

EMI TEST REPORT

According to FCC Part 15 Subpart B/Class B

Product : CD-RW/DVD DRIVE

Model No. : SM-352(Ver.B)

FCC ID : A3LSM352

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

Date of test : January 23, 2003 ~ January 24, 2003

Issued Date : February 4, 2003

Tested by:

Jin Hwan, Jung/ Test Engineer

Reviewed by:

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NVLAP Code: 200447

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Distribution

This test report has been made available as follows:

CS Management Center, EMC Laboratory	1 original
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1. General Information

Applicant : **Samsung Electronics Co., Ltd.**
Digital Media Network, OMS Division

Full Address : **416 Maetan 3 Dong, Paldal-Ku,**
Suwon City, Kyungki Do, Korea, 442-742

Kind of Product : **CD-RW/DVD DRIVE**

FCC ID : **A3LSM352**

Project Name : **-**

Model & Variant Names : **SM-352(Ver.B)**
(Brand Name: Samsung)

Test Report Produced by : Jin Hwan, Jung/ 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.

The system was pre-tested using the below additional components, and we found worst emission level for the components, were selected as the final components for the test.

Component	Brand and Model Name	Remark
Computer	Pavilion 8871	Compaq
LCD Monitor	CX151S	Samsung
Mouse	M-U48a	Logitech
Key-Board	SDM4540UL	Compaq
Ear-Phone	-	Sony
Printer	BJC-50	CANON
AC Adapter	K30088	TABUCHI
CD-RW/DVD Drive	SM-352(Ver.B)	EUT/Samsung

And then the system was tested with the configuration of clause 1.4

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 :

- 1. Resonator : 33.86Mhz
- 2. HFM : 250~300 Mhz

3) Description of Testing operating mode

Operating Mode	Operating section of EUT
CD-ROM MODE CD-R MODE CD-RW MODE DVD-ROM MODE	CD-ROM MODE
	Continuously Audio CD playing by EUT

4) Manufacturer : SAMSUNG Electronics Co., Ltd.

1.2 Configuration of EUT and peripherals

Mark	Item	Model No.	Serial No.	Manufacturer	FCC ID
A	CD-RW/DVD DRIVE	SM-352(Ver.B)	None	Samsung	EUT
B	D/T PC	Pavilion 8871	KR11106864	HP	-
C	Printer	BJC-50	CLG010600281	CANON	-
D	LCD Monitor	CX151S	N192H4LT105171	Samsung	-
E	USB Key-Board	SDM4540UL	B354ALP0BL1VKW	Compaq	-
F	USB Mouse	M-U48a	LZE95183958	Logitech	-
G	AC Adapter	K30088	CLG010600281	TABUCHI	-
H	Ear-Phone	None	None	Sony	-

1.3 Used Cable Description

No.	Item	Length[m]	Shielded (Y/N)	Remark
1	AC Power Cable	1.7	N	-
2	Monitor Cable	1.2	Y	-
3	Mouse Cable	1.2	N	-
4	Key-Board Cable	1.2	N	-
5	AC Power Cable	1.7	N	-
6	Ear-Phone Cabe	0.7	N	-
7	AC Power Cable	1.7	N	

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)



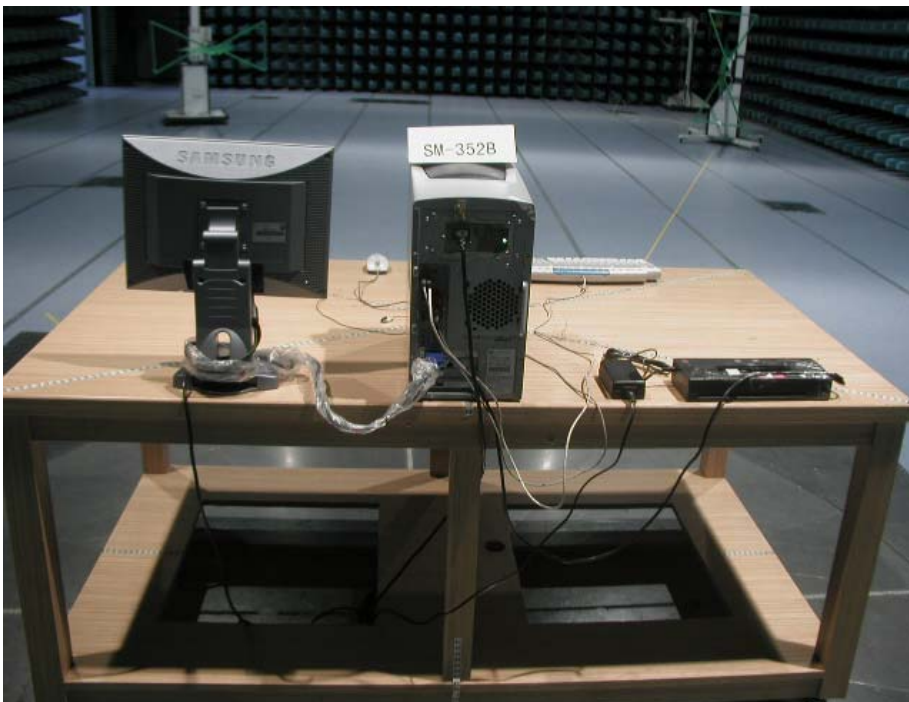
2)Conduction(Rear View)



