EMC TEST REPORT

Project No.	LBE20112452	**Issue No.**	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	April 19, 2011	
EUT	**Type of device**	Class B personal computers and peripherals	
	Equipment authorization	☐ Declaration of Conformity ☒ Certification ☐ Verification	
	FCC ID	**A3LML2955W**	
	Kind of product	**Mono Laser Printer**	
	Model No.	**ML-2955DW**	
	Variant Model No.	**Refer to clause 3.5 at 6 page**	
	Manufacturer	**1) Samsung Electronics Co., Ltd.** 259, Gongdan-Dong, Gumi-City, Gyeongsangbuk-Do, Korea 730-030 **2) Samsung Electronics (Shandong) Digital Printing Co., Ltd.** 264209, Samsung Road, Weihai Hi-Tech. IDZ, Shandong Province, P.R.China **3) Weihai Shin Heung Digital Electronics Co., Ltd.** 98, Samsung Road, Weihai Hi-Tech. IDZ, Shandong Province, P.R.China **4) Intops : Intops (Weihai) Electronics Co., Ltd.** Keji Road-268-1, Weihai Hi-Tech,Industries Development Zone , Shandong Province , CHINA	
Applied Standards		FCC Part 15, Subpart B / ANSI C63.4-2009	
Test Period		April 19, 2011 ~ May 20, 2011	
Issue date		May 20, 2011	

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.)

Tested by : Sung Jin Sim	**Reviewed by :** No Cheon Park

SAMSUNG

416 Maetan 3-Dong, Yeongtong-Gu, Suwon-Si, Gyeonggi-Do, 443-742 Korea
Tel: 82 31 277 7752, Fax: 82 31 277 7753

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1. Summary of test results

1.1 Emission

The EUT has been tested according to the following specifications:

Applied	Test type	Applied standard	Result	Remarks
☒	Conducted Disturbance (Mains Port)	FCC Part 15 Subpart B / ANSI C63.4-2009	Complied	Meets Class B Limit
☒	Radiated Disturbance		Complied	Meets Class B Limit

2. General Information

2.1 Test facility

The CS & Environment center is located on Samsung Electronics Co., Ltd. at 416 Maetan 3-Dong, Yeongtong-Gu, Suwon-Si, Gyeonggi-Do, South Korea.
All testing are performed in Semi-anechoic chambers conforming to the site attenuation Characteristics defined by ANSI C63.4, CISPR 22, 16-1 and 16-2. and Shielded rooms.

The CS & Environment center is operated as testing laboratory in accordance with the requirements of ISO/IEC 17025:2005.

3. Test Setup configuration

3.1 Test Peripherals

The cables used for these peripherals are either permanently attached by the peripheral manufacturer or coupled with an assigned cable as defined below.
The following is a listing of the EUT and peripherals utilized during the performance of EMC test:

Description	Model No.	Serial No.	Manufacturer	Fcc ID / DoC
Mono Laser Printer	ML-2955DW	-	SAMSUNG	EUT
Laptop PC	NT-RV511	ZZDN93CZB00036R	SAMSUNG	DoC
Adapter	A10-090P1A	CNBA4400215ADON43AB01380	Chicony	DoC
USB mouse	SC-1000	328447928	Primax electronics Ltd.,	DoC
Head set	Microsoft	-	Plantronics	-

3.2 EUT operating mode

To achieve compliance with the applied standards and/or specifications, two different SMPS which were manufactured by Shandong cowei and Dongyang E&P respectively were applied for testing, and the following mode(s) were considered and tested.

Operating Mode 1	Standby
Operating Mode 2	USB Printing(Duplex)
Operating Mode 3	Wireless Printing(Duplex)

3.3 Details of Sampling

Customer selected, two units

(One with SMPS of SHANDONG Cowei and another with SMPS of DongYang E&P)

3.4 Used cable description

The EUT is configured, installed, arranged and operated in a manner consistent with typical applications. Interface cables/loads/devices are connected to at least one of each type of interface port of the EUT, and where practical, each cable shall be terminated in a device typical of actual usage. The type(s) of interconnecting cables to be used and the interface port (of the EUT) to which these were connected;

Connected cable	Length [m]	Shielded [Y/N]	Note
Power	1.8	No	For EUT
Power	1.8	No	For laptop PC
USB	1.8	Yes	From laptop PC to EUT
USB	1.5	Yes	From laptop PC to Mouse
Audio	1.8	No	From Notebook PC to Headphones

3.5 EUT Description

1. The following features describe EUT represented by this report:

Item	Specification and Description
Processor	CHOURS3N(533 Mhz)
Standard System memory	DDR2 64 MB
Resolution	True 600 x 600 dpi, addressable 1 200 x 1 200
Copy Quality mode	N.A
Paper Handling	250-sheet Cassette @ 80 g/㎡, 1-sheet Multi Purpose Tray
Power Rating	[90 ~ 135] VAC, 2.8 A, 50 Hz /60 Hz
Power Consumption	Power save mode : 1.4 Wh Ready mode : 37 Wh Printing mode : 400 Wh(Max)
Printer Language	PCL6, SPL
PC Interfaces	High Speed USB 2.0 Ethernet 10/100 802.11 b/g/n
OS compatibility	Windows 2000/XP(32 bits /64 bits)/Vista(32 bits /64 bits)/2003 Server(32 bits /64 bits)/2008 Server(32 bits /64 bits)/7(32 bits /64 bits)/2008 Server R2(64 bits) Mac OS X 10.4 ~ 10.6 RedHat Enterprise Linux WS 4, 5 (32 bits /64 bit) Fedora 5, 6, 7, 8, 9, 10, 11, 12, 13 (32 bits /64 bit) SuSE Linux 10.1 (32 bit) OpenSuSE 10.2, 10.3, 11.0, 11.1, 11.2 (32 bits /64 bit) Mandriva 2007, 2008, 2009, 2009.1, 2010 (32 bits /64 bit) Ubuntu 6.06, 6.10, 7.04, 7.10, 8.04, 8.10, 9.04, 9.10, 10.04 (32 bits /64 bit) SuSE Linux Enterprise Desktop 10, 11 (32 bits /64 bit) Debian 4.0, 5.0 (32 bits /64 bit) Sun Solaris 9,10 (x86, SPARC) HP-UX 11.0, 11i v1, 11i v2, 11i v3 (PA-RISC, Itanium) IBM AIX 5.1, 5.2, 5.3, 5.4
Modes of Operation	USB Printing, Network Printing, Wireless
Intended Class for Emissions	Class B

2. The variant models

: ML-2950DW, ML-2955ND, ML-2950ND

3.6 Clock Frequencies

Kind of Clocks	Frequency [MHz]	Kind of Clocks	Frequency [MHz]
Main Source Clock	12	Video Clock	12
CPU Internal Clock	**360**	DDR Clock	266
USB Device Clock	12	Network	25

3.7 Test configuration 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.

- **Configuration 1 : ShanDong Cowei SMPS applied**
- **Configuration 2 : DongYang SMPS applied**

The EUT was measured all testing with toner cartridge.

Power source for the EUT operating was supplied by CVCF made by the Voltech Corp.

- Test Voltage : AC 120 V, 60 Hz

3.8 Measurement uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus: (According to CISPR 16-4 and UKAS Lab 34.)

3.8.1 Emission

Test type		Measurement uncertainty (C.L. 95 %, k = 2)
Conducted disturbance	Main terminal	2.90 dB
Radiated Disturbance (30 MHz ~ 1 GHz)	Horizontal	4.61 dB
	Vertical	4.68 dB
Radiated Disturbance (1 GHz ~ 6 GHz)	Horizontal	3.32 dB
	Vertical	3.32 dB

4. Results of individual test

4.1 Conducted disturbance

Both conducted lines are measured in Quasi-Peak and Average mode, including the worst-case data points for each tested configuration. The EUT measured in accordance with the methods described in standards.

Limits for conducted disturbance at the mains ports of class B ITE

Frequency range Limits MHz	Resolution Bandwidth	Limits dBµV	
		Quasi-peak	Average
0.15 to 0.50	9 kHz	66 to 56	56 to 46
0.50 to 5	9 kHz	56	46
5 to 30	9 kHz	60	50
NOTE 1 The lower limit shall apply at the transition frequency NOTE 2 The limit decreases linearly with the logarithm of the frequency in the range 0,15 MHz to 0,50 MHz.			

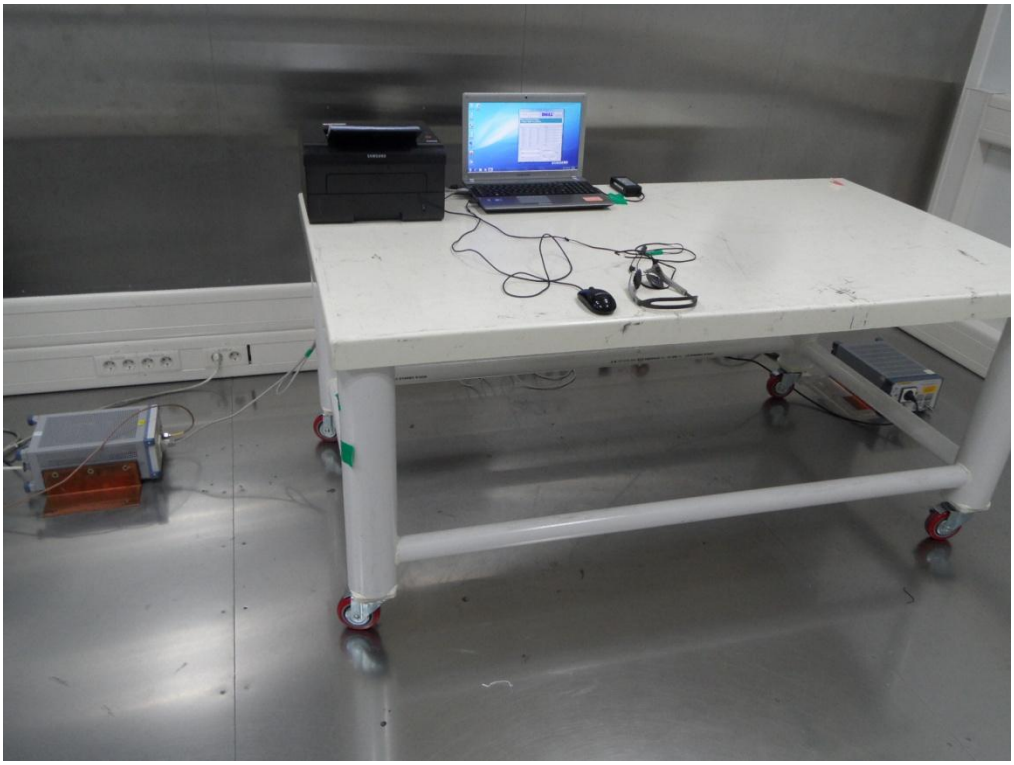
4.1.1 Test instrumentation

Test instrumentation	Model name	Manufacturer	Serial or Firmware (No./Ver.)	Calibration	
				Date	Interval (Month)
Measuring receiver	ESIB26	R&S	100147	2010-08-17	12
Artificial mains network	ENV216	R&S	100117	2010-11-16	12
Artificial mains network	ESH3-Z5	R&S	831887/004	2010-07-07	12
Test software	EP5CE	TOYO	Ver 4.7.10	N/A	N/A

4.1.2 Temperature and humidity condition

Test date	April 19, 2011	**Test engineer**	Sung Jin Sim
Test place	Shielded Room #1		

