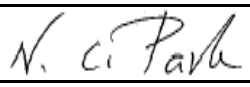
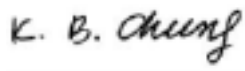
EMC Test Report

Project No.		**LBE032550**
Equipment under Test		
	Applicant	Samsung Electronics Co.Ltd 416 Maetan-3 Dong, YoungTong-Ku, Suwon City, Gyeonggi-Do, Korea, 442-742
	FCC ID	**A3L2004KAISER**
	Product Name	**Video Cassette Recorder**
	Model Name	**DVD-V4600**
	Manufacturer	Samsung Electronics Co. Ltd
	Brand Name	SAMSUNG
	Variant Model	See Page 2
Issued Date		30-Dec-03

Applied Standards	**FCC Part 15**
Result	**Passed** The equipment under test has found to be compliant with the applied standards.

	Name/Position	**Signature**
Tested by	Tae Young, Jang Test Engineer	
Reviewed by	No Cheon, Park Manager of EMC Lab.	
Authorized by	Kyu Baek, Chung Chief of EMC Lab.	

SAMSUNG ELECTRONICS Co., Ltd. **SUWON EMC Test 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

	Address	416 Maetan-3 Dong, Paldal-Ku, Suwon City, Kyungki-Do,Korea, 442-742
	Telephone No.	82-31-200-2135
	Fax No.	82-31-200-2189

1. General Information

1.1 Basic Information related Product

Applicant	Samsung Electronics Co. Ltd	
Product name	Video Cassette Recorder	
Model name	DVD-V4600	
Brand Name	SAMSUNG	
Manufacturer	Samsung Electronics Co. Ltd	
Variant Models	None	
Type of RF Output Connector	Type "F" Connector 75 ohm(Unbalanced)	
FCC ID Number	A3L2004KAISER	
Operating (RF Modulator) Frequency	CH. 3	Visual Carrier : 61.25 MHz
		Aural Carrier : 65.75 MHz
	CH. 4	Visual Carrier : 67.25 MHz
		Aural Carrier : 71.75 MHz

1.2 Power Input Ports

Description	Voltage(V)	Frequency(Hz)	No of phases
Mains Cable	120V	60Hz	1

1.3 EUT & Support Equipment

Used EUT and Peripherals

Mark	Item	Model No.	Serial No.	Manufacturer	Remark
A	Video Cassette Recorder	DVD-V4600	-	SAMSUNG	EUT
B	Remote Controller	-	-	SAMSUNG	EUT

Used Cable Description

No.	Item	Length[m]	Shielded	Remark
1	AC Power Cable	1.5	N	to the mains
2	AV In Cable	1.2	N	Terminated video : 75 ohm Audio In : 1k ohm
3	AV Out Cable	1.2	N	Terminated video : 75 ohm Audio In : 10k ohm
4	Front AV In Cable	1.2	N	Terminated video : 75 ohm Audio In : 1k ohm
5	RF In Cable	1.5	Y	75 ohm Terminated
6	RF Out Cable	1.2	Y	75 ohm Terminated
7	Component	1.2	N	Terminated video : 75 ohm Audio In : 1k ohm

1.4 Operating Mode and Conditions

The EUT was tested in the following operating modes(at both channel 3 and 4) for the tests mention in this report :

1) Recording (NTSC Signal)

A NTSC signal(Color bar) was supplied at ch.5(77.25MHz) through the ant. Input connector for recording.

2) Recording (1V VITS Signal)

A 1V peak-to-peak VITS signal was supplied through the video input connector for recording.

3) Recording (5V VITS Signal)

A 5V peak-to-peak VITS signal was supplied through the video input connector for recording.

4) VCR Play

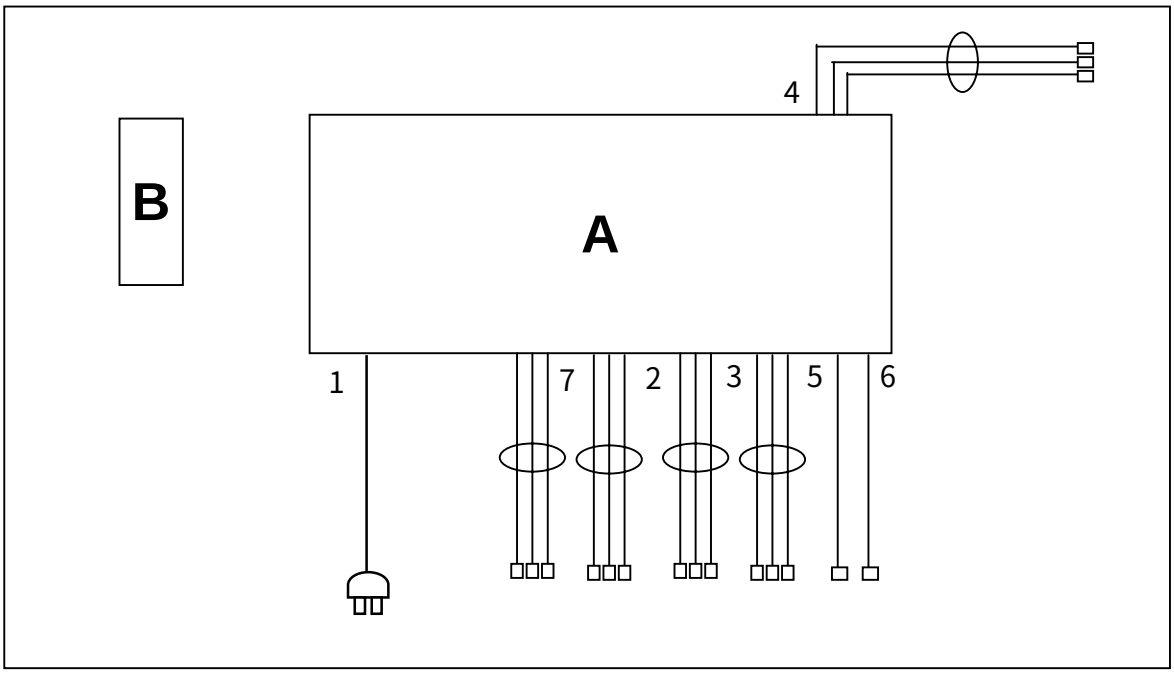
In this test mode, a video tape recorded with VITS signal was played on the EUT.

Note : Recording(NTSC Signal) mode is not applicable to the antenna transfer switch test.

5) DVD Play

In this test mode, a video tape recorded with VITS signal was played on the EUT.

1.5 Block Diagram



1.6 Test Facility

General Information

The EMI/EMS measurement facilities used to collect the tested data are located at 416 Maetan 3 Dong, Youngtong-Ku, Suwon City, Gyeonggi-Do, Korea.

This sites are constructed in conformance with the requirements of ANSI C63.4 and CISPR 16-1 & 16-2.

SAMSUNG Electronics Co.,Ltd 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)

Accreditation and Listing

Reg. No. 124

Reg. No. KR0004

No.195

App. No.001

LAB CODE 200623-0

Reg. No.98856

R-1221,C-1095

H9354285

1.7 Applied Standards

List

FCC Rule Part(s)	Test Procedure(s)
FCC Part 15 Subpart B	ANSI C63.4-2001
	-
	-

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	Result
Electromagnetic Emission Test			
3.1	AC Powerline Conducted Emission Measurement	FCC Part 15	Complied
3.2	Radiated Emission Measurement	FCC Part 15	Complied
3.3	Output Signal Level Measurement	FCC Part 15	Complied
3.4	Output Terminal Conducted Spurious Emission Measurement	FCC Part 15	Complied
3.5	Antenna Transfer Switch Measurement	FCC Part 15	Complied

*** N/A : Test not applicable**

3. Description of Individual Tests

3.1 AC Powerline Conducted Emission Measurement

Test Information	
Test Engineer	Tae Young, Jang
Test Date	24-Dec-03
Climate Condition	Ambient Temperature : 23.0℃, Relative Humidity : 27%
Test Place	Shield Room #5

Test Equipments

Equipment	Model Name	Manufacturer	Serial No.	Calibration Date
TEST RECEIVER	ESI26	R & S	839809/002	2004-11-04
LISN	ESH3-Z5	R & S	847265/028	2004-07-16
LISN	ESH3-Z5	R & S	100261	2004-07-16
10dB Attenuator	8491A	AGILENT	2708A52512	2004-10-08
Test Software	EP5/CE	TOYO	Version : 2.0.860	N/A

Test Setup

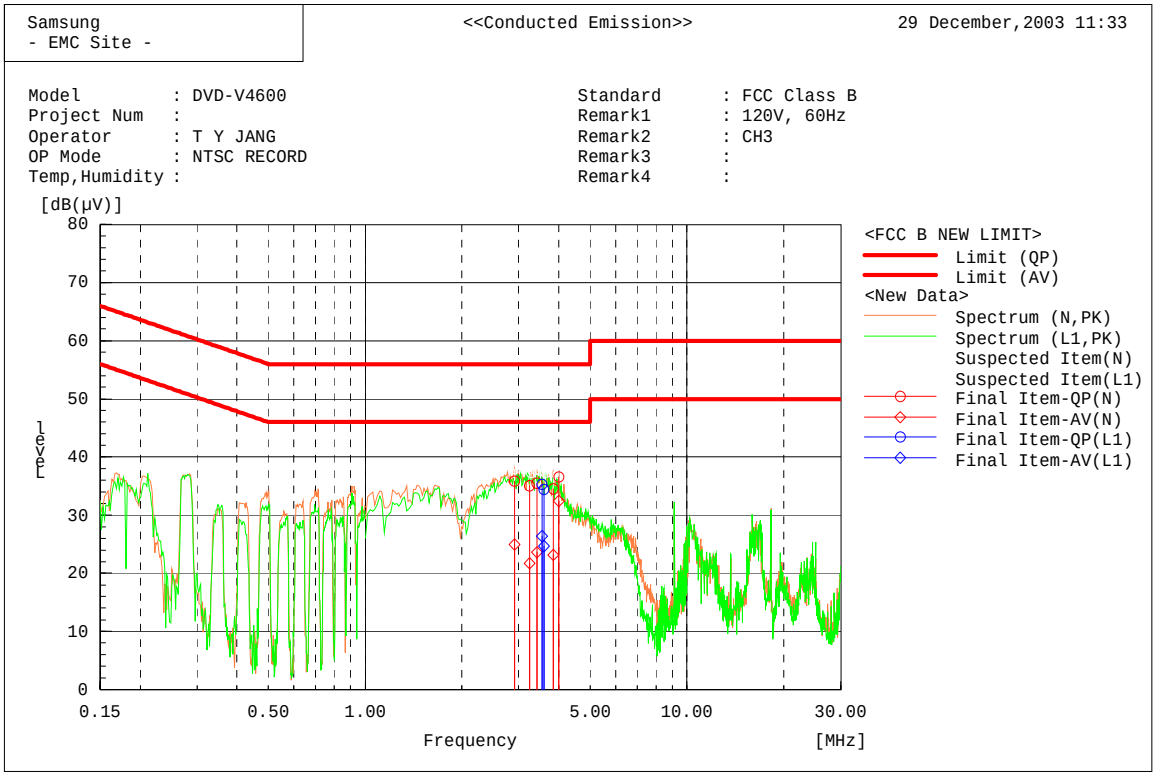
EUT was placed on a platform of nominal size, raised 80cm above the conducting ground plane. The rear of table top was located 40cm to the vertical conducting plane. The rear of EUT was aligned and flushed with rear of tabletop. All other surfaces of tabletop was at least 80cm from any other grounded conducting surface. All unused 50 ohm connectors of the LISN were resistively terminated in 50 ohm when not connected to the measuring equipment
See photo.

Test Result

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

Test Graph & Data

*** Operating Mode : Recording (NTSC Signal)** **RF Out Channel : CH.3**



Final Result

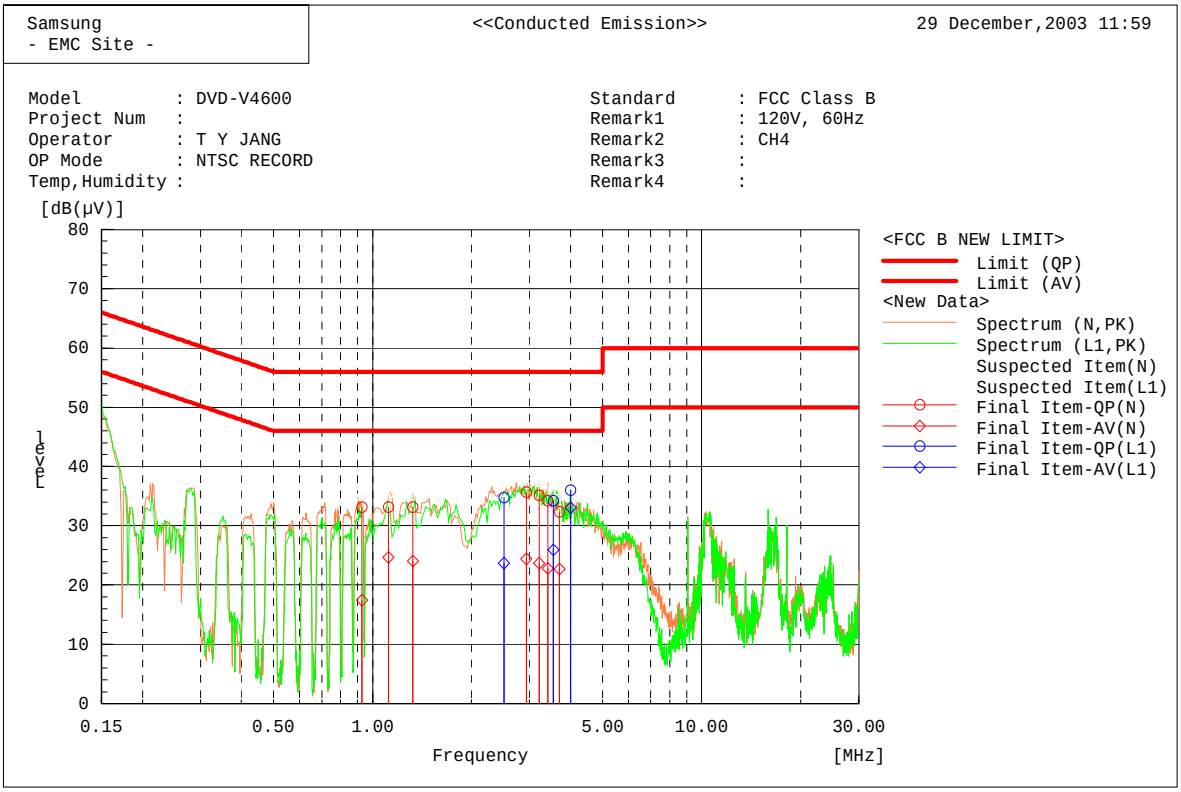
--- N Phase ---

No.	Frequency [MHz]	Reading QP [dB(µV)]	Reading AV [dB(µV)]	c.f [dB]	Result QP [dB(µV)]	Result AV [dB(µV)]	Limit QP [dB(µV)]	Limit AV [dB(µV)]	Margin QP [dB]	Margin AV [dB]
1	2.9166	35.8	24.8	0.1	35.9	24.9	56.0	46.0	20.1	21.1
2	3.24035	34.9	21.7	0.1	35.0	21.8	56.0	46.0	21.0	24.2
3	3.41656	35.3	23.5	0.1	35.4	23.6	56.0	46.0	20.6	22.4
4	3.84889	34.4	23.0	0.1	34.5	23.1	56.0	46.0	21.5	22.9
5	4.00057	36.5	32.4	0.1	36.6	32.5	56.0	46.0	19.4	13.5

