
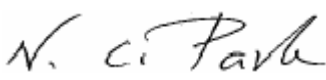



EMC Test Report

Project No.	LBE051217
Equipment under Test	
Applicant	Samsung Electronics Co. Ltd;
Address	416 Maetan3-Dong, Yeongtong-Gu, Suwon-City, Gyeonggi-Do, Korea, 443-742
Product Name	DIGITAL VIDEO RECORDER
Model Name	SHR-2040P
Manufacturer	SAMSUNG
Brand Name	SAMSUNG
Variant Model	See Page 3
Date of Test	June 07 ~ 18 , 2005
Issued Date	June 20, 2005

Applied Standards	EN61000-6-4: 2001, EN61000-3-2: 2000, EN61000-3-3: 1995+A1:2001, EN50130-4: 1995 + A1:1998
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.		      	
Address	416 Maetan3-Dong, Yeongtong-Gu, Suwon-City, Gyeonggi-Do, Korea, 443-742		
Telephone No.	82-31-200-2135		
Fax No.	82-31-200-2189		

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1. General Information

1.1 Basic Information related Product

Applicant	Samsung Electronics Co. Ltd;
Model name	SHR-2040P
Applicant Address	Samsung Electronics Co. Ltd; 416 Maetan3- Dong, Yeongtong-Gu, Suwon- Si, Gyeonggi-Do, Korea, 443-742
Contact Person	KIM JONG UK
Kind of Product	Digital Video Recorder
Valiant Model List	None
Manufacturer	Samsung Electronics Co. Ltd;

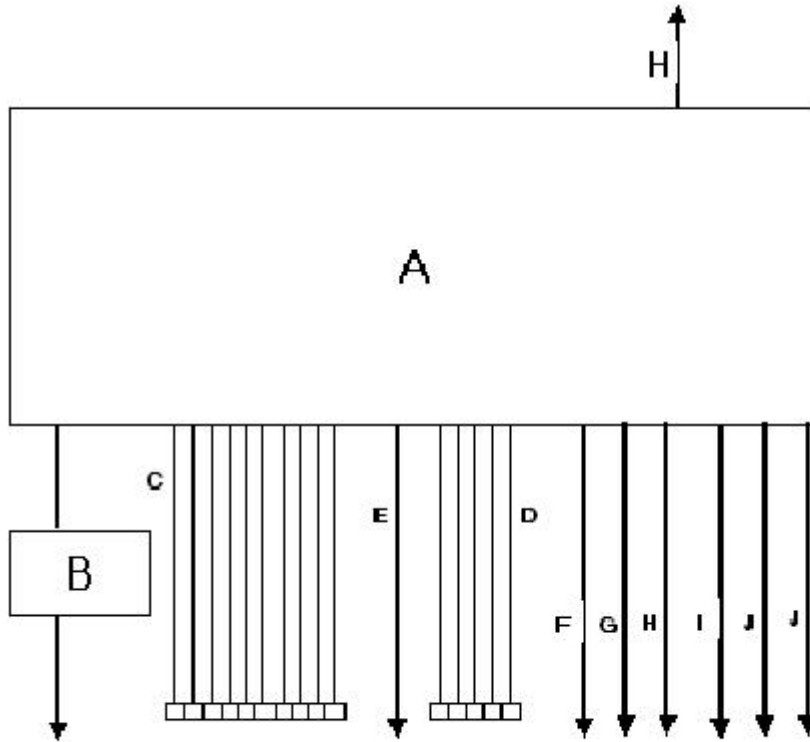
1.2 Detail Information related Product

Specification

Video Input	<p>Composite 4 channel</p> <ul style="list-style-type: none"> - 1.0Vp-p - 75 Ohms Hi Z Terminal <p>BNC Type</p> <p>Loop Through Out 4 channel</p> <ul style="list-style-type: none"> - Auto Termination
Video Output	<p>Composite 2 channel</p> <ul style="list-style-type: none"> - Normal Video Output 1 channel - Spot Output 1 channel <p>BNC Type</p> <p>S-Video 1 channel</p> <ul style="list-style-type: none"> - 1.0Vp-p <p>VGA 1 channel</p>
Audio Input	<p>Mono 4 channel</p> <ul style="list-style-type: none"> - -5dBm, 600ohms <p>RCA Type</p>
Audio Output	<p>Mono 1 channel</p> <ul style="list-style-type: none"> - -6dBm <p>RCA Type</p>