4.1.3 Photograph of Test Setup



Front

Rear

4.1.4 Test results (mains port)

- **Configuration 1, Operating Mode 1 : Standby Mode**

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

Subrange 1

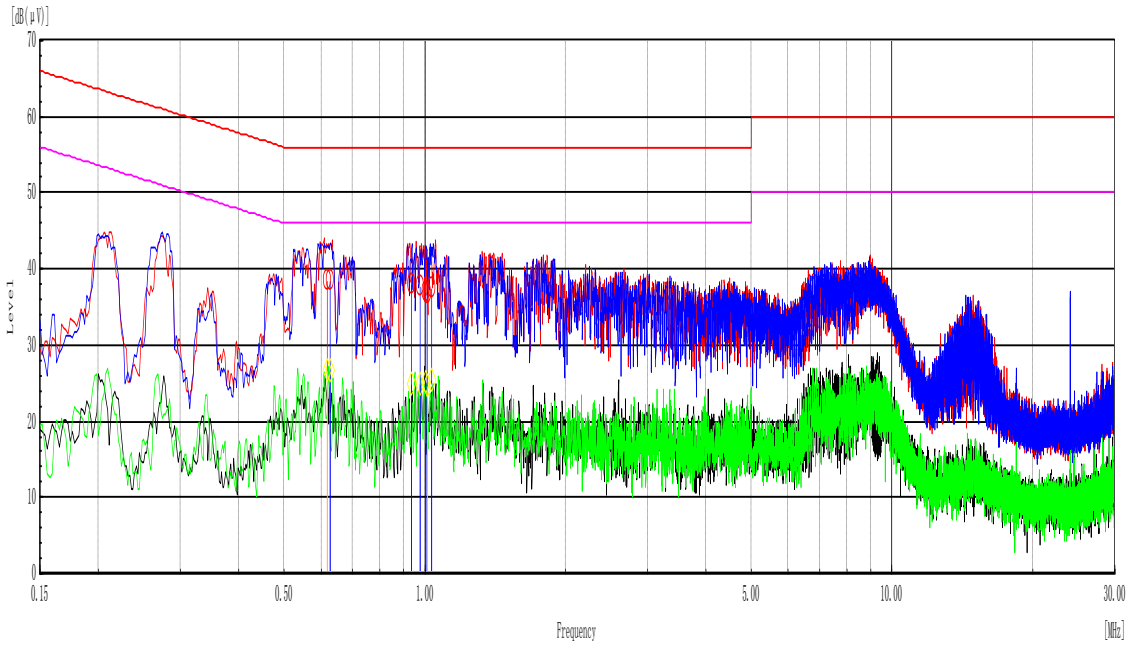
Frequency Range:	150 kHz – 30 MHz
Receiver:	ESIB 26
Transducer:	ENV216 / Receiver-2-Line-LISN ENV216

Scan Setup: EN 55022_B_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
150 kHz – 30 MHz	QuasiPeak; Average	9 kHz	15 s	ESIB 26

Test Graph



Test Results (Quasi-Peak and Average)

Quasi-peak final measurement results table

Frequency (MHz)	Quasi-Peak (dB μ V)	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)
0.617 34	38.6	L1	10.1	17.4	56.0
0.627 83	38.5	N	10.1	17.5	56.0
0.937 77	38.0	N	9.9	18.0	56.0
0.975 94	37.8	N	9.9	18.2	56.0
1.004 35	36.9	N	9.9	19.1	56.0
1.013 99	36.8	L1	9.9	19.2	56.0
1.034 39	37.4	N	9.9	18.6	56.0

Average final measurement results table

Frequency (MHz)	Average (dB μ V)	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)
0.617 34	26.7	L1	10.1	19.3	46.0
0.627 83	26.8	N	10.1	19.2	46.0
0.937 77	24.8	N	9.9	21.2	46.0
0.975 94	24.9	N	9.9	21.1	46.0
1.004 35	25.3	N	9.9	20.7	46.0
1.013 99	24.6	L1	9.9	21.4	46.0
1.034 39	25.3	N	9.9	20.7	46.0

Note) Level (Quasi-Peak and/or Average) = Meter Reading (Quasi-Peak and/or Average) +
Factor (LISN Insertion Loss + Cable Loss)

Margin = Limit – Level (Quasi-Peak and/or Average)

- **Configuration 1, Operating Mode 2 : USB Printing(Duplex)**

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

Subrange 1

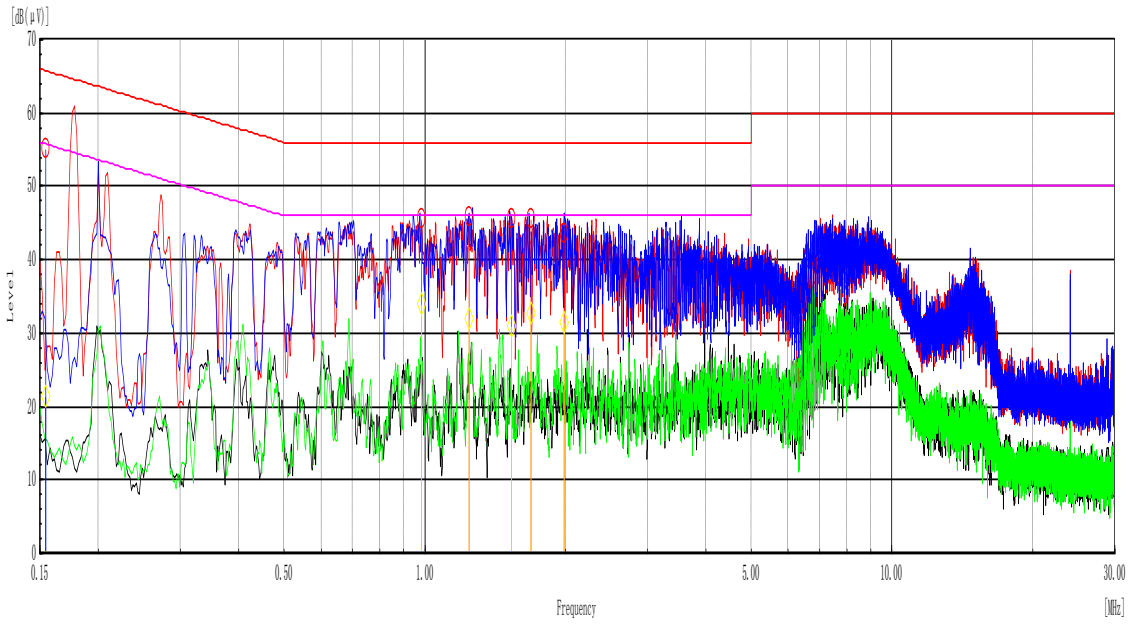
Frequency Range:	150 kHz – 30 MHz
Receiver:	ESIB 26
Transducer:	ENV216 / Receiver-2-Line-LISN ENV216

Scan Setup: EN 55022_B_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
150 kHz – 30 MHz	QuasiPeak; Average	9 kHz	15 s	ESIB 26

Test Graph



Test Results (Quasi-Peak and Average)

Quasi-peak final measurement results table

Frequency (MHz)	Quasi-Peak (dB μ V)	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)
0.154 26	55.2	N	10.1	10.6	65.8
0.983 58	45.6	L1	9.9	10.4	56.0
1.241 36	45.9	L1	9.9	10.1	56.0
1.532 23	45.5	L1	9.9	10.5	56.0
1.686 47	45.5	L1	9.9	10.5	56.0
1.986 24	43.6	L1	9.9	12.4	56.0
1.986 24	43.6	N	10.1	10.6	65.8

Average final measurement results table

Frequency (MHz)	Average (dB μ V)	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)
0.154 26	21.4	N	10.1	34.4	55.8
0.983 58	34.0	L1	9.9	12.0	46.0
1.241 36	32.1	L1	9.9	13.9	46.0
1.532 23	30.9	L1	9.9	15.1	46.0
1.686 47	32.7	L1	9.9	13.3	46.0
1.986 24	31.5	L1	9.9	14.5	46.0

Note) Level (Quasi-Peak and/or Average) = Meter Reading (Quasi-Peak and/or Average) +
Factor (LISN Insertion Loss + Cable Loss)

Margin = Limit – Level (Quasi-Peak and/or Average)

- **Configuration 1, Operating Mode 3 : Wireless Printing(Duplex)**

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

Subrange 1

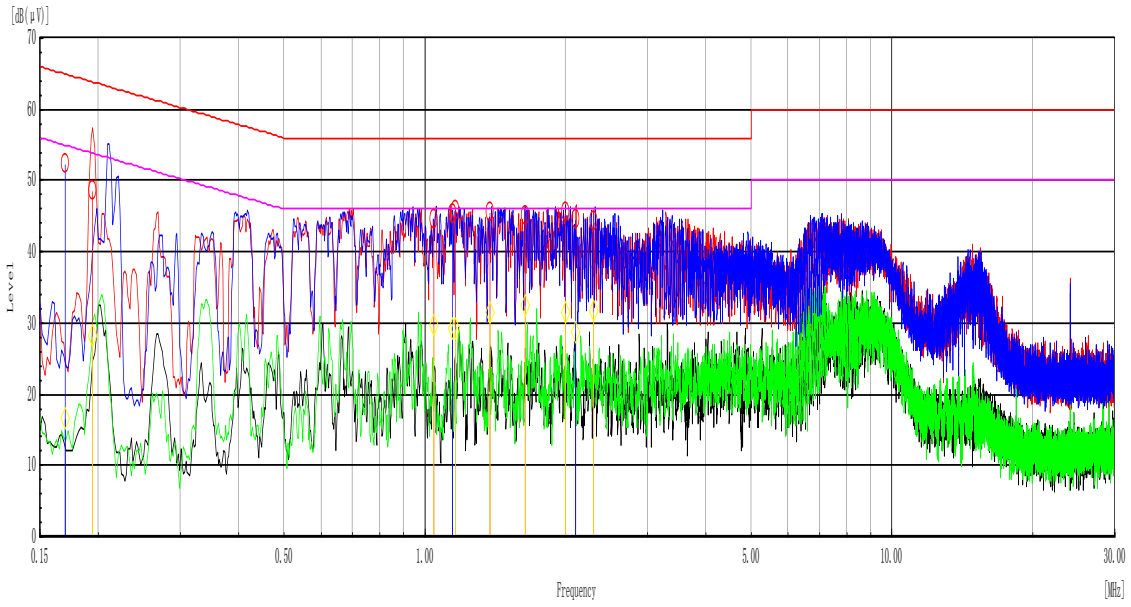
Frequency Range:	150 kHz – 30 MHz
Receiver:	ESIB 26
Transducer:	ENV216 / Receiver-2-Line-LISN ENV216

Scan Setup: EN 55022_B_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
150 kHz – 30 MHz	QuasiPeak; Average	9 kHz	15 s	ESIB 26

Test Graph



Test Results (Quasi-Peak and Average)

Quasi-peak final measurement results table

Frequency (MHz)	Quasi-Peak (dB μ V)	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)
0.169 76	52.5	N	10.2	12.5	65.0
0.194 48	48.5	L1	10.1	15.3	63.8
1.043 56	44.5	L1	9.9	11.5	56.0
1.145 94	45.4	N	9.9	10.6	56.0
1.160 98	45.8	L1	9.9	10.2	56.0
1.376 14	45.7	L1	9.9	10.3	56.0
1.638 38	45.1	L1	9.9	10.9	56.0
1.999 06	45.5	L1	9.9	10.5	56.0
2.106 25	44.5	N	9.9	11.5	56.0
2.297 02	44.3	L1	9.9	11.7	56.0