--- L1 Phase ---

No.	Frequency [MHz]	Reading QP [dB(µV)]	Reading AV [dB(µV)]	c.f [dB]	Result QP [dB(µV)]	Result AV [dB(µV)]	Limit QP [dB(µV)]	Limit AV [dB(µV)]	Margin QP [dB]	Margin AV [dB]
1	3.54805	35.2	26.3	0.1	35.3	26.4	56.0	46.0	20.7	19.6
2	3.5953	34.3	24.6	0.1	34.4	24.7	56.0	46.0	21.6	21.3

*** Operating Mode : Recording (NTSC Signal)** **RF Out Channel : CH.4**



Final Result

--- N Phase ---

No.	Frequency [MHz]	Reading QP [dB(μV)]	Reading AV [dB(μV)]	c.f [dB]	Result QP [dB(μV)]	Result AV [dB(μV)]	Limit QP [dB(μV)]	Limit AV [dB(μV)]	Margin QP [dB]	Margin AV [dB]
1	0.92806	33.0	17.3	0.1	33.1	17.4	56.0	46.0	22.9	28.6
2	1.11805	33.0	24.6	0.1	33.1	24.7	56.0	46.0	22.9	21.3
3	1.3251	33.0	23.9	0.1	33.1	24.0	56.0	46.0	22.9	22.0
4	2.93248	35.5	24.3	0.1	35.6	24.4	56.0	46.0	20.4	21.6
5	3.20789	35.0	23.6	0.1	35.1	23.7	56.0	46.0	20.9	22.3
6	3.41025	34.1	22.7	0.1	34.2	22.8	56.0	46.0	21.8	23.2
7	3.69143	32.3	22.6	0.1	32.4	22.7	56.0	46.0	23.6	23.3

--- L1 Phase ---

No.	Frequency [MHz]	Reading QP [dB(μV)]	Reading AV [dB(μV)]	c.f [dB]	Result QP [dB(μV)]	Result AV [dB(μV)]	Limit QP [dB(μV)]	Limit AV [dB(μV)]	Margin QP [dB]	Margin AV [dB]
1	2.50448	34.7	23.6	0.1	34.8	23.7	56.0	46.0	21.2	22.3
2	3.54786	34.1	25.8	0.1	34.2	25.9	56.0	46.0	21.8	20.1
3	4.00039	36.0	33.0	0.1	36.1	33.1	56.0	46.0	19.9	12.9

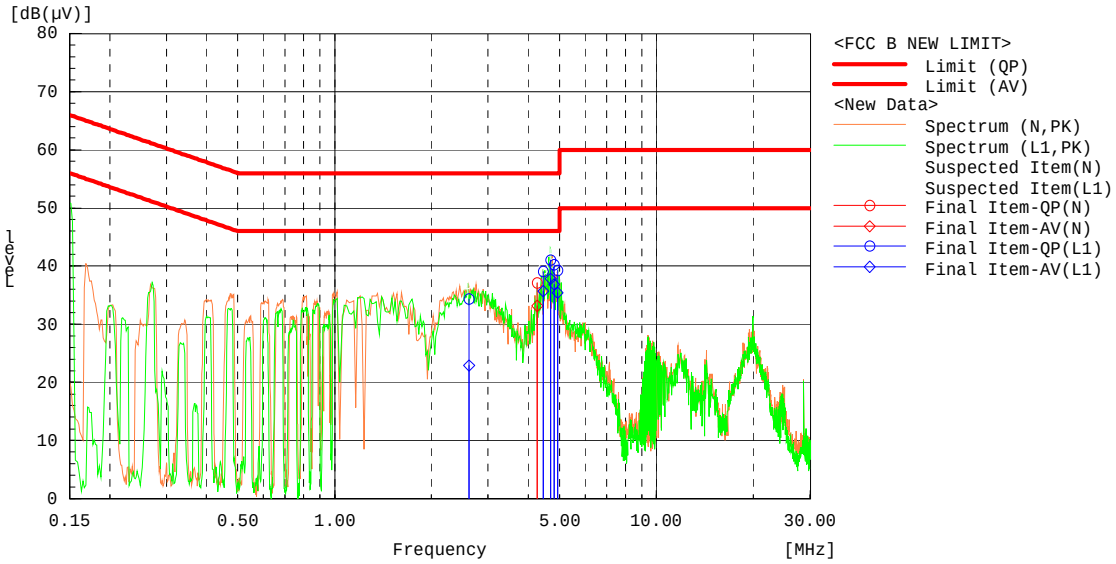
*** Operating Mode : Recording (1V VITS Signal)** **RF Out Channel : CH.3**

Samsung
- EMC Site -

<<Conducted Emission>> 24 December,2003 10:37

Model : DVD-V4600
Project Num :
Operator : T Y JANG
OP Mode : 1V VITS Recording
Temp,Humidity :

Standard : FCC Class B
Remark1 : 120V, 60Hz
Remark2 : CH3
Remark3 :
Remark4 :



Final Result

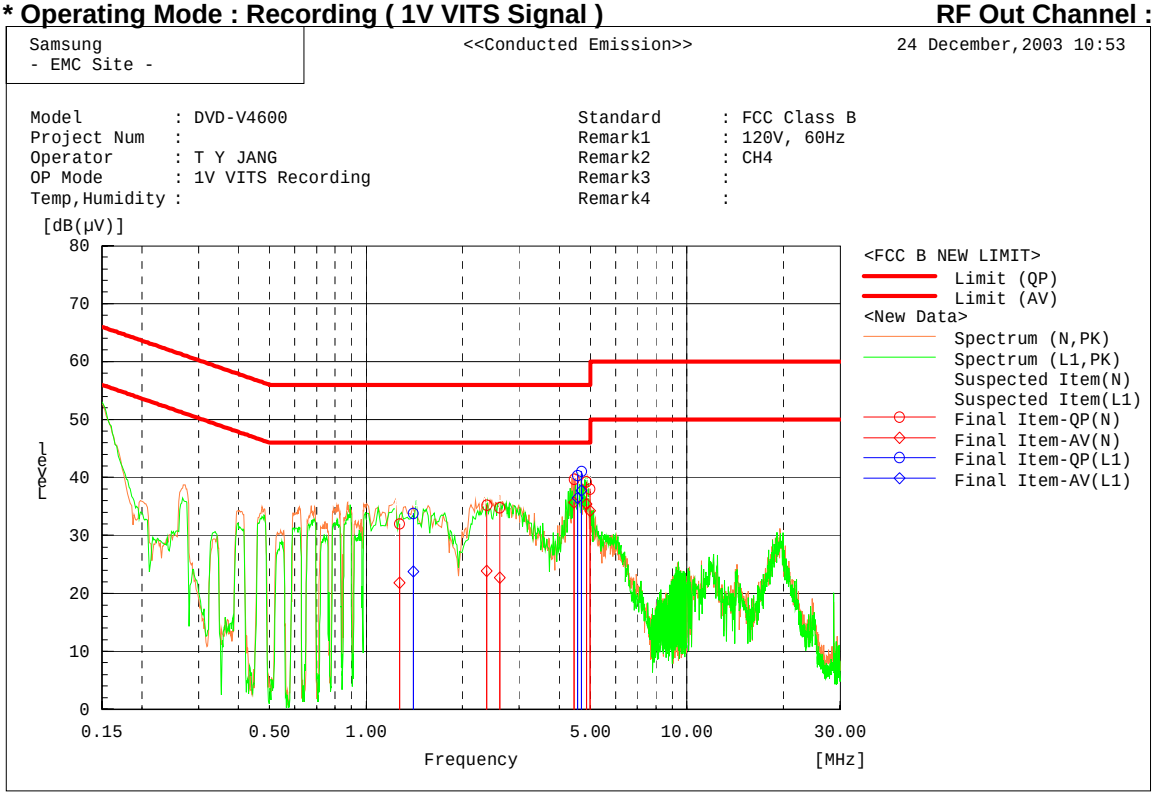
--- N Phase ---

No.	Frequency [MHz]	Reading QP [dB(µV)]	Reading AV [dB(µV)]	c.f [dB]	Result QP [dB(µV)]	Result AV [dB(µV)]	Limit QP [dB(µV)]	Limit AV [dB(µV)]	Margin QP [dB]	Margin AV [dB]
1	4.26191	36.9	32.9	0.2	37.1	33.1	56.0	46.0	18.9	12.9

--- L1 Phase ---

No.	Frequency [MHz]	Reading QP [dB(µV)]	Reading AV [dB(µV)]	c.f [dB]	Result QP [dB(µV)]	Result AV [dB(µV)]	Limit QP [dB(µV)]	Limit AV [dB(µV)]	Margin QP [dB]	Margin AV [dB]
1	2.61288	34.2	22.8	0.1	34.3	22.9	56.0	46.0	21.7	23.1
2	4.44498	38.9	35.5	0.2	39.1	35.7	56.0	46.0	16.9	10.3
3	4.68883	40.8	37.6	0.2	41.0	37.8	56.0	46.0	15.0	8.2
4	4.81057	40.1	36.6	0.2	40.3	36.8	56.0	46.0	15.7	9.2
5	4.93177	39.0	35.2	0.2	39.2	35.4	56.0	46.0	16.8	10.6

*** Operating Mode : Recording (1V VITS Signal)** **RF Out Channel : CH.4**



Final Result

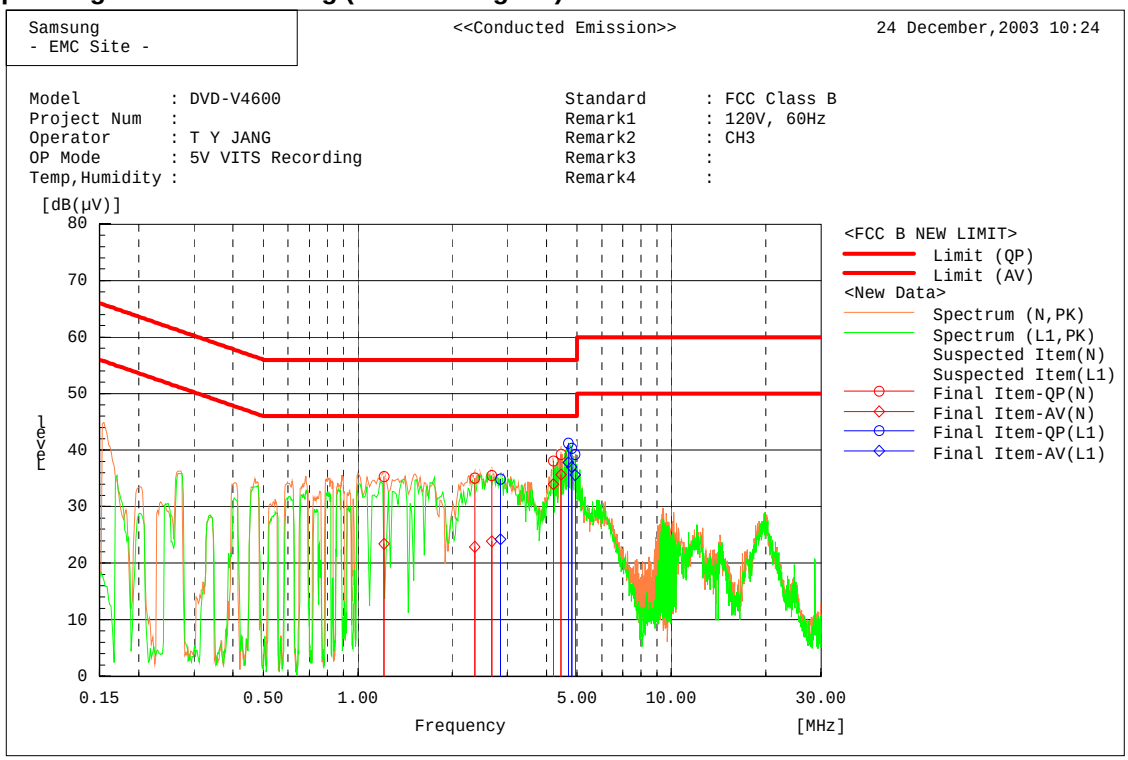
--- N Phase ---

No.	Frequency [MHz]	Reading QP [dB(µV)]	Reading AV [dB(µV)]	c.f [dB]	Result QP [dB(µV)]	Result AV [dB(µV)]	Limit QP [dB(µV)]	Limit AV [dB(µV)]	Margin QP [dB]	Margin AV [dB]
1	1.26847	31.9	21.8	0.1	32.0	21.9	56.0	46.0	24.0	24.1
2	2.37426	35.1	23.7	0.1	35.2	23.8	56.0	46.0	20.8	22.2
3	2.60476	34.6	22.6	0.1	34.7	22.7	56.0	46.0	21.3	23.3
4	4.4448	39.5	35.4	0.2	39.7	35.6	56.0	46.0	16.3	10.4
5	4.87045	39.1	35.2	0.2	39.3	35.4	56.0	46.0	16.7	10.6
6	4.99256	37.8	34.1	0.2	38.0	34.3	56.0	46.0	18.0	11.7

