

# EMC TEST REPORT

<b>Project No.</b>	LBE073636	<b>Revision No.</b>	None
<b>Applicant</b>	<b>Name of organization</b>	Samsung Electronics Co., Ltd.	
	<b>Address</b>	416 Maetan 3-Dong, Yeongtong-Gu, Suwon-Si, Gyeonggi-Do 443-742 Korea	
	<b>Date of application</b>	2007.11.23	
<b>EUT Equipment Under Test</b>	<b>Type of device</b>	Class B personal computers and peripherals	
	<b>Equipment authorization</b>	<input type="checkbox"/> Declaration of Conformity <input checked="" type="checkbox"/> Certification <input type="checkbox"/> Verification	
	<b>FCC ID</b>	A3LML1640	
	<b>Kind of product</b>	Printer	
	<b>Model No.</b>	ML-1640	
		<b>Variant Model No.</b>	-
<b>Manufacturer</b>	Samsung Electronics (Shandong) Digital Printing Co., Ltd. 264209, Samsung Road, Weihai Hi-Tech. IDZ, Shandong Province, P.R.China		
<b>Applied Standards</b>		FCC Part 15, Subpart B / ANSI C63.4-2003	
<b>Issue date</b>		2007.12.11	

**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.)

<b>Tested by</b> : Young Ju, Ryu  <div style="text-align: center; font-family: cursive;">Y. J. Ryu</div>	<b>Reviewed by</b> : No Cheon, Park  <div style="text-align: center; font-family: cursive;">N. C. Park</div>
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**SEC EMC Laboratory**

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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
<input checked="" type="checkbox"/>	Conducted Disturbance	FCC Part 15 Subpart B	Complied	Meets Class B Limit Minimum margin is 5.8 dB at 4.668 MHz
<input checked="" type="checkbox"/>	Radiated Disturbance		Complied	Meets Class B Limit Minimum margin is 5.7 dB at 31.393 MHz

## 2. General Information

### 2.1 Test facility

The SEC EMC Laboratory 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 SEC EMC Laboratory is operated as testing laboratory in accordance with the requirements of ISO/IEC 17025:2005.

## 2.2 Accreditation and listing

Laboratory Qualifications		Remarks
	KOLAS(Korea Laboratory Accreditation Scheme)	Accredited : 124
	Radio Research Laboratory	Accredited : KR0004
	FCC(Federal Communications Commission)	Accredited : KR0004
	National Voluntary Laboratory Accreditation Program	Lab Code: 200623-0
	Norges Elektriske Materiekkontroll	Accredited : ELA 195
	VCCI (Voluntary Control Council for Interference by Information Technology Equipment)	C-2421,R-2224
	China Quality Certification Center	5-053, 5-054
	TUV Rhineland	H9354285
	GOST(GOSTSTANDART)	ROSTEST
	Elektrotechnicky Zkusebni Ustav	Reg. No.: 001
 Industry Canada	IC(Industry Canada)	Assigned Code: 5871

### 3. Test Setup configuration

#### 3.1 Test Peripherals

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
Printer	ML-1640	-	Samsung	A3LML1640
Note PC	NP-Q20	KRBA5901278A00C F43M00MH	Samsung	A3LNPQ20
AC Adapter	AD-4212A	CNBA44XXXXXXSE 3831L0241	Dongguan Samsung Electro-Mechanics	-
USB Mouse	M-UAE96	LZK61923406	Logitech	DoC
Earphone	-	-	COSY	-

#### 3.2 EUT operating mode

To achieve compliance applied standard specification, the following mode(s) were made during compliance testing:

Operating Mode 1	USB Printing
Operating Mode 2	Standby

#### 3.3 Details of Sampling

Customer selected, single unit.

