

EMI TEST REPORT

According to FCC Part 15 Subpart B/Class B

Product : Multi Function Printer

Model No. : Dell Laser MFP 1600n

FCC ID : A3LLASERMFP1600N

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All tests necessary to show compliance to the requirements were and these results met the specifications requirement.
4. That data in this report are traceable to National or International Standards.

Date of test : February 6, 2004

Issued Date : February 11, 2004

Tested by:

Kyeong Dong, KIM / Test Engineer

Reviewed by:

No Cheon, PARK / Manager of EMC Lab.

Authorised by:

Kyu Baek, CHUNG / Chief of EMC Lab.

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The test reported herein have been performed in accordance with its terms of registration.



NVLAP Code: 200623-

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Distribution

This test report has been made available as follows:

CS Management Center, EMC Laboratory	1 original
Printer Division	1 copy

1. General Information

Applicant : Samsung Electronics Co., Ltd.

Full Address : Maetan 3-Dong 416, Yeongtong-Gu,
Suwon City, Gyeonggi-Do, Korea, 443-742

Kind of Product : Multi Function Printer

FCC ID : A3LLASERMFP1600N

Project Name : -

Model & Variant Names : None

Test Report Produced by : Kyeong Dong, KIM / Test Engineer

1.1 Product Description

1) Justification

The system was configured for testing in typical fashion use. Cable 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.

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 was reported.

Further details of cabling and configuration are shown in the test system configuration.

2) Operating Frequency :

Dell Laser MFP 1600n is supporting the USB, LAN Printing, Fax Tx/Rx and Copy Mode.

Dell Laser MFP 1600n use clock frequencies as follows;

Video Clock : 19.61374MHz, CPU : 60MHz, SDRAM : 60MHz, Main Clock : 12MHz,
CIP4_Main : 20MHz, UART : 12MHz, USB_EXT : 30MHz, CCD Clock(Copy) : 8MHz
DADF : 25MHz, Modem : 28.224MHz.

3) Description of Testing operating mode

Operating Mode	Operating section of EUT
USB Printing	Continuously H pattern printing by Computer
LAN Printing	Continuously H pattern printing by Computer
Fax Tx and Rx	Continuously H pattern Receiving and Transmitting
Copying	Continuously H pattern Copying (ADF copying & Second Tray feeding)

EUT was tested all operating mode as above. Finally EUT was tested USB Printing mode as maximum emission. But all ports are active and connected.

4) Tested Resolution :

Tested Video mode	Resolutions	Refresh rates	Colors

5) Manufacturer 1 : SAMSUNG Electronics Co., Ltd.

(Address : 259, Gongdan-Dong, Gumi-City, Kyung-Buk, 730-030, Korea)

Manufacturer 2 : Shandong Samsung Telecommunication Co., Ltd.

(Address : Sanxing Road, Weihai Hi-Tech, IDZ Shandong Province, 264209, China)

