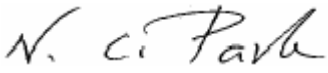
EMC Test Report

According to FCC Part 15 Subpart B

Project No.	LBE052790
Equipment under Test	
Applicant	Samsung Electronics Co., Ltd 416 Maetan 3-Dong, Yeongtong-Gu, Suwon-Si, Gyeonggi-Do, 443-742 Korea
FCC ID	A3LLASERMFP1815DN
Product Name	Multi Function Printer
Model Name	Dell Laser MFP 1815dn
Manufacturer	1) Samsung Electronics Co., Ltd. 259, Gongdan-Dong, Gumi-City, Gyeongsangbuk-Do, 730-030 Korea 2) Shandong Samsung Telecommunications Co., Ltd. 264209, Samsugn (Sanxing) Road, Weihai Hi-Tech. IDZ, Shandong Province, P.R.China
Date of Test	November 30, 2005
Issued Date	December 12, 2005

	Name/Position	Signature
Tested by	Min Gon, Kim Test Engineer	
Reviewed by	No Cheon, Park Manager of EMC Lab.	
Authorized by	Seung Kyu, Cha Chief of EMC Lab.	

1. This test reports does not constitute an endorsement by NIST/NVLAP or U.S Government.
2. This test report is to certify that the tested device properly complies with the requirements of FCC Rules and Regulations Part 15 Subpart B Unintentional Radiators.
   All tests necessary to show compliance to the requirements were and these results met the specifications requirement.

This laboratory is registered by the NIST/NVLAP, U.S.A.
The test reported herein have been performed in accordance with its terms of registration.

NVLAP LAB CODE 200623-0

3. FCC filing Registration Number : 873282

Table of Contents

1. General Information

1.1 Basic Information related Product

Applicant	Samsung Electronics Co., Ltd.
Model name	Dell Laser MFP 1815dn
Applicant Address	416 Maetan 3-Dong, Yeongtong-Gu, Suwon-Si, Gyeonggi-Do, 443-742 Korea
Contact Person	Min Gon, Kim
Kind of product	Multi Function Printer
Variant List	Dell Laser MFP 1815n
Manufacturer	1) Samsung Electronics Co., Ltd. 259, Gongdan-Dong, Gumi-City, Gyeongsangbuk-Do, 730-030 Korea 2) Shandong Samsung Telecommunications Co., Ltd. 264209, Samsugn (Sanxing) Road, Weihai Hi-Tech. IDZ, Shandong Province, P.R.China
New / Alternative / Permissive change Information	New

1.2 Detail Information related Product

Specification

Item	Specification	Remark
Power rating	110 ~ 127 VAC, 5A, 50/60 Hz	-
Power consumption	Average : 520 W Power save mode : Less than 10 W	-
Display	16 characters x 2 lines	-
Toner cartridge life	4,000 or 8,000 pages at ISO 19752 5% coverage	-
Memory	Dell Laser MFP 1815n: 64 MB (max. 320 MB) Dell Laser MFP 1815dn: 96 MB (max. 320 MB)	-
External dimension	467,5 x 435,5 x 458 mm (W x D x H)	-
Weight	17,5 Kg (including consumables)	-
Printing method	Laser Beam Printing	-
Printing speed	Up to 28 ppm in A4 (30 ppm in Letter)	-
Print resolution	Up to 1,200 x 1,200 dpi effective output	-

Interface	High Speed USB 2.0 Ethernet 10/100 Base TX(Embedded type)	-
Scanning method	ADF and Flat-bed Color CCD (Charge Coupled Device)	-
Scan Resolution	Optical: 600 x 1,200 dpi (mono and color) Enhanced: 4,800 x 4,800 dpi	-
Copy speed	Up to 28 ppm in A4 (30 ppm in Letter)	-
Copy resolution	Scan: up to 600 x 300 (text, text/photo) up to 600 x 600 (photo using platen) up to 600 x 300 (photo using ADF) Print: up to 600 x 600 (text, text/photo, photo)	-
Modem speed	33,6 Kbps	-
Fax Resolution	Standard: 203 x 98 dpi Fine: 203 x 196 dpi Super Fine: 300 x 300 dpi Photo: 203 x 196 dpi Color: 200 x 200 dpi	-
Fax Memory	8 MB	-
Fax Data coding	MH/MR/MMR/JPEG/ECM (Error Correction Mode)	-

Operating Frequency

- Main Source Clock : 12 MHz
- Video Source Clock : 12 MHz
- USB Device Source Clock : 12 MHz
- USB Host Source Clock : 6 MHz
- Network Source Clock : 25 MHz
- CPU Operating Clock : 300 MHz
- SDRAM Operating Clock : 100 MHz
- CCD Operating Clock(mono) : 8.33 MHz
- MODEM Source Clock : 28.224 MHz

1.3 Operating Mode and Condition

The system was configured for testing in typical fashion use. Cable were attached to each of the available I/O port. Where applicable, peripherals were attached to the I/O cables.