### 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	-
USB	1.8	Yes	From PC to EUT From PC to Mouse
Audio	1.0	No	From earphone to PC

### 3.5 EUT Description

The following features describe EUT represented by this report:

Item	Specification	Remarks
<b>Processor</b>	Jupiter4e(ARM940T, 150MHz)	-
<b>Standard System memory</b>	8MB SDRAM	-
<b>Resolution</b>	1200x600dpi	-
<b>Copy Quality mode</b>	NA	-
<b>Paper Handling</b>	Paper Tray(standard) 150 Sheets 2nd Tray(optional) : NA Bypass Tray : NA	-
<b>Power Rating</b>	110~127 VAC, 4.0A, 50/60 Hz	-
<b>Power Consumption</b>	Power save mode : 6Watts Printing simplex : 300Watts	-
<b>Printer Language</b>	SPL	-
<b>Interfaces</b>	USB1.1 (Compatible with USB2..0)	-
<b>OS compatibility</b>	Windows 2000 / XP / 2003 / Vista Linux Mac OS 8.6~9.2, 10.1~10.4	-
<b>Modes of Operation</b>	USB Printing	-
<b>Intended Class for Emissions</b>	Class B	-

### 3.6 Clock Frequencies

Kind of Clocks	Frequency[MHz]	Kind of Clocks	Frequency[MHz]
Main Source	12	Video	14.75
CPU Internal	150	SDRAM	75
USB Device	48		

### 3.7 Operating mode 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 printing mode.

- 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	Mains Port	± 2.8 dB
Radiated disturbance	Horizontal	± 5.1 dB
	Vertical	± 5.09 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 mains ports of class A

Frequency range Limits MHz	Limits dB( $\mu$ V)	
	Quasi-peak	Average
0,15 to 0,50	79	66
0,50 to 30	73	60

Note 1: 1  $\mu$ V is regarded as 0 dB.  
 Note 2: If the average limit is met in the measurement with quasi-peak detector, the measurement with average detector at the same frequency is unnecessary.  
 Note 3: The lower limit shall apply at the transition frequency.

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

Frequency range Limits MHz	Limits dB( $\mu$ V)	
	Quasi-peak	Average
0,15 to 0,50	66 to 56	56 to 46
0,50 to 5	56	46
5 to 30	60	50

Note 1: 1  $\mu$ V is regarded as 0 dB.  
 Note 2: The limits shall decrease linearly with the logarithm of the frequency in the range 150 - 500 kHz.  
 Note 3: If the average limit is met in the measurement with quasi-peak detector, the measurement with average detector is unnecessary.  
 Note 4: The lower limit shall apply at the transition frequency.

### 4.1.1 Test instrumentation

Test instrumentation used in the Conducted disturbance test was as follows:

Test instrumentation	Model name	Manufacturer	Serial or Firmware (No./Ver.)	Calibration	
				Date	Interval (Month)
Test Software	EMC 32	R&S	Ver 5.20.2	N/A	N/A
Measuring receiver	ESCI	R&S	100368	2007-06-01	12
Artificial mains network	ENV216	R&S	100117	2007-09-03	12
Artificial mains network	ESH3-Z5	R&S	100262	2007-09-03	12

## 4.1.2 Photograph of the test Configuration

(Front)



(Rear)



### 4.1.3 Test results

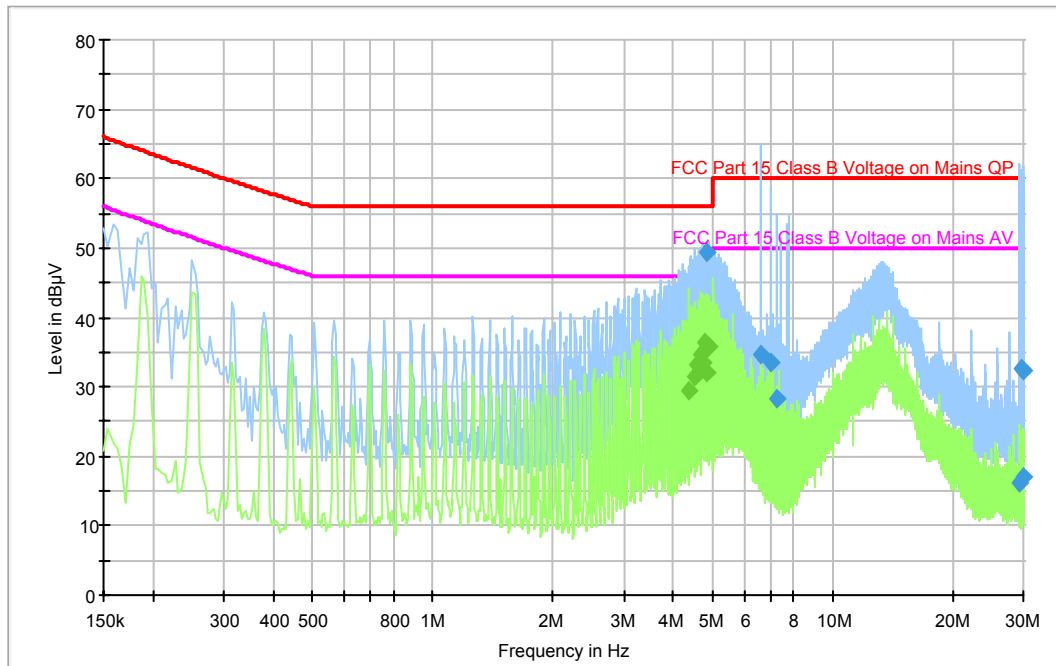
<b>Operating condition</b>	USB Printing			
<b>Test date</b>	2007-11-26	<b>Test engineer</b>	Young Ju, Ryu	
<b>Climate condition</b>	<b>Ambient temperature</b>	24.0 °C	<b>Relative humidity</b>	36 %
	<b>Atmospheric pressure</b>	101.7 kPa		
<b>Test place</b>	Shielded room #1			
<b>Note</b>	* QP : Quasi-peak, AV: Average * Level (QP or AV) = Meter Reading(QP or AV) + Corr.(LISN Insertion loss + Cable loss) * Margin = Limit - Level			

