



ELECTRONICS

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JOB NO. : KE-01-0400

EMI TEST REPORT

FCC Part 15 Subpart B, Class B

Product : Multi Function Product

Model No. : SF-531P

JOB NO. : KE-01-400

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All tests necessary to show compliance to the requirements were and these results met the specifications requirement.

Date of test : July 24, 2001

Issued Date : July 27, 2001

Prepared by:

Min Gon, KIM / Test Engineer

Tested and Reviewed by:

Choon Kil, KIM / Manager of EMC Lab.

Authorised by:

Yang Soo, KIM / Chief of EMC Lab.

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1. General Information

APPLICANT : SAMSUNG ELECTRONICS CO., LTD.

ADDRESS : 416, Maetan-3Dong, Paldal-Gu
Suwon-City, Kyungki-Do, Korea 442-742

CONTACT PERSON : Sang Chul, Park
TEL. +82-31-200-4298

CONTACT ADDRESS : 416, Maetan-3Dong, Paldal-Gu
Suwon-City, Kyungki-Do, Korea 442-742

REGULATION(S) : FCC Part 15 Subpart B, Class B

MODEL NUMBER : SF-531P

SERIAL NUMBER : -

VARIANT NAME(S) : SF-535e
WorkCentre Pro 580

TESTED DATE : July 24, 2001

TEST SITE : 3meter semi-anechoic chamber

TEST SITE ADDRESS : San 14, Nongseo-Ri, Kihung-Eup,
Yongin-City, Kyungki-Do, Korea, 449-900

1.1 Product Description

The Samsung MFP, SF-531P is supporting the ADF Copy, fax Tx,Rx and PC Printing, ADF Scan through IEEE1284,USB port, and it have phone call handset so talk to each other through PSTN.

Main System clock 9.5MHz, Video clock 28.745MHz, USB clock 48MHz and Modem clock 28.2MHz. See the attached SF-531P User's Guide for more information.

1.2 Tested System Details

The FCC IDs for all equipment, plus descriptions of all cables used in the tested system are:

Model	FCC ID/DoC	Description	Cable description
(1) Samsung Electronics M/N : SF-531P S/N : - (EUT)	A3LSF531P	MFP	Unshielded RJ11 cable Unshielded AC power cable Centronics USB
(2) Samsung Electronics M/N : CPG17NF S/N : P106H2JN401141	DOC	Monitor	Shielded Signal Cable Unshielded AC power cable
(3) Samsung Electronics M/N : TD260-DT S/N : C92DK409981	DOC	Computer	Unshielded AC power cable
(4) Compaq M/N : RT6656TW S/N : 23N39D015196	AQ6-MTN4XZ15	KeyBoard	PS/2
(5) SEJIN M/N : SMB-600 S/N : 6GAF00761	GJJB50PA0	Mouse	PS/2
(6) US Robotics M/N : SPORTSTER S/N : 33083962	CJE-0149-217	Ext. Modem	Serial Cable
(7) Samsung M/N : SP-F124 S/N : KKC614776	-	Ext. Telephone	Telephone Cable

1.3 Test Methodology

Both conducted and radiated testing were performed according to the procedures in FCC/ANSI C63.4(1992).

Radiated testing was performed at a distance of 3 meters from the antenna to EUT.

1.4 Test Facility

All test described in this report were performed by :

- ☐ Open area test site : 781-14, Chung-Ri, Dongtan-Myun, Hwasung-Kun, Kyungki-Do, Korea
- ☒ Conducted measurement facility and 3meter Semi-anechoic chamber :
San 14, Nongseo-Ri, Kihung-Eup,Yongin-City, Kyungki-Do, Korea, 449-900

2. System Test Configuration

2.1 Operation Environment

	Conduction	Radiation
Temperature [] :	22.5	22.5
Humidity [%] :	48	48
Power supply :	AC120V/60Hz	AC120V/60Hz

2.2 Justification

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

2.3 EUT Exercise Soft ware

It used Hun2000 word processor to PC printing.
Word processor excuted 'H' character documant continuously.

2.4 Test Procedure

2.4.1 Conducted Emissions

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

The rear of EUT, including peripherals was aligned and flush with rear of tabletop. All other surfaces of tabletop was at least 80cm 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 bundle 30cm to 40cm long and were hanged at a 40cm 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.