This EUT is supporting the USB and Network(LAN) printing, Fax Tx and Rx mode, Copy mode.

In each test mode, finally we found worst case emission. So, the data of the maximum EUT operation, ADF Copy was reported.

- ADF Copy Mode (worst emission)

- USB Printing Mode
- Network(LAN) Printing Mode
- Fax Tx, Rx Mode
- Standby Mode

- Power Input

Voltage : AC 110V

Frequency : 60Hz

1.4 Test System Details

Refer to 1.2

1.5 Equipment Modifications

No equipment modifications were required.

1.6 Test Procedure

1.6.1 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 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 bindle 30 cm to 40 cm long and were handed 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.

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

1.6.2 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.

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 run table 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.

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

1.7 Test Configuration

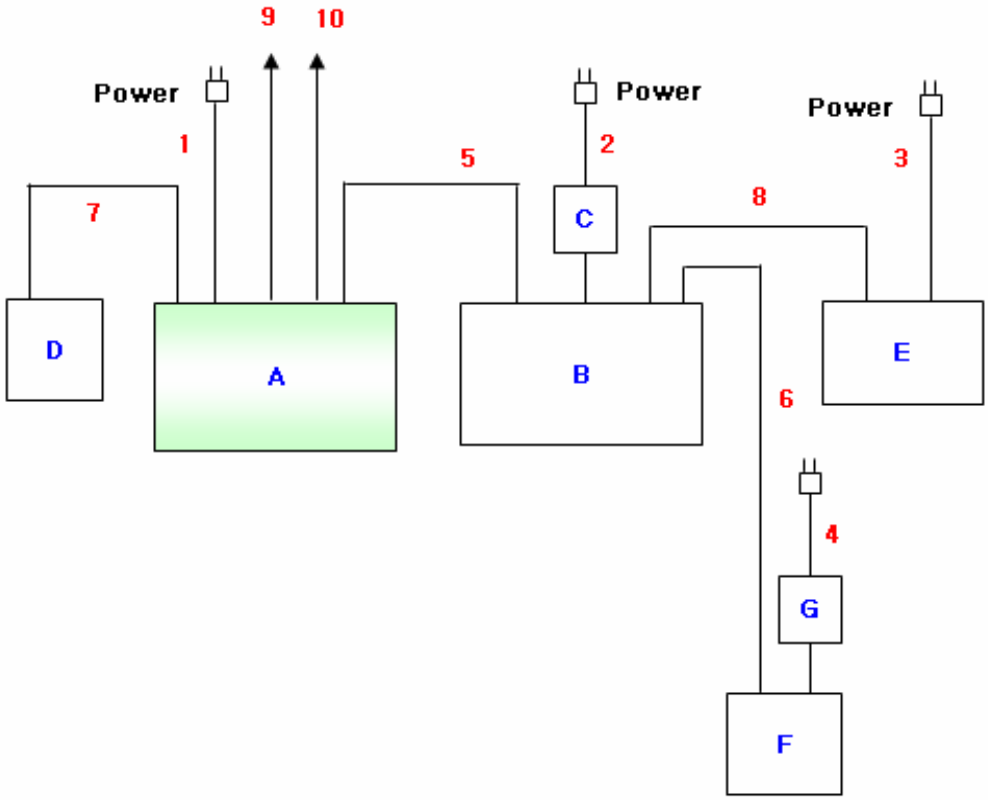
Used EUT and Peripherals

Mark	Item	Model No.	Serial No.	Manufacturer	Remark
A	Multi Function Printer	Dell Laser MFP 1815dn	-	Samsung	FCC ID : **A3LLASERMFP1815DN**
B	Notebook PC	PP01X	CN-03J010-12961-29N-2853	Dell	DoC
C	AC Adaptor	ADP-90FB Rev.B	TH-06G356-17971-29C-27ET	Delta	For Note PC
D	Telephone	SP-F118	B2DFB31118	Samsung	-
E	Monitor	Slimwin 13L	K01270587	Korea Computer	DoC
F	External HDD	SEV08UP	HV08J1AT600367-	Samsung	-
G	AC Adaptor	PSCV360104A	C020381945B	Samsung	For External HDD
H	Mouse	OMS3CB	OMS3CBGGDRT02050 11212	Samsung	USB
I	USB Memory	MD3100	-	Memory Drive	FCC ID : PU9MD-S

