

EMC TEST REPORT

Samsung Electronics Co., Ltd.

416 Maetan 3-Dong, Yeongtong-Gu,
Suwon-Si, Gyeonggi-Do, 443-742 Korea
(Tel: 031 277 7752, Fax: 031 277 7753)

Project No. : LBE063892
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**1. Applicant**

- Name of organization : Samsung Electronics Co., Ltd.
- Address : 416 Maetan 3-Dong, Yeongtong-Gu, Suwon-Si, Gyeonggi-Do, 443-742 Korea
- Date of application : 2006. 12. 8

2. Purpose for the report : Approval for EMC**3. Kind of product : Plain Paper FAX (Model name : SCX-4521F)****4. Date of test : 2006.12. 11 ~ 2006.12.14****5. Applied standard : FCC Part 15, Subpart B****6. Test result : Complied**

The equipment under test has found to be compliant with the applied standards.

(Refer to the attached test result for more detail.)

7. FCC ID : A3LWT21MFF

Tested by

Name : Sang Kyu, Seo

Reviewed by

Name : No Cheon Park

This report is the test result about the sphere accredited by KOLAS which signed the Mutual Recognition Arrangement of International Laboratory Accreditation Cooperation.

2007. 1. 9

Samsung Electronics Co., Ltd.
Chief of CS Management Center

TEST RESULT

Test Report No. : LBE063892

Applicant / Address : Samsung Electronics Co., Ltd.
416 Maetan 3-Dong, Yeongtong-Gu, Suwon-Si, Gyeonggi-Do
443-742 Korea

Manufacture / Address : 1) Samsung Electronics Co., Ltd.
259, Gongdan-Dong, Gumi-City, Gyeongsangbuk-Do, 730-030 Korea
2) Samsung Electronics(Shandong) Digital Printing Co., Ltd.
264209, Samsung Road, Weihai Hi-Tech IDZ, Shandong Province, China

EUT : 1. Product name : Plain Paper FAX
2. Model name : SCX-4521F
3. Brand name : Samsung
4. Variant model : SCX-4321, WorkCentre PE220

Test Method : **ANSI C 63.4:2003**

Test Result : **PASS**
The equipment under test has found to be compliant
with the applied standards

Test Lab. : CS Management Center, Samsung Electronics Co., Ltd.



Tested by : Sang Kyu, Seo

Reviewed by : No Cheon Park

Date of Issue : 2006. 1. 9

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1. General information

1.1 Basic information related product

Applicant	Samsung Electronics Co., Ltd.
Model name	SCX-4521F
Applicant address	416 Maetan 3-Dong, Yeongtong-Gu, Suwon-Si, Gyeonggi-Do 443-742 Korea
Contact person	Sangsu, ROH
Kind of product	Plain Paper FAX
Valiant model	SCX-4321, WorkCentre PE220
Manufacturer	1) Samsung Electronics Co., Ltd. 259, Gongdan-Dong, Gumi-City, Gyeongsangbuk-Do, 730-030 Korea 2) Samsung Electronics(Shandong) Digital Printing Co., Ltd. 264209, Samsung Road, Weihai Hi-Tech IDZ, Shandong Province, China
Rated power	AC 120 V, 60 Hz
Alternative	1) Main PBA : JC92-01726D (SCX-4521F) JC92-01726E (SCX-4321) JC92-01726C (WC PE220) 2) LIU PBA : JC92-01684H / J : 2 Type (EU/USA) 3) LIU Harness : JC39-00641A : 3pin, 300mm, 1Core

1.2 Detail Information related product

1.2.1 Specification

Item	Specification	Remark
Power Requirement	110~127 VAC, 50/60Hz, 4.5A	
Power Consumption	Sleep Mode : 10W, Average : 350W	
Warm-Up Time	Less than 35 seconds	
LCD Screen	16 words x 2 Lines	
Toner Cartridge Life	3,000 pages(for starter 1,000 pages) at IDC 5% Coverage	
Memory	Basic 10Mb(Non expendable)	
Weight	10.1 Kg	
Dimension(WxDxH)	438 x 374 x 368 mm	
Scan Method	CIS, ADF mode	
Scan resolution	Optical 600 * 600 dpi, Enhanced 4800 * 4800 dpi	
Scan Speed	20 pages per 1 min. (A4)	
Fax Compatibility	ITU-T Group 3	
Modem Speed	33.6 Kbps	
Transmission Speed	3 seconds/page(ITU-T No. 1 chart)	
Fax Resolution	Standard : 203 * 98 dpi Fine : 203 * 196 dpi Super fine : 300 * 300 dpi	
Fax User Memory	2 MB (160 pages)	
Printing Method	Laser Beam Printing	
Printing Speed	Letter : 20 ppm A4 : 20 ppm	
Print Resolution	600 * 600 dpi (1200*600dpi)	
Interface	USB2.0 1Port, IEEE 1284 1Port	