Average final measurement results table

Frequency (MHz)	Average (dB μ V)	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)
0.169 76	16.5	N	10.2	38.5	55.0
0.194 48	28.2	L1	10.1	25.6	53.8
1.043 56	29.6	L1	9.9	16.4	46.0
1.145 94	29.3	N	9.9	16.7	46.0
1.160 98	29.3	L1	9.9	16.7	46.0
1.376 14	31.4	L1	9.9	14.6	46.0
1.638 38	32.5	L1	9.9	13.5	46.0
1.999 06	31.6	L1	9.9	14.4	46.0
2.106 25	28.6	N	9.9	17.4	46.0
2.297 02	31.6	L1	9.9	14.4	46.0

Note) Level (Quasi-Peak and/or Average) = Meter Reading (Quasi-Peak and/or Average) +
Factor (LISN Insertion Loss + Cable Loss)

Margin = Limit – Level (Quasi-Peak and/or Average)

- **Configuration 2, Operating Mode 1 : Standby**

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

Subrange 1

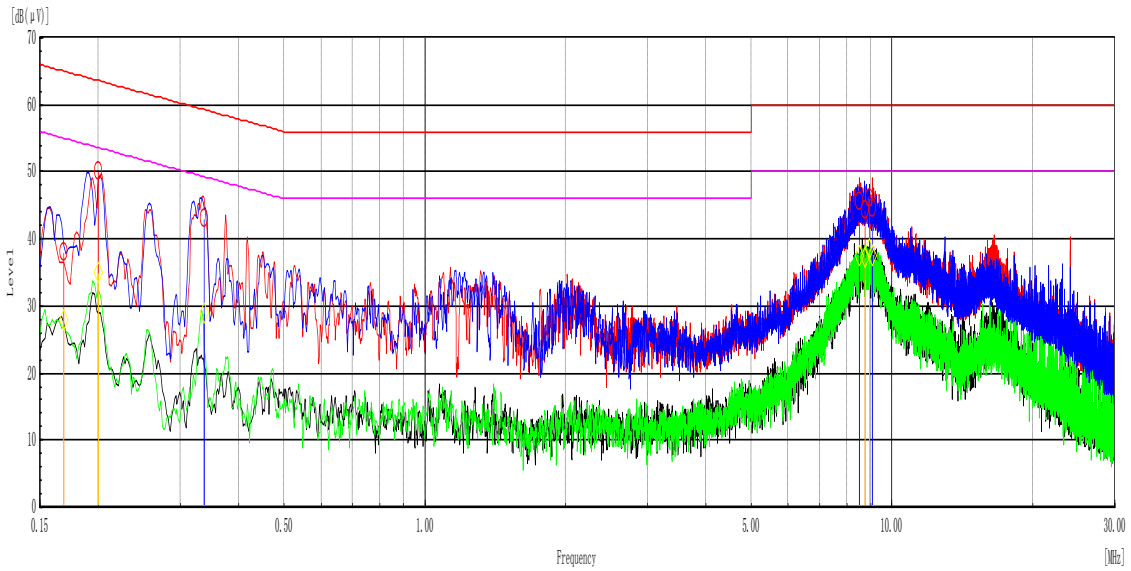
Frequency Range:	150 kHz – 30 MHz
Receiver:	ESIB 26
Transducer:	ENV216 / Receiver-2-Line-LISN ENV216

Scan Setup: EN 55022_B_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
150 kHz – 30 MHz	QuasiPeak; Average	9 kHz	15 s	ESIB 26

Test Graph



Test Results (Quasi-Peak and Average)

Quasi-peak final measurement results table

Frequency (MHz)	Quasi-Peak (dB μ V)	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)
0.168 69	37.9	L1	10.1	27.1	65.0
0.199 99	50.2	L1	10.1	13.4	63.6
0.336 51	43.1	N	10.0	16.2	59.3
8.502 41	45.5	N	9.8	14.5	60.0
8.751 79	44.4	L1	9.9	15.6	60.0
8.942 13	46.1	L1	9.9	13.9	60.0
9.068 08	44.6	N	9.9	15.4	60.0

Average final measurement results table

Frequency (MHz)	Average (dB μ V)	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)
0.168 69	27.9	L1	10.1	27.1	55.0
0.199 99	35.1	L1	10.1	18.5	53.6
0.336 51	28.9	N	10.0	20.4	49.3
8.502 41	37.5	N	9.8	12.5	50.0
8.751 79	37.2	L1	9.9	12.8	50.0
8.942 13	38.5	L1	9.9	11.5	50.0
9.068 08	37.5	N	9.9	12.5	50.0

Note) Level (Quasi-Peak and/or Average) = Meter Reading (Quasi-Peak and/or Average) + Factor (LISN Insertion Loss + Cable Loss)

Margin = Limit – Level (Quasi-Peak and/or Average)

- **Configuration 2, Operating Mode 2 : USB Printing(Duplex)**

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

Subrange 1

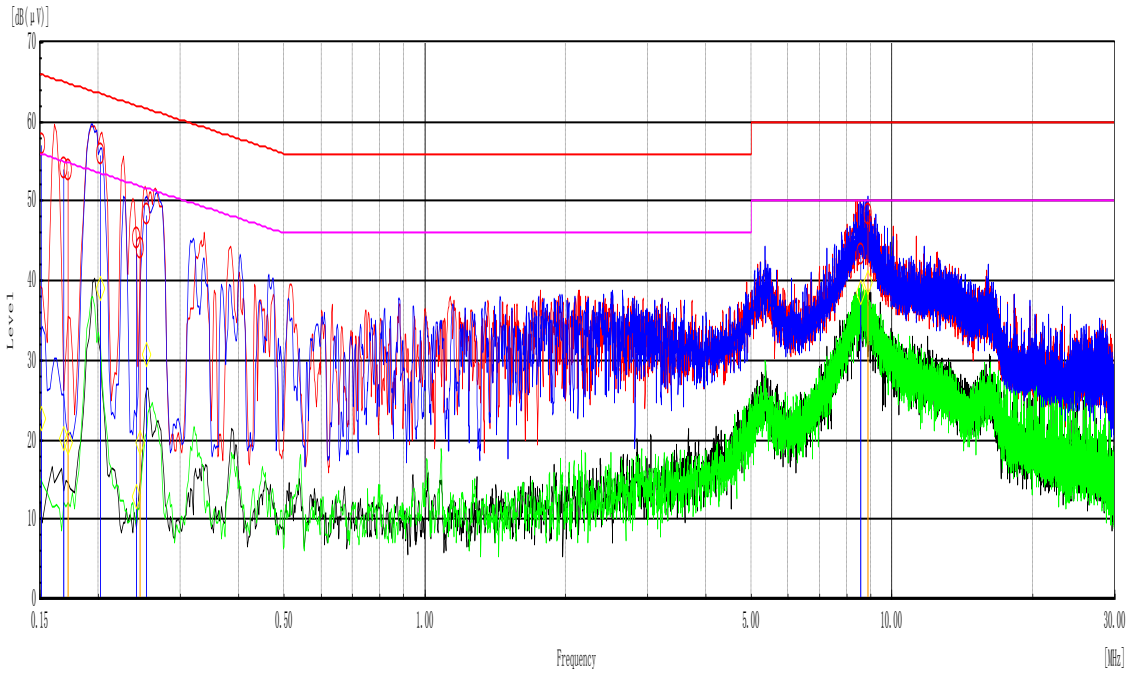
Frequency Range:	150 kHz – 30 MHz
Receiver:	ESIB 26
Transducer:	ENV216 / Receiver-2-Line-LISN ENV216

Scan Setup: EN 55022_B_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
150 kHz – 30 MHz	QuasiPeak; Average	9 kHz	15 s	ESIB 26

Test Graph



Test Results (Quasi-Peak and Average)

Quasi-peak final measurement results table

Frequency (MHz)	Quasi-Peak (dB μ V)	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)
0.151 20	57.1	N	10.0	8.8	65.9
0.168 76	54.1	N	10.2	10.9	65.0
0.172 02	53.8	L1	10.1	11.1	64.9
0.201 92	55.8	N	9.9	7.7	63.5
0.241 49	45.3	N	9.9	16.7	62.0
0.245 24	44.0	L1	10.1	17.9	61.9
0.253 19	48.3	N	9.9	13.4	61.7
8.572 14	43.2	N	9.8	16.8	60.0
8.867 39	48.4	L1	9.9	11.6	60.0

Average final measurement results table

Frequency (MHz)	Average (dB μ V)	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)
0.151 20	22.7	N	10.0	33.2	55.9
0.168 76	20.1	N	10.2	34.9	55.0
0.172 02	19.6	L1	10.1	35.3	54.9
0.201 92	39.0	N	9.9	14.5	53.5
0.241 49	12.8	N	9.9	39.2	52.0
0.245 24	19.7	L1	10.1	32.2	51.9
0.253 19	30.8	N	9.9	20.9	51.7
8.572 14	38.4	N	9.8	11.6	50.0
8.867 39	39.8	L1	9.9	10.2	50.0

Note) Level (Quasi-Peak and/or Average) = Meter Reading (Quasi-Peak and/or Average) +
Factor (LISN Insertion Loss + Cable Loss)

Margin = Limit – Level (Quasi-Peak and/or Average)

- **Configuration 2, Operating Mode 3 : Wireless Printing(Duplex)**

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

Subrange 1

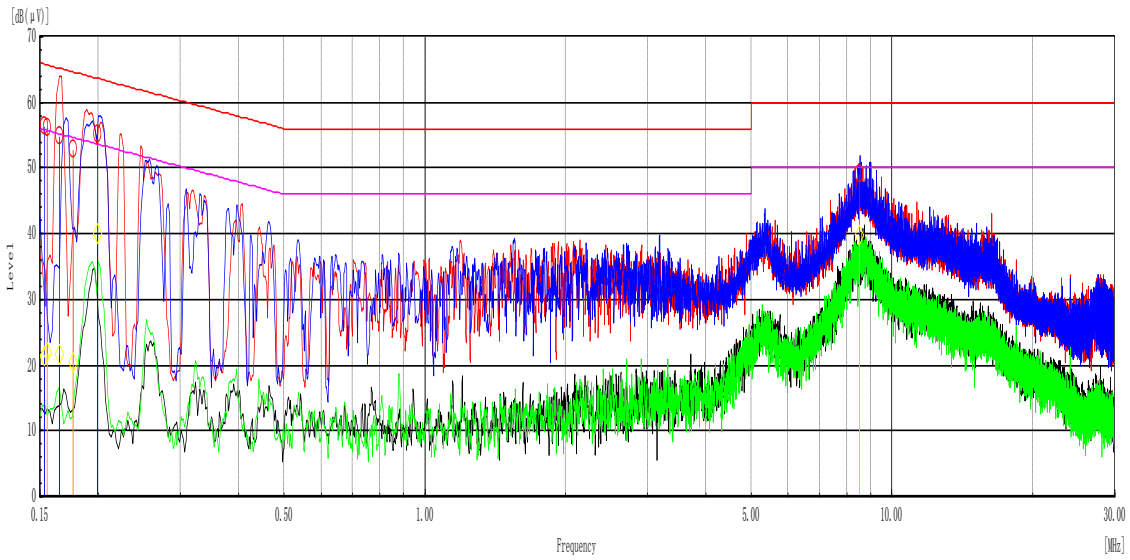
Frequency Range:	150 kHz – 30 MHz
Receiver:	ESIB 26
Transducer:	ENV216 / Receiver-2-Line-LISN ENV216

Scan Setup: EN 55022_B_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
150 kHz – 30 MHz	QuasiPeak; Average	9 kHz	15 s	ESIB 26

Test Graph



Test Results (Quasi-Peak and Average)

Quasi-peak final measurement results table

Frequency (MHz)	Quasi-Peak (dB μ V)	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)
0.153 38	56.4	N	10.0	9.4	65.8
0.155 35	56.3	L1	10.1	9.4	65.7
0.164 91	54.8	N	10.2	10.4	65.2
0.176 36	53.0	L1	10.1	11.7	64.7
0.199 28	55.2	N	9.9	8.4	63.6
8.519 09	49.0	L1	9.8	11.0	60.0

Average final measurement results table

Frequency (MHz)	Average (dB μ V)	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)
0.153 38	21.3	N	10.0	34.5	55.8
0.155 35	21.9	L1	10.1	33.8	55.7
0.164 91	21.5	N	10.2	33.7	55.2
0.176 36	20.3	L1	10.1	34.4	54.7
0.199 28	40.0	N	9.9	13.6	53.6
8.519 09	39.8	L1	9.8	10.2	50.0

Note) Level (Quasi-Peak and/or Average) = Meter Reading (Quasi-Peak and/or Average) +
Factor (LISN Insertion Loss + Cable Loss)

Margin = Limit – Level (Quasi-Peak and/or Average)

4.2 Radiated disturbance

Of those disturbances above (*L* - 20dB), where *L* is the limit level in logarithmic units, record at least the disturbance levels and the frequencies of the six highest disturbances.
The following data lists the significant emission frequencies, measured levels, correction factors (for antenna and cables), orientation of table, polarization and height of antenna, the corrected reading, the limit, and the amount of margin. All measurements were taken utilizing quasi-peak detection unless stated otherwise.
Measurements were performed at an antenna to EUT distance of 10 meters and elevated between 1 and 4 meters. Both vertical and horizontal antenna polarizations were measured.