Used Cable Description

No	Connect Cable	Length [m]	Shielded [Y/N]	Remark
1	Power	1.8	No	EUT
2	Power	1.8	No	Notebook PC
3	Power	1.8	No	Monitor
4	Power	1.8	No	External HDD
5	USB	1.8	Yes	-
6	USB	1.8	Yes	-
7	Tel Cable (RJ11)	2.0	No	-
8	Monitor	2.0	Yes	-
9	Tel Cable (RJ11)	3.0	No	-
10	LAN Cable (RJ45)	3.0	No	

Block Diagram



1.8 Applied Standards

List

Product or Generic Standards	Basic Standards
FCC Part15	ANSI C63.4 : 2003

1.9 Test Facility

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.

Accreditation and Listing

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

Conducted Emission **:** ±3.1 dB

Radiated Emission Bi-Log Antenna : ±4.8 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	FCC Part15 Subpart B
Electromagnetic Emission Test			
3.1	Conducted Emission	ANSI C63.4 : 2003	Complied
3.2	Radiated Emission	ANSI C63.4 : 2003	Complied

3.1 Conducted Emission

Test Information	
Test Engineer	Min Gon, Kim
Test Date	November 30, 2005
Climate Condition	Ambient Temperature: 22.5 ℃ Relative Humidity: 53 %
	Atmospheric Pressure: 1020 mbar
Test Place	Shield Room #2

Test Equipments

Equipment	Model Name	Manufacturer	Serial No.	Calibration	
				Next Date	Interval
EMI TEST RECEIVER	ESCS30	R&S	830986/004	2006-02-17	12
LISN	3810/2NM	EMCO	2251	2006-02-01	12
LISN	ESH3-Z5	R&S	100263	2006-06-06	12

Measurement Results	**Passed** The Measured emissions of the EUT have found to be below the specified limits.

Test Data & Graph

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

The find data represents worst-case emissions.

* QP : Quasi-peak, AV: Average

* Level = Meter Reading(QP or AV) + Corr(LISN Insertion loss + Cable loss)

* Margin = Limit – Level

1. - TEST DATA & GRAPH

1-1. Quasi Peak Table

MEASUREMENT RESULT: "D_1815dn_LV1_fin QP"

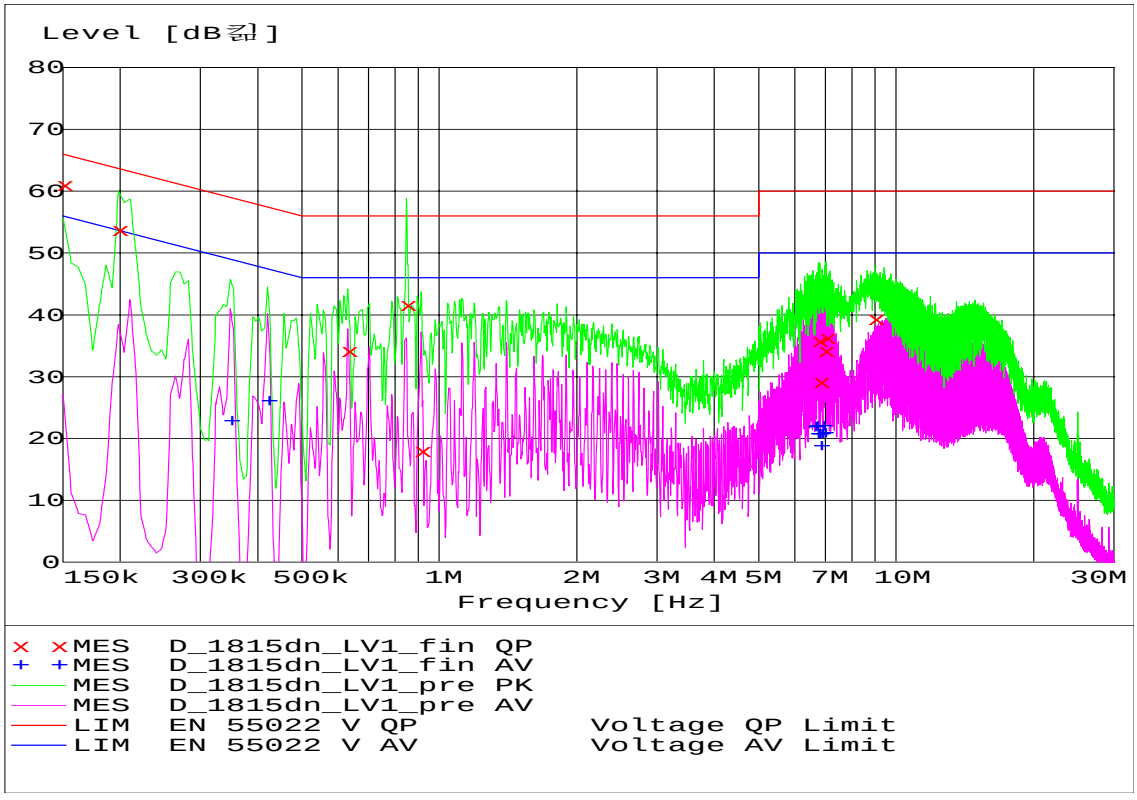
Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Line	PE
0.150000	61.00	0.2	66	5.0	N	GND
0.198000	53.70	0.1	64	10.0	N	GND
0.630000	34.10	0.1	56	21.9	N	GND
0.846000	41.50	0.1	56	14.5	L1	GND
0.912000	17.90	0.1	56	38.1	N	GND
6.760000	35.70	0.4	60	24.3	L1	GND
6.808000	29.20	0.4	60	30.8	N	GND
6.982000	34.10	0.4	60	25.9	N	GND
7.030000	36.30	0.4	60	23.7	N	GND
8.974000	39.30	0.5	60	20.7	N	GND