--- L1 Phase ---

No.	Frequency [MHz]	Reading QP [dB(µV)]	Reading AV [dB(µV)]	c.f [dB]	Result QP [dB(µV)]	Result AV [dB(µV)]	Limit QP [dB(µV)]	Limit AV [dB(µV)]	Margin QP [dB]	Margin AV [dB]
1	1.40284	33.7	23.7	0.1	33.8	23.8	56.0	46.0	22.2	22.2
2	4.56618	40.1	36.3	0.2	40.3	36.5	56.0	46.0	15.7	9.5
3	4.68792	40.9	37.5	0.2	41.1	37.7	56.0	46.0	14.9	8.3

*** Operating Mode : Recording (5V VITS Signal)** **RF Out Channel : CH.3**



Final Result

--- N Phase ---

No.	Frequency [MHz]	Reading QP [dB(μV)]	Reading AV [dB(μV)]	c.f [dB]	Result QP [dB(μV)]	Result AV [dB(μV)]	Limit QP [dB(μV)]	Limit AV [dB(μV)]	Margin QP [dB]	Margin AV [dB]
1	1.21382	35.2	23.3	0.1	35.3	23.4	56.0	46.0	20.7	22.6
2	2.36362	35.0	22.8	0.1	35.1	22.9	56.0	46.0	20.9	23.1
3	2.6733	35.4	23.8	0.1	35.5	23.9	56.0	46.0	20.5	22.1
4	4.20221	38.0	33.9	0.1	38.1	34.0	56.0	46.0	17.9	12.0
5	4.44552	39.1	35.4	0.2	39.3	35.6	56.0	46.0	16.7	10.4

--- L1 Phase ---

No.	Frequency [MHz]	Reading QP [dB(μV)]	Reading AV [dB(μV)]	c.f [dB]	Result QP [dB(μV)]	Result AV [dB(μV)]	Limit QP [dB(μV)]	Limit AV [dB(μV)]	Margin QP [dB]	Margin AV [dB]
1	2.84843	34.7	24.1	0.1	34.8	24.2	56.0	46.0	21.2	21.8
2	4.68901	41.0	37.6	0.2	41.2	37.8	56.0	46.0	14.8	8.2
3	4.81057	40.1	36.8	0.2	40.3	37.0	56.0	46.0	15.7	9.0
4	4.93195	39.0	35.3	0.2	39.2	35.5	56.0	46.0	16.8	10.5

*** Operating Mode : Recording (5V VITS Signal)** **RF Out Channel : CH.4**

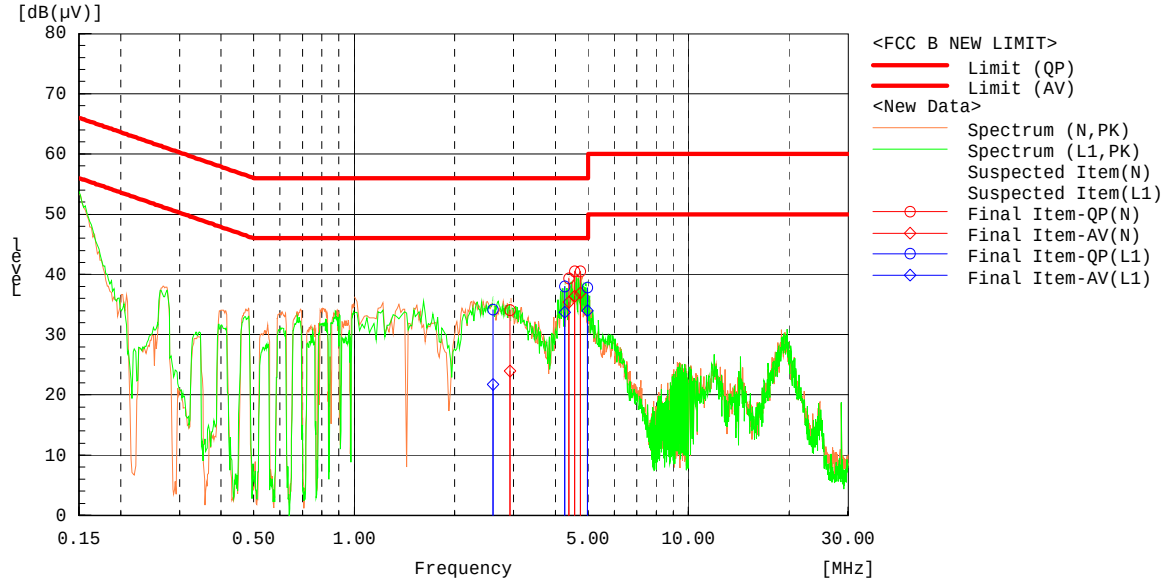
Samsung
- EMC Site -

<<Conducted Emission>>

24 December,2003 11:05

Model : DVD-V4600
Project Num :
Operator : T Y JANG
OP Mode : 5V VITS Recording
Temp,Humidity :

Standard : FCC Class B
Remark1 : 120V, 60Hz
Remark2 : CH4
Remark3 :
Remark4 :



Final Result

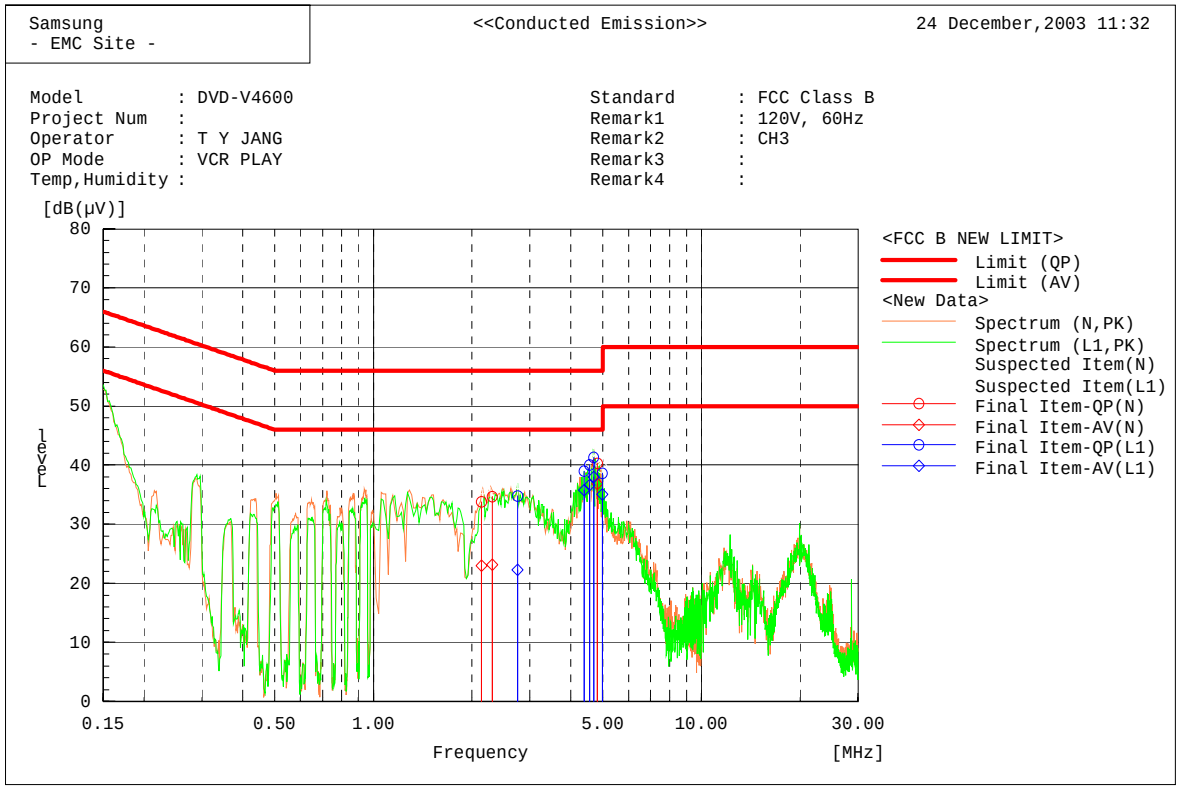
--- N Phase ---

No.	Frequency [MHz]	Reading QP [dB(μV)]	Reading AV [dB(μV)]	c.f [dB]	Result QP [dB(μV)]	Result AV [dB(μV)]	Limit QP [dB(μV)]	Limit AV [dB(μV)]	Margin QP [dB]	Margin AV [dB]
1	2.92634	34.0	23.8	0.1	34.1	23.9	56.0	46.0	21.9	22.1
2	4.38348	39.1	35.2	0.2	39.3	35.4	56.0	46.0	16.7	10.6
3	4.56636	40.3	36.2	0.2	40.5	36.4	56.0	46.0	15.5	9.6
4	4.74889	40.3	36.7	0.2	40.5	36.9	56.0	46.0	15.5	9.1

--- L1 Phase ---

No.	Frequency [MHz]	Reading QP [dB(μV)]	Reading AV [dB(μV)]	c.f [dB]	Result QP [dB(μV)]	Result AV [dB(μV)]	Limit QP [dB(μV)]	Limit AV [dB(μV)]	Margin QP [dB]	Margin AV [dB]
1	2.59664	34.0	21.6	0.1	34.1	21.7	56.0	46.0	21.9	24.3
2	4.26155	37.8	33.5	0.2	38.0	33.7	56.0	46.0	18.0	12.3
3	4.99238	37.6	33.8	0.2	37.8	34.0	56.0	46.0	18.2	12.0

*** Operating Mode : VCR PLAY** **RF Out Channel : CH.3**



Final Result

--- N Phase ---

No.	Frequency [MHz]	Reading QP [dB(µV)]	Reading AV [dB(µV)]	c.f [dB]	Result QP [dB(µV)]	Result AV [dB(µV)]	Limit QP [dB(µV)]	Limit AV [dB(µV)]	Margin QP [dB]	Margin AV [dB]
1	2.13384	33.7	22.9	0.1	33.8	23.0	56.0	46.0	22.2	23.0
2	2.30482	34.6	23.0	0.1	34.7	23.1	56.0	46.0	21.3	22.9
3	4.81003	40.1	36.7	0.2	40.3	36.9	56.0	46.0	15.7	9.1

--- L1 Phase ---

No.	Frequency [MHz]	Reading QP [dB(µV)]	Reading AV [dB(µV)]	c.f [dB]	Result QP [dB(µV)]	Result AV [dB(µV)]	Limit QP [dB(µV)]	Limit AV [dB(µV)]	Margin QP [dB]	Margin AV [dB]
1	2.75536	34.7	22.2	0.1	34.8	22.3	56.0	46.0	21.2	23.7
2	4.38348	38.8	35.5	0.2	39.0	35.7	56.0	46.0	17.0	10.3
3	4.5669	39.8	36.5	0.2	40.0	36.7	56.0	46.0	16.0	9.3
4	4.68829	41.1	37.8	0.2	41.3	38.0	56.0	46.0	14.7	8.0
5	4.99238	38.4	34.8	0.2	38.6	35.0	56.0	46.0	17.4	11.0

*** Operating Mode : VCR PLAY** **RF Out Channel : CH.4**

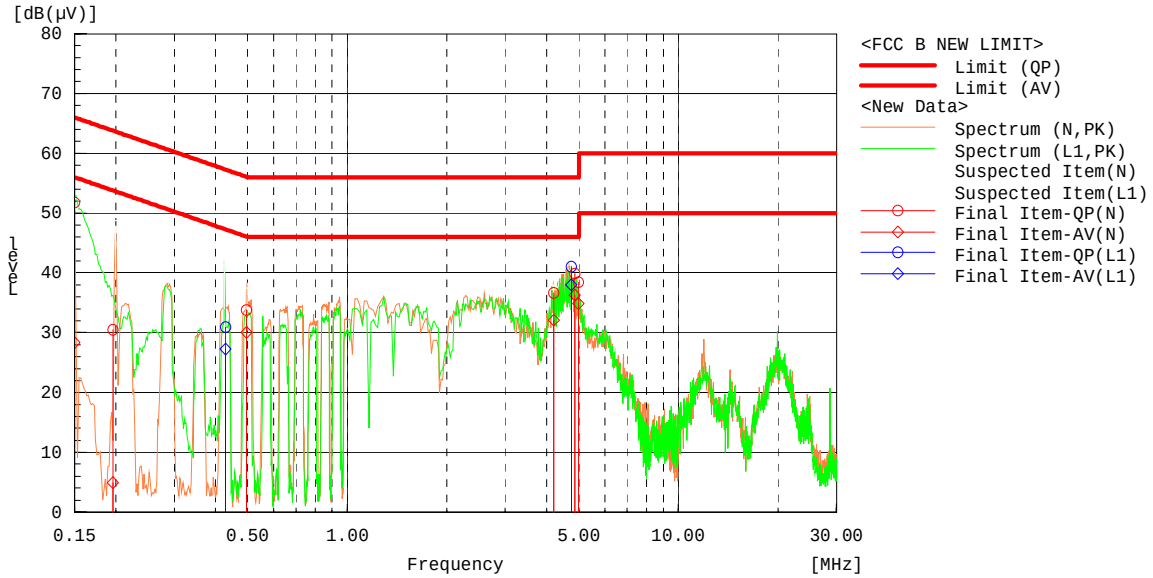
Samsung
- EMC Site -

<<Conducted Emission>>

24 December,2003 11:18

Model : DVD-V4600
Project Num :
Operator : T Y JANG
OP Mode : VCR PLAY
Temp,Humidity :