3) Radiation(Front View)



4) Radiation(Rear View)



2.2 Operation Environment

	Conduction	Radiation
Temperature [C] :	24.7	13.2
Humidity [%]	28	30
Power supply	: AC120V/60Hz	AC120V/60Hz

2.3 Test Procedure

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.

The explanation of measuring instrument setup when respective function is used in any frequency band is as following:

Frequency Band [MHz]	Instrument	Detector fuction	resolution Bandwidth	Video Bandwidth
30 to 1000	Spectrum analyzer	Peak	1MHz	1MHz
	EMI Test receiver	Quasi-Peak	120kHz	-

3. Conducted Emission Test Data

O Test Data Sheet

Frequency [MHz]	Meter reading (a)		Total Loss (b) [dB]	Results (a) + (b)		Limits		Margin (Limits-Result)	
	QP	AV		QP	AV	QP	AV	QP	AV
	[dBuV]			[dBuV]		[dBuV]		[dB]	
0.220	50.3	-	0.6	51.0	-	62.8	52.8	11.9	-
0.330	39.2	-	0.5	39.7	-	59.5	49.5	19.7	-
0.439	34.1	-	0.5	34.6	-	57.1	47.1	22.5	-
0.548	33.2	-	0.6	33.9	-	56.0	46.0	22.1	-
0.658	35.1	-	0.5	35.6	-	56.0	46.0	20.4	-
0.767	33.0	-	0.5	33.5	-	56.0	46.0	22.5	-
0.986	32.7	-	0.7	33.3	-	56.0	46.0	22.7	-
1.099	35.5	-	0.7	36.2	-	56.0	46.0	19.8	-
1.537	31.7	-	0.6	32.3	-	56.0	46.0	23.7	-
26.259	27.2	-	2.1	29.3	-	60.0	50.0	30.7	-
27.451	35.1	-	2.1	37.2	-	60.0	50.0	22.8	-
27.771	35.6	-	2.3	37.8	-	60.0	50.0	22.2	-
28.638	34.1	-	2.3	36.4	-	60.0	50.0	23.6	-

* QP : Quasi-peak, AV: Average

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

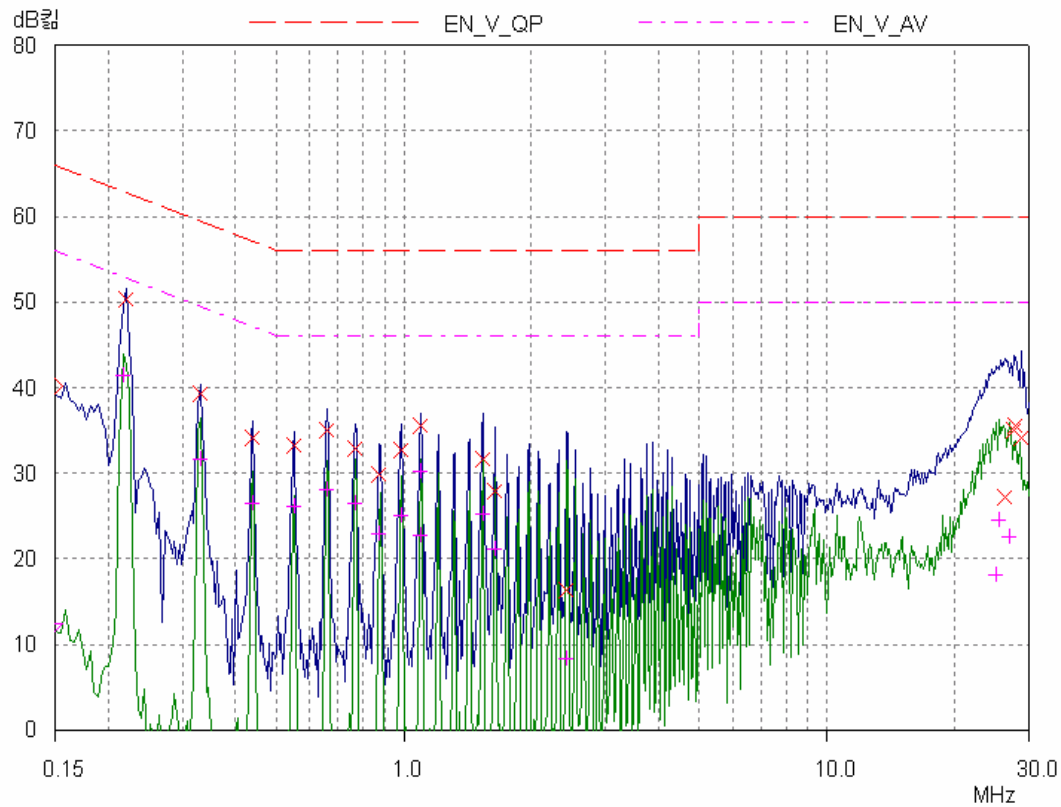
**"-":The Quasi-peak reading value also meets average limit so it is not necessary to measure with Average detector