1-2. Average Table

MEASUREMENT RESULT: "D_1815dn_LV1_fin AV"

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Line	PE
0.348000	22.70	0.1	49	26.3	N	GND
0.420000	26.00	0.2	47	21.5	L1	GND
6.622000	21.80	0.4	50	28.2	N	GND
6.670000	22.00	0.4	50	28.0	L1	GND
6.712000	20.60	0.4	50	29.4	N	GND
6.760000	20.60	0.4	50	29.4	N	GND
6.808000	18.80	0.4	50	31.2	N	GND
6.850000	20.60	0.4	50	29.4	L1	GND
6.892000	21.90	0.4	50	28.1	N	GND
6.940000	20.90	0.4	50	29.1	N	GND

- Graph -



3.2 Radiated Emission

Test Information	
Test Engineer	Min Gon, Kim
Test Date	November 30, 2005
Climate Condition	Ambient Temperature: 19.5 ℃ Relative Humidity : 52 % Atmospheric Pressure: 1020 mbar
Test Place	10m Semi Anechoic Chamber

Test Equipments

Equipment	Model Name	Manufacturer	Serial No.	Calibration	
				Next Date	Interval
Test Receiver	ESIB-26	R&S	100010	2006-09-22	12
Turn Table	DT430	HD	430/691/01	N/A	N/A
Antenna Mast	MA240	HD	240/678 BJ:01	N/A	N/A
Controller	HD100	HD	100/723	N/A	N/A
Preamplifier	CPA9232	SCHAFFNER	1054	2006-02-07	12
BILOG Antenna	CBL6112B	SCHAFFNER	2805	2006-04-15	12

Measurement Results	**Passed** The measured emissions of the EUT have found to be below the specified limits.

Test Data & 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 are reported. All other emission are non-significant.

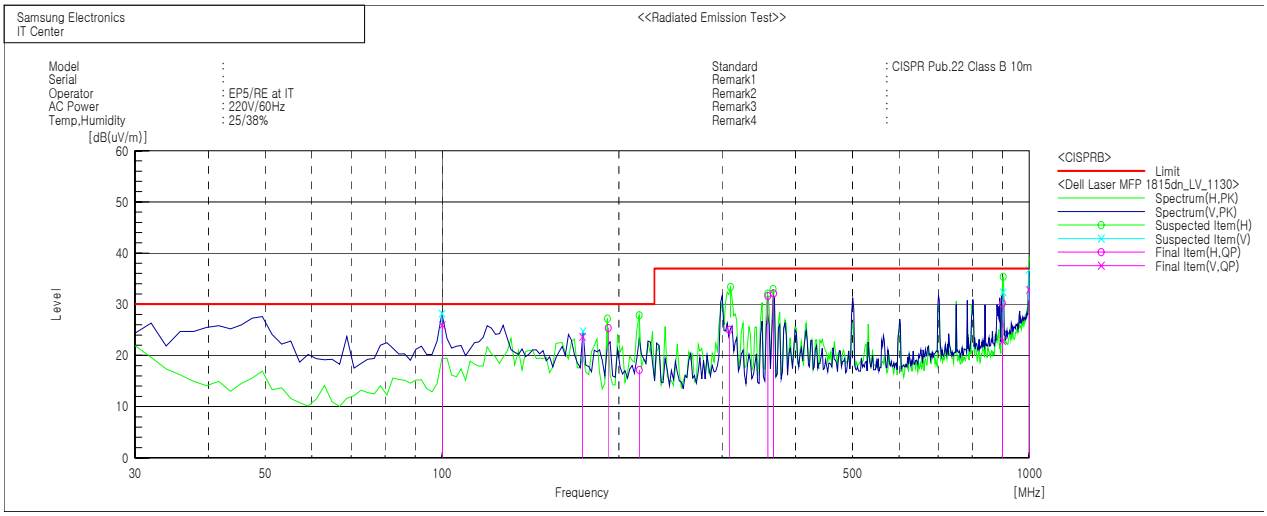
The minimum margin to the limit is as follows:

All other emission are non-significant.

* Receiving Antenna Mode : Horizontal, Vertical
* Test distance : 10m (RF Semi Anechoic Chamber)
* Result = Meter Reading + c.f (Antenna factor + Cable loss)
* Margin = Limit – Result

1. Test Data (30MHz ~ 1GHz)

Samsung Electronics Co., Ltd
IT Center



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]	Remark
1	100.087	V	32.4	-6.5	25.9	30.0	4.1	112.0	286.0	
2	173.371	V	31.4	-7.8	23.6	30.0	6.4	112.0	45.0	
3	191.975	H	33.9	-8.6	25.3	30.0	4.7	299.0	204.0	
4	216.798	H	25.3	-8.1	17.2	30.0	12.8	311.0	122.0	
5	308.608	H	28.6	-3.6	25.0	37.0	12.0	250.0	0.0	
6	358.741	H	33.5	-1.9	31.6	37.0	5.4	201.0	194.0	
7	366.788	H	33.6	-1.5	32.1	37.0	4.9	160.0	190.0	
8	899.919	H	24.3	5.9	30.2	37.0	6.8	399.0	328.0	
9	900.949	V	14.8	8.0	22.8	37.0	14.2	107.0	310.0	
10	999.981	V	24.0	8.8	32.8	37.0	4.2	285.0	298.0	

2. Test Data (1GHz~2GHz)

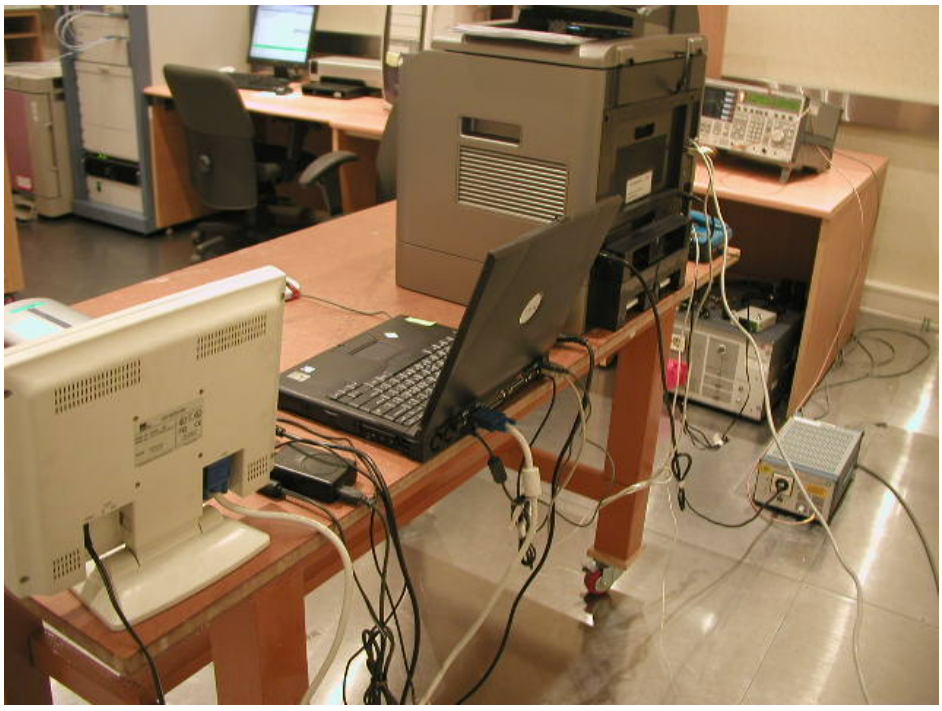
Freq. [㎒]	Reading [dBuV/m]	c.f. [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Azimuth [°]	Pol. [H/V]
1000.00	49.25	-13.15	36.10	54	17.90	100.0	0.0	H
1202.00	51.67	-12.67	39.00	54	15.00	100.0	240.0	H
1400.00	51.31	-12.11	39.20	54	14.80	100.0	30.0	H
1501.00	49.72	-11.92	37.80	54	16.20	100.0	0.0	H
1600.00	50.66	-11.46	39.20	54	14.80	100.0	0.0	H