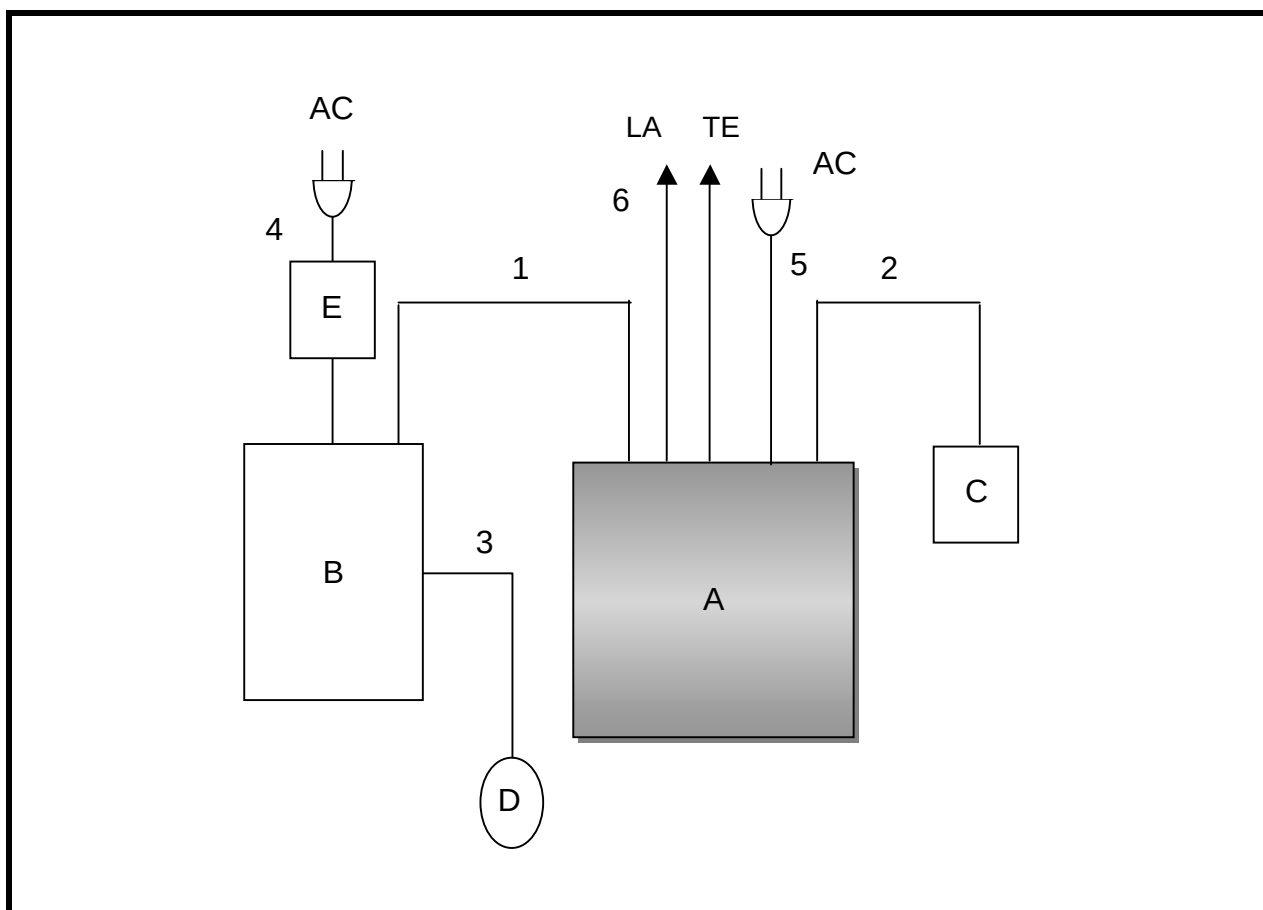
1.2 Configuration of EUT and peripherals

Mark	Item	Model No.	Serial No.	Manufacturer	Remark
A	Multi Function Printer	Dell Laser MFP 1600n	-	Samsung	EUT
B	Notebook PC	PP03L	1D166A02	DELL	DoC
C	Telephone	SP-F008	KKBR237456	Samsung	-
D	Serial Mouse	37964	1406899	Microsoft	DoC
E	AC Adapter	ADP-90FB REV.B	06G356	Delta	-

1.3 Used Cable Description

No.	Item	Length[m]	Shielded (Y/N)	Remark
1	USB Cable	1.7	Y	-
2	Telephone Cable	3.0	N	-
3	Serial Mouse Cable	1.7	N	-
4	AC Power Cable	1.5	N	-
5	AC Power Cable	1.5	N	-
6	LAN Cable	3.0	Y	-

1.4 System Block Diagram of Test Configuration



1.5 Test Facility

All test described in this report were performed by :
SAMSUNG ELECTRONICS CO., LTD.
EMC TESTING LABORATORY
416 Maetan 3-Dong, Yeongtong-Gu, Suwon City, Gyunggi-Do, Korea, 443-742
Semi Anechoic Chamber #2(Registration Number:873282) and Shielded Room.

This test facility has been filed in FCC under the criteria in ANSI C63.4-1995.

2. System Test Configuration

2.1 Configuration of Radiated and Conducted Interference Measurement

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

1)Conduction(Front View)



2)Conduction(Rear View)



3) Radiation(Front View)



3) Radiation(Rear View)



2.2 Operation Environment

	Conduction	Radiation
Temperature [C] :	23	23
Humidity [%]	37	36
Power supply	: AC110V/60Hz	AC110V/60Hz

2.3 Test Procedure(ANSI C63.4)

2.3.1 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.

The EUT was switched on and allowed to warm up to its normal operating condition.

A quick scan, from 150kHz to 30MHz, was made on the L1 & L2 line by LISN.

High peaks, relative to the limit line, over the frequency range were then selected.

The EMI TEST RECEIVER was then tuned to the selected frequencies.

CISPR quasi-peak measurements with a receiver bandwidth setting of 10kHz, were taken.

2.3.2 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.

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 1000 MHz using biconiLog antenna.