### 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  $\mu$  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 $\mu$ V)	Line	Corr. (dB)	Margin (dB)	Limit (dB $\mu$ V)
4.852 500	49.4	L1	9.8	6.6	56.0
6.600 500	34.7	N	9.9	25.3	60.0
7.028 500	33.4	N	9.9	26.6	60.0
7.232 500	28.3	N	9.9	31.7	60.0
29.287 500	16.3	N	10.4	43.7	60.0
29.556 500	32.6	L1	10.4	27.4	60.0
29.880 500	17.0	N	10.4	43.0	60.0
29.940 500	32.3	L1	10.4	27.7	60.0

## Final Measurement Detector 2

Frequency (MHz)	Average (dB $\mu$ V)	Line	Corr. (dB)	Margin (dB)	Limit (dB $\mu$ V)
4.344 500	29.6	L1	9.8	16.4	46.0
4.532 500	31.6	L1	9.8	14.4	46.0
4.596 500	33.1	L1	9.8	12.9	46.0
4.660 500	34.6	L1	9.8	11.4	46.0
4.716 500	33.4	N	9.8	12.6	46.0
4.784 500	36.5	L1	9.8	9.5	46.0
4.848 500	32.2	L1	9.8	13.8	46.0
4.916 500	35.8	L1	9.8	10.2	46.0

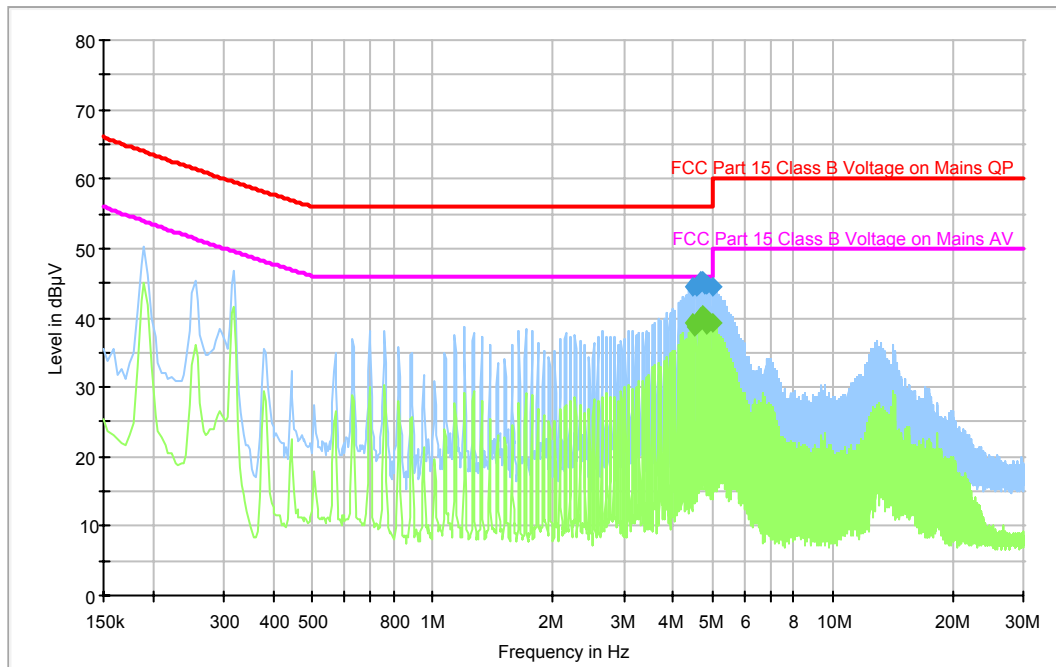
<b>Operating condition</b>	Standby			
<b>Test date</b>	2007-11-26	<b>Test engineer</b>	Young Ju, Ryu	
<b>Climate condition</b>	<b>Ambient temperature</b>	24.0 °C	<b>Relative humidity</b>	36 %
	<b>Atmospheric pressure</b>	101.7 kPa		
<b>Test place</b>	Shielded room #1			
<b>Note</b>	* QP : Quasi-peak, AV: Average * Level (QP or AV) = Meter Reading(QP or AV) + Corr.(LISN Insertion loss + Cable loss) * Margin = Limit - Level			