Standard : FCC Class B
Remark1 : 120V, 60Hz
Remark2 : CH4
Remark3 :
Remark4 :



Final Result

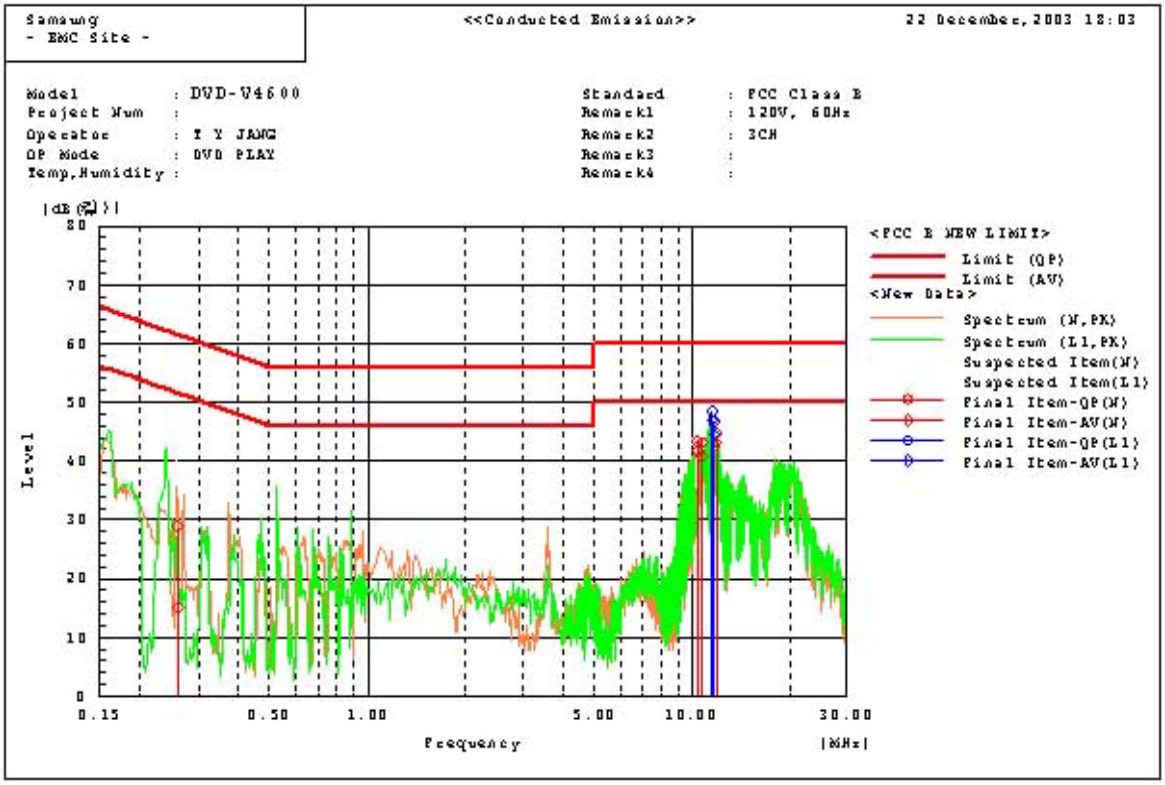
--- N Phase ---

No.	Frequency [MHz]	Reading QP [dB(μV)]	Reading AV [dB(μV)]	c.f [dB]	Result QP [dB(μV)]	Result AV [dB(μV)]	Limit QP [dB(μV)]	Limit AV [dB(μV)]	Margin QP [dB]	Margin AV [dB]
1	0.150	51.7	28.2	0.1	51.8	28.3	66.0	56.0	14.2	27.7
2	0.19609	30.3	4.8	0.1	30.4	4.9	63.8	53.8	33.4	48.9
3	0.49638	33.7	29.9	0.1	33.8	30.0	56.1	46.1	22.3	16.1
4	4.20131	36.6	32.0	0.1	36.7	32.1	56.0	46.0	19.3	13.9
5	4.87063	39.7	36.1	0.2	39.9	36.3	56.0	46.0	16.1	9.7
6	4.99328	38.2	34.7	0.2	38.4	34.9	56.0	46.0	17.6	11.1

--- L1 Phase ---

No.	Frequency [MHz]	Reading QP [dB(μV)]	Reading AV [dB(μV)]	c.f [dB]	Result QP [dB(μV)]	Result AV [dB(μV)]	Limit QP [dB(μV)]	Limit AV [dB(μV)]	Margin QP [dB]	Margin AV [dB]
1	0.42863	30.8	27.2	0.1	30.9	27.3	57.3	47.3	26.4	20.0
2	4.74979	40.9	37.7	0.2	41.1	37.9	56.0	46.0	14.9	8.1

*** Operating Mode : DVD Play** **RF Out Channel : CH.3**



Final Result

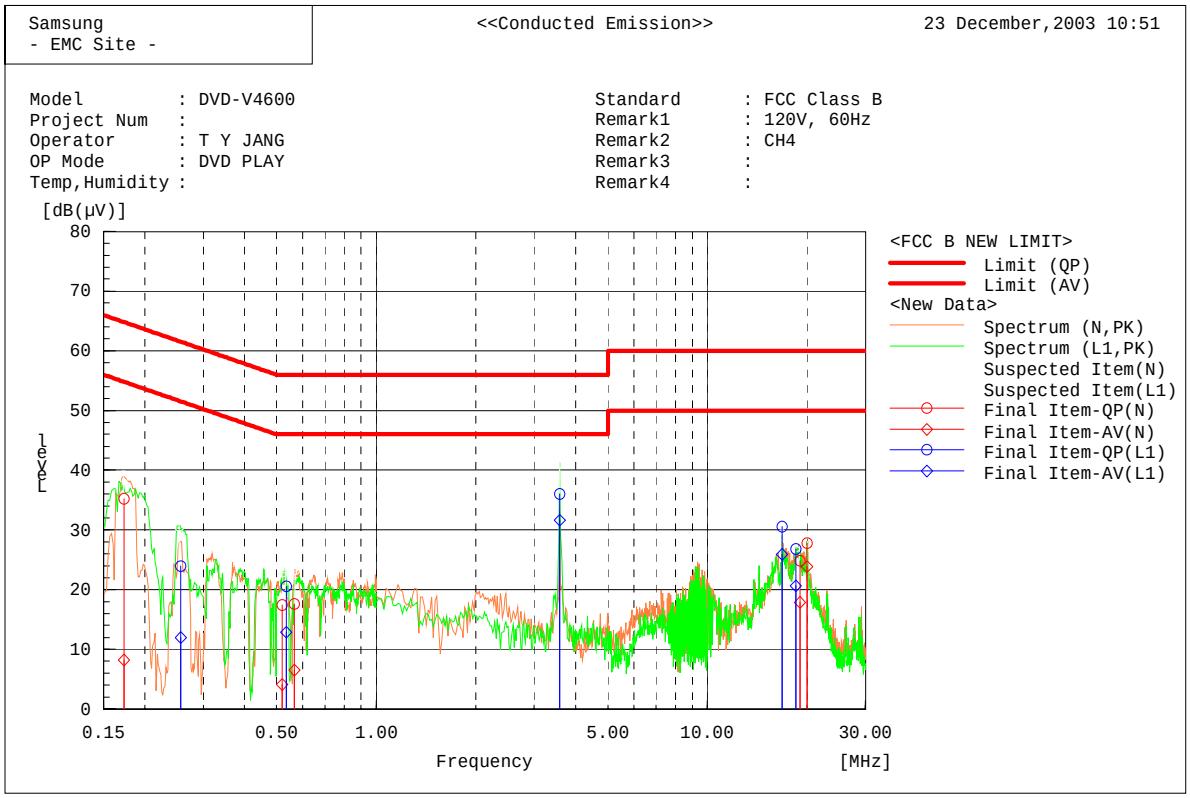
--- N Phase ---

No.	Frequency	Reading QP	Reading AV	c.f	Result QP	Result AV	Limit QP	Limit AV	Margin QP	Margin AV
	|MHz|	|dB(㎶)|	|dB(㎶)|	|dB|	|dB(㎶)|	|dB(㎶)|	|dB(㎶)|	|dB(㎶)|	|dB|	|dB|
1	0.25836	28.7	14.8	0.1	28.8	14.9	61.5	51.5	32.7	36.6
2	10.29238	43.1	41.4	0.2	43.3	41.6	60.0	50.0	16.7	8.4
3	10.59659	42.9	40.4	0.2	43.1	40.6	60.0	50.0	16.9	9.4
4	11.87515	44.4	42.9	0.2	44.6	43.1	60.0	50.0	15.4	6.9

--- L1 Phase ---

No.	Frequency	Reading QP	Reading AV	c.f	Result QP	Result AV	Limit QP	Limit AV	Margin QP	Margin AV
	|MHz|	|dB(㎶)|	|dB(㎶)|	|dB|	|dB(㎶)|	|dB(㎶)|	|dB(㎶)|	|dB(㎶)|	|dB|	|dB|
1	11.50962	48.2	46.7	0.3	48.5	47.0	60.0	50.0	11.5	3.0
2	11.63107	46.6	44.2	0.3	46.9	44.5	60.0	50.0	13.1	5.5

*** Operating Mode : DVD Play** **RF Out Channel : CH.4**



Final Result

--- N Phase ---

No.	Frequency [MHz]	Reading QP [dB(μV)]	Reading AV [dB(μV)]	c.f [dB]	Result QP [dB(μV)]	Result AV [dB(μV)]	Limit QP [dB(μV)]	Limit AV [dB(μV)]	Margin QP [dB]	Margin AV [dB]
1	0.17304	35.2	8.2	0.1	35.3	8.3	64.8	54.8	29.5	46.5
2	0.51926	17.3	4.0	0.1	17.4	4.1	56.0	46.0	38.6	41.9
3	0.56647	17.5	6.4	0.1	17.6	6.5	56.0	46.0	38.4	39.5
4	19.03387	24.6	17.6	0.3	24.9	17.9	60.0	50.0	35.1	32.1
5	19.96934	27.5	23.5	0.3	27.8	23.8	60.0	50.0	32.2	26.2

--- L1 Phase ---

No.	Frequency [MHz]	Reading QP [dB(μV)]	Reading AV [dB(μV)]	c.f [dB]	Result QP [dB(μV)]	Result AV [dB(μV)]	Limit QP [dB(μV)]	Limit AV [dB(μV)]	Margin QP [dB]	Margin AV [dB]
1	0.25651	23.9	11.9	0.1	24.0	12.0	61.5	51.5	37.5	39.5
2	0.53501	20.5	12.8	0.1	20.6	12.9	56.0	46.0	35.4	33.1
3	3.57997	35.9	31.5	0.1	36.0	31.6	56.0	46.0	20.0	14.4
4	16.8002	30.2	25.5	0.4	30.6	25.9	60.0	50.0	29.4	24.1
5	18.46352	26.3	20.1	0.5	26.8	20.6	60.0	50.0	33.2	29.4

3.2 Radiated Emission Measurement

Test Information	
Test Engineer	Tae Young, Jang
Test Date	19-Dec-03
Climate Condition	Ambient Temperature : 23.1℃, Relative Humidity : 30%
Test Place	Semi-Anechoic Chamber

Test Equipments

Equipment	Model Name	Manufacturer	Serial No.	Calibration Date
Test Receiver	ESCS30	R & S	100104	2004-01-17
Secetrum Analyzer	E7445A	AGILENT	US41110272	2004-06-14
RF Selector	NS4900	TOYO	0303-015	N/A
Mast Controller	HD2000	HD	HD20000902027	N/A
Bi-Log Antenna	CBL6112B	SCHAFFNER	2766	2004-06-20
Preamp	8447D	Agilent	2944A10430	2004-07-25
Test Software	EP5/RE	TOYO	Version : 2.0.860	N/A
Antenna Mast	MA240	HD	240/620	N/A
Turn Table	DS412	HD	-	N/A

Test Setup

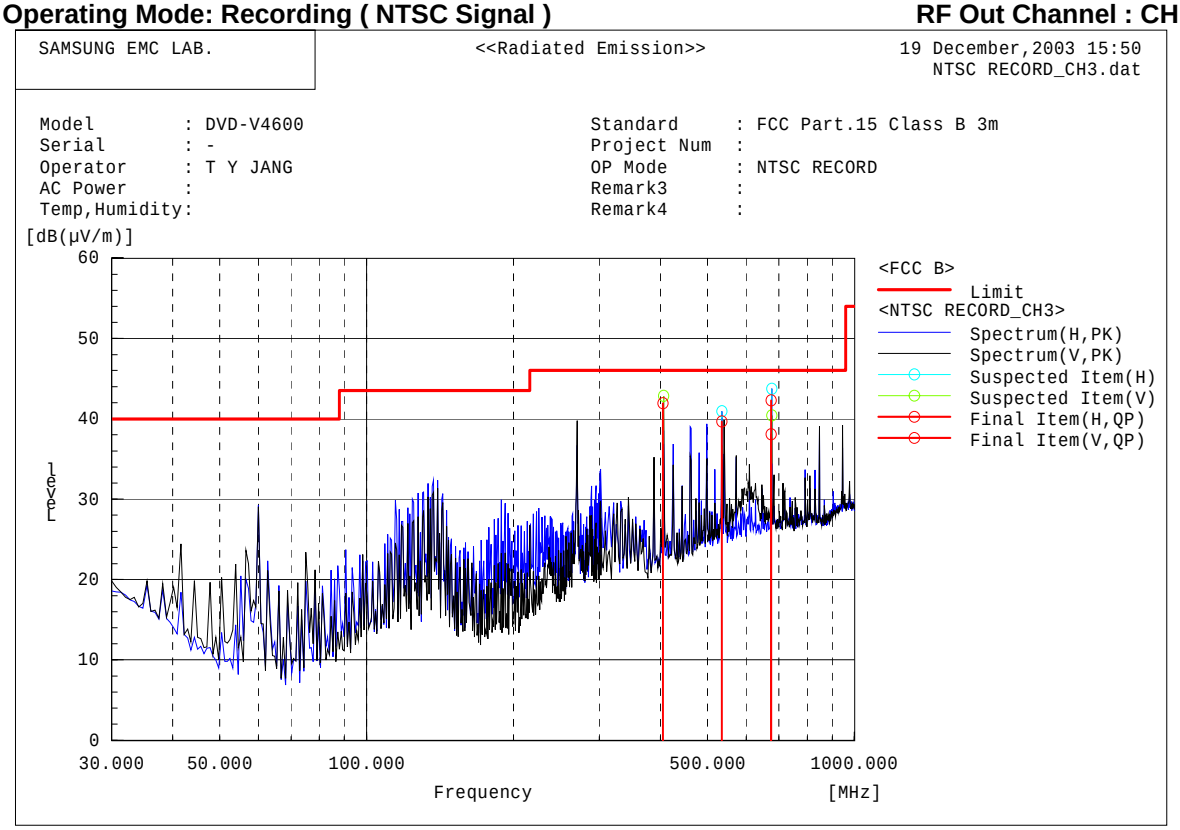
EUT was placed on a platform of nominal size and raised 80cm above the conducting ground plane.
The rear of EUT was aligned and flushed with rear of tabletop.
Test was made with the antenna positioned in both the horizontal and vertical planes of polarization.
The measurement antenna was varied in height above the conducting ground plane to obtain the maximum signal strength.
See photo.