Limits for radiated disturbance of ITE at a measuring distance of 10 m

Frequency range Limits MHz	**Resolution Bandwidth**	**Quasi-peak Limits dBµV/m**
		Class B
30 to 230	**120 kHz**	**30**
230 to 1000	**120 kHz**	**37**
NOTE 1 The lower limit shall apply at the transition frequency NOTE 2 Additional provisions may be required for cases where interference occurs.		

Peak measurements were made over the changeable frequency range 1 GHz to 40 GHz or 5th in accordance with internal maximum operating frequency at a measurement distance of 3m for the following antenna and turntable arrangements:

Antenna Height (cm)	Antenna Polarisation	Turntable position (degrees)
100 ~ 400	Horizontal, Vertical	Continuous

Limits for above 1 GHz radiated disturbance of ITE at a measuring distance of 3 m

Class	Limits - dB(μV/m)	
	Peak	Average
B	74	54
Average limit 500, 20 log 500 = 53.979 dB ≒ 54 dB		

Measurements within 20 dB of the limit were then maximized by adjusting turntable position. Final measurements were made using a average detector.

Results checked manually; and points close to the limit line were re-measured.

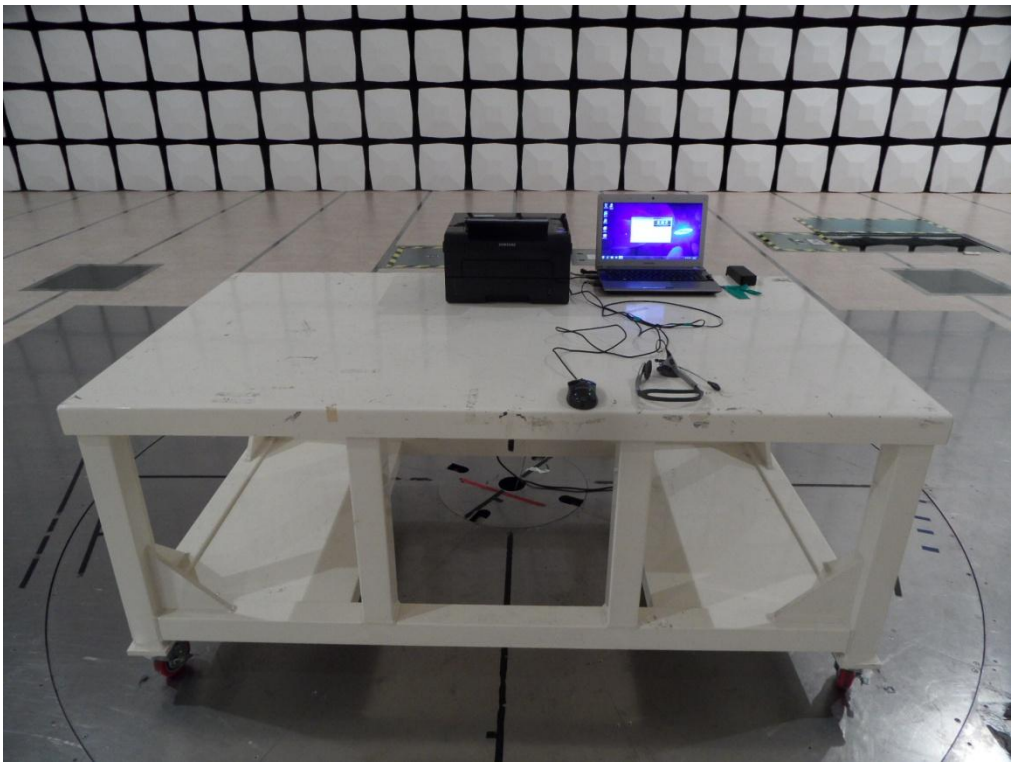
4.2.1 Test instrumentation

Test instrumentation	Model name	Manufacturer	Serial or Firmware (No./Ver.)	Calibration	
				Date	Interval (Month)
Bi-con Antenna	CBL6112D	Schaffner	22602	2010-04-21	24
Horn Antenna	HF907	R&S	100016	2010-04-28	24
EMI Receiver	ESIB-26	R&S	100288	2010-06-04	12
EMI Receiver	ESIB-26	R&S	100147	2010-08-17	12
Amplifier	310N	Sonoma	185861	2011-04-07	12
Preamplifier	SCU_F018	R&S	10001	2011-04-22	12
Antenna Mast	MA4000	INN CO	-	N/A	N/A
Mast Controller	CO2000	INN CO	-	N/A	N/A
Test software	EP5/RE	TOYO	VER 3.1.20	N/A	N/A
RF Selector	NS4900	TOYO	-	N/A	N/A

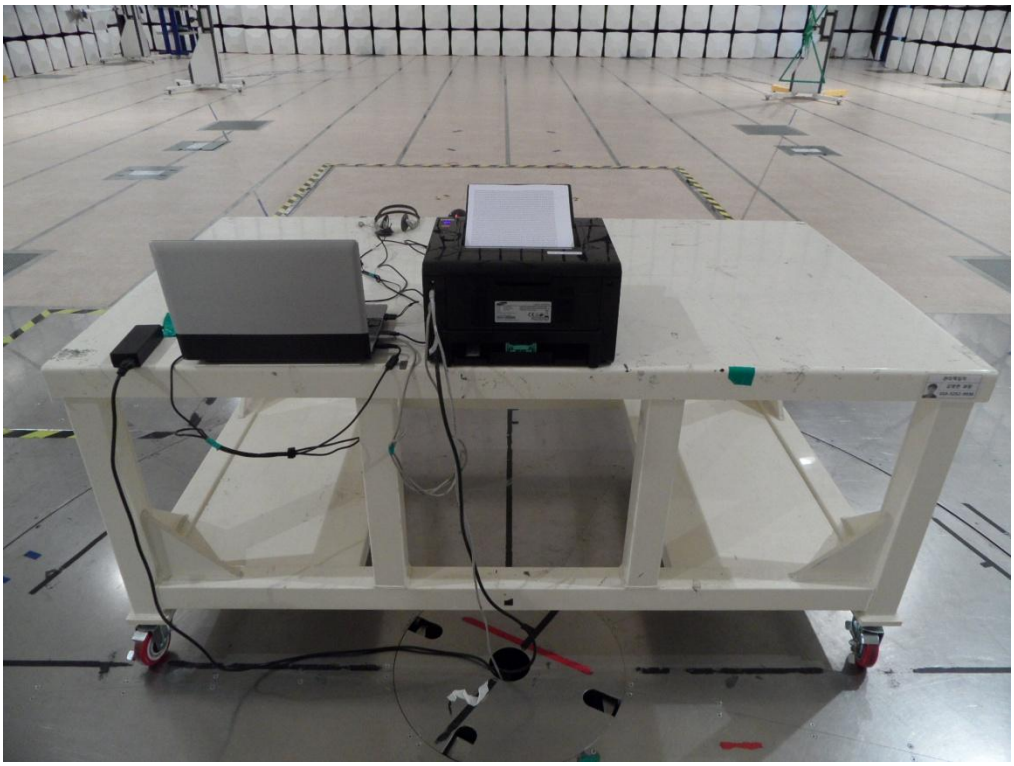
4.2.2 Temperature and humidity condition

Test date	April 20, 2011 ~ April 22, 2011 May 20, 2011	**Test engineer**	Sung Jin Sim
Test place	Semi-Anechoic Chamber		