Operating Frequency

Video clock : 18.75 Mhz, CPU clock : 66 Mhz, SDRAM clock : 66 Mhz, Main clock : 10 Mhz
CIS clock(copy) : 4.166 Mhz, Modem clock : 4.9152 Mhz, OPE Micom clock : 7.37 Mhz

1.3 Operating mode and condition

The system was configured for testing in typical fashion use. Cables were attached to each of the available I/O Ports. Where applicable, peripherals were attached to the I/O cables. The mode of operation utilized for testing was selected to best simulate typical EUT use. The EUT is supporting the USB and parallel printing mode. The EUT is supporting the ADF copy and FAX mode. In each test mode, finally we found worst case emission that is above configuration with the worst case components(in the above table). So, the data of the maximum EUT operation, ADF copy mode was reported.

- ADF Copy Mode (worst emission)

- USB Printing Mode
- Parallel Printing Mode
- FAX Printing Mode

- Test Voltage : 120 V, 60 Hz

1.4 Equipment modifications

No equipment modifications were required.

1.5 Test procedure

1.5.1 Conducted emission

EUT was placed on a platform nominal size, 1 m by 1.5 m, raised 80 cm above the conducting ground plane. The rear of tabletop was located 40 cm to the vertical conducting ground plane.

The rear of EUT, including peripherals was aligned and flush with rear of tabletop.

All other surfaces of tabletop was at least 80 cm from any other grounded conducting surface.

I/O cables and AC cables that were connected to the peripherals were bundled in center.

They were folded back and forth forming a bindle 30 cm to 40 cm long and were handed at a 40 cm height to the ground plane.

Each EUT current-carrying power lead, except the ground(safety) lead, were individually connected through a LISN to the input power source.

All unused 50 ohm connectors of the LISN were resistively terminated in 50 ohm when not connected to the measuring equipment.

Frequency Band [MHz]	Instrument	Detector	Resolution Bandwidth	Video Bandwidth
0.15 to 30	EMI Receiver	Quasi-Peak	9 kHz	-
		Average	9 kHz	-

1.5.2 Radiated emission

EUT was placed on a platform of nominal size, 1 m by 1.5 m, raised 80 cm above the conducting ground plane. The rear of EUT, including peripherals was aligned and flush with rear of tabletop.

The I/O cables that were connected to the peripherals were bundle in center.

They were folded back and forth forming a bundle 30 cm to 40 cm long and were hanged 40 cm height to the ground plane.

Test was made with the antenna positioned in both the horizontal and vertical planes of polarization.

The measurement antenna was varied in height above the conducting ground plane and the turntable azimuth was varied to obtain the maximum signal strength

The system configuration, clock speed, mode of operation or video resolution, turntable azimuth with respect to the antenna were noted for each frequency found.

The spectrum was scanned from 30 to 1 000 MHz using biconiLog antenna.

Also, the EMI Receiver was scanned from 1 000 to 2 000 MHz using linearly polarization

Double ridge horn antennas were used. The explanation of measuring instrument setup when

Respective function is used in any frequency band is as following;

Frequency Band [MHz]	Instrument	Detector	Resolution Bandwidth	Video Bandwidth
30 to 1 000	EMI Receiver	Quasi-Peak	120 kHz	-
Above 1 000	EMI Receiver	Peak	1 MHz	1 MHz