Each emission was maximized by: varying the mode of operation or resolution; clock or data exchange speed; scrolling H pattern to the EUT and/or support equipment; powering the monitor from the floor mounted outlet box and the computer aux AC outlet if applicable, and changing the polarity of the antenna; whichever determined the worst-case emission.

3. Conducted Emission Test Data

O Test Mode :

MEASUREMENT RESULT: "1600n_FCC_fin QP"

Frequency	Results	T/Loss	Limit	Margin	Line	PE
MHz	dBμV	dB	dBμV	dB		
0.150000	47.30	0.6	66	18.7	N	GND
0.170000	50.10	0.6	65	14.8	N	GND
3.100000	37.20	0.6	56	18.8	N	GND
3.170000	36.10	0.6	56	19.9	N	GND
3.370000	38.70	0.7	56	17.3	N	GND
3.440000	40.00	0.7	56	16.0	N	GND
3.510000	40.20	0.7	56	15.8	N	GND
3.650000	40.00	0.7	56	16.0	N	GND
3.720000	37.80	0.7	56	18.2	N	GND
14.390000	37.50	1.5	60	22.5	N	GND
14.530000	33.80	1.6	60	26.2	N	GND
19.620000	30.20	1.8	60	29.8	N	GND
19.900000	21.60	1.8	60	38.4	N	GND

MEASUREMENT RESULT: "1600n_FCC_fin AV"

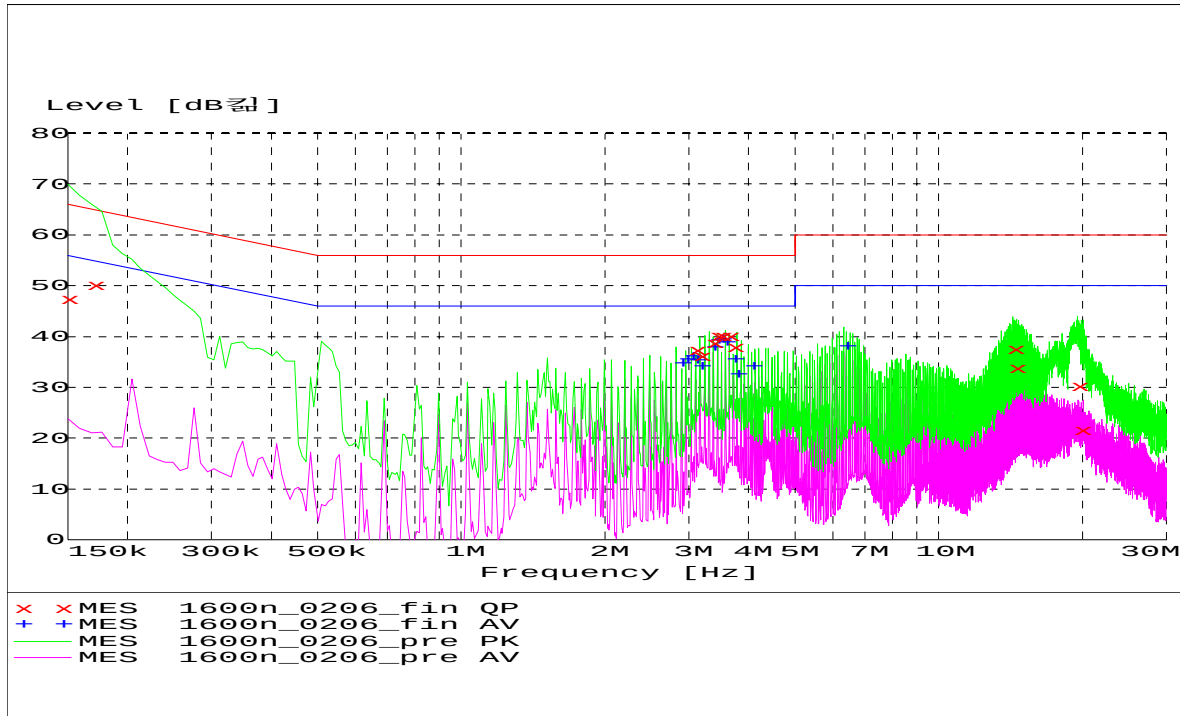
Frequency	Results	T/Loss	Limit	Margin	Line	PE
MHz	dBμV	dB	dBμV	dB		
2.890000	34.80	0.6	46	11.2	N	GND
2.960000	35.40	0.6	46	10.6	N	GND
3.030000	36.10	0.6	46	9.9	N	GND
3.100000	35.30	0.6	46	10.7	N	GND
3.170000	34.20	0.6	46	11.8	N	GND
3.370000	37.90	0.7	46	8.1	N	GND
3.440000	39.20	0.7	46	6.8	N	GND
3.510000	39.30	0.7	46	6.7	N	GND
3.580000	38.80	0.7	46	7.2	N	GND
3.720000	35.40	0.7	46	10.6	N	GND
3.790000	32.50	0.7	46	13.5	N	GND
4.060000	34.20	0.8	46	11.8	N	GND
6.400000	38.10	0.9	50	11.9	N	GND

※ Quasi-peak value is less 10dB than Average limits.