Test Result

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

Test Graph & Data

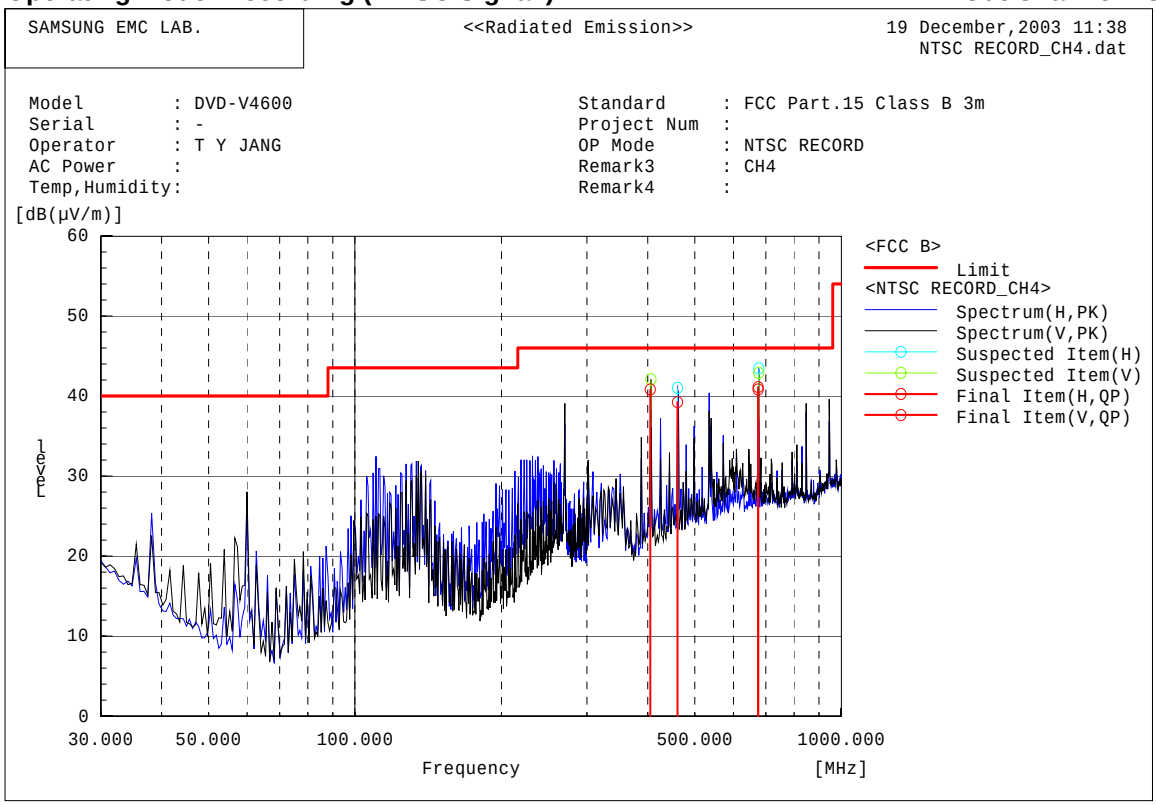
*** Operating Mode: Recording (NTSC Signal)** **RF Out Channel : CH.3**



Final Result

No.	Frequency [MHz]	(P)	S.C	Reading QP [dB(µV)]	c.f [dB(1/m)]	Result QP [dB(µV/m)]	Limit [dB(µV/m)]	Margin QP [dB]	Remark
1	405.000	V	S	48.5	-6.6	41.9	46.0	4.1	
2	534.550	H	S	43.3	-3.6	39.7	46.0	6.3	
3	675.010	H	S	43.9	-1.6	42.3	46.0	3.7	
4	675.010	V	S	39.7	-1.6	38.1	46.0	7.9	

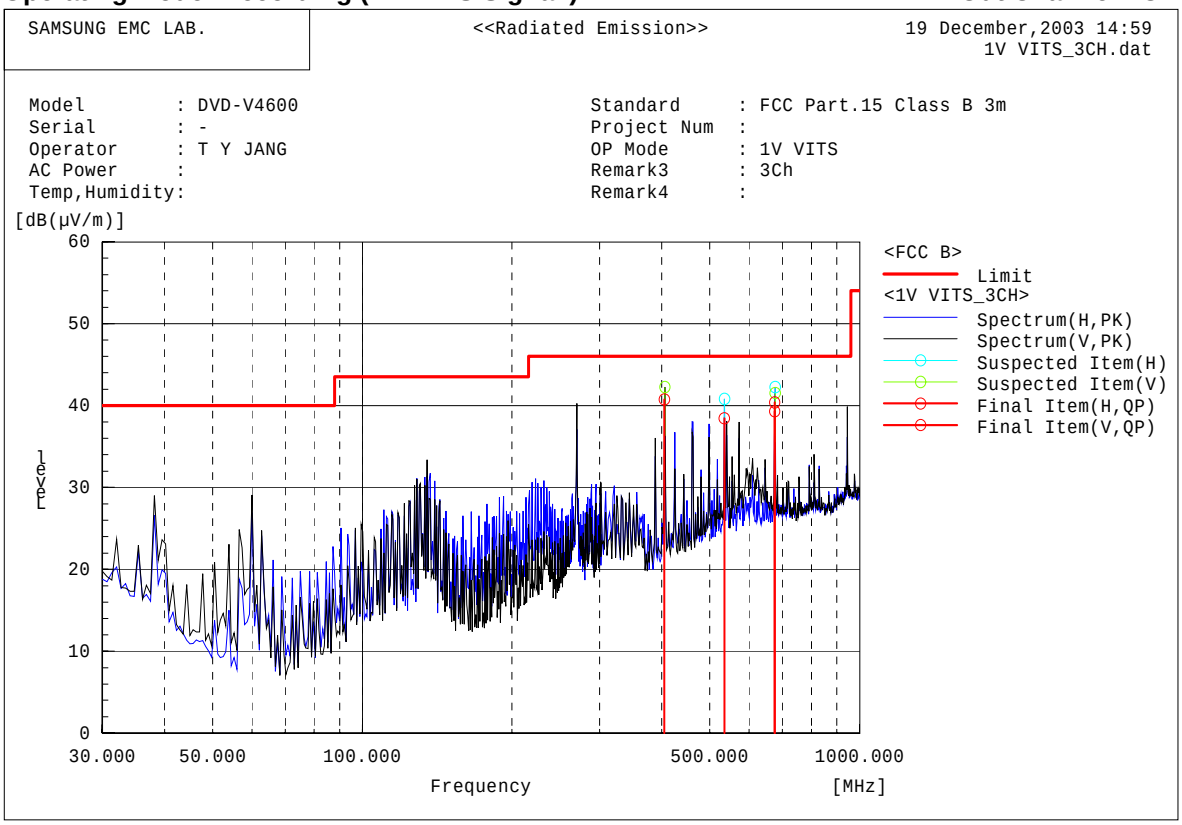
*** Operating Mode: Recording (NTSC Signal)** **RF Out Channel : CH.4**



Final Result

No.	Frequency [MHz]	(P)	S.C	Reading QP [dB(μV)]	c.f [dB(1/m)]	Result QP [dB(μV/m)]	Limit [dB(μV/m)]	Margin QP [dB]	Remark
1	405.000	V	S	47.4	-6.6	40.8	46.0	5.2	
2	460.830	H	S	44.6	-5.4	39.2	46.0	6.8	
3	675.010	H	S	42.7	-1.6	41.1	46.0	4.9	
4	675.010	V	S	42.4	-1.6	40.8	46.0	5.2	

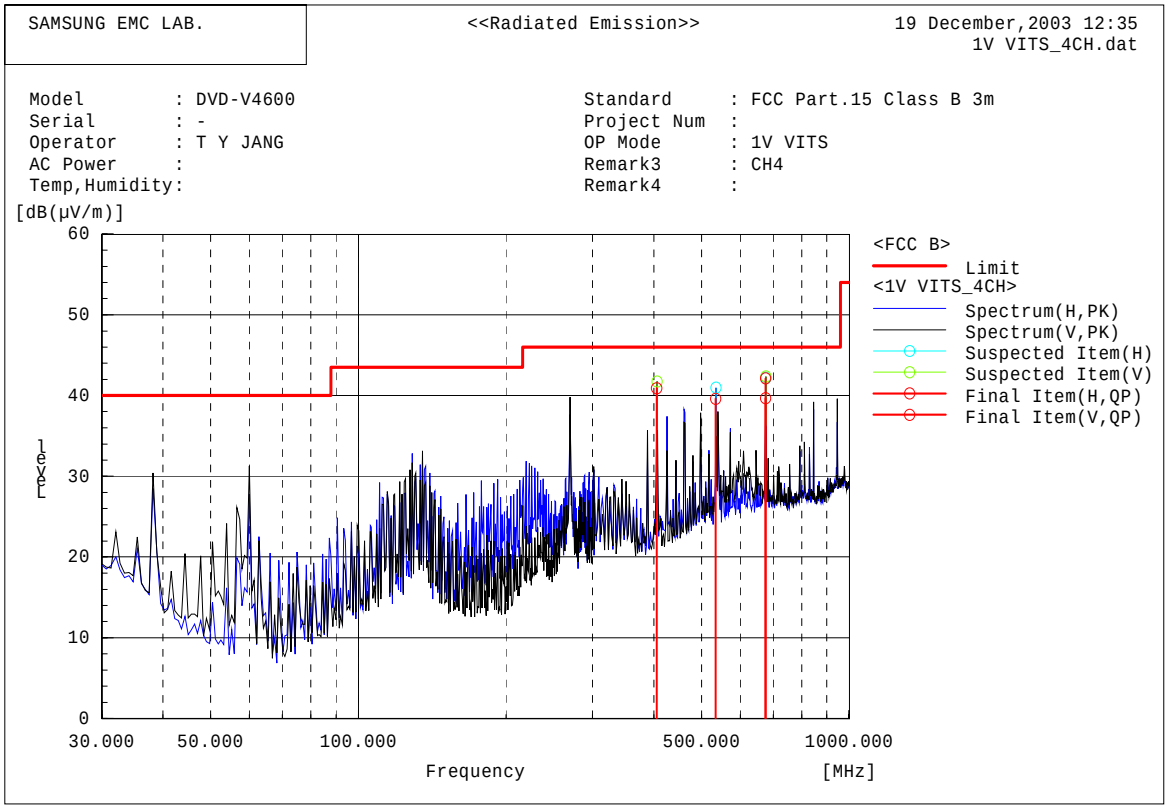
*** Operating Mode: Recording (1V VITS Signal)** **RF Out Channel : CH.3**



Final Result

No.	Frequency [MHz]	(P)	S.C	Reading QP [dB(μV)]	c.f [dB(1/m)]	Result QP [dB(μV/m)]	Limit [dB(μV/m)]	Margin QP [dB]	Remark
1	405.000	V	S	47.4	-6.6	40.8	46.0	5.2	
2	534.550	H	S	42.0	-3.6	38.4	46.0	7.6	
3	675.010	H	S	42.0	-1.6	40.4	46.0	5.6	
4	675.010	V	S	40.9	-1.6	39.3	46.0	6.7	

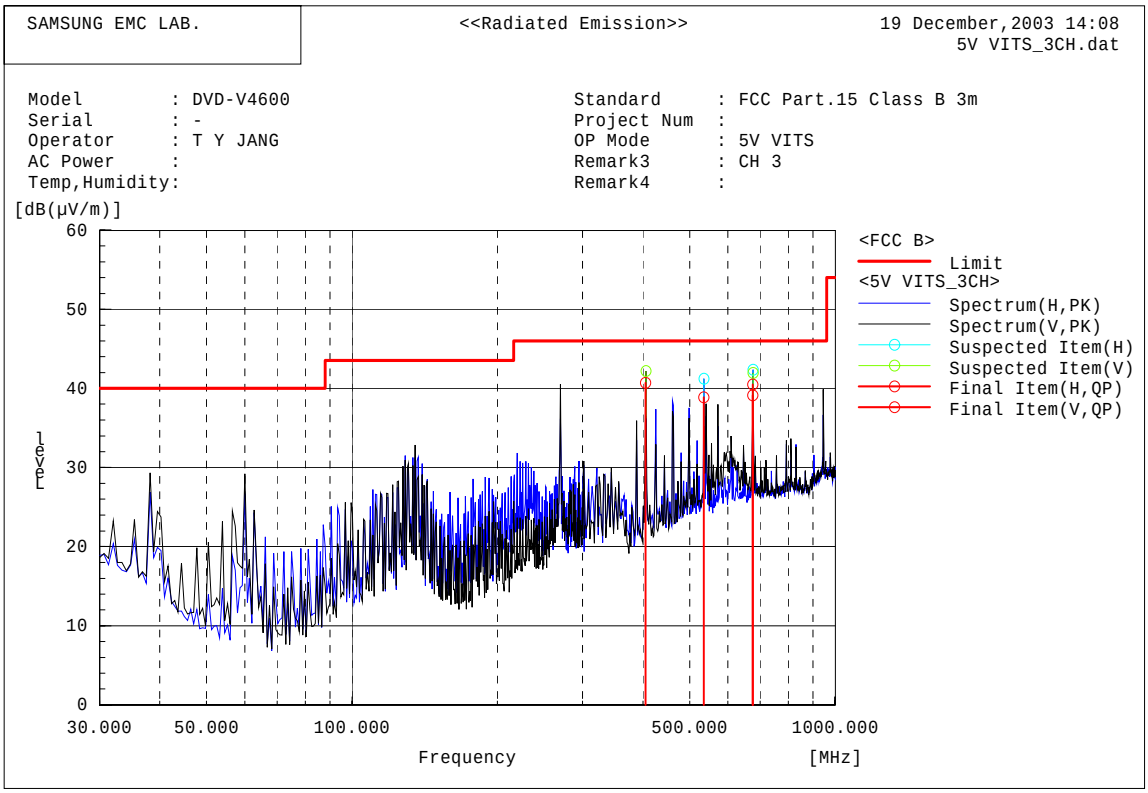
*** Operating Mode: Recording (1V VITS Signal)** **RF Out Channel : CH.4**