* Measurement detector function and bandwidth
  - Detector function : Average
  - Bandwidth : 1MHz
* Receiving Antenna Mode : Horizontal, Vertical
* Test distance : 3m (Semi-Anechoic Chamber)
* Result = Meter Reading + c.f (Antenna factor + Cable loss-Amp. Gain)
* Margin = Limit – Result

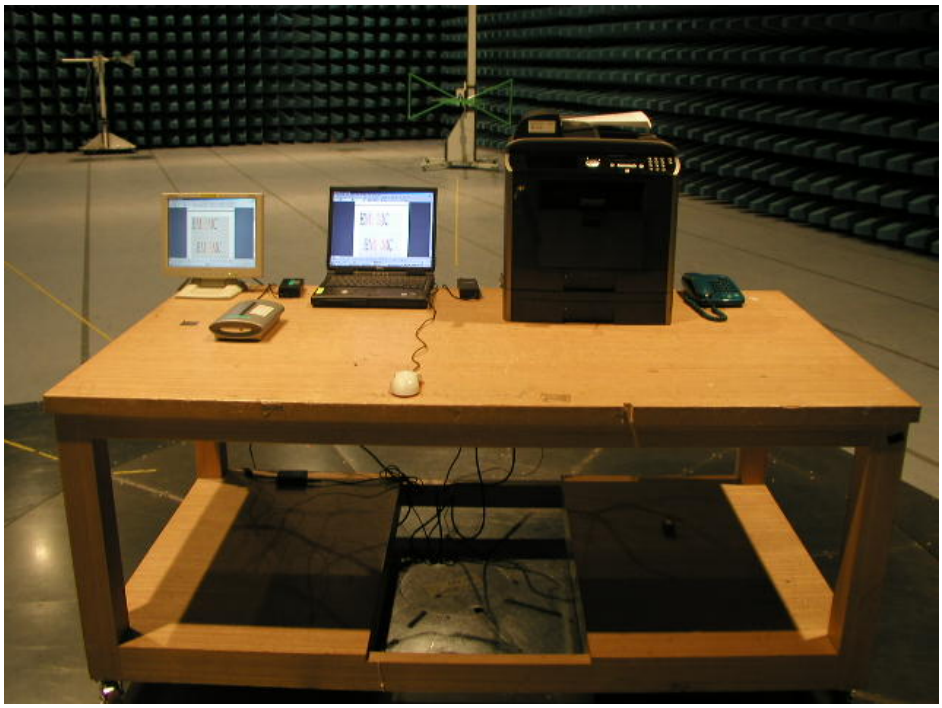
4. Appendix

4.1 Test Photography

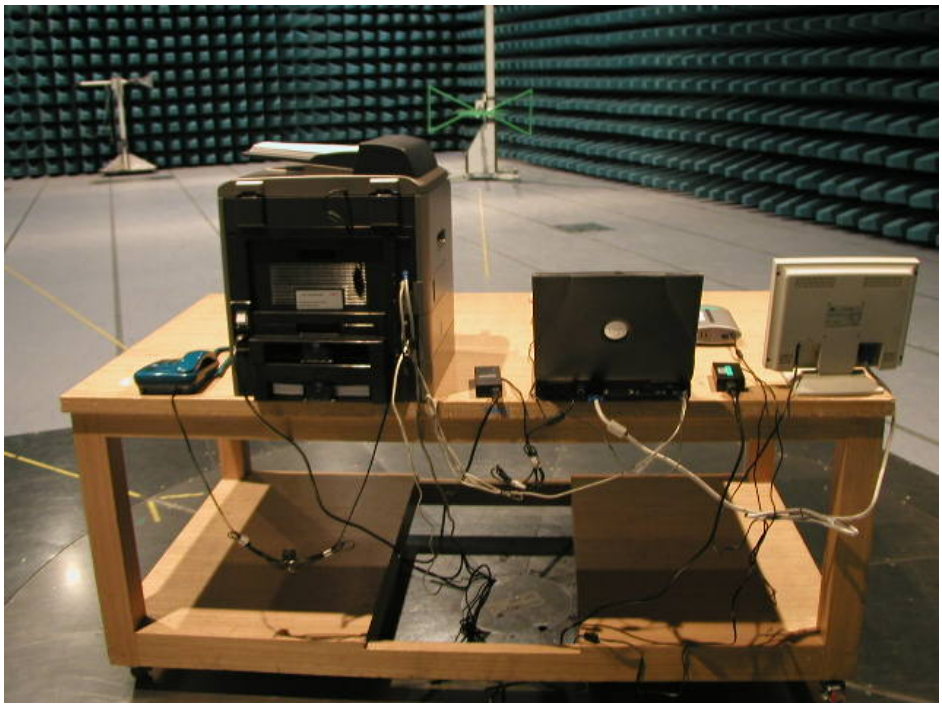
Pic. 1 Conducted Emission (Front)