* Measurement detector function and bandwidth

Detector function : CISPR quasi-peak

Bandwidth : 9kHz

3-1. Conducted Emission Test Graph



4. Radiated Emission Test Data

Frequency Range	Tested Frequency	ANT Pol.	Meter Reading [A]	Total Loss [B]	Antenna Height [Cm]	Turn table Degree [Deg]	Results [A+B]	Limits at 10m [dBuV/m]	Margin (Limit-Result) [dB]
[MHz]	[MHz]		[dBuV/m]	[dB]	[Cm]	[Deg]	[dBuV/m]	[dBuV/m]	[dB]
30 - 230	83.99	V	13.9	9	150	28	22.9	30.0	7.1
	144.01	H	11.6	12.2	400	59	23.8		6.2
	144.02	H	10.9	12.2	350	71	23.1		6.9
	156.76	H	10.9	11.8	400	18	22.7		7.3
	168.82	H	9.4	11.1	399	260	20.5		9.5
	184.56	V	15.1	10.4	100	161	25.5		4.5
	221.48	V	11.9	10.8	100	139	22.7		7.3
	228.01	V	9.2	11.6	100	139	20.8		9.2
230 - 1000	295.30	V	15.2	15.8	100	59	31.0	37.0	6.0
	298.52	V	9.3	15.8	100	73	25.1		11.9
	369.14	V	11.7	17.9	400	40	29.6		7.4
	624.10	V	6.3	23.1	400	27	29.4		7.6
	786.40	V	5.1	24.5	269	35	29.6		7.4
	895.21	V	5.3	25.1	140	30	30.4		6.6

* "<" 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)