2.4.2 Radiated Emissions

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

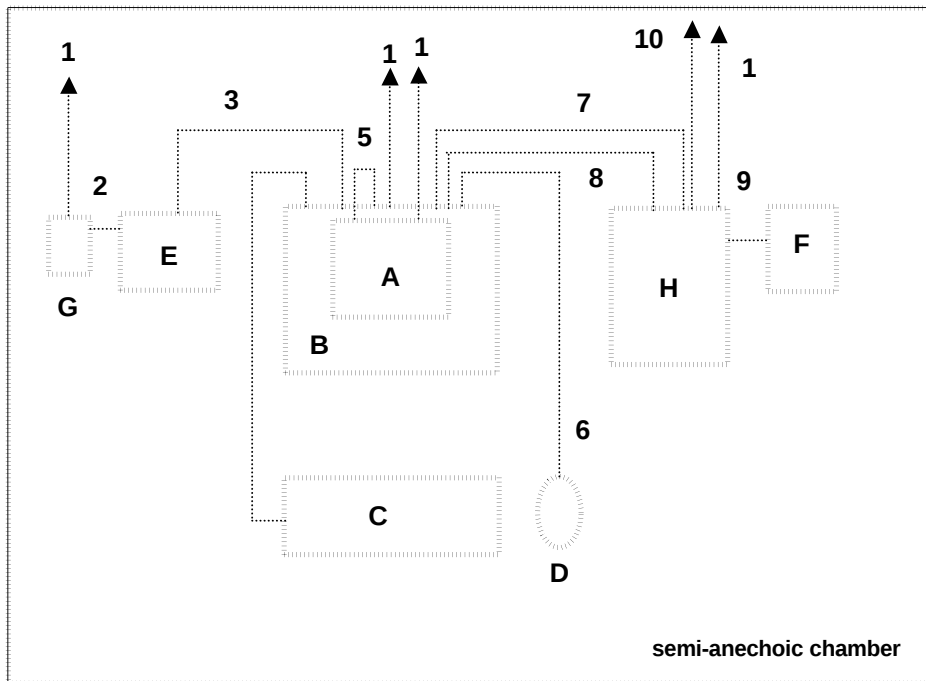
The rear of EUT, including peripherals was aligned and flush with rear of tabletop. I/O cables that were connected to the peripherals were bundle in center.

They were folded back and forth forming a bundle 30cm to 40cm long and were hanged 40cm 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 to obtain the maximum signal strength.

2.5 Test System configuration

2.5.1 System Block Diagram of Test Configuration



2.5.2 Configuration of EUT and peripherals

Mark	Item	Model No.	Serial No.	Manufacturer	Remark
A	Monitor	CPG17NF	P106H2JN401141	Samsung	
B	Computer	TD260-DT	C92DK409981	Samsung	
C	KeyBoard	RT6656TW	23N39D015196	compaq	
D	Mouse	SMB-600	6GAF007601	Sejin	
E	Ext. Modem	SPORTSTER	33083962	US Robotics	
F	Ext. Telephone	SP-F118	B2AJ403896	Samsung	
G	AC/DC Adaptor	AW-1220A	-	US Robotics	
H	MFP	SF-531P	-	Samsung	EUT

2.5.3 Used Cable Description

No.	Item	Length[m]	Shielded(Y/N)	Remark
1	AC Power cable	1.7	N	
2	DC Power cable	1.5	N	
3	Serial cable	1.5	Y	
4	KeyBoard Cable	1.8	N	PS/2
5	Monitor Cable	1.8	Y	D-sub
6	Mouse Cable	1.8	N	PS/2
7	Centronics Cable	1.5	Y	IEEE1284
8	USB Cable	1.5	N	
9	Telephone Cable	1.5	N	RJ11
10	Telephone Cable	2	N	Connect to PSTN

3. Conducted and Radiated Measurement Photos

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

3.1 Conducted Measurement Photos

o Conduction(Front View)



o Conduction(Rear View)



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

3.2 Radiated Measurement Photos

o Radiation(Front View)



o Radiation(Rear View)



4. Measurement Uncertainty

All data in report are to be traceability to the national or international standards.

4.1 Conducted Emission Test

The measurement uncertainty(with a 95% confidence level)for this test was $\pm 2.2\text{dB}$.

- ☐ The data listed in this test report may exceed the test limit because it does not have enough margin(more than 2.0dB).
- *The data listed in this test report has enough margin, more than 2.0dB.*

4.2 Radiated Emission Test

The measurement uncertainty(with a 95% confidence level)for this test was $\pm 3.4\text{dB}$.

- ☐ The data listed in this test report may exceed the test limit because it does not have enough margin(more than 2.0dB).
- *The data listed in this test report has enough margin, more than 3.4dB.*

5. Conducted Emission Test Data

The initial step in collecting conducted data was to perform a quasi-peak scan over the measurement range using a spectrum analyzer.

All modes of operation(printing in USB connection, scanning using the twain driver and copying) were investigated and the worst case(USB printing) emissions were reported. All other emission are non-significant.