### 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  $\mu$  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 $\mu$ V)	Line	Corr. (dB)	Margin (dB)	Limit (dB $\mu$ V)
4.480 500	44.6	L1	9.8	11.4	56.0
4.544 500	44.6	L1	9.8	11.4	56.0
4.604 500	44.9	N	9.8	11.1	56.0
4.668 500	45.5	L1	9.8	10.5	56.0
4.732 500	45.5	L1	9.8	10.5	56.0
4.796 500	44.9	N	9.8	11.1	56.0
4.856 500	44.9	L1	9.8	11.1	56.0
4.984 500	44.4	L1	9.8	11.6	56.0

## Final Measurement Detector 2

Frequency (MHz)	Average (dB $\mu$ V)	Line	Corr. (dB)	Margin (dB)	Limit (dB $\mu$ V)
4.480 500	39.2	L1	9.8	6.8	46.0
4.540 500	38.6	N	9.8	7.4	46.0
4.604 500	39.5	N	9.8	6.5	46.0
4.668 500	40.2	L1	9.8	5.8	46.0
4.732 500	40.3	L1	9.8	5.7	46.0
4.796 500	39.5	N	9.8	6.5	46.0
4.856 500	39.1	N	9.8	6.9	46.0
4.984 500	39.3	L1	9.8	6.7	46.0

## 4.2 Radiated disturbance

Of those disturbances above ( $L - 20\text{dB}$ ), 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	Quasi-peak Limits dB dB( $\mu\text{V}/\text{m}$ )	
	Class A	Class B
30 to 230	40	30
230 to 1000	47	37

Note 1: The lower limit shall apply at the transition frequency.  
 Note 2: Additional provisions may be required for cases where interference occurs.  
 Note 3: 1  $\mu\text{V}/\text{m}$  is regarded as 0 dB.