1.6 Test configuration

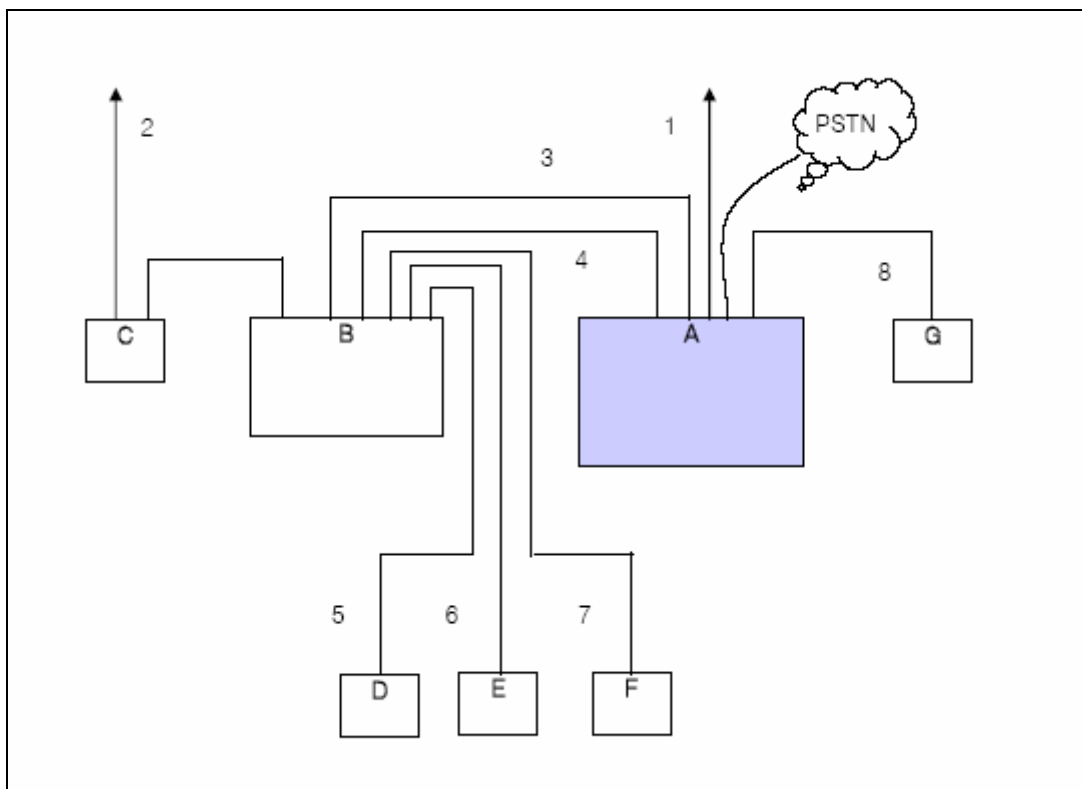
1.6.1 Used EUT and peripherals

Seq	Device	Model Name	Serial #	Maker	Note
A	Plain Paper Fax	SCX-4521F	-	Shandong Samsung Telecommunications Co .Ltd	EUT
B	Notebook PC	SQ20	I86191CWC00005	Samsung	DoC
C	AC Adaptor	AD-4212A	CNBAXXXXXXSE3831E0241	DongGuan SEM	-
D	Serial Mouse	37964	1406874	Microsoft	C3KMS1
E	PS/2 Mouse	M-SBF69	HCA43400999	Logitech	DoC
F	USB Mouse	M-UV69a	HCA33509030	Logitech	DoC
G	Telephone	SP-F209K	-	Dong Heung	DoC

1.6.2 Used cable description

No	Connect Cable	Length [m]	Shielded [Y/N]	Remark
1	Power	1.8	No	For EUT
2	Power	1.8	No	For Notebook PC Adaptor
3	Parallel	1.8	Yes	From printer to pc
4	USB	1.8	Yes	From printer to pc
5	Serial	1.8	Yes	From printer to mouse
6	PS/2	1.8	Yes	From printer to mouse
7	USB	1.8	Yes	From printer to mouse
8	Telephone	2.0	No	From printer to telephone

1.6.3 Block diagram



1.7 Applied Standards

Test standard	Test method
FCC Part 15 Subpart B	ANSI C63.4:2003

1.8 Test Facility

1.8.1 General information

The sites are constructed in conformance with the requirements of ANSI C63.4 and CISPR 22, 16-1, 16-2.

This EMC Testing Lab. is accredited by Korea Laboratory Accreditation Scheme(KOLAS) which signed the International Laboratory Accreditation Cooperation (ILAC) Mutual Recognition Arrangement

(MRA) for the above test item(s) and test method(s).

This Lab. is operated as testing laboratory in accordance with the requirements of ISO/IEC 17025:1998.

1.8.2 Accreditation and listing



1.8.3 Measurement uncertainty

(According to CISPR 16-4 and Lab. 34)

Test item	Measurement uncertainty
Conducted emission	± 2.8 dB
Radiated emission Horizontal	± 5.1 dB
Vertical	± 5.09 dB

2. Summary of test results

Result : PASS

The equipment under test(EUT) has been found to comply with the applied standards.