Final Result

No.	Frequency [MHz]	(P)	S.C	Reading QP [dB(μV)]	c.f [dB(1/m)]	Result QP [dB(μV/m)]	Limit [dB(μV/m)]	Margin QP [dB]	Remark
1	405.000	V	S	47.5	-6.6	40.9	46.0	5.1	
2	534.550	H	S	43.2	-3.6	39.6	46.0	6.4	
3	675.010	V	S	41.3	-1.6	39.7	46.0	6.4	
4	675.010	H	S	43.7	-1.6	42.1	46.0	3.9	

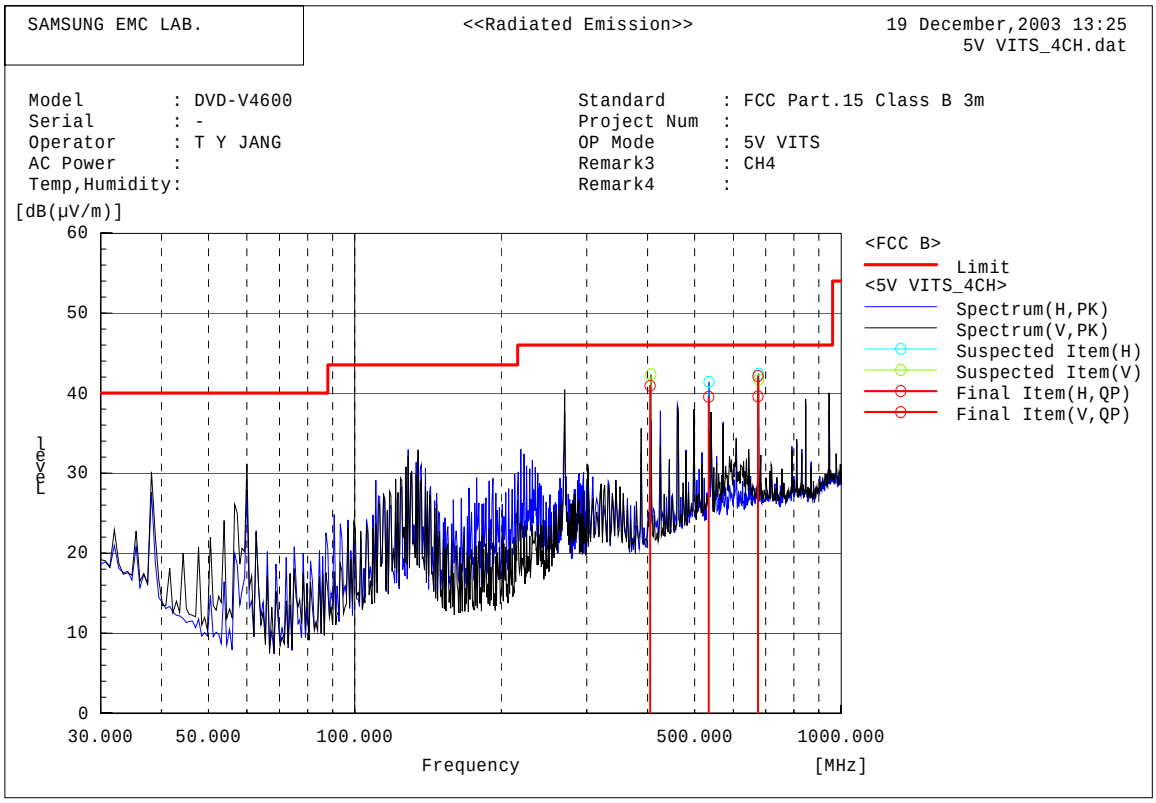
*** Operating Mode: Recording (5V VITS Signal)** **RF Out Channel : CH.3**



Final Result

No.	Frequency [MHz]	(P)	S.C	Reading QP [dB(μV)]	c.f [dB(1/m)]	Result QP [dB(μV/m)]	Limit [dB(μV/m)]	Margin QP [dB]	Remark
1	405.000	V	S	47.3	-6.6	40.7	46.0	5.3	
2	534.550	H	S	42.5	-3.6	38.9	46.0	7.1	
3	675.010	H	S	42.1	-1.6	40.5	46.0	5.5	
4	675.010	V	S	40.7	-1.6	39.1	46.0	6.9	

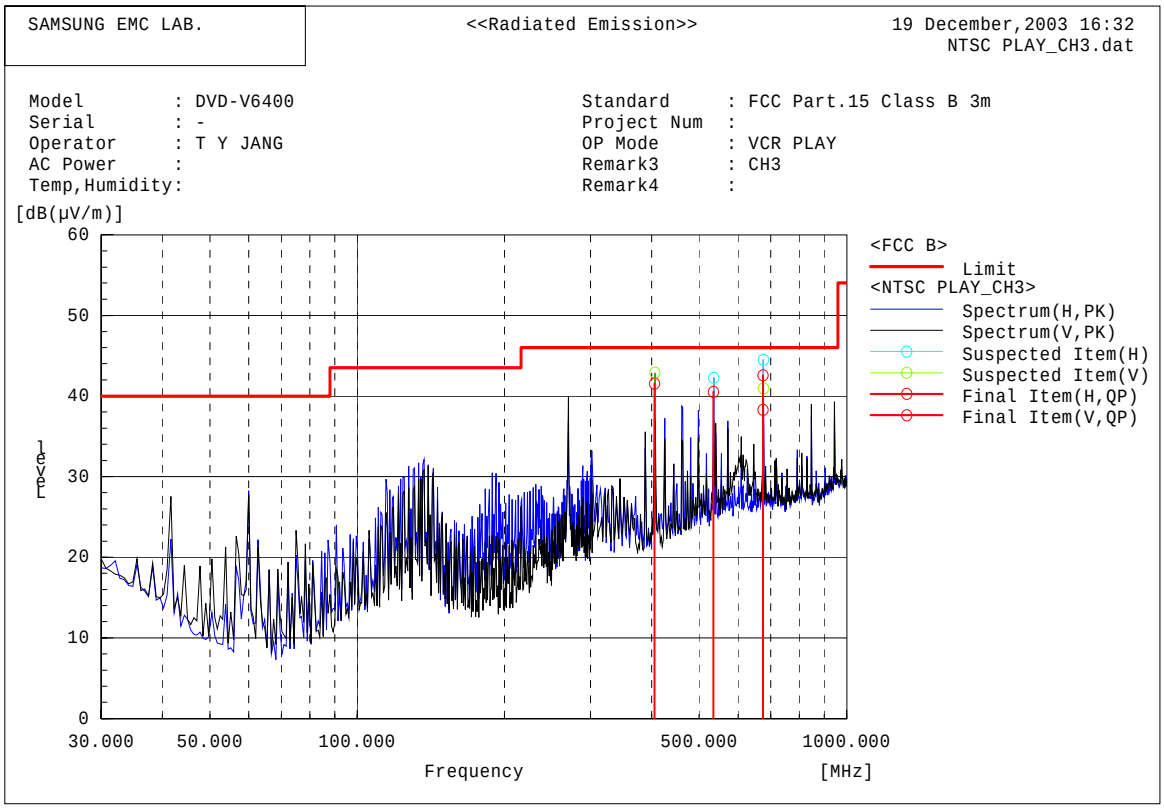
*** Operating Mode: Recording (5V VITS Signal)** **RF Out Channel : CH.4**



Final Result

No.	Frequency [MHz]	(P)	S.C	Reading QP [dB(μV)]	c.f [dB(1/m)]	Result QP [dB(μV/m)]	Limit [dB(μV/m)]	Margin QP [dB]	Remark
1	405.000	V	S	47.5	-6.6	40.9	46.0	5.1	
2	534.550	H	S	43.1	-3.6	39.5	46.0	6.5	
3	675.010	H	S	43.7	-1.6	42.1	46.0	3.9	
4	675.010	V	S	41.2	-1.6	39.6	46.0	6.4	

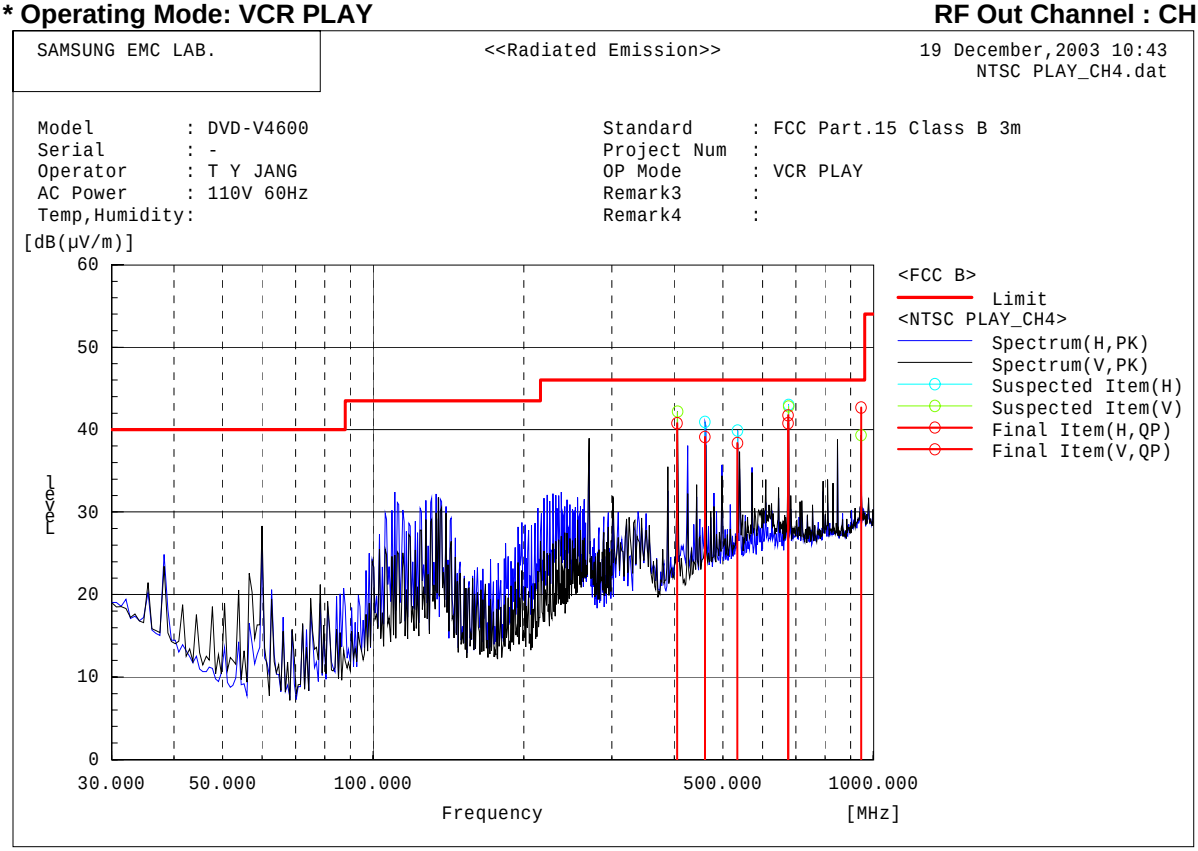
*** Operating Mode: VCR PLAY** **RF Out Channel : CH.3**



Final Result

No.	Frequency [MHz]	(P)	S.C	Reading QP [dB(μV)]	c.f [dB(1/m)]	Result QP [dB(μV/m)]	Limit [dB(μV/m)]	Margin QP [dB]	Remark
1	405.000	V	S	48.2	-6.6	41.6	46.0	4.5	
2	534.550	H	S	44.1	-3.6	40.5	46.0	5.5	
3	675.010	H	S	44.2	-1.6	42.6	46.0	3.4	
4	675.010	V	S	39.9	-1.6	38.3	46.0	7.7	