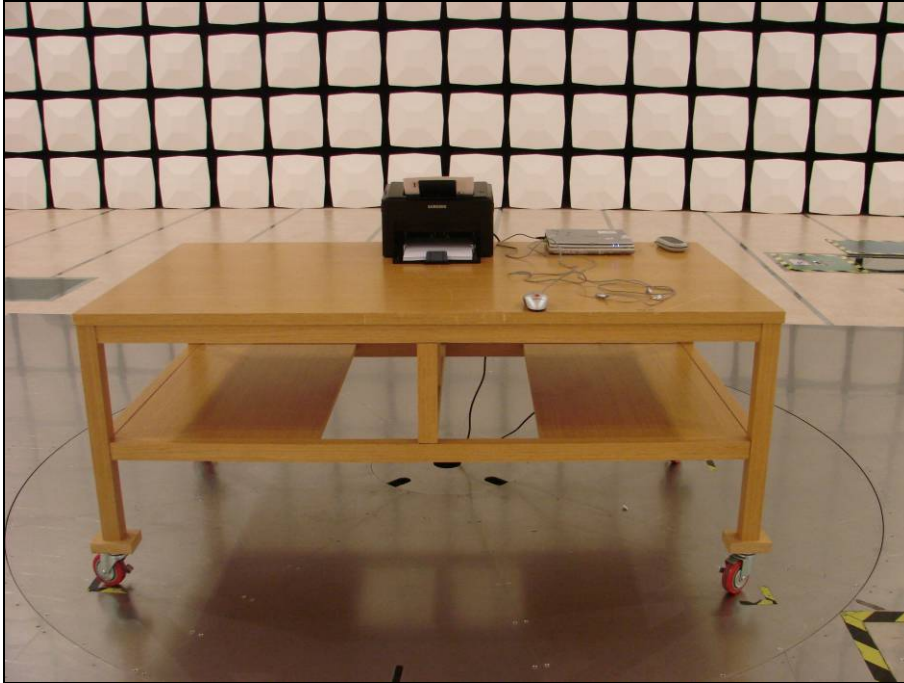
### 4.2.1 Test instrumentation

Test instrumentation used in the Radiated disturbance was as follows:

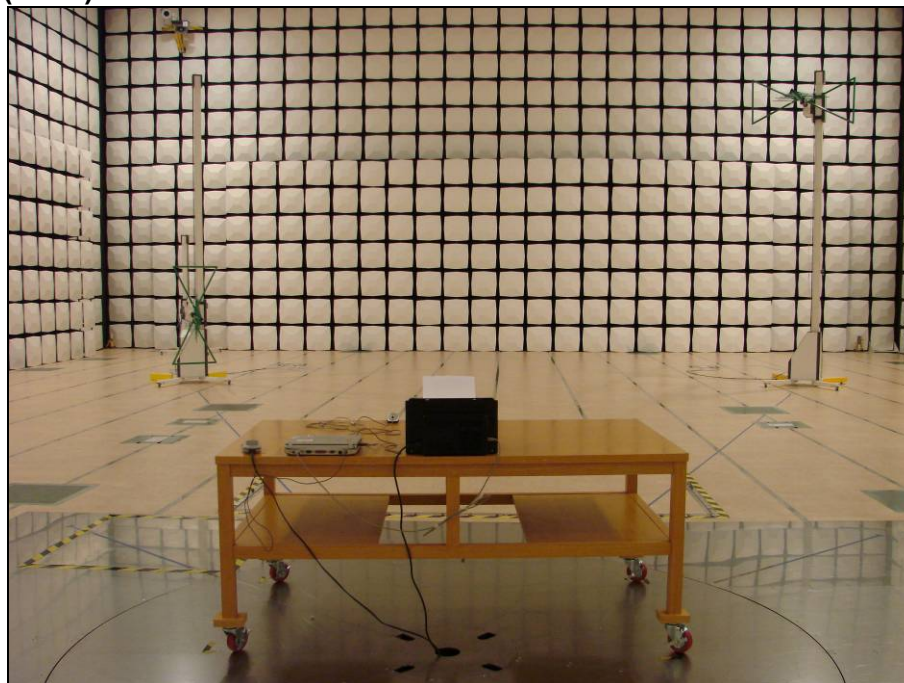
Test instrumentation	Model name	Manufacturer	Serial or Firmware (No./Ver.)	Calibration	
				Date	Interval (Month)
Bi-con Antenna	CBL6112D	SCHAFFNER	22602	2006-06-26	24
Bi-con Antenna	CBL6112D	SCHAFFNER	22601	2007-04-02	24
EMI Receiver	ESIB-26	R&S	100289	2007-03-22	12
EMI Receiver	ESIB-26	R&S	100287	2007-04-10	12
AMPLIFIER	310N	SONOMA	186467	2007-03-17	12
AMPLIFIER	310N	SONOMA	251673	2007-03-17	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
Test software	EP5/RE	TOYO	VER 3.1.20	N/A	N/A
RF Selector	NS4900	TOYO	-	N/A	N/A
HORN ANTENNA	BBHA9120B	SCHWARZBECK	335	2007-01-08	24
HORN ANTENNA	BBHA9120C	SCHWARZBECK	352	2007-03-15	24