1.3 Test Block Diagram

Block Diagram



Used EUT and Peripherals

Seq	Device	Model Name	Serial #	Maker	Note
A	DVR	SHR-2040P	-	SAMSUNG	EUT
B	AC Adapter	ADP-5412WD	0504025	DONGYANG INSTRUMENT INC.	
C	BNC Cable	-	-	-	Termination
D	RCA Cable	-	-	-	Termination
E	D-Sub Cable	-	-	-	
F	S-Video Cable	-	-	-	Termination
G	RS232C Cable	-	-	-	
H	USB Cable	-	-	-	
I	LAN Cable	-	-	-	
J	ALARM Cable	-	-	-	

1.3 Applied Standards

List

Product or Generic Standards	Basic Standards
EN61000-6-4: 1992	EN61000-4-2:1995 +A1(1998)+A2:2001
EN61000-3-2: 2000	EN61000-4-3:2002
EN61000-3-3: 1995+A1:2001	EN61000-4-4:1995 +A1:2001 +A2:2001
	EN61000-4-5:1995
	EN61000-4-6:1996 +A1:2001
	EN61000-4-11:1994 +A1:2001

Performance Criteria

- A. normal performance within the specification limits
- B. temporary degradation or less of function or performance which is self-recoverable
- C. temporary degradation or less of function or performance which require operator intervention or system reset

1.4 Test Facility

General Information

The sites are constructed in conformance with the requirements of ANSI C63.4 and CISPR 22, 16-1, 16-2, 11.

This EMC Testing Lab. is accredited by Korea Laboratory Accreditation Scheme(KOLAS) which signed the International Laboratory Accreditation Cooperation (ILAC) Mutual Recognition Arrangement (MRA) for the above test item(s) and test method(s).

This Lab. is operated as testing laboratory in accordance with the requirements of ISO/IEC 17025:1998.

Accreditation and Listing



Uncertainty

(According to NAMAS Pub.NIS81)

Test Item	Expanded Uncertainty
Radiated Disturbance	±5.09
Disturbance voltage at the mains terminals	±3.30
Disturbance Power	2.46

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	Conducted Emission	EN61000-6-4:2001	Complied
3.2	Radiated Emission	EN61000-6-4:2001	Complied
3.3	Harmonics	EN61000-3-2: 2000	Complied
3.4	Flicker	EN61000-3-3: 1995+A1:2001	Complied
Electromagnetic Susceptibility(Immunity) Test			
3.5	ESD	EN61000-4-2:1995 +A1:1998+A2:2001	Complied
3.6	Radiated Immunity	EN61000-4-3:2002	Complied
3.7	EFT	EN61000-4-4:1995 +A1:2001+A2:2001	Complied
3.8	SURGE	EN61000-4-5:1995	Complied
3.9	Conducted Immunity	EN61000-4-6:1996+A1:2001	Complied
3.10	Voltage Dip	EN61000-4-11:1994+A1:2001	Complied

3. Description of Individual Tests

3.1 Conducted Emission

Test Information	
Test Engineer	Tae Young, Jang
Test Date	June 14, 2005
Climate Condition	Ambient Temperature : 23 Relative Humidity : 40%
Test Place	Shield Room #5

Test Equipments

Equipment	Model Name	Manufacturer	Serial No.	Calibration	
				Next Date	Interval
Field strength meter	ESCI	R&S	100086	2006-01-17	12
TV Signal Generator	PM5418-TDSI	PHILIPS	LO612437	2005-09-23	12
Field strength meter	ESS	R&S	844661/005	2006-01-11	12
L.I.S.N	ESH3-Z5	R&S	100261	2005-07-23	12
RF Relais Matrix	PSU	R&S	861206/024	N/A	N/A
Measurement Software	EP5CE	TOYO	-	N/A	N/A

EUT Test Setup

EUT set up in semi-anechoic chamber. EUT positioned at 3m from antenna in center of table.
All ports terminated into characteristic loads.

