1140	June, 2005 June, 2006
RF cable	SCHAFFNER	RG214/U 50Ω	(4m)	May, 2005 May, 2006
RF Selector	TOYO Corporation	NS4906A	9601008	- -
Transient Limiter	CHASE Electronics Limited	CFL9206	1426	- -

7.2 Radiated Emission Measurement

Instruments	Manufacturer	Model / Type	Serial No.	Calibration Date Next Calibration
Programmable AC/DC Power Source	NF Corporation	ES18000W	425779	---
EMI Test Receiver	ROHDE & SCHWARZ	ESIB40	100211	April, 2005 April, 2006
Biconical Antenna (30 to 300MHz)	SCHWARZBECK	VHBB9124(Balun) BBA9106(Elements)	311	September, 2004 September, 2005
Log.-Periodic Antenna (300 MHz to 1 GHz)	SCHWARZBECK	UHALP 9108 A	645	September, 2004 September, 2005
Loop Antenna (0.15 to 30 MHz)	ROHDE & SCHWARZ	HFH2-Z2	131	August, 2005 August, 2006
Environment Chamber	ESPEC	LHU-112M	---	---