Pic. 2 Conducted Emission (Rear)



Pic. 3. Radiated Emission (Front)

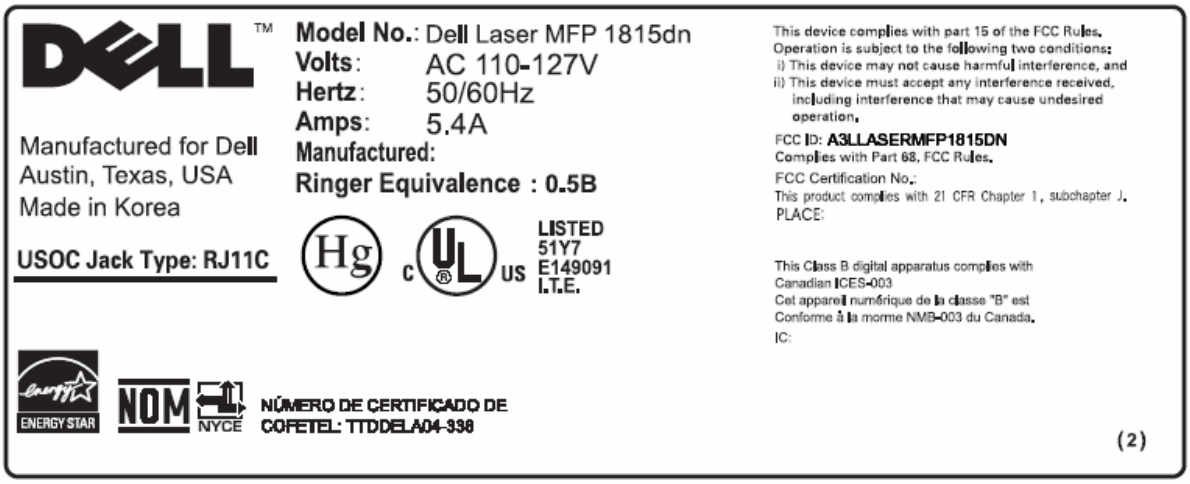


Pic. 4. Radiated Emission (Rear)

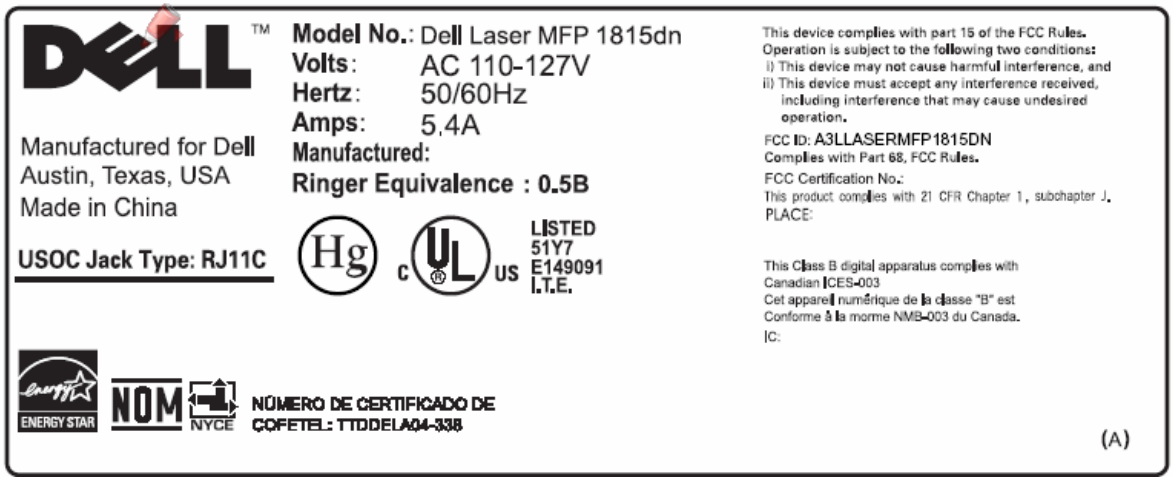
4.2 EUT Photography

Pic. 5 EUT (Front)