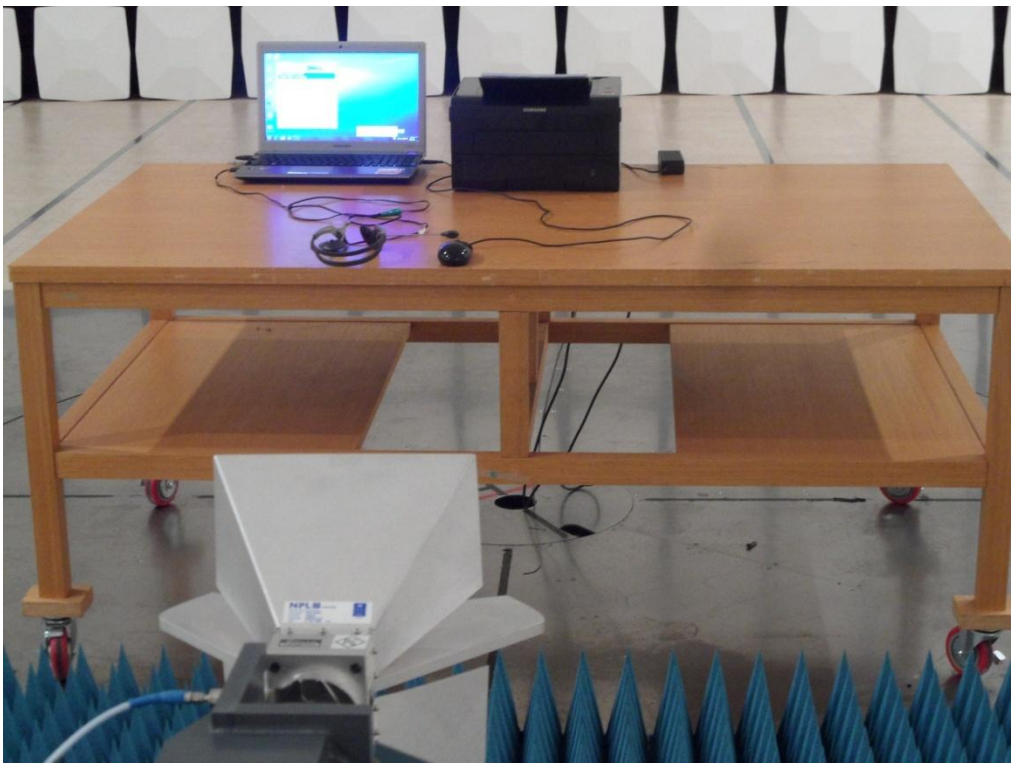
4.2.3 Photograph of Test Setup



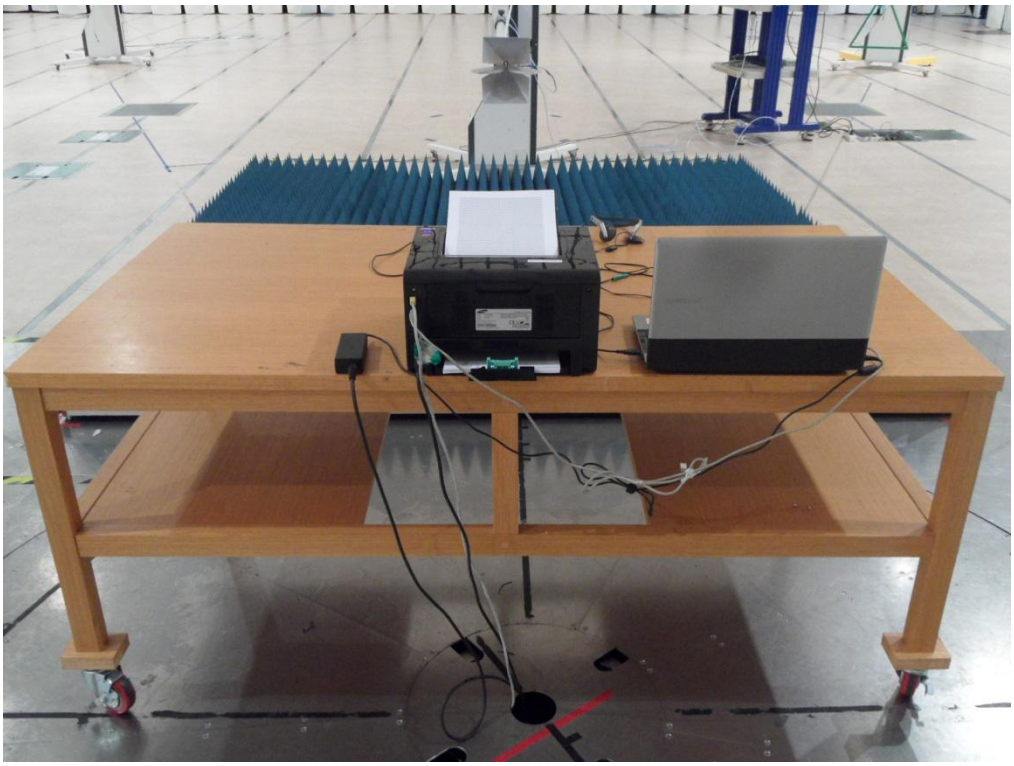
Front (below 1 GHz)



Rear (below 1 GHz)



Front (above 1 GHz)



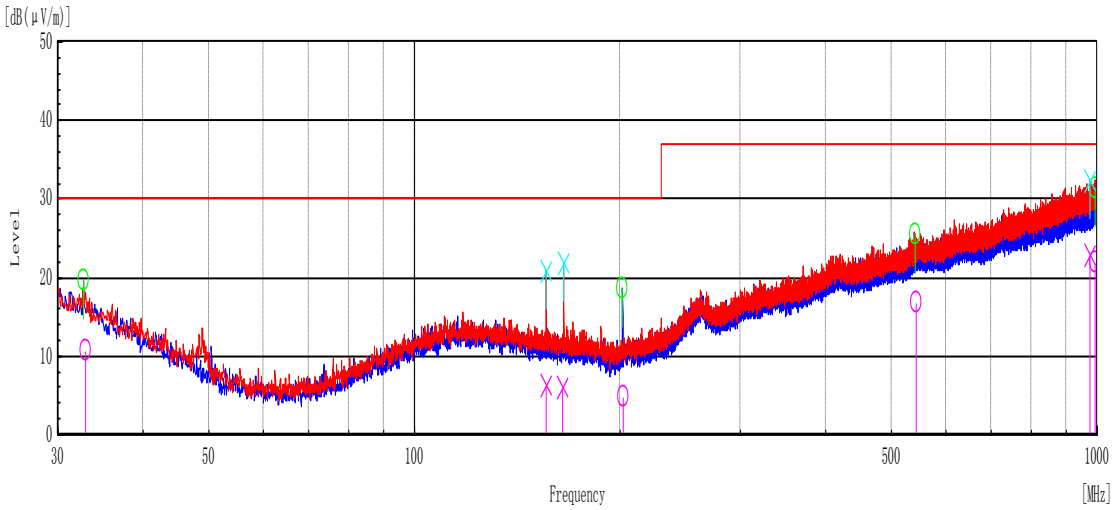
Rear (above 1 GHz)

4.2.4 Test results

4.2.4.1 30 MHz to 1GHz test results

- **Configuration 1, Operating Mode 1 : Standby**

Test Graph and Results



Frequency [MHz]	Pol.	Reading QP [dBμV/m]	Factor [dB(1/m)]	Level QP [dBμV /m]	Limit [dBμV /m]	Margin QP [dB]	Height [cm]	Angle [deg]
32.995	H	21.9	-11.1	10.8	30	19.2	207	289.0
155.891	V	21.9	-15.5	6.4	30	23.6	266	346.9
164.945	V	22.0	-15.8	6.2	30	23.8	184	271.6
202.444	H	21.9	-17.1	4.8	30	25.2	262	110.5
542.367	H	21.7	-4.9	16.8	37	20.2	170	327.8
975.201	V	20.3	2.7	23.0	37	14.0	180	298.4
993.208	H	20.7	1.3	22.0	37	15.0	189	28.6
330.862	V	39.9	-13.4	26.5	37	10.5	116	9.7

Note) Receiving antenna polarization : Horizontal and/or Vertical

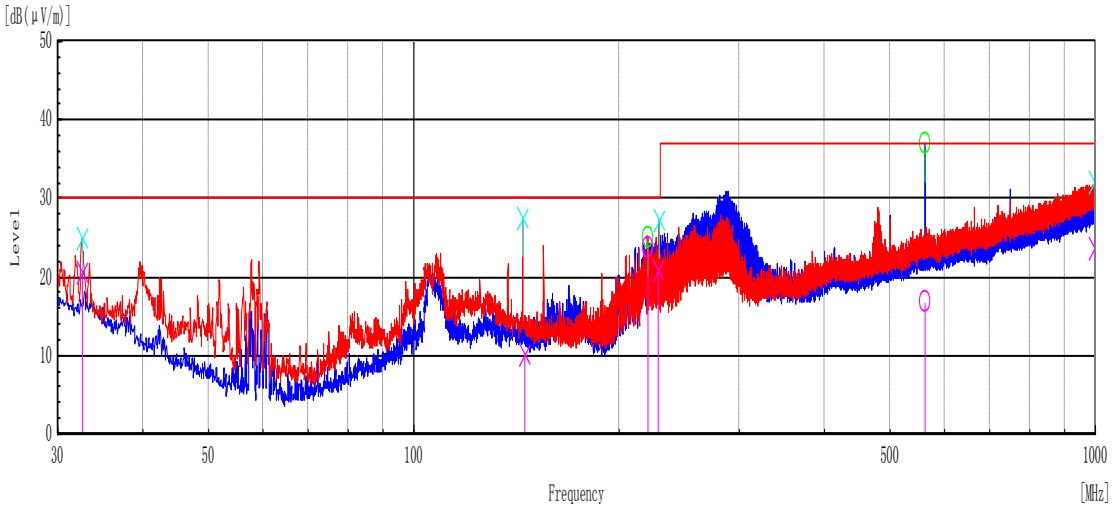
Test Distance : 10m, Antenna Height : 1 to 4 meters

Level QP (Quasi-Peak) = Reading QP + Factor (Antenna Factor + Cable Loss - Amp. Gain)

Margin QP (Quasi-Peak) = Limit – Level QP

- **Configuration 1, Operating Mode 2 : USB Printing(Duplex)**

Test Graph and Results



Frequency [MHz]	Pol.	Reading QP [dBμV/m]	Factor [dB(1/m)]	Level QP [dBμV /m]	Limit [dBμV /m]	Margin QP [dB]	Height [cm]	Angle [deg]
32.565	V	31.7	-11.0	20.7	30	9.3	118	312.8
145.334	V	25.3	-15.0	10.3	30	19.7	101	290.9
220.130	H	40.3	-16.6	23.7	30	6.3	369	239.6
228.270	V	36.3	-15.3	21.0	30	9.0	103	56.2
562.798	H	21.8	-5.0	16.8	37	20.2	178	73.6
996.799	V	20.4	3.3	23.7	37	13.3	374	82.1

Note) Receiving antenna polarization : Horizontal and/or Vertical

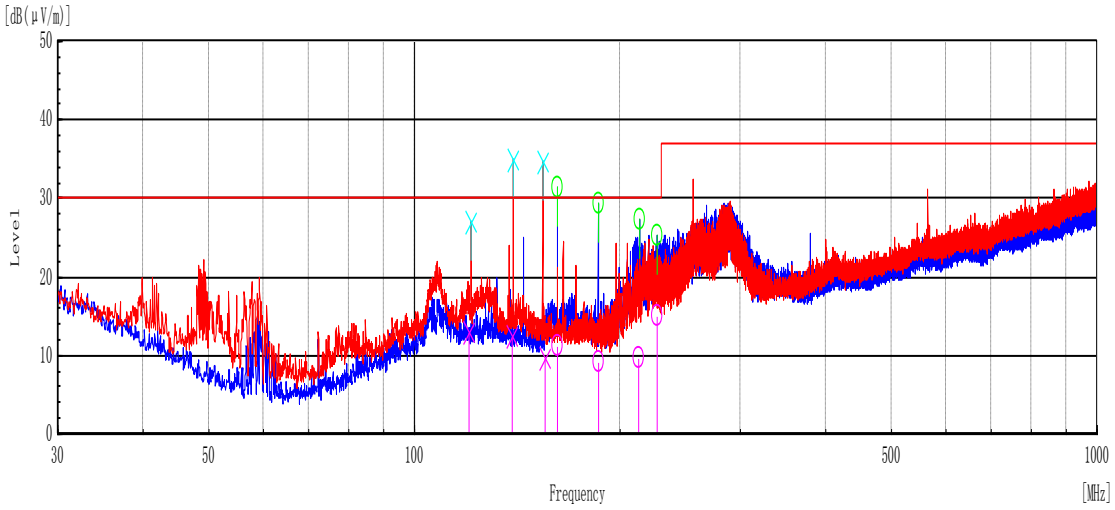
Test Distance : 10m, Antenna Height : 1 to 4 meters

Level QP (Quasi-Peak) = Reading QP + Factor (Antenna Factor + Cable Loss - Amp. Gain)

Margin QP (Quasi-Peak) = Limit – Level QP

- **Configuration 1, Operating Mode 3 : Wireless Printing(Duplex)**

Test Graph and Results



Frequency [MHz]	Pol.	Reading QP [dBμV/m]	Factor [dB(1/m)]	Level QP [dBμV /m]	Limit [dBμV /m]	Margin QP [dB]	Height [cm]	Angle [deg]
120.298	V	26.9	-14.0	12.9	30	17.1	100	359.9
139.058	V	27.1	-14.5	12.6	30	17.4	185	349.0
155.055	V	25.2	-15.5	9.7	30	20.3	228	356.3
162.079	H	27.5	-16.3	11.2	30	18.8	309	353.2
185.872	H	26.3	-17.0	9.3	30	20.7	396	132.8
212.744	H	26.6	-16.9	9.7	30	20.3	300	359.9
226.911	H	31.1	-16.0	15.1	30	14.9	399	80.3