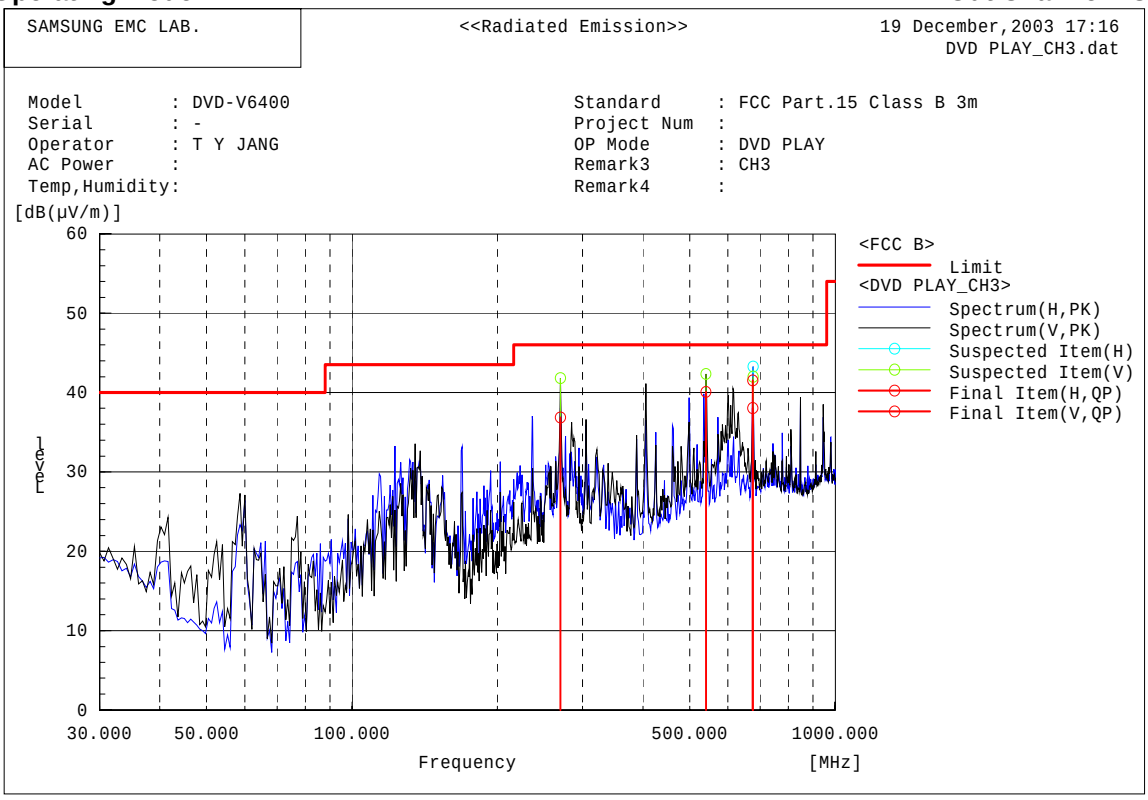
*** Operating Mode: VCR PLAY** **RF Out Channel : CH.4**



Final Result

No.	Frequency [MHz]	(P)	S.C	Reading QP [dB(μV)]	c.f [dB(1/m)]	Result QP [dB(μV/m)]	Limit [dB(μV/m)]	Margin QP [dB]	Remark
1	405.000	V	S	47.4	-6.6	40.8	46.0	5.2	
2	460.830	H	S	44.5	-5.4	39.1	46.0	6.9	
3	534.550	H	S	42.0	-3.6	38.4	46.0	7.6	
4	675.010	H	S	43.3	-1.6	41.7	46.0	4.3	
5	675.010	V	S	42.4	-1.6	40.8	46.0	5.2	
6	945.000	V	S	40.0	2.7	42.7	46.0	3.3	

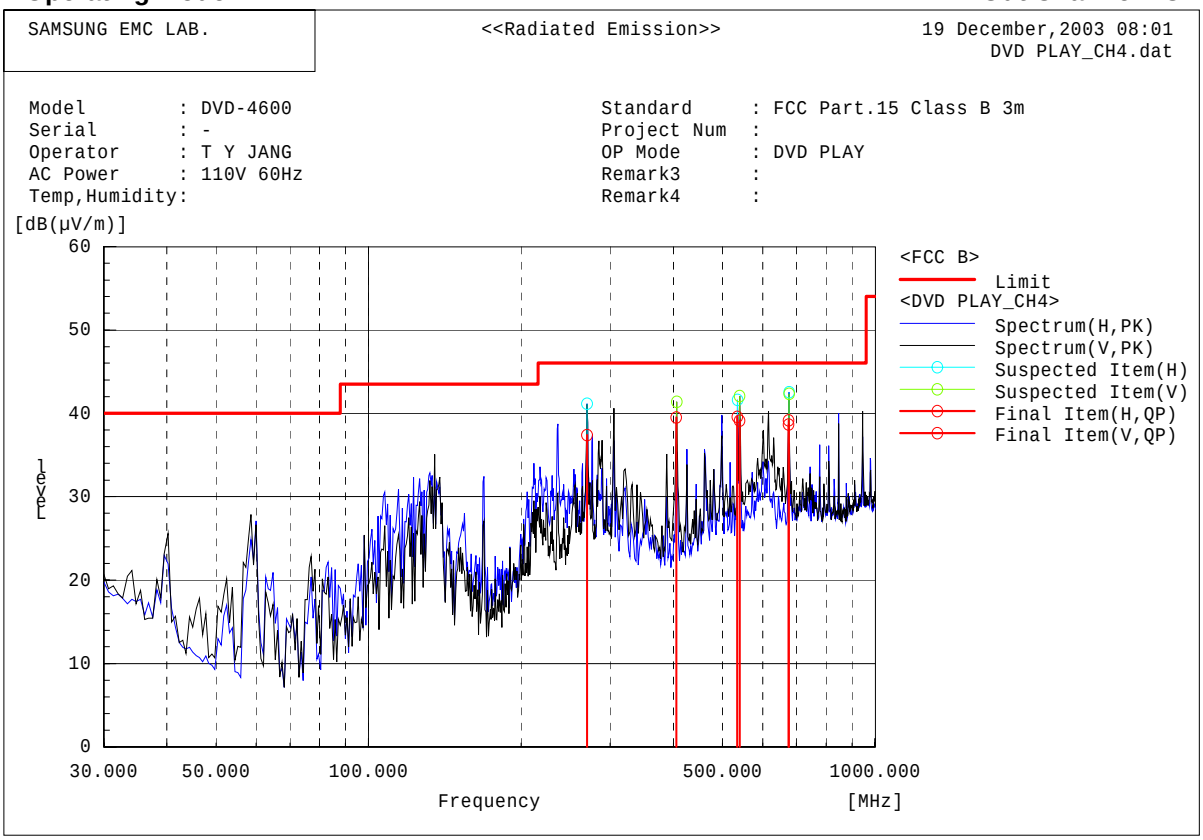
*** Operating Mode: DVD PLAY** **RF Out Channel : CH.3**



Final Result

No.	Frequency [MHz]	(P)	S.C	Reading QP [dB(μV)]	c.f [dB(1/m)]	Result QP [dB(μV/m)]	Limit [dB(μV/m)]	Margin QP [dB]	Remark
1	269.996	V	S	46.9	-10.0	36.9	46.0	9.1	
2	540.000	V	S	43.7	-3.6	40.1	46.0	5.9	
3	674.990	H	S	43.1	-1.6	41.5	46.0	4.5	
4	674.990	V	S	39.6	-1.6	38.0	46.0	8.0	

*** Operating Mode: DVD PLAY** **RF Out Channel : CH.4**



Final Result

No.	Frequency [MHz]	(P)	S.C	Reading QP [dB(µV)]	c.f [dB(1/m)]	Result QP [dB(µV/m)]	Limit [dB(µV/m)]	Margin QP [dB]	Remark
1	269.996	H	S	47.4	-10.0	37.4	46.0	8.6	
2	405.000	V	S	46.1	-6.6	39.5	46.0	6.5	
3	534.550	H	S	43.2	-3.6	39.6	46.0	6.4	
4	540.000	V	S	42.7	-3.6	39.1	46.0	6.9	
5	675.010	H	S	40.8	-1.6	39.2	46.0	6.8	
6	675.010	V	S	40.3	-1.6	38.7	46.0	7.3	

3.3 Output Signal Level Measurement

Test Information	
Test Engineer	Tae Young, Jang
Test Date	26-Dec-03
Climate Condition	Ambient Temperature : 23.1℃, Relative Humidity : 30%
Test Place	Shield Room #5

Test Equipments

Equipment	Model Name	Manufacturer	Serial No.	Next Cal. Date
TEST RECEIVER	ESI26	R & S	839809/002	2004-11-04
Preamp	310	SONOMA INSTRUMENT	185861	2004-09-20
Matching Pad	RAM	R & S	882204/064	-

Test Setup

The RF output terminal is connected to the test receiver through the matching pad(75 - 50 ohm) with a calibrated cable. Then, the RF output signal level is measured under the EUT operating mode(s).

See photo.

Test Result

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

Test Data

*** Operating Mode : Recording(NTSC Signal)** **RF Out Ch. : CH 3**

Frequency [MHz]	Reading [dB(μV)]	Factor [dB]	Level [dB(μV)]	Limit [dB(μV)]	Margin [dB]	Remark
56.76002	75.9	-25.1	50.8	56.5	5.7	Audio Signal
61.26102	89.9	-25.1	64.8	69.5	4.7	Video Signal
65.76002	75.3	-25.1	50.2	56.5	6.3	Audio Signal

*CF Factor = Preamp Gain + Matching Pad Loss + Cable Loss

*** Operating Mode : Recording(1V VITS Signal)** **RF Out Ch. : CH 3**

Frequency [MHz]	Reading [dB(μV)]	Factor [dB]	Level [dB(μV)]	Limit [dB(μV)]	Margin [dB]	Remark
56.76403	75.9	-25.1	50.8	56.5	5.7	Audio Signal
61.26303	89.9	-25.1	64.8	69.5	4.7	Video Signal
65.76403	75.5	-25.1	50.4	56.5	6.1	Audio Signal

*CF Factor = Preamp Gain + Matching Pad Loss + Cable Loss

*** Operating Mode : Recording(5V VITS Signal)** **RF Out Ch. : CH 3**

Frequency [MHz]	Reading [dB(μV)]	Factor [dB]	Level [dB(μV)]	Limit [dB(μV)]	Margin [dB]	Remark
56.76202	76	-25.1	50.9	56.5	5.6	Audio Signal
61.26303	89.8	-25.1	64.7	69.5	4.8	Video Signal
65.76002	75.7	-25.1	50.6	56.5	5.9	Audio Signal

*CF Factor = Preamp Gain + Matching Pad Loss + Cable Loss

*** Operating Mode : VCR Play** **RF Out Ch. : CH 3**

Frequency [MHz]	Reading [dB(μV)]	Factor [dB]	Level [dB(μV)]	Limit [dB(μV)]	Margin [dB]	Remark
56.76002	75.9	-25.1	50.8	56.5	5.7	Audio Signal
61.25902	89.9	-25.1	64.8	69.5	4.7	Video Signal
65.75802	75.6	-25.1	50.5	56.5	6	Audio Signal

*CF Factor = Preamp Gain + Matching Pad Loss + Cable Loss

*** Operating Mode : DVD Play** **RF Out Ch. : CH 3**

Frequency [MHz]	Reading [dB(μV)]	Factor [dB]	Level [dB(μV)]	Limit [dB(μV)]	Margin [dB]	Remark
56.76002	75.9	-25.1	50.8	56.5	5.7	Audio Signal
61.25902	89.9	-25.1	64.8	69.5	4.7	Video Signal
65.75802	75.6	-25.1	50.5	56.5	6	Audio Signal

*CF Factor = Preamp Gain + Matching Pad Loss + Cable Loss

Test Data

*** Operating Mode : Recording(NTSC Signal)** **RF Out Ch. : CH 4**

Frequency [MHz]	Reading [dB(μV)]	Factor [dB]	Level [dB(μV)]	Limit [dB(μV)]	Margin [dB]	Remark
62.72595	76	-25.1	50.9	56.5	5.6	Audio Signal
67.22095	89.9	-25.1	64.8	69.5	4.7	Video Signal
71.72395	75.6	-25.1	50.5	56.5	6	Audio Signal

*CF Factor = Preamp Gain + Matching Pad Loss + Cable Loss

*** Operating Mode : Recording(1V VITS Signal)** **RF Out Ch. : CH 4**

Frequency [MHz]	Reading [dB(μV)]	Factor [dB]	Level [dB(μV)]	Limit [dB(μV)]	Margin [dB]	Remark
62.72395	76	-25.1	50.9	56.5	5.6	Audio Signal
67.22495	89.9	-25.1	64.8	69.5	4.7	Video Signal
71.72796	75.6	-25.1	50.5	56.5	6	Audio Signal

*CF Factor = Preamp Gain + Matching Pad Loss + Cable Loss

*** Operating Mode : Recording(5V VITS Signal)** **RF Out Ch. : CH 4**

Frequency [MHz]	Reading [dB(μV)]	Factor [dB]	Level [dB(μV)]	Limit [dB(μV)]	Margin [dB]	Remark
62.72595	76	-25.1	50.9	56.5	5.6	Audio Signal
67.22695	89.9	-25.1	64.8	69.5	4.7	Video Signal
71.72595	75.6	-25.1	50.5	56.5	6	Audio Signal

*CF Factor = Preamp Gain + Matching Pad Loss + Cable Loss

*** Operating Mode : VCR Play** **RF Out Ch. : CH 4**

Frequency [MHz]	Reading [dB(μV)]	Factor [dB]	Level [dB(μV)]	Limit [dB(μV)]	Margin [dB]	Remark
62.72194	76	-25.1	50.9	56.5	5.6	Audio Signal
67.22095	89.9	-25.1	64.8	69.5	4.7	Video Signal
71.72195	75.6	-25.1	50.5	56.5	6	Audio Signal

*CF Factor = Preamp Gain + Matching Pad Loss + Cable Loss

*** Operating Mode : DVD Play** **RF Out Ch. : CH 4**

Frequency [MHz]	Reading [dB(μV)]	Factor [dB]	Level [dB(μV)]	Limit [dB(μV)]	Margin [dB]	Remark
62.72595	75.9	-25.1	50.8	56.5	5.7	Audio Signal
67.22495	89.9	-25.1	64.8	69.5	4.7	Video Signal
71.72796	75.6	-25.1	50.5	56.5	6	Audio Signal

*CF Factor = Preamp Gain + Matching Pad Loss + Cable Loss

3.4 Output Terminal Conducted Spurious Measurement

Test Information	
Test Engineer	Tae Young, Jang
Test Date	26-Dec-03
Climate Condition	Ambient Temperature : 23.1℃, Relative Humidity : 30%
Test Place	Shield Room #5

Test Equipments

Equipment	Model Name	Manufacturer	Serial No.	Next Cal. Date
TEST RECEIVER	ESI26	R & S	839809/002	2004-11-04
Preamp	310	SONOMA INSTRUMENT	185861	2004-09-20
Matching Pad	RAM	R & S	882204/064	-

Test Setup

The RF output terminal is connected to the test receiver through the matching pad(75 - 50 ohm) with a calibrated cable. Then, the RF output signal level is measured under the EUT operating mode(s).