## 4.2.2 Photograph of the test Configuration

(Front)

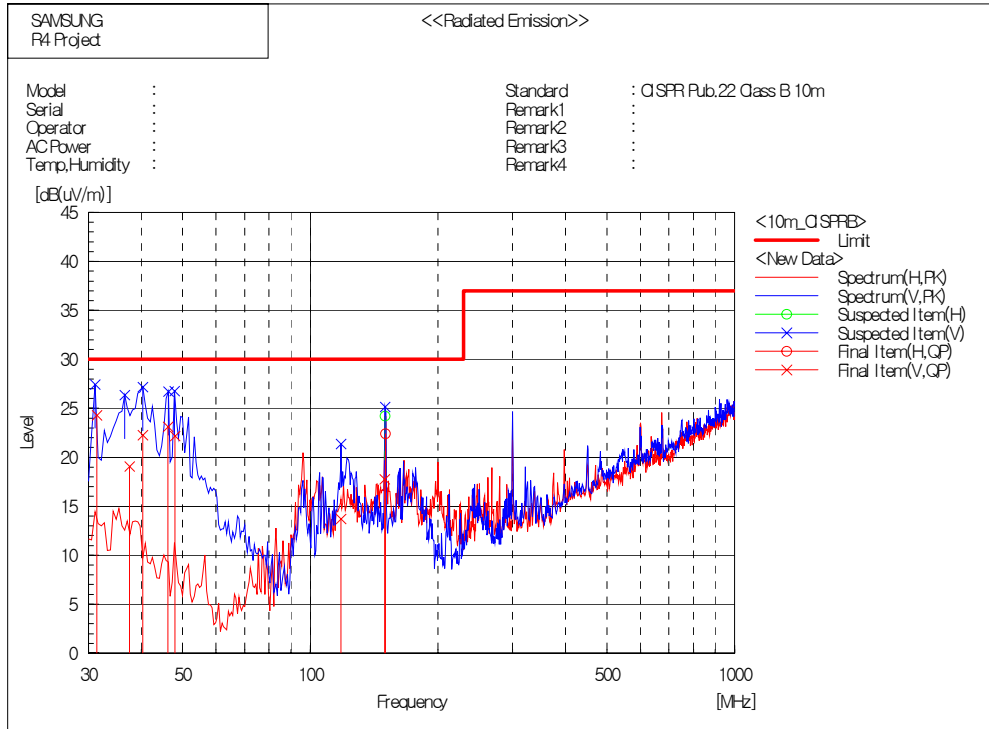


(Rear)



### 4.2.3 Test results ( 30 MHz ~ 1 GHz)

Operating condition	USB Printing			
Test date	2007-11-23	Test engineer	Young Ju, Ryu	
Climate condition	Ambient temperature	22.5 °C	Relative humidity	31 %
	Atmospheric pressure	102.1 kPa		
Test place	10m Semi-Anechoic Chamber #1			
Note	* Receiving antenna mode : Horizontal, Vertical * Test distance : 10 m (RF Semi Anechoic Chamber) * Result = Reading + c.f (Antenna factor + Cable loss- Amp Gain) * Margin = Limit – Result			