* Results = Meter Reading(QP) + Total Loss(LISN Insertion loss + Cable loss)

* Margin = Limits - Result

3-1. Conducted Emission Test Graph



4. Radiated Emission Test Data

MEASUREMENT RESULT: "1600n_RE_fin QP"

Frequency	Results	Total	Limit	Margin	Height	Azimuth	Polarisation
		Loss					
MHz	dBμV/m	dB	dBμV/m	dB	cm	deg	
54.240000	23.80	7.6	30.0	6.2	279.0	123.00	VERTICAL
72.080000	24.40	6.9	30.0	5.6	180.0	120.00	VERTICAL
86.720000	25.70	9.6	30.0	4.3	150.0	120.00	VERTICAL
87.680000	26.80	9.8	30.0	3.2	281.0	120.00	VERTICAL
114.480000	18.40	13.1	30.0	11.6	138.0	148.00	VERTICAL
143.760000	23.70	12.1	30.0	6.3	100.0	82.00	VERTICAL
176.160000	26.00	11.0	30.0	4.0	123.0	59.00	VERTICAL
179.600000	23.60	10.8	30.0	6.4	259.0	19.00	VERTICAL
320.240000	30.50	16.7	37.0	6.5	250.0	47.00	HORIZONTAL
328.320000	31.30	16.7	37.0	5.7	188.0	203.00	HORIZONTAL
962.400000	28.20	25.8	37.0	8.8	328.0	86.00	HORIZONTAL

* "<" Means equal or less then 5dB

* Receiving Antenna Mode : **Horizontal, Vertical**

* Results = Meter Reading + Total Loss(Antenna factor + Cable loss)

* Measurement detector function and bandwidth

Detector function : CISPR quasi-peak(Above 1000MHz: Peak)

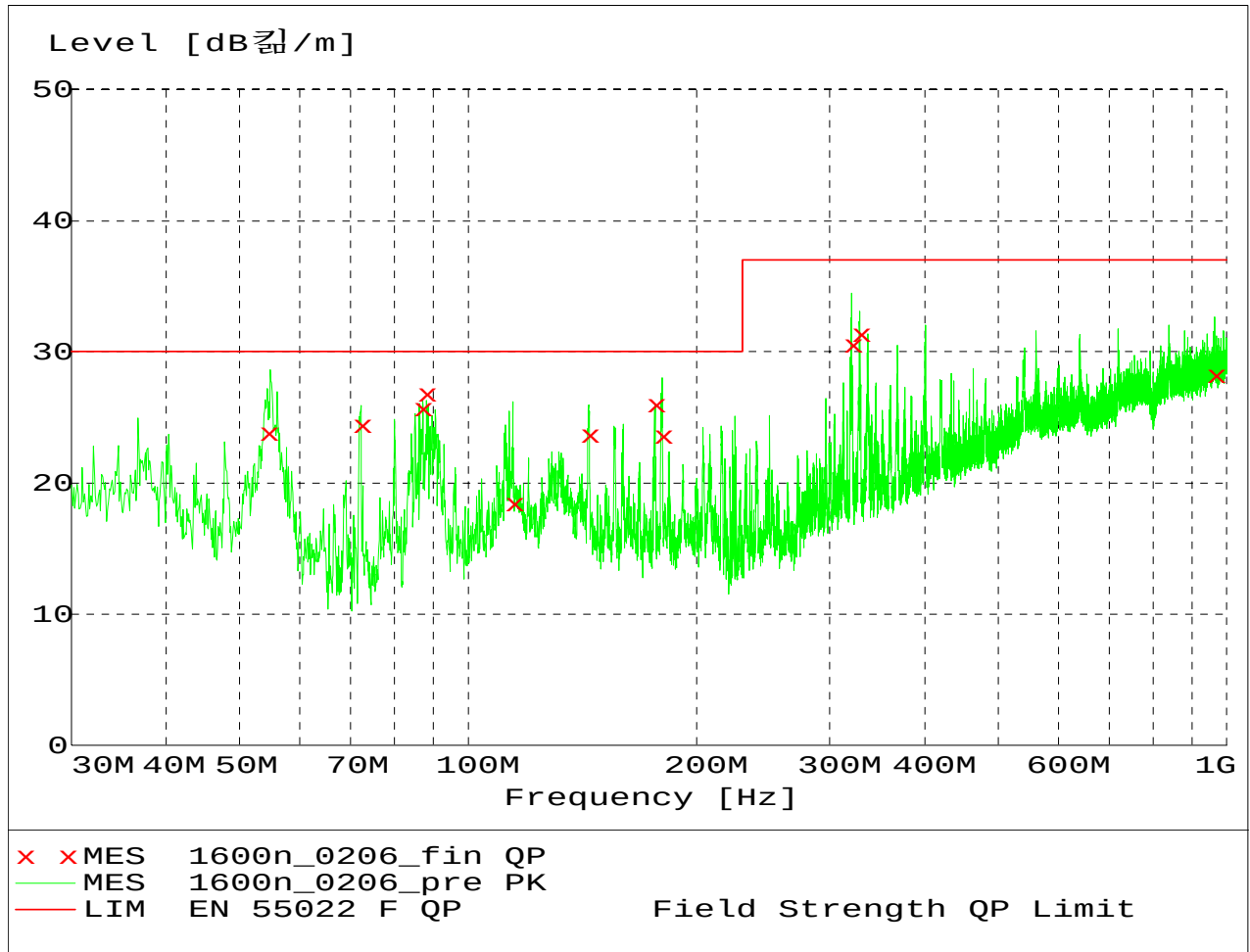
Resolution Bandwidth : 120kHz(Above 1000MHz: 1MHz)