See photo.

Test Result

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

Test Data

*** Operating Mode : Recording(NTSC Signal)** **RF Out Ch. : CH 3**

Frequency [MHz]	Reading [dB(μV)]	Factor [dB]	Level [dB(μV)]	Limit [dB(μV)]	Margin [dB]
47.69288	39.6	-25.1	14.5	39.5	25
52.2143	32.1	-25.1	7	39.5	32.5
54.15617	35.7	-25.1	10.6	39.5	28.9
122.51151	55.6	-25.1	30.5	39.5	9
365.96988	43.9	-24.5	19.4	39.5	20.1
609.95488	41	-24.4	16.6	39.5	22.9

*CF Factor = Preamp Gain + Matching Pad Loss + Cable Loss

*** Operating Mode : Recording(1V VITS Signal)** **RF Out Ch. : CH 3**

Frequency [MHz]	Reading [dB(μV)]	Factor [dB]	Level [dB(μV)]	Limit [dB(μV)]	Margin [dB]
54.09796	39.2	-25.1	14.1	39.5	25.4
55.15007	41	-25.1	15.9	39.5	23.6
56.4094	50.1	-25.1	25	39.5	14.5
74.75567	37.6	-25.1	12.5	39.5	27
122.51151	55.5	-25.1	30.4	39.5	9.1
183.75889	37.5	-24.9	12.6	39.5	26.9

*CF Factor = Preamp Gain + Matching Pad Loss + Cable Loss

*** Operating Mode : Recording(5V VITS Signal)** **RF Out Ch. : CH 3**

Frequency [MHz]	Reading [dB(μV)]	Factor [dB]	Level [dB(μV)]	Limit [dB(μV)]	Margin [dB]
54.81948	41.2	-25.1	16.1	39.5	23.4
55.15168	41.2	-25.1	16.1	39.5	23.4
56.4094	50.2	-25.1	25.1	39.5	14.4
74.75567	38.6	-25.1	13.5	39.5	26
122.51151	55.5	-25.1	30.4	39.5	9.1
183.7675	37	-24.9	12.1	39.5	27.4

*CF Factor = Preamp Gain + Matching Pad Loss + Cable Loss

*** Operating Mode : VCR Play** **RF Out Ch. : CH 3**

Frequency [MHz]	Reading [dB(μV)]	Factor [dB]	Level [dB(μV)]	Limit [dB(μV)]	Margin [dB]
42.9589	34.3	-25.1	9.2	39.5	30.3
47.75483	39.8	-25.1	14.7	39.5	24.8
55.95545	30.9	-25.1	5.8	39.5	33.7
74.75567	38.5	-25.1	13.4	39.5	26.1
122.51151	55.8	-25.1	30.7	39.5	8.8
183.7675	37.8	-24.9	12.9	39.5	26.6

*CF Factor = Preamp Gain + Matching Pad Loss + Cable Loss

*** Operating Mode : Recording(NTSC Signal)** **RF Out Ch. : CH 4**

Frequency [MHz]	Reading [dB(μV)]	Factor [dB]	Level [dB(μV)]	Limit [dB(μV)]	Margin [dB]
53.68041	39.6	-25.1	14.5	39.5	25
56.47954	34.9	-25.1	9.8	39.5	29.7
60.9982	37.7	-25.1	12.6	39.5	26.9
134.48098	52.5	-25.1	27.4	39.5	12.1
365.97509	43.7	-24.5	19.2	39.5	20.3
609.95488	44.9	-24.4	16.5	39.5	23

*CF Factor = Preamp Gain + Matching Pad Loss + Cable Loss

*** Operating Mode : Recording(1V VITS Signal)** **RF Out Ch. : CH 4**

Frequency [MHz]	Reading [dB(μV)]	Factor [dB]	Level [dB(μV)]	Limit [dB(μV)]	Margin [dB]
60.14498	40.4	-25.1	15.3	39.5	24.2
60.80649	41	-25.1	15.9	39.5	23.6
61.62438	41.7	-25.1	16.6	39.5	22.9
80.74297	37	-25.1	11.9	39.5	27.6
129.981	32.7	-25.1	7.6	39.5	31.9
134.48098	52.3	-25.1	27.2	39.5	12.3

*CF Factor = Preamp Gain + Matching Pad Loss + Cable Loss

*** Operating Mode : Recording(5V VITS Signal)** **RF Out Ch. : CH 4**

Frequency [MHz]	Reading [dB(μV)]	Factor [dB]	Level [dB(μV)]	Limit [dB(μV)]	Margin [dB]
60.80649	41.2	-25.1	16.1	39.5	23.4
61.16897	41.4	-25.1	16.3	39.5	23.2
62.08304	41.6	-25.1	16.5	39.5	23
80.74297	37.8	-25.1	12.7	39.5	26.8
134.48098	52.4	-25.1	27.3	39.5	12.2
201.71889	33.2	-24.8	8.4	39.5	31.1

*CF Factor = Preamp Gain + Matching Pad Loss + Cable Loss

*** Operating Mode : VCR Play** **RF Out Ch. : CH 4**

Frequency [MHz]	Reading [dB(μV)]	Factor [dB]	Level [dB(μV)]	Limit [dB(μV)]	Margin [dB]
42.9576	34.1	-25.1	9	39.5	30.5
53.74257	39.9	-25.1	14.8	39.5	24.7
61.82655	29.8	-25.1	4.7	39.5	34.8
80.74297	37.9	-25.1	12.8	39.5	26.7
129.981	33.7	-25.1	8.6	39.5	30.9
134.48098	52.6	-25.1	27.5	39.5	12

*CF Factor = Preamp Gain + Matching Pad Loss + Cable Loss

3.5 Antenna Transfer Switch Measurement

Test Information	
Test Engineer	Tae Young, Jang
Test Date	28-Nov-03
Climate Condition	Ambient Temperature : 23.1℃, Relative Humidity : 30%
Test Place	Shield Room #5

Test Equipments

Equipment	Model Name	Manufacturer	Serial No.	Next Cal. Date
TEST RECEIVER	ESI26	R & S	839809/002	2004-11-04
Preamp	310	SONOMA INSTRUMENT	185861	2004-09-20
Matching Pad	RAM	R & S	882204/064	-

Test Setup

The ANT input terminal is connected to the test receiver through the matching pad(75 - 50 ohm) with a calibrated cable. Then, the RF output leakage level is measured under the EUT operating mode(s).

See photo.

Test Result

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

Test Data

*** Operating Mode : Recording(1V VITS Signal)** **RF Out Ch. : CH 3**

Frequency [MHz]	Reading [dB(μV)]	Factor [dB]	Level [dB(μV)]	Limit [dB(μV)]	Margin [dB]
61.27651	24.3	-25.1	-0.8	9.5	10.3

*CF Factor = Preamp Gain + Matching Pad Loss + Cable Loss

*** Operating Mode : Recording(5V VITS Signal)** **RF Out Ch. : CH 3**

Frequency [MHz]	Reading [dB(μV)]	Factor [dB]	Level [dB(μV)]	Limit [dB(μV)]	Margin [dB]
61.93523	24.3	-25.1	-0.8	9.5	10.3

*CF Factor = Preamp Gain + Matching Pad Loss + Cable Loss

*** Operating Mode : VCR Play** **RF Out Ch. : CH 3**

Frequency [MHz]	Reading [dB(μV)]	Factor [dB]	Level [dB(μV)]	Limit [dB(μV)]	Margin [dB]
61.4414	24.3	-25.1	-0.8	9.5	10.3

*CF Factor = Preamp Gain + Matching Pad Loss + Cable Loss

*** Operating Mode : DVD Play** **RF Out Ch. : CH 3**

Frequency [MHz]	Reading [dB(μV)]	Factor [dB]	Level [dB(μV)]	Limit [dB(μV)]	Margin [dB]
61.25571	24.3	-25.1	-0.8	9.5	10.3

*CF Factor = Preamp Gain + Matching Pad Loss + Cable Loss

*** Operating Mode : Recording(1V VITS Signal)** **RF Out Ch. : CH 4**

Frequency [MHz]	Reading [dB(μV)]	Factor [dB]	Level [dB(μV)]	Limit [dB(μV)]	Margin [dB]
67.24398	25.8	-25.1	0.7	9.5	8.8

*CF Factor = Preamp Gain + Matching Pad Loss + Cable Loss

*** Operating Mode : Recording(5V VITS Signal)** **RF Out Ch. : CH 4**

Frequency [MHz]	Reading [dB(μV)]	Factor [dB]	Level [dB(μV)]	Limit [dB(μV)]	Margin [dB]
67.24398	25.8	-25.1	0.7	9.5	8.8

*CF Factor = Preamp Gain + Matching Pad Loss + Cable Loss

*** Operating Mode : VCR Play** **RF Out Ch. : CH 4**

Frequency [MHz]	Reading [dB(μV)]	Factor [dB]	Level [dB(μV)]	Limit [dB(μV)]	Margin [dB]
67.23998	25.8	-25.1	0.7	9.5	8.8

*CF Factor = Preamp Gain + Matching Pad Loss + Cable Loss

*** Operating Mode : DVD Play** **RF Out Ch. : CH 4**

Frequency [MHz]	Reading [dB(μV)]	Factor [dB]	Level [dB(μV)]	Limit [dB(μV)]	Margin [dB]
67.24398	25.7	-25.1	0.6	9.5	8.9

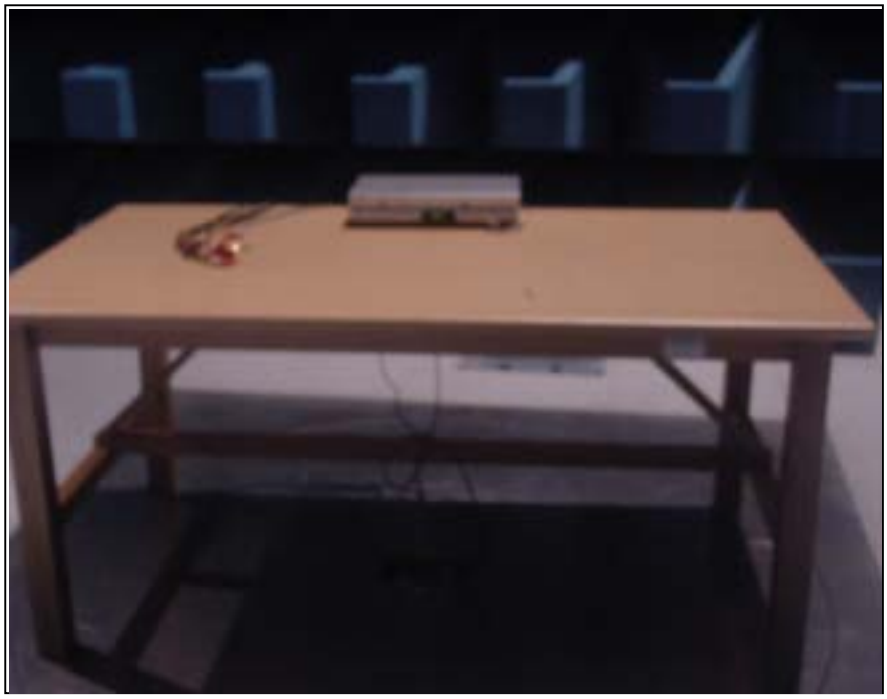
*CF Factor = Preamp Gain + Matching Pad Loss + Cable Loss

4. Appendix

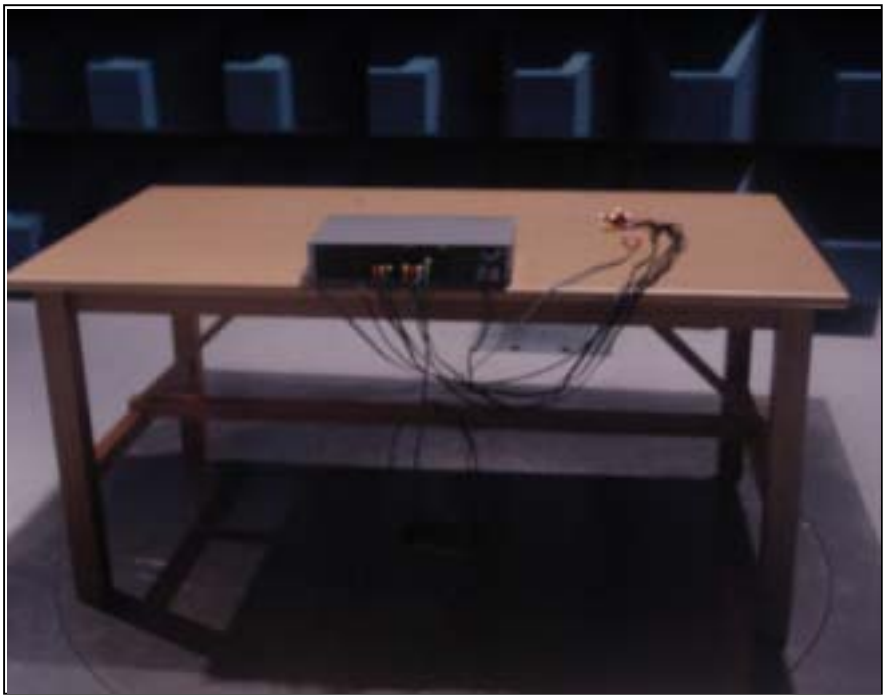
4.1 Test Photography

Pic. 1 AC Powerline Conducted Emission [Front]

Pic. 2 AC Powerline Conducted Emission [Rear]



Pic. 3 Radiated Emission [Front]



Pic. 4 Radiated Emission [Rear]

Pic. 5 RF Output Signal Level & Output Terminal Conducted Spurious Emission

Pic. 6 Antenna Transfer Switch

4.2 EUT Photography

Pic. 7 EUT [Front]

Pic. 8 EUT [Rear]