Section of the product standard		Applied standard	Test result
3.1	Conducted Emission	ANSI C63.4 : 2003	Complied
3.2	Radiated Emission	ANSI C63.4 : 2003	Complied

3. Description of individual tests

3.1 Conducted emission

3.1.1 Test information

Test engineer	Sang Kyu, Seo
Test date	December 14, 2006
Climate condition	Ambient temperature : 24.0 Relative humidity : 32 Atmospheric pressure 102.9kPa
Test place	Shielded room # 1

3.1.2 Test equipment

Equipment	Model name	Manufacturer	Serial no.	Calibration	
				Date	Interval (Month)
EMI TEST RECEIVER	ESCI	R&S	100369	2006-05-01	12
LISN	ENV216	R&S	100116	2006-09-01	12
LISN	ESH3-Z5	R&S	100261	2006-07-21	12
Test Software	EMC 32	R&S	Ver 4.40.0	N/A	N/A

EUT Test Setup

The EUT was set up as per normal use on a wooden table, 0.4 m from a vertical ground reference plane, At least 0.8 m from other conduction surfaces and 0.8 m from the LISN.

See photo.

Test Result

Measurement Results

Pass

The measured emissions of the EUT have found to be below the specified limits.

3.1.3 Test data and graph

The initial step in collecting conducted data was to perform a peak and average scan over the measurement range using a receiver.

3.1.4.1 Test graph

Test Information

EUT Name:	SCX-4521F
Operating Conditions:	110 VAC, 60 Hz
Operator Name:	Seo Sang Kyu
Comment:	ADF Copy
Description	Plain Paper FAX

Hardware Setup: Voltage with ENV 2-Line-LISN - [EMI conducted]

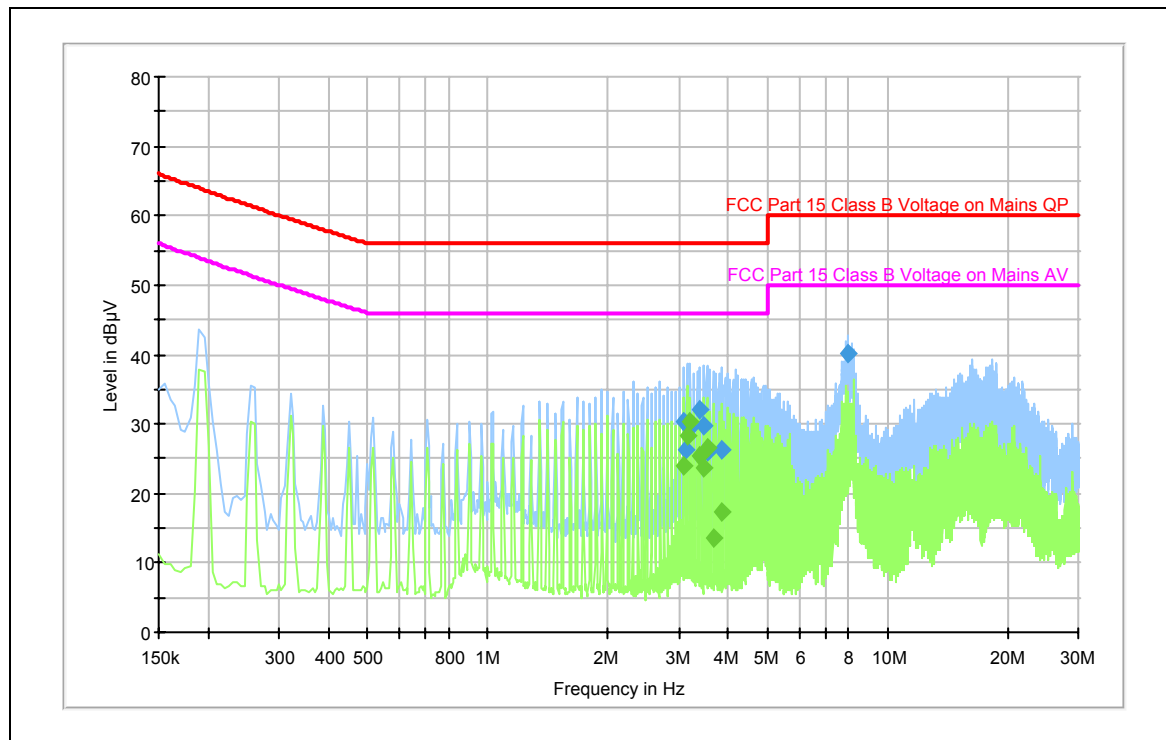
Subrange 1	
Frequency Range:	150kHz - 30MHz
Receiver:	ESCI 3
Transducer:	ENV216 / Receiver-2-Line-LISN ENV216