* Test distance

- Below 1000MHz: 3m(Quasi-peak)

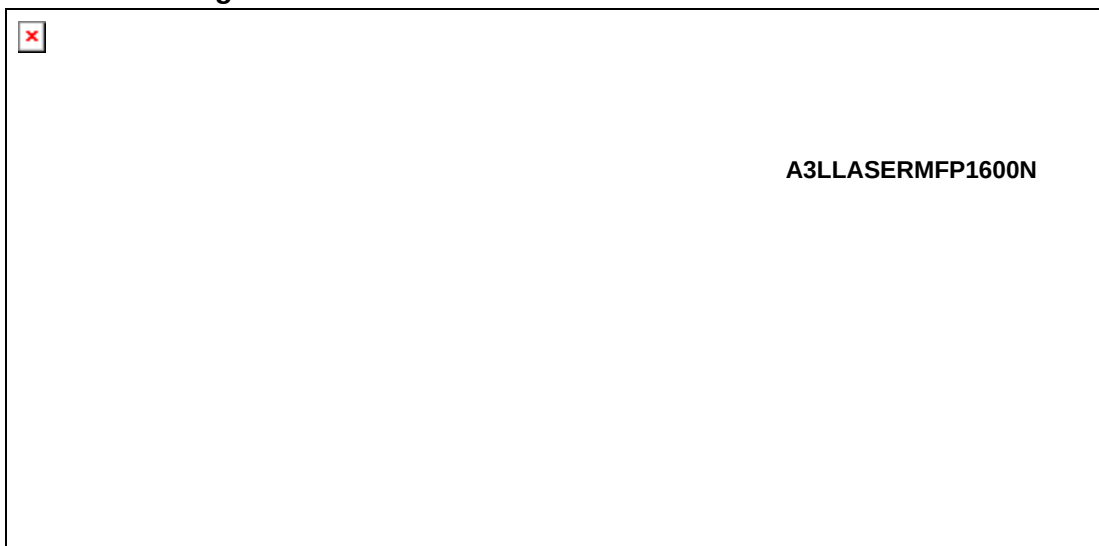
- Above 1000MHz: 3m(Peak)

4-2. Radiated Emission Test Graph



5. FCC Label Configuration and Location

5.1 Label Configuration



5.2 Location of Label



6. Test Equipment Used

Equipment	Model No.	Serial No	Makers.	Calibration Last calibration and Interval
Field strength meter	ESS	844861/005	R & S	2005-01-05
	Firmware versions : Main 1.10, OTP 02.01, GRA 02.03			
Test Receiver	ESI26	100019	R&S	2004-05-04
L.I.S.N	ESH3-Z5	831886/0006	R&S	2004-02-07
L.I.S.N	3825/2NM	2251	EMCO	2004-02-07
Bi-Log Antenna	HF906	100027	R&S	2004-08-19