Note) Receiving antenna polarization : Horizontal and/or Vertical

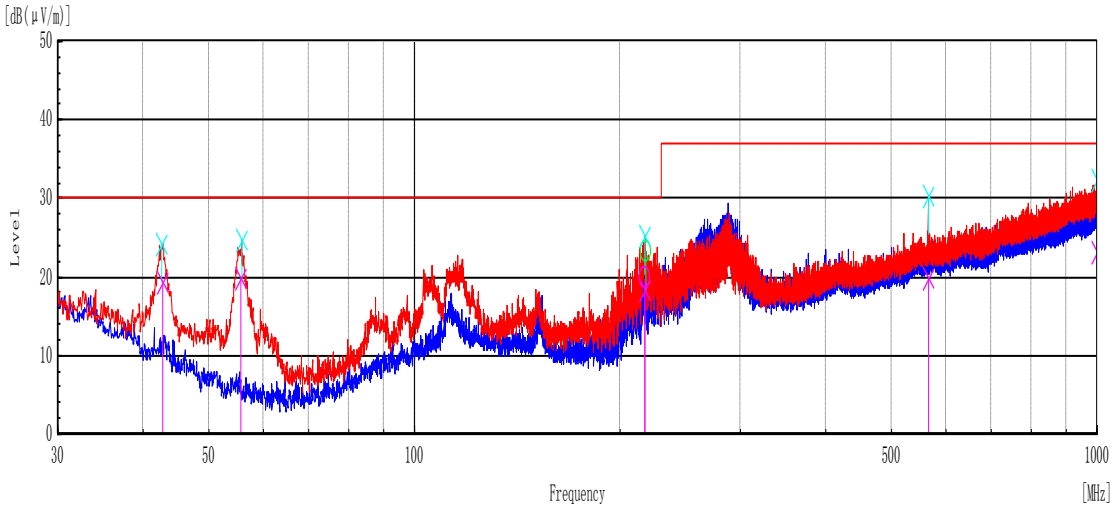
Test Distance : 10m, Antenna Height : 1 to 4 meters

Level QP (Quasi-Peak) = Reading QP + Factor (Antenna Factor + Cable Loss - Amp. Gain)

Margin QP (Quasi-Peak) = Limit – Level QP

- **Configuration 2, Operating Mode 1 : Standby**

Test Graph and Results



Frequency [MHz]	Pol.	Reading QP [dBμV/m]	Factor [dB(1/m)]	Level QP [dBμV /m]	Limit [dBμV /m]	Margin QP [dB]	Height [cm]	Angle [deg]
42.697	V	35.8	-16.3	19.5	30	10.5	101	130.5
55.636	V	40.9	-20.9	20.0	30	10.0	138	292.3
217.064	V	34.2	-15.8	18.4	30	11.6	101	272.1
217.317	H	36.7	-16.8	19.9	30	10.1	390	63.7
565.807	V	23.5	-3.6	19.9	37	17.1	310	354.1
999.813	V	19.9	3.4	23.3	37	13.7	349	12.5

Note) Receiving antenna polarization : Horizontal and/or Vertical

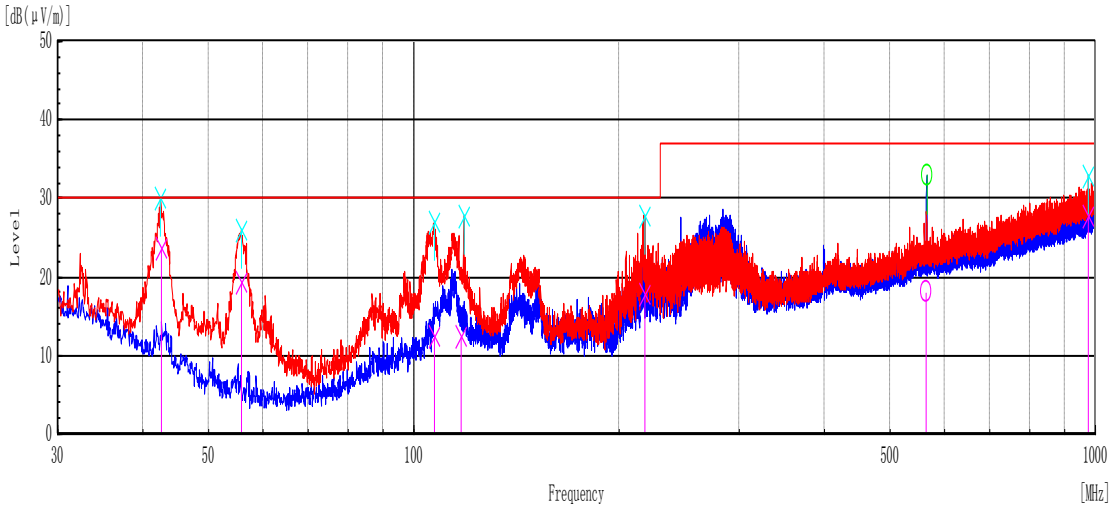
Test Distance : 10m, Antenna Height : 1 to 4 meters

Level QP (Quasi-Peak) = Reading QP + Factor (Antenna Factor + Cable Loss - Amp. Gain)

Margin QP (Quasi-Peak) = Limit – Level QP

- **Configuration 2, Operating Mode 2 : USB Printing(Duplex)**

Test Graph and Results



Frequency [MHz]	Pol.	Reading QP [dBμV/m]	Factor [dB(1/m)]	Level QP [dBμV /m]	Limit [dBμV /m]	Margin QP [dB]	Height [cm]	Angle [deg]
42.635	V	40.0	-16.3	23.7	30	6.3	132	169.5
55.727	V	40.3	-20.9	19.4	30	10.6	100	255.8
107.206	V	27.4	-14.8	12.6	30	17.4	103	34.2
117.351	V	26.4	-14.0	12.4	30	17.6	116	191.8
218.027	V	33.5	-15.7	17.8	30	12.2	169	321.1
565.091	H	23.0	-5.0	18.0	37	19.0	349	339.0
977.430	V	24.9	2.8	27.7	37	9.3	398	226.7

Note) Receiving antenna polarization : Horizontal and/or Vertical

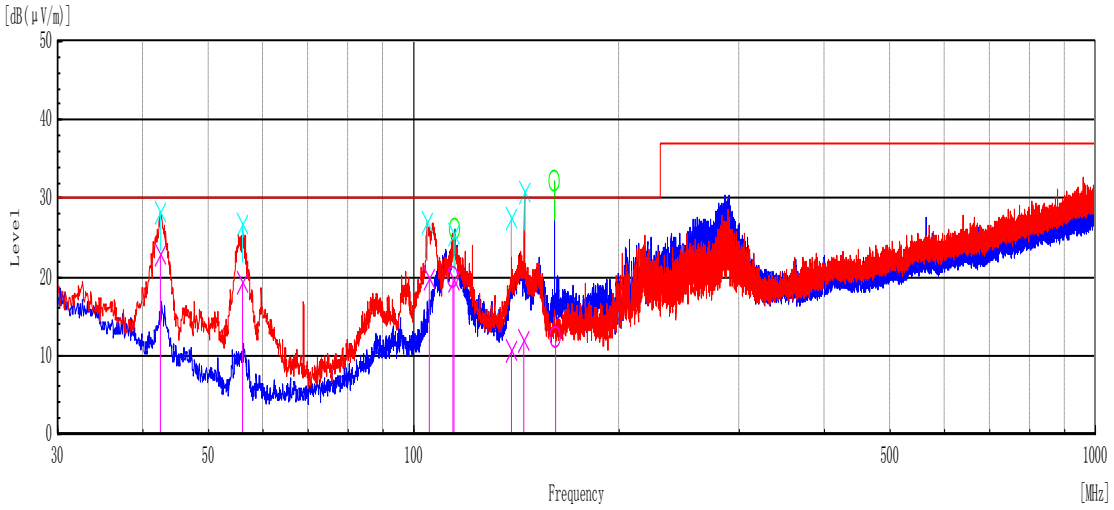
Test Distance : 10m, Antenna Height : 1 to 4 meters

Level QP (Quasi-Peak) = Reading QP + Factor (Antenna Factor + Cable Loss - Amp. Gain)

Margin QP (Quasi-Peak) = Limit – Level QP

- **Configuration 2, Operating Mode 3 : Wireless Printing(Duplex)**

Test Graph and Results



Frequency [MHz]	Pol.	Reading QP [dBμV/m]	Factor [dB(1/m)]	Level QP [dBμV /m]	Limit [dBμV /m]	Margin QP [dB]	Height [cm]	Angle [deg]
42.412	V	39.1	-16.2	22.9	30	7.1	106	33.9
56.028	V	40.4	-20.9	19.5	30	10.5	101	247.3
105.313	V	35.1	-15.1	20.0	30	10.0	126	71.1
113.933	H	34.8	-14.8	20.0	30	10.0	394	344.8
114.343	V	33.6	-14.1	19.5	30	10.5	136	140.0
138.786	V	25.1	-14.5	10.6	30	19.4	132	224.4
144.860	V	27.0	-15.0	12.0	30	18.0	116	359.7
161.597	H	28.6	-16.3	12.3	30	17.7	298	359.7

Note) Receiving antenna polarization : Horizontal and/or Vertical

Test Distance : 10m, Antenna Height : 1 to 4 meters

Level QP (Quasi-Peak) = Reading QP + Factor (Antenna Factor + Cable Loss - Amp. Gain)

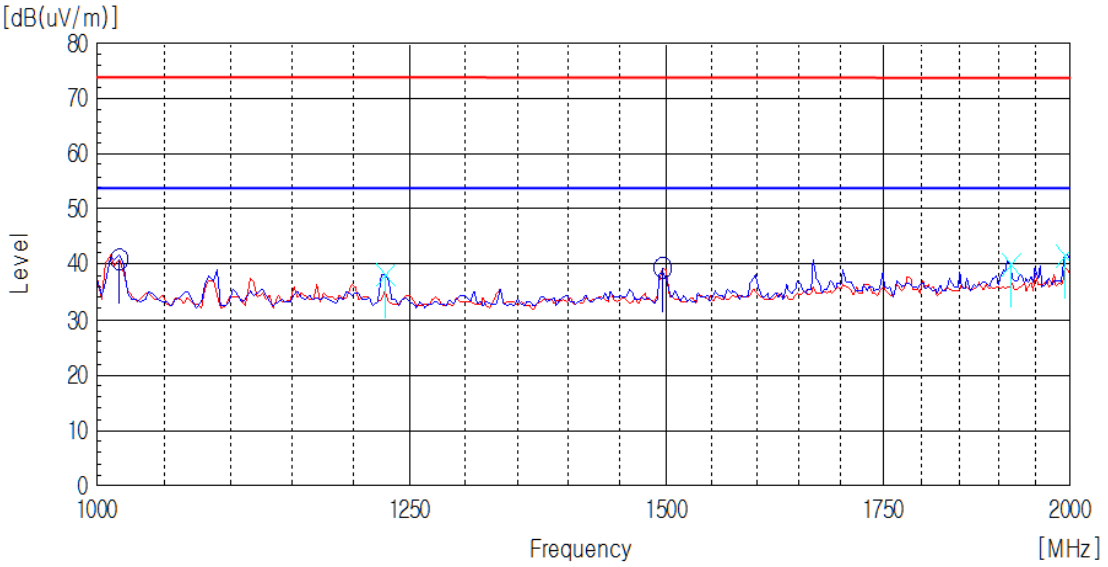
Margin QP (Quasi-Peak) = Limit – Level QP