The minimum margin to the limit is as follows :

Frequency : 21.993 [MHz]
Meter Reading : 32 [dBuV]
LISN Loss : 0.59 [dB]
Cable loss : 1.39 [dB]
Corrected Readings : 33.98 [dBuV/m]
Margin : -13.98 [dB]

o Test Data Sheet

Tested Frequency [MHz]	Meter Reading [A] [dBuV]	LISN Pol. [L1/L2]	Factor[B] [dB]		Corrected Reading [A+B] [dBuV/m]	Limits [dBuV/m]	Margin [dB]
			LISN Loss	Cable Loss			
10.126	30.66	H	0.32	0.50	31.48	47.96	-16.48
10.169	31.15	H	0.32	0.50	31.97	47.96	-15.99
10.321	31.66	H	0.32	0.50	32.48	47.96	-15.48
10.575	31.28	H	0.35	0.70	32.33	47.96	-15.63
10.786	31.18	H	0.35	0.70	32.23	47.96	-15.73
10.837	31.24	N	0.35	0.70	32.29	47.96	-15.67
10.989	30.75	N	0.35	0.70	31.80	47.96	-16.16
13.032	20.76	H	0.42	1.12	22.30	47.96	-25.66
21.993	32	H	0.59	1.39	33.98	47.96	-13.98

- * All readings are quasi-peak mode.
- * The selected bandwidth in emission testing is 9kHz.
- * Results = Meter Reading + LISN Insertion loss + Cable loss
- * Margin = Corrected Reading - Limits
- * L1 = Hot, L2 = Neutral

6. Radiated Emission Test Data

The initial step in collecting conducted data was to perform a quasi-peak scan over the measurement range using a spectrum analyzer.

All modes of operation(printing in USB connection, scanning using the twain driver and copying) were investigated and the worst case(USB printing) emissions were reported.

All other emission are non-significant.

The minimum margin to the limit is as follows :

Frequency : **78.55** [MHz]
Meter Reading : **27.2** [dBuV]
Antenna Factor : **8.40** [dB]
Cable loss : **0.40** [dB]
Corrected Reading : **36.0** [dBuV/m]
Margin : **-4.00** [dB]

o Test Data Sheet

Frequency Range	Tested Frequency	Ant. Pol.	Meter Reading [A]	Factor[B]		Antenna Height	Turn table Degree	Corrected Reading [A+B]	Margin	Limits [3m]
				Ant. Factor	Cable Loss					
				[dB]						
[MHz]	[MHz]		[dBuV]			[Cm]	[Deg]	[dBuV/m]	[dB]	[dBuV/m]
30 - 88	30.40	V	15.5	18.80	0.10	120	180	34.4	-5.60	40.0
	40.00	V	20.1	14.40	0.10	250	180	34.6	-5.40	
	71.40	V	26.6	6.60	0.30	220	175	33.5	-6.50	
	78.55	V	27.2	8.40	0.40	220	180	36.0	-4.00	
	84.00	V	25.5	8.70	0.45	150	110	34.7	-5.35	
88 - 216	90.70	V	22.7	8.80	0.50	130	100	32.0	-11.50	43.5
	97.00	V	26.5	8.80	0.50	220	180	35.8	-7.70	
	185.40	H	16.0	6.80	1.05	120	170	23.9	-19.65	
	189.80	H	17.1	7.00	1.10	150	180	25.2	-18.30	
	199.50	V	21.3	7.20	1.10	130	100	29.6	-13.90	
216 - 960	431.20	V	24.3	14.10	2.20	220	180	40.6	-5.40	46.0
	504.40	H	19.6	15.60	2.52	150	110	37.7	-8.28	
	598.60	H	16.5	17.00	2.80	240	130	36.3	-9.70	
	731.2	V	16.6	18.80	3.08	220	175	38.5	-7.52	
	864.40	V	14.7	20.10	3.52	230	130	38.3	-7.68	
	931.00	V	15.3	20.90	3.82	160	180	40.0	-5.98	
960 -1000										54.0

* "<" Means equal or less than * All readings are quasi-peak mode.

* The selected bandwidth in emission testing is 100kHz.

* Corrected Reading = Meter Reading + Antenna Factor + Cable loss

* Margin = Corrected Reading - Limits

* H = Horizontal Polarization/Antenna, V = Vertical Polarization/Antenna

7. Label and Label Location

7.1 Label



7.2 Label location



8. Test Equipment Used

Equipment	Model No.	Serial No.	Makers	Last calibration and Interval
Spectrum analyzer	8568B	2841A04394	H.P	00/11/02, 12Months
		Firmware versions : REV 7.4.87		
Quasi-peak adapter	85650A	2811A01182	H.P	00/11/16, 12Months
RF Preselector	85685A	2837A00835	H.P	00/11/16, 12Months
EMI Test Receiver	ESCS30	8309861004	R & S	01/01/06, 12Months
		F/W ver. : Main 3.10, OTP 02.01, GRA 02.03		
L.I.S.N	ESH2-Z5	831886/006	R & S	00/11/30, 12Months
	3825/2	1408	EMCO	00/11/11, 12Months
Biconilog Antenna	HL 562	361324/003	R & S	01/01/22, 12Months
EMI Measurement Software	HP	Firmware versions : Rev. A.00.00		