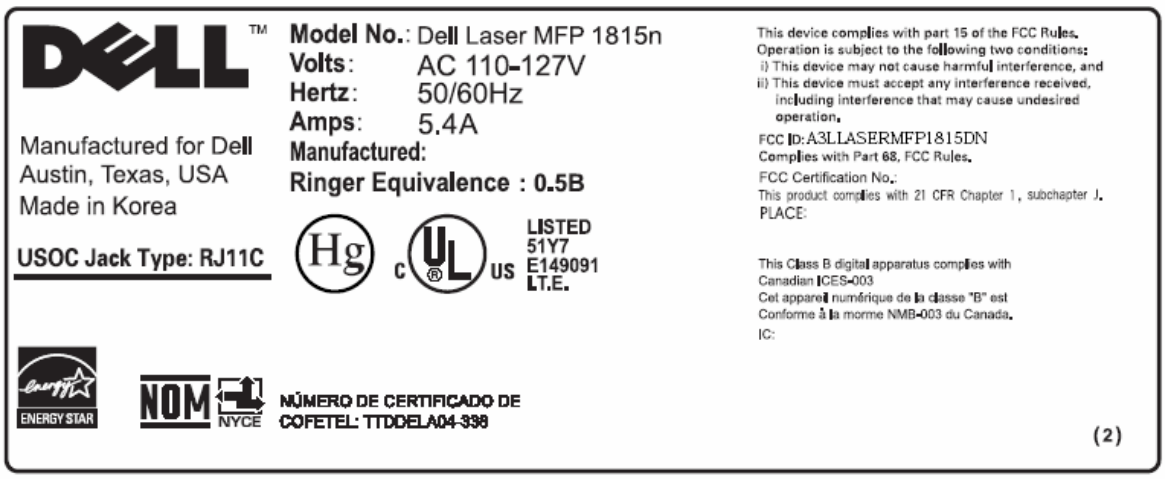
Pic. 6 EUT & Label Location (Rear)



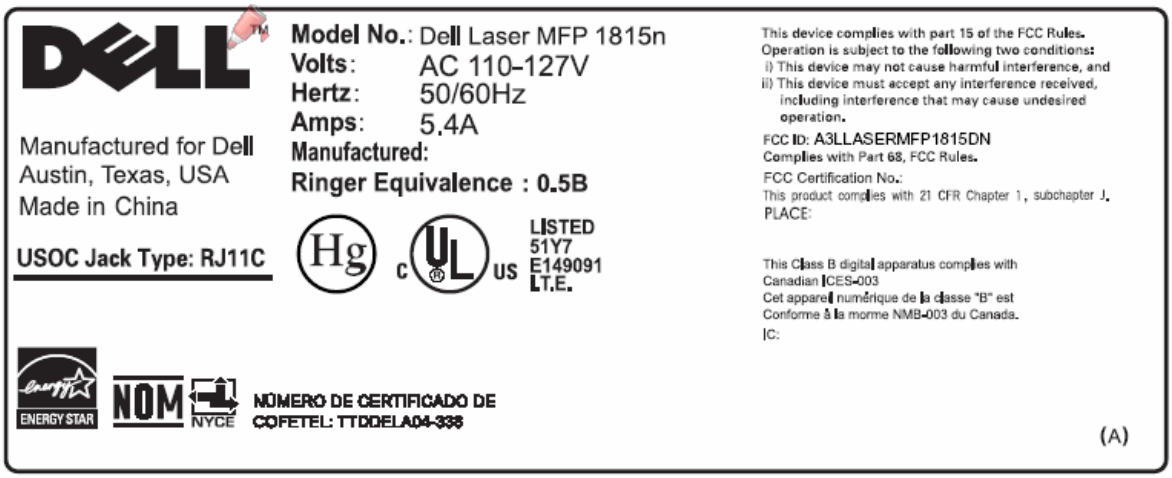
Pic. 7 Label (Dell Laser MFP 1815dn) - KOREA



Pic. 8 Label (Dell Laser MFP 1815dn) - CHINA



Pic. 9 Label (Dell Laser MFP 1815n) – KOREA



Pic. 10 Label (Dell Laser MFP 1815n) - CHINA