Scan Setup: FCC Part 15 Class B with ENV 2-Line-LISN fin [EMI conducted]

Hardware Setup:	Voltage with ENV 2-Line-LISN
Level Unit:	dB μ V

Subrange	Detectors	IF Bandwidth	Meas. Time	Receiver
150kHz - 30MHz	QuasiPeak; Average	9kHz	15s	ESCI 3

FCC Part 15 Class B with ENV 2-Line-LISN



Final Measurement Detector 1

Frequency (MHz)	QuasiPeak (dB μ V)	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)
3.075500	30.3	L1	9.7	25.7	56.0
3.140500	26.3	L1	9.7	29.7	56.0
3.205500	29.3	L1	9.7	26.7	56.0
3.395500	32.0	L1	9.7	24.0	56.0
3.460500	29.9	L1	9.7	26.1	56.0
3.525500	26.1	L1	9.7	29.9	56.0
3.845500	26.4	L1	9.7	29.6	56.0
7.959500	40.2	N	9.9	19.8	60.0

Final Measurement Detector 2

Frequency (MHz)	Average (dB μ V)	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)
3.075500	24.0	L1	9.7	22.0	46.0
3.144500	28.4	L1	9.7	17.6	46.0
3.205500	30.4	L1	9.7	15.6	46.0
3.395500	25.4	L1	9.7	20.6	46.0
3.460500	23.8	L1	9.7	22.2	46.0
3.525500	26.6	L1	9.7	19.4	46.0
3.650500	13.5	L1	9.7	32.5	46.0
3.845500	17.3	L1	9.7	28.7	46.0

3.2 Radiated emission

3.2.1 Test information

Test engineer	Sang Kyu, Seo
Test date	December 11, 2006
Climate condition	Ambient temperature : 24.2 °C, Relative humidity : 31 % Atmospheric pressure 101.5 kPa
Test place	10 m Semi-anechoic Chamber

3.2.2 Test equipment

Equipment	Model name	Manufacturer	Serial no.	Calibration	
				Date	Interval (Month)
Bi-con Antenna	CBL6112D	SCHAFFNER	22601	2006-06-26	12
Bi-con Antenna	CBL6112D	SCHAFFNER	22602	2006-06-26	12
EMI Receiver	ESI-26	R&S	100287	2006-03-05	12
EMI Receiver	ESI-26	R&S	100288	2006-04-04	12
AMPLIFIER	310N	SONOMA	251674	2006-03-14	12
AMPLIFIER	310N	SONOMA	251677	2006-03-05	12
Ant Mast	MA4000	Inn-co	-	N/A	N/A
Ant Mast	MA4000	Inn-co	-	N/A	N/A
Mast Controller	CO2000	Inn-co	-	N/A	N/A
RF Selector	NS4900	TOYO	-	N/A	N/A

EUT Test Setup

EUT set up in semi-anechoic chamber. EUT positioned at 10 m from antenna in center of table.

All ports terminated into characteristic loads.