4.2.4.2 1 GHz to 2 GHz test results

The EUT was measured up to 2 GHz because the internal maximum frequency is 360 MHz, below 500MHz

- **Configuration 1, Operating Mode 1 : Standby**

Test Results



Peak Measurement

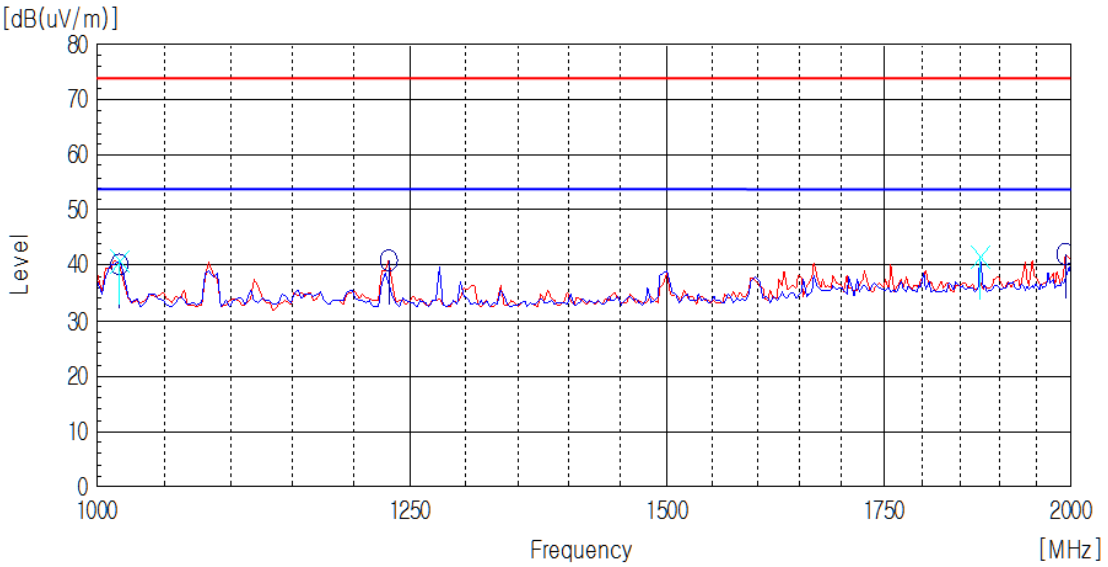
Frequency [MHz]	(P)	Reading PK [dBuV/m]	Factor [dB(1/m)]	Level PK [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]
1016.026	H	57.6	-16.5	41.1	74.0	32.9	100	328.3
1496.795	H	55.6	-16.3	39.3	74.0	34.7	100	289.3
1227.564	V	55.1	-16.7	38.4	74.0	35.6	100	279.4
1916.667	V	54.1	-14.0	40.1	74.0	33.9	100	109.7
1993.590	V	55.3	-13.7	41.6	74.0	32.4	100	312.4

Note1) Representative operating modes were selected by customer and any emissions that do NOT exceed Average limit were not tested with average detector mode.

Note2) Receiving antenna polarization : Horizontal and Vertical
Level PK(Peak) = Reading PK(Peak) + Factor(Antenna Factor + Cable Loss - Amp. Gain)
Level AV (Average) = Reading AV (Average) + Factor(Antenna Factor + Cable Loss - Amp. Gain)
Margin PK (Peak) = Limit – Level PK (Peak)
Margin AV (Average) = Limit – Level AV (Average)

- **Configuration 1, Operating Mode 2 : USB Printing(Duplex)**

Test Results



Peak Measurement

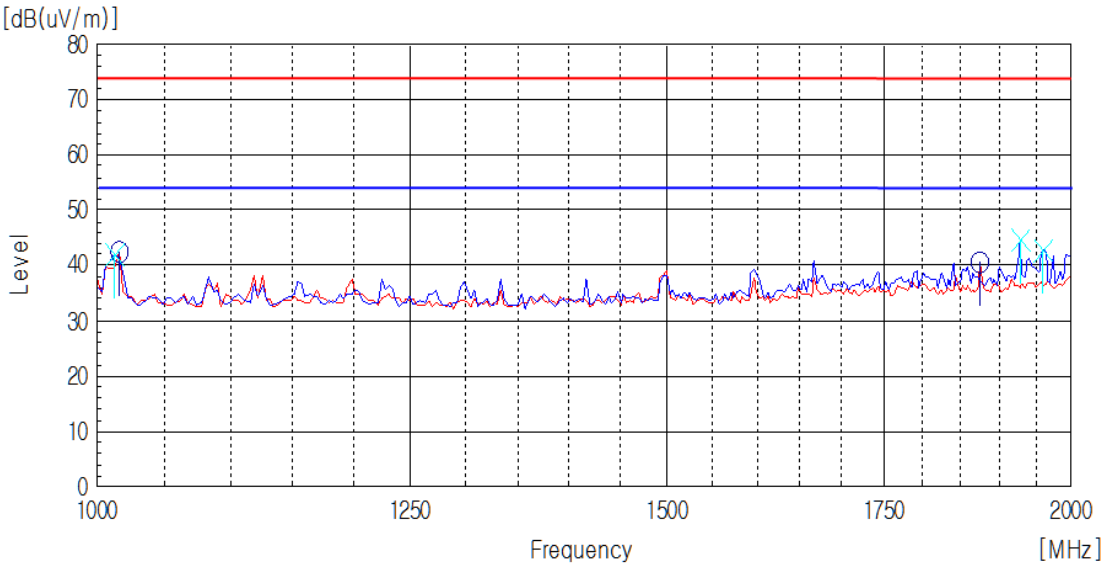
Frequency [MHz]	(P)	Reading PK [dBuV/m]	Factor [dB(1/m)]	Level PK [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]
1016.026	H	56.8	-16.5	40.3	74.0	33.7	100	134.6
1016.026	V	57.3	-16.5	40.8	74.0	33.2	100	209.2
1230.769	H	57.8	-16.7	41.1	74.0	32.9	100	127.1
1875.000	V	56.1	-14.3	41.8	74.0	32.2	100	96.6
1993.590	H	55.8	-13.7	42.1	74.0	31.9	100	311.5

Note1) Representative operating modes were selected by customer and any emissions that do NOT exceed Average limit were not tested with average detector mode.

Note2) Receiving antenna polarization : Horizontal and Vertical
Level PK(Peak) = Reading PK(Peak) + Factor(Antenna Factor + Cable Loss - Amp. Gain)
Level AV (Average) = Reading AV (Average) + Factor(Antenna Factor + Cable Loss - Amp. Gain)
Margin PK (Peak) = Limit – Level PK (Peak)
Margin AV (Average) = Limit – Level AV (Average)

- **Configuration 1, Operating Mode 3 : Wireless Printing(Duplex)**

Test Results



Peak Measurement

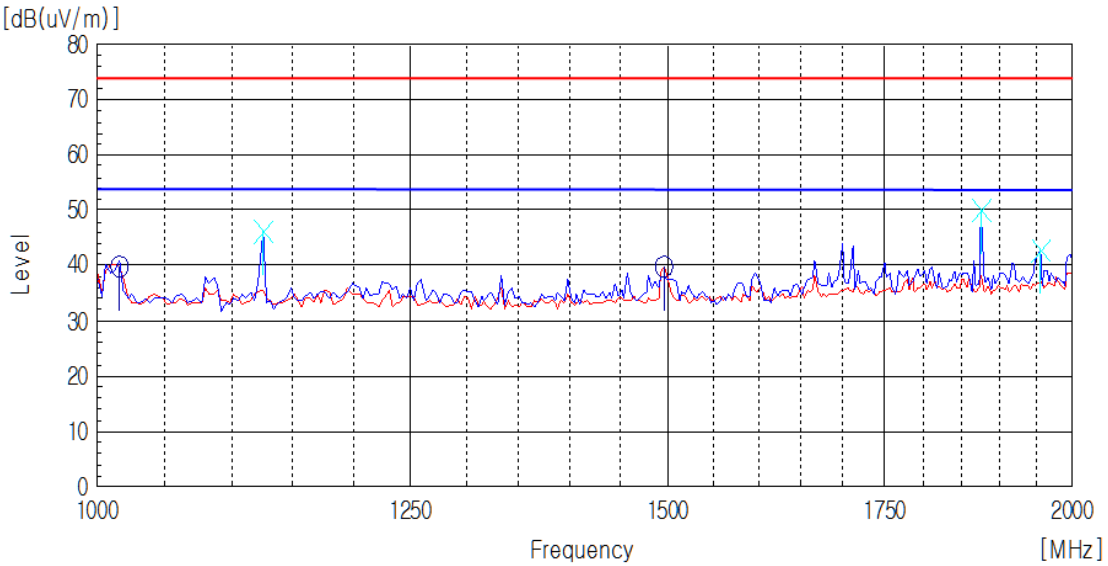
Frequency [MHz]	(P)	Reading PK [dBuV/m]	Factor [dB(1/m)]	Level PK [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]
1012.821	V	58.5	-16.5	42.0	74.0	32.0	100	129.9
1016.026	H	58.8	-16.5	42.3	74.0	31.7	100	206.6
1875.000	H	54.9	-14.3	40.6	74.0	33.4	100	338.4
1929.487	V	58.7	-13.9	44.8	74.0	29.2	100	47.4
1961.539	V	56.8	-13.8	43.0	74.0	31.0	100	134.4

Note1) Representative operating modes were selected by customer and any emissions that do NOT exceed Average limit were not tested with average detector mode.

Note2) Receiving antenna polarization : Horizontal and Vertical
Level PK(Peak) = Reading PK(Peak) + Factor(Antenna Factor + Cable Loss - Amp. Gain)
Level AV (Average) = Reading AV (Average) + Factor(Antenna Factor + Cable Loss - Amp. Gain)
Margin PK (Peak) = Limit – Level PK (Peak)
Margin AV (Average) = Limit – Level AV (Average)

- **Configuration 2, Operating Mode 2 : USB Printing(Duplex)**

Test Results



Peak Measurement

Frequency [MHz]	(P)	Reading PK [dBuV/m]	Factor [dB(1/m)]	Level PK [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]
1016.026	H	56.4	-16.5	39.9	74.0	34.1	100	351.6
1496.795	H	55.9	-16.3	39.6	74.0	34.4	100	289.7
1125.000	V	63.2	-17.1	46.1	74.0	27.9	100	21.5
1875.000	V	64.5	-14.3	50.2	74.0	23.8	100	303.8
1955.128	V	56.9	-13.8	43.1	74.0	30.9	100	47.0

Note1) Representative operating modes were selected by customer and any emissions that do NOT exceed Average limit were not tested with average detector mode.