Final Result

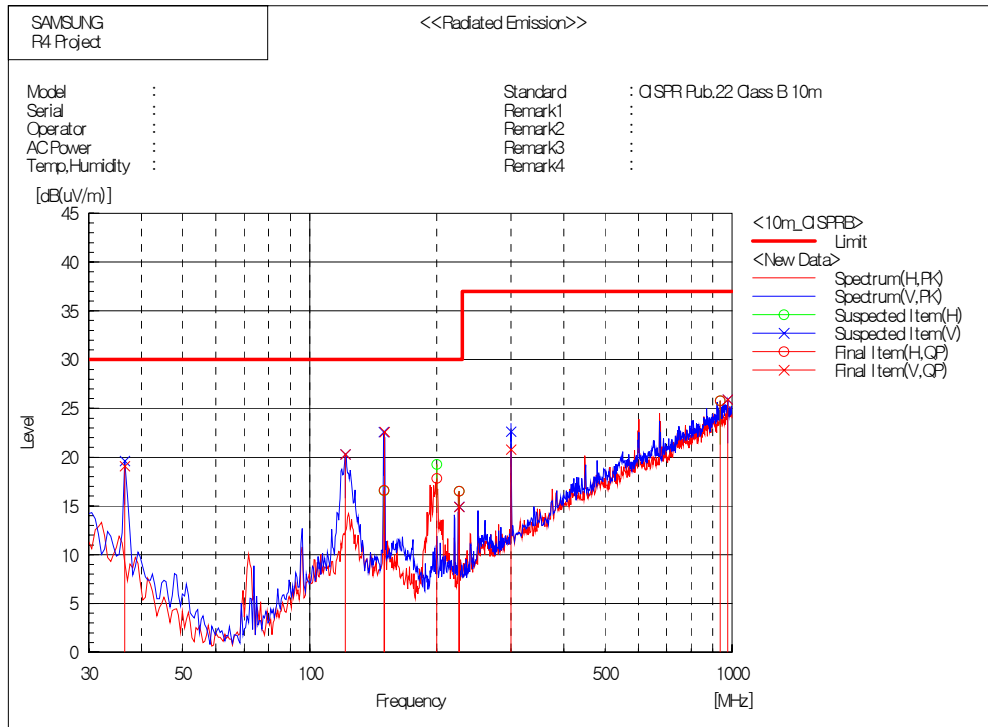
--- Horizontal Polarization (QP)---

No.	Frequency [MHz]	Reading [dB(uV)]	c.f [dB(1/m)]	Result [dB(uV/m)]	Limit [dB(uV/m)]	Margin [dB]	Remark
1	150.307	41.2	-18.8	22.4	30.0	7.6	

--- Vertical Polarization (QP)---

No.	Frequency [MHz]	Reading [dB(uV)]	c.f [dB(1/m)]	Result [dB(uV/m)]	Limit [dB(uV/m)]	Margin [dB]	Remark
1	31.393	38.5	-14.2	24.3	30.0	5.7	
2	37.475	36.3	-17.2	19.1	30.0	10.9	
3	40.294	41.0	-18.7	22.3	30.0	7.7	
4	46.186	44.8	-21.7	23.1	30.0	6.9	
5	48.026	44.7	-22.5	22.2	30.0	7.8	
6	118.196	31.6	-17.9	13.7	30.0	16.3	
7	149.728	36.9	-19.1	17.8	30.0	12.2	

<b>Operating condition</b>	Standby			
<b>Test date</b>	2007-11-23	<b>Test engineer</b>		Young Ju, Ryu
<b>Climate condition</b>	<b>Ambient temperature</b>	22.5 °C	<b>Relative humidity</b>	31 %
	<b>Atmospheric pressure</b>	102.1 kPa		
<b>Test place</b>	10m Semi-Anechoic Chamber #1			
<b>Note</b>	* Receiving antenna mode : Horizontal, Vertical * Test distance : 10 m (RF Semi Anechoic Chamber) * Result = Reading + c.f (Antenna factor + Cable loss- Amp Gain) * Margin = Limit – Result			