Test Result

Measurement Results

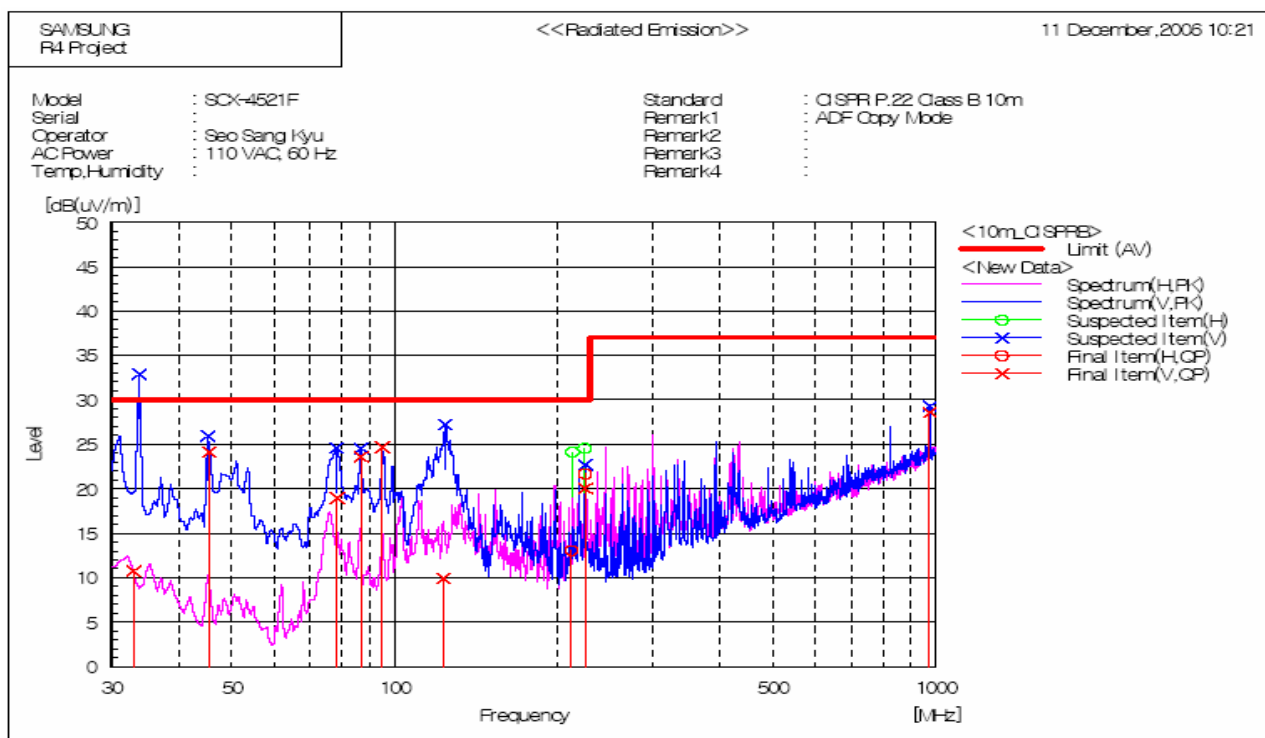
Pass
The measured emissions of the EUT have found to be below the specified limits.

3.2.3 Test data and graph

The initial step in collecting radiated data was to perform a peak scan over the measurement range using a receiver. All modes of operation were investigated and the worst-case emissions were reported. All other emissions are non-significant

3.2.3.1 30 MHz ~ 1 000 MHz

■ Operating Mode: ADF Copy



Final Result

No.	Frequency [MHz]	(P)	Reading QP [dB(uV)]	c.f [dB(1/m)]	Result QP [dB(uV/m)]	Limit [dB(uV/m)]	Margin QP [dB]	Height [cm]	Angle [deg]	System
1	32.984	V	24.9	-14.2	10.7	30.0	19.3	112.0	251.3	2
2	45.391	V	45.0	-20.9	24.1	30.0	5.9	101.0	67.2	2
3	78.316	V	42.4	-23.4	19.0	30.0	11.0	399.0	51.3	2
4	86.643	V	45.2	-21.6	23.6	30.0	6.4	150.0	0.3	2
5	94.927	V	44.7	-20.0	24.7	30.0	5.3	174.0	359.6	2
6	122.880	V	27.9	-18.0	9.9	30.0	20.1	100.0	161.1	2
7	212.467	H	32.9	-19.9	13.0	30.0	17.0	322.0	227.7	1
8	224.998	V	39.4	-19.3	20.1	30.0	9.9	105.0	172.7	2
9	225.003	H	41.1	-19.4	21.7	30.0	8.3	332.0	276.0	1
10	975.023	V	30.5	-1.9	28.6	37.0	8.4	304.0	226.1	2