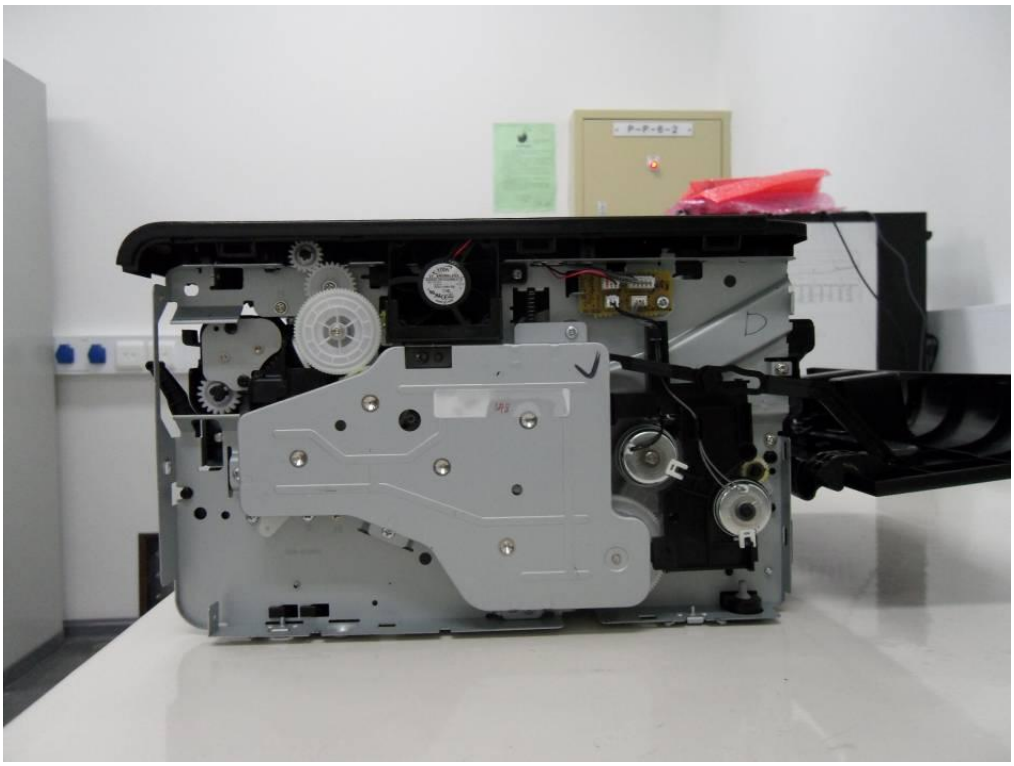
Note2) Receiving antenna polarization : Horizontal and Vertical
Level PK(Peak) = Reading PK(Peak) + Factor(Antenna Factor + Cable Loss - Amp. Gain)
Level AV (Average) = Reading AV (Average) + Factor(Antenna Factor + Cable Loss - Amp. Gain)
Margin PK (Peak) = Limit – Level PK (Peak)
Margin AV (Average) = Limit – Level AV (Average)

Appendix – EUT photography

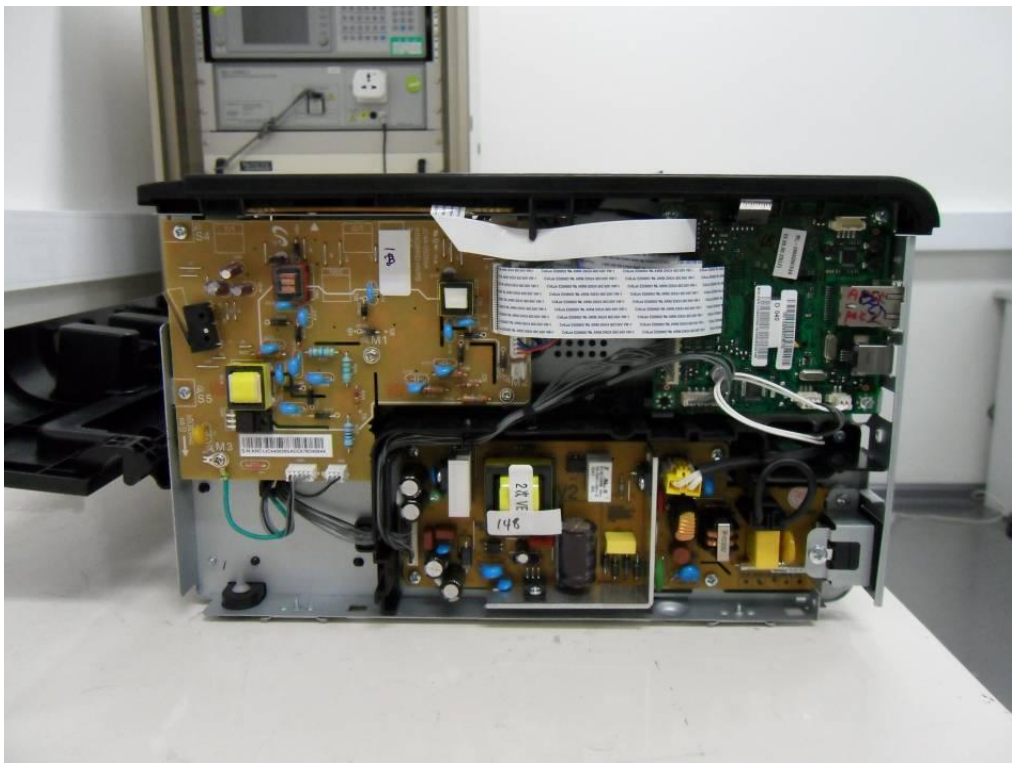
Front View

Rear View & Label location

Internal View(front)

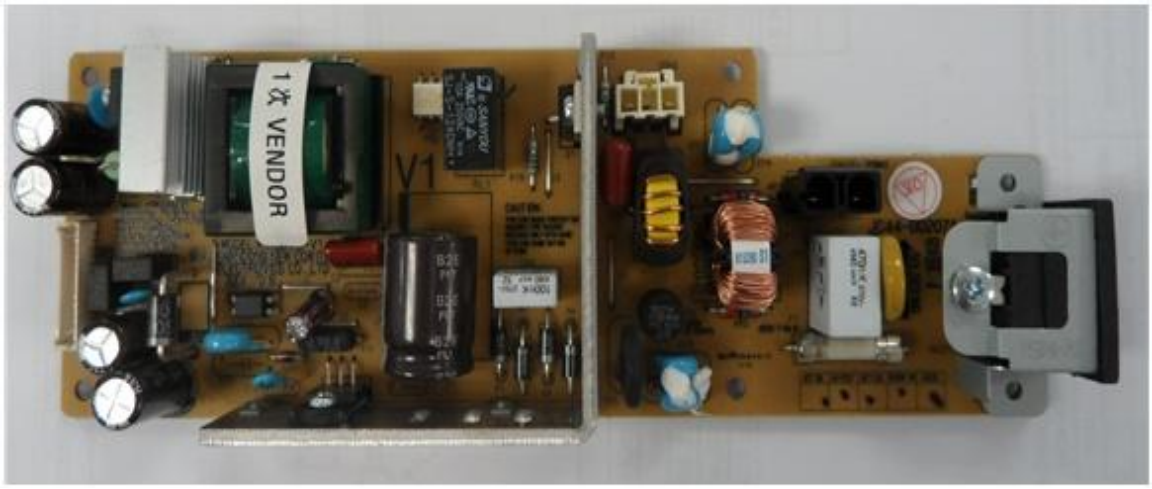


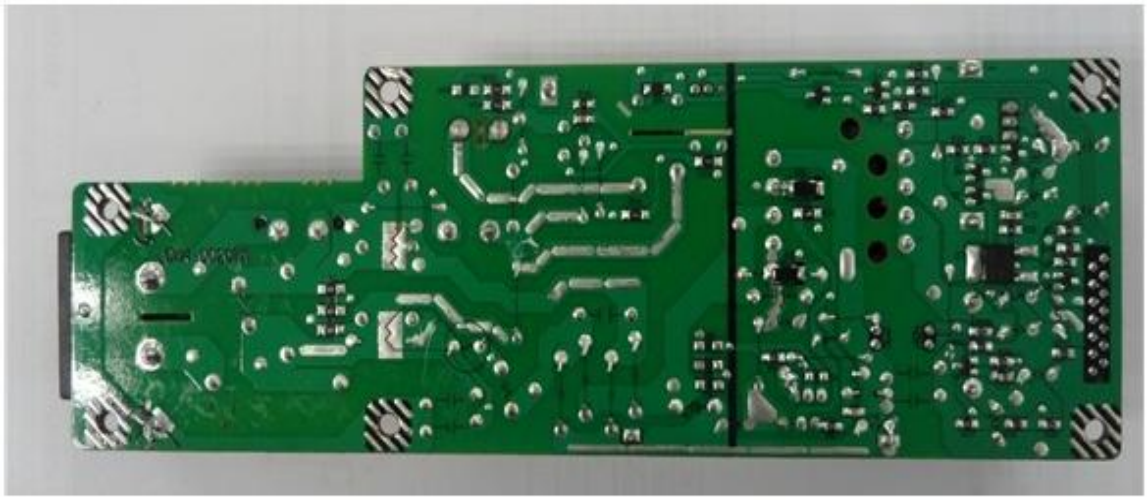
Internal View(left)



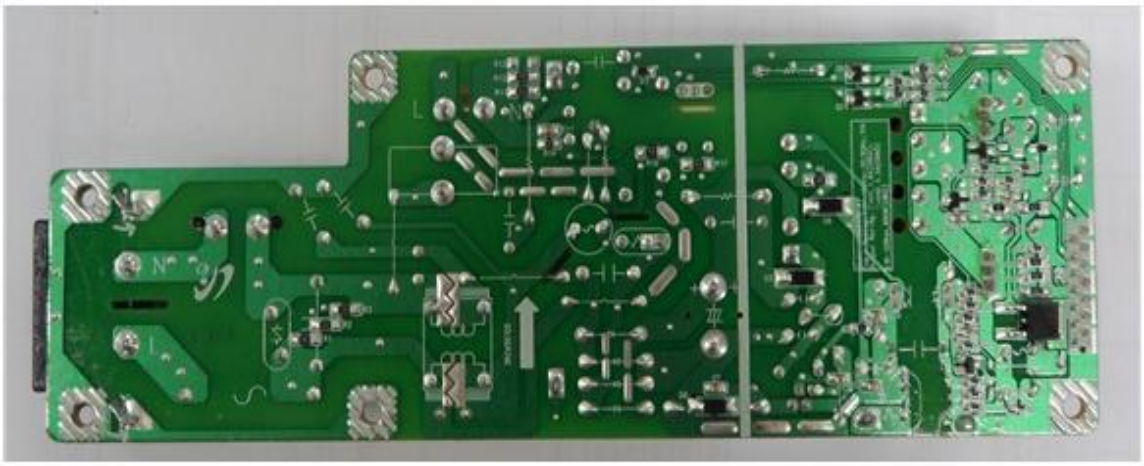
Internal View(right)

Internal View(rear)

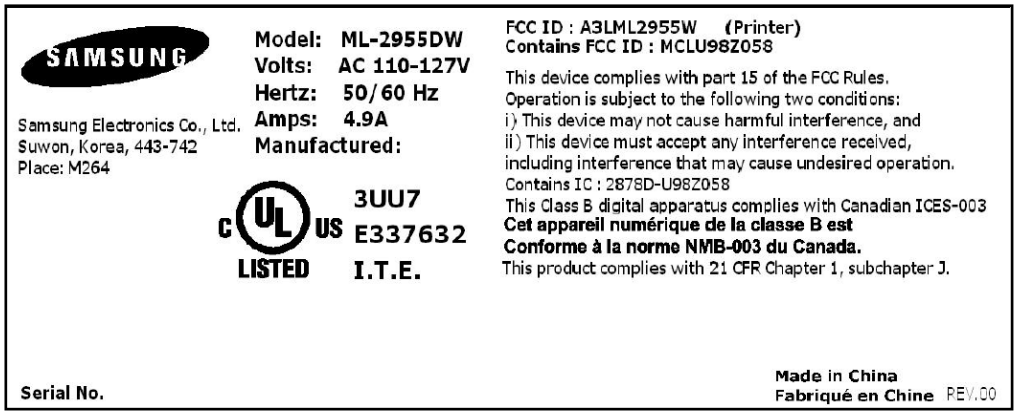




SMPS view of SHANDONG



SMPS view of DONGYANG



Label Rating