Final Result

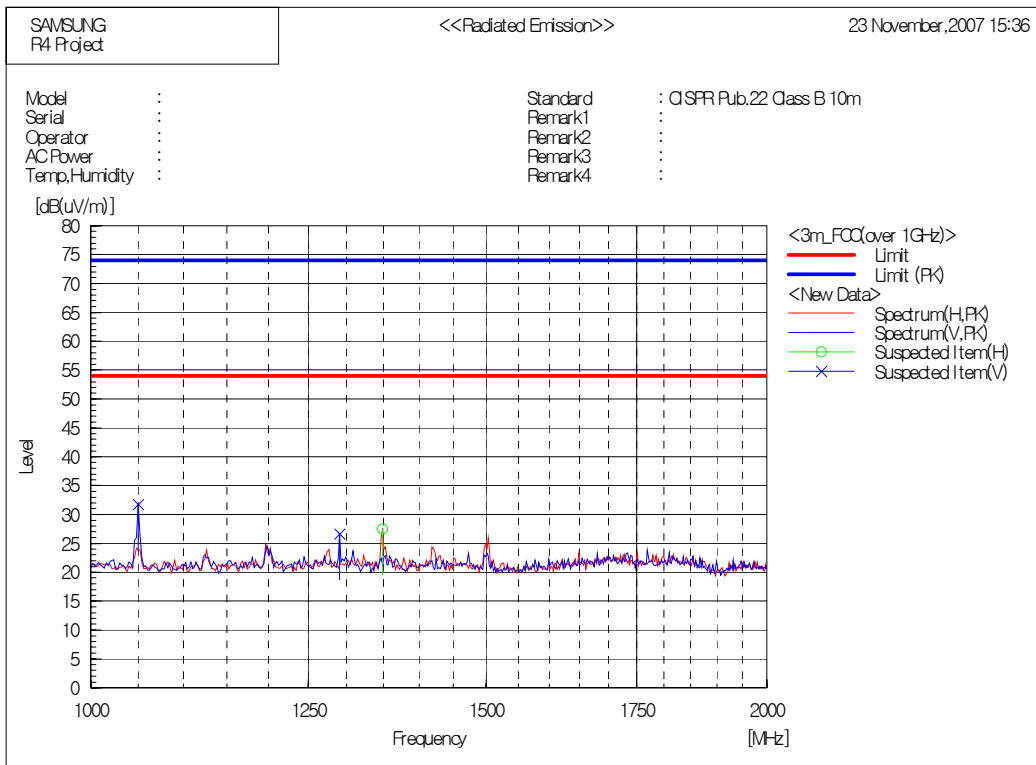
--- Horizontal Polarization (QP)---							
No.	Frequency [MHz]	Reading [dB(uV)]	c.f [dB(1/m)]	Result [dB(uV/m)]	Limit [dB(uV/m)]	Margin [dB]	Remark
1	150.120	35.4	-18.8	16.6	30.0	13.4	
2	199.900	37.6	-19.8	17.8	30.0	12.2	
3	225.872	35.7	-19.2	16.5	30.0	13.5	
4	938.277	28.3	-2.5	25.8	37.0	11.2	

--- Vertical Polarization (QP)---							
No.	Frequency [MHz]	Reading [dB(uV)]	c.f [dB(1/m)]	Result [dB(uV/m)]	Limit [dB(uV/m)]	Margin [dB]	Remark
1	36.493	35.8	-16.7	19.1	30.0	10.9	
2	121.443	38.1	-17.8	20.3	30.0	9.7	
3	150.339	41.7	-19.1	22.6	30.0	7.4	
4	225.872	33.9	-19.0	14.9	30.0	15.1	
5	299.459	35.4	-14.6	20.8	37.0	16.2	
6	976.152	27.2	-1.3	25.9	37.0	11.1	

### 4.2.4 Test results ( 1 GHz ~ 2 GHz)

Operating condition	USB Printing			
Test date	2007-11-23	Test engineer	Young Ju, Ryu	
Climate condition	Ambient temperature	22.5 °C	Relative humidity	31 %
	Atmospheric pressure	102.1 kPa		
Test place	10m Semi-Anechoic Chamber #1			
Note	* 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			



Spectrum Selection

--- Horizontal Polarization ---

No.	Frequency [MHz]	Reading [dB(uV)]	c.f [dB(1/m)]	Result PK [dB(uV/m)]	Limit [dB(uV/m)]	Margin [dB]	Remark
1	1348.697	38.4	-10.9	27.5	54.0	26.5	

--- Vertical Polarization ---



No.	Frequency [MHz]	Reading [dB(uV)]	c.f [dB(1/m)]	Result PK [dB(uV/m)]	Limit [dB(uV/m)]	Margin [dB]	Remark
1	1050.100	44.1	-12.3	31.8	54.0	22.2	
2	1290.581	37.9	-11.2	26.7	54.0	27.3	



## Label Location



## Label

 Samsung Electronics Co., Ltd. Suwon, Korea, 443-742 Place:M264	Model No.:	ML-1640	FCC ID:A3LML1640
	Voltz:	AC 110-127V	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.
	Hertz:	50/60Hz	This Class B digital apparatus complies with Canadian ICES-003
	Amps:	4.0A	<b>Cet appareil numérique de la classe B est Conforme à la norme NMB-003 du Canada.</b>
	Manufactured:		This product complies with 21 CFR Chapter 1, subchapter J.
		51Y7 E149091 I.T.E.	
S/N			MADE IN CHINA REV.00