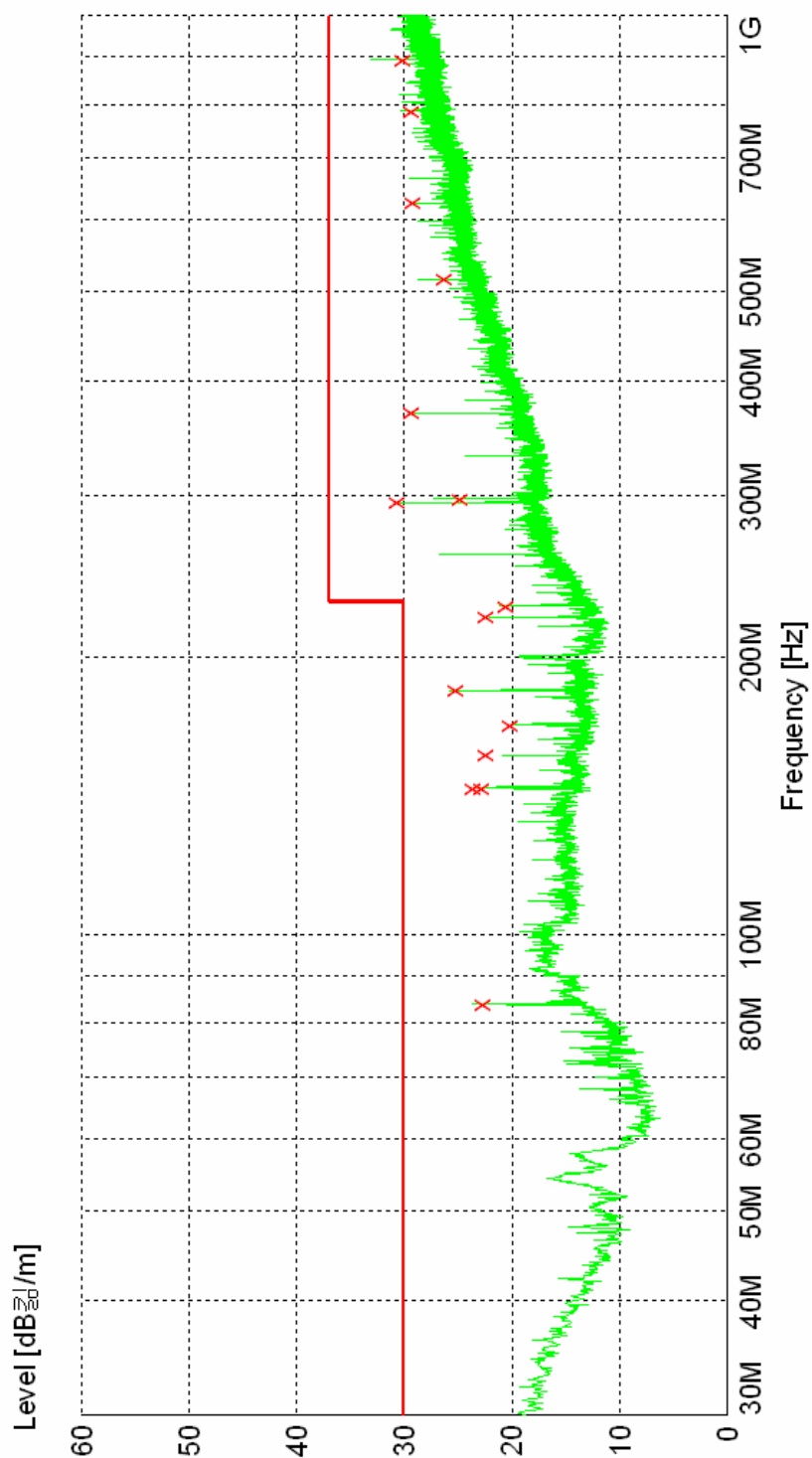
Resolution Bandwidth : 120kHz(Above 1000MHz: 1MHz)

* Test distance

- Below 1000MHz: 10m(Quasi-peak)

- Above 1000MHz: 3m(Peak)

4-1. Radiated Emission Test Graph



5. FCC Label Configuration and Location

5.1 Label Configuration

SAMSUNG		CD-RW/DVD DRIVE SM-352	
5V === 1.2A 12V === 1.5A	FCC ID : A3LSM352	D33020	
This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) This device must accept any interference received, including interference that may cause undesired operation. PRODUCT IS CERTIFIED BY THE MANUFACTURER TO COMPLY WITH DHHS RULES 21CFR CHAPTER 1, SUBCHAPTER J APPLICABLE AT DATE OF MANUFACTURE. THIS PRODUCT IS NOT INTENDED FOR SALE IN KOREA, A/S IN KOREA MUST BE PAID FOR. (본 제품은 한국의 지역 판매용으로 한국내에서는 유상 A/S 처리됩니다.)		CLASS 1 LASER PRODUCT APPAREIL A LASER DE CLASSE 1 LASER SCHUTZ KLASSE 1 PRODUKT NACH IEC 60825	CAUTION INVISIBLE LASER RADIATION WHEN OPEN. AVOID EXPOSURE TO BEAM. CAUTION RADIATIONS INVISIBLES DU LASER EN CAS D'OUVERTURE. EVITER TOUTE EXPOSITION AU FAISCEAU. WARNING OSYNLIG LASER STRÅLNING NÄR DENNA DEL ÄR ÖPPNAD. STRÅLEN ÄR FARLIG.
US 5,060,220 US 5,581,716 US 5,703,862 US 5,909,424 US 6,091,891 US 6,222,812 US 6,259,868 US 6,272,096 US 6,147,956		VCCI SAMSUNG ELECTRONICS CO., LTD. 416, Maetan-3Dong, Paldal-Gu, Suwon City, Kyungki-Do, 442-742, Korea	
FACTORY ID : SEC MADE IN KOREA		BG68-XXXXA Rev.00	

5.2 Location of Label



6. Test Equipment Used

Equipment	Model No.	Makers.	Serial No	Last Calibration and Interval
Field strength meter	ESCS30	830986/004	R & S	2002-02-15, 12Months
	Firmware versions : Main 2.22, OTP 02.01, GRA 02.36			
Test Receiver	ESI26	100010	R&S	2002-05-04, 12Months
L.I.S.N	ESH3-Z5	831887/0004	R & S	2002-08-06, 12Months
Biconilog Antenna	CBL6112B	2804	SCHAFFNER	2002-04-23, 12Months
L.I.S.N	3810/2NM	EMCO	2251	2002-05-07, 12Months