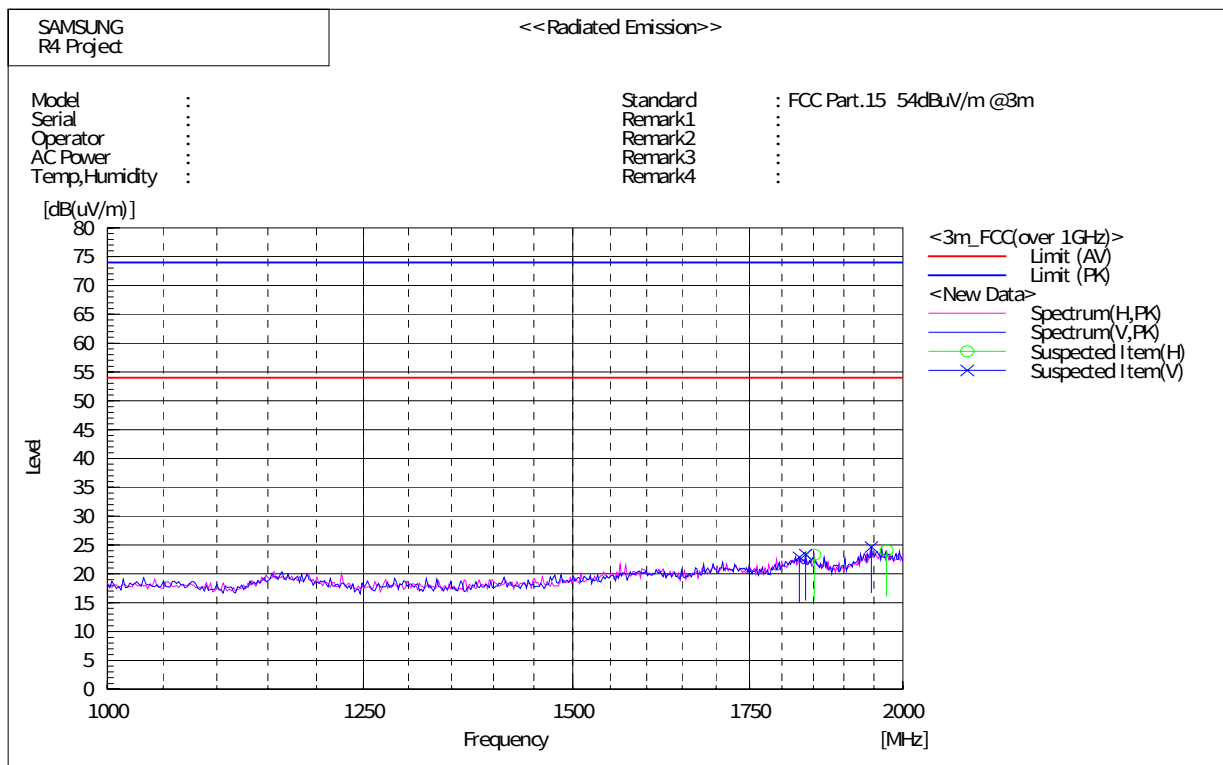
* Receiving antenna mode : Horizontal, Vertical

* Test distance : 10 m (Semi Anechoic Chamber)

* Result = Reading + c.f (Antenna factor + Cable loss- Amp Gain)

* Margin = Limit – Reading

3.2.3.2 1 GHz ~ 2 GHz



Final Result

No.	Frequency [MHz]	(P)	c.f [dB(1/m)]	Limit [dB(uV/m)]	Height [cm]	Angle [deg]
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- * Receiving antenna mode : Horizontal, Vertical
- * Test distance : 3 m (Semi Anechoic Chamber)
- * Result = Reading + c.f (Antenna factor + Cable loss- Amp Gain)
- * Margin = Limit – Reading

4. Appendix

4.1 Test photography



Picture 1. Conducted Emission (Front)



Picture 2. Conducted Emission (Rear)



Picture 3. Radiated emission (Front)



Picture 4. Radiated emission (Rear)

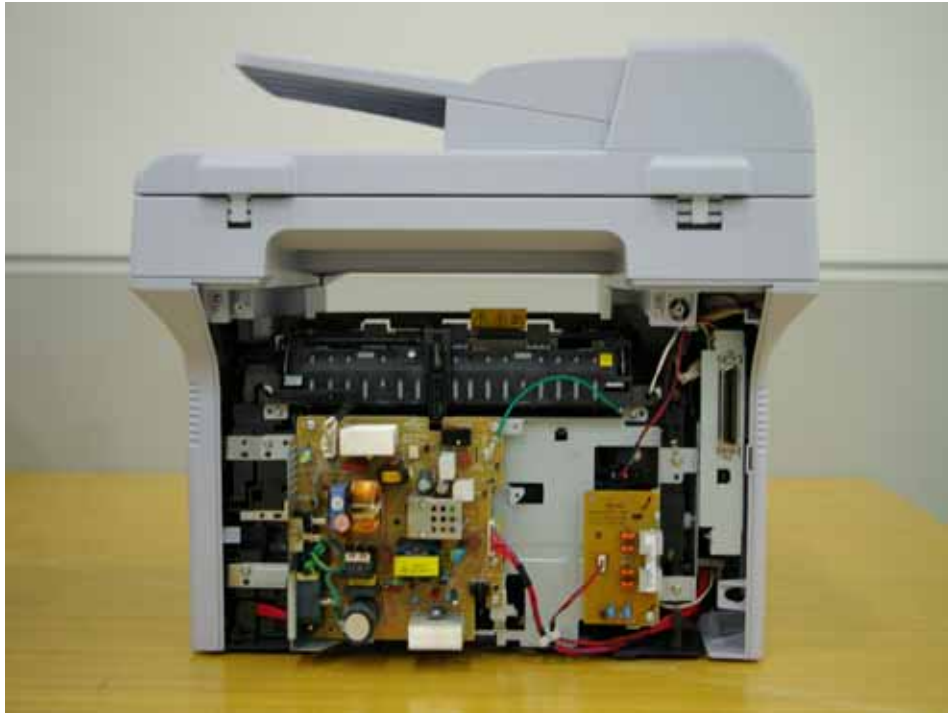
4.2 EUT photography



Picture 5. EUT (Front)



Picture 6. EUT (Rear)



Picture 7. Internal 1



Picture 8. Internal 2

4.3 Label and Label Location

 USOC Jack Type:RJ11C Complies with Part 68, FCC Rules. FCC Certification No.: US:A3LFA05BWT21MFF  M/C:SCX- 4521F/XAA	Model: SCX- 4521F Type No.: WT21MFF Volts : AC 110-127V Hertz : 50/60Hz Amps : 4.5A Ringer Equivalence : 0.5B Manufactured : JANUARY 2007	This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: i) This device may not cause harmful interference, and ii) This device must accept any interference received, including interference that may cause undesired operation. FCC ID: A3LWT21MFF This product complies with 21 CFR Chapter 1, subchapter J. COMPANY NAME : Samsung Electronics(Shandong)Digital Printing Co.,Ltd ADDRESS: Sanxing Road, Weihai Hi-Tech.IDZ, Shandong Province, 264209, China Place:M264 This Class B digital apparatus complies with Canadian ICES-003 Cet appareil numérique de la classe B est conforme à la norme NMB-003 du Canada. IC:649E-WT21MFF MADE IN CHINA REV.01
Serial No.:	 51Y7 E149091 I.T.E.	

  Serial No.	Model: SCX-4321 Type No.: WT21MFC Volts: AC 110-127V Hertz: 50/60Hz Amps: 4.5A Manufactured:	This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: i) This device may not cause harmful interference, and ii) This device must accept any interference received, including interference that may cause undesired operation. FCC ID: A3LWT21MFF This product complies with 21 CFR Chapter 1, subchapter J. COMPANY NAME: Samsung Electronics(Shandong) Digital Printing Co.,Ltd ADDRESS: Sanxing Road,Weihai Hi-Tech. IDZ, Shandong Province, 264209, China Place:M264 This Class B digital apparatus complies with Canadian ICES-003 Cet appareil numérique de la classe B est Conforme à la norme NMB-003 du Canada.
	 51Y7 E149091 I.T.E.	MADE IN CHINA REV.02

 Xerox Corporation Webster, NY 14580 Made in China USOC Jack Type:RJ11C Complies with Part 68, FCC Rules. FCC Certification No.: US: A3LFA05BWT21MFF This product complies with FDA performance Standards for laser products except for Deviations pursuant to laser notice No 50, Dated 26 July 2001. Place: M264 Serial No.:	WorkCentre PE220 Volts: AC 110-127V Hertz: 50/60Hz Amps: 4.5A Ringer Equivalence: 0.5B Manufactured:	This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: i) This device may not cause harmful interference, and ii) This device must accept any interference received, including interference that may cause undesired operation. FCC ID: A3LWT21MFF This Class B digital apparatus complies with Canadian ICES-003 Cet appareil numérique de la classe "B" est conforme à la norme NMB-003 du Canada. IC: 649E-WT21MFF
	 LISTED 51Y7 E149091 I.T.E.	 REV.00 (A)

Picture 8. Label (SCX-4521F, SCX-4321, WorkCentre PE220)



Picture 9. Label location