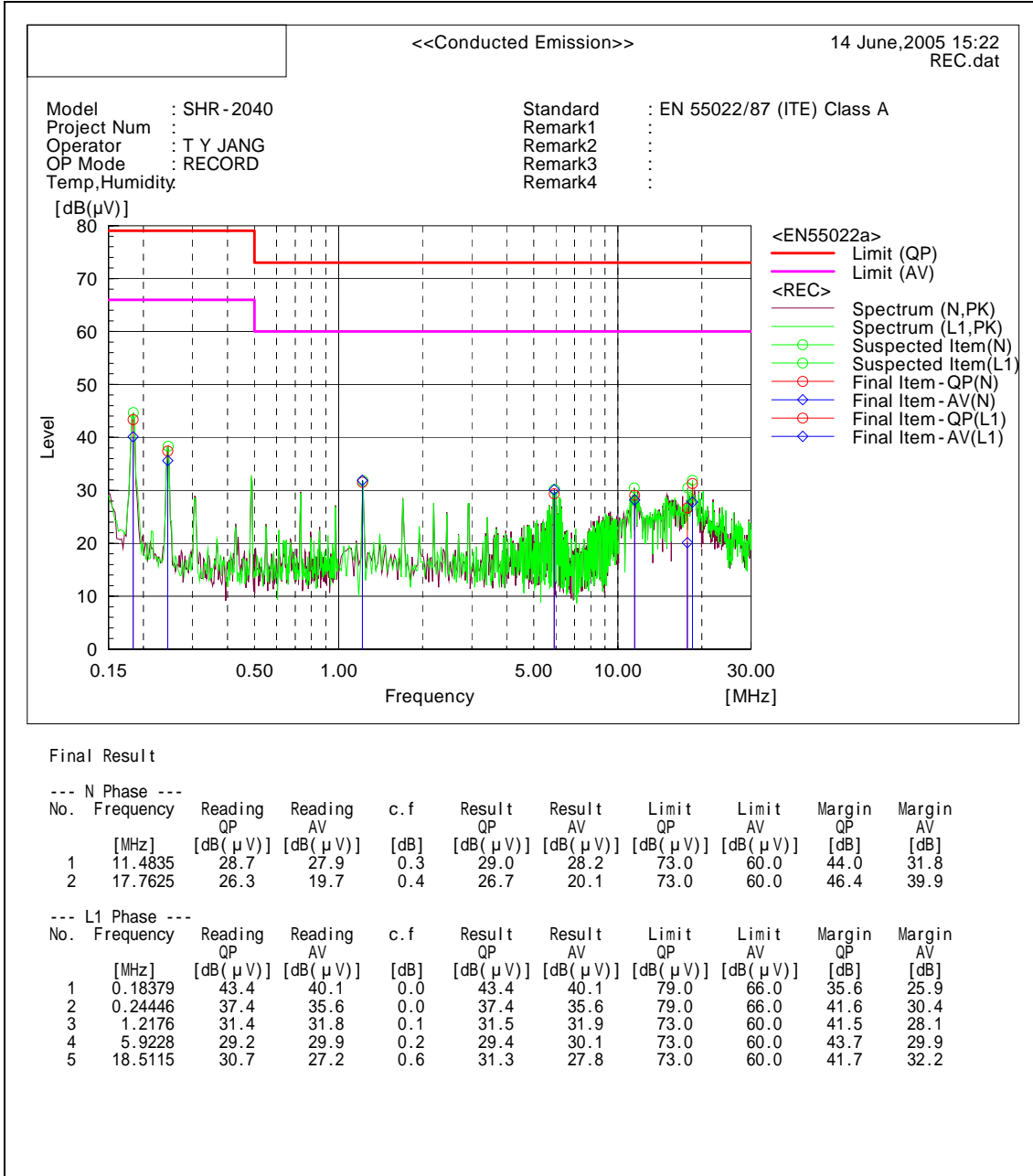
Test Result

Measurement Results	<p>Pass</p> <p>The measured emissions of the EUT have found to be below the specified limits.</p>
----------------------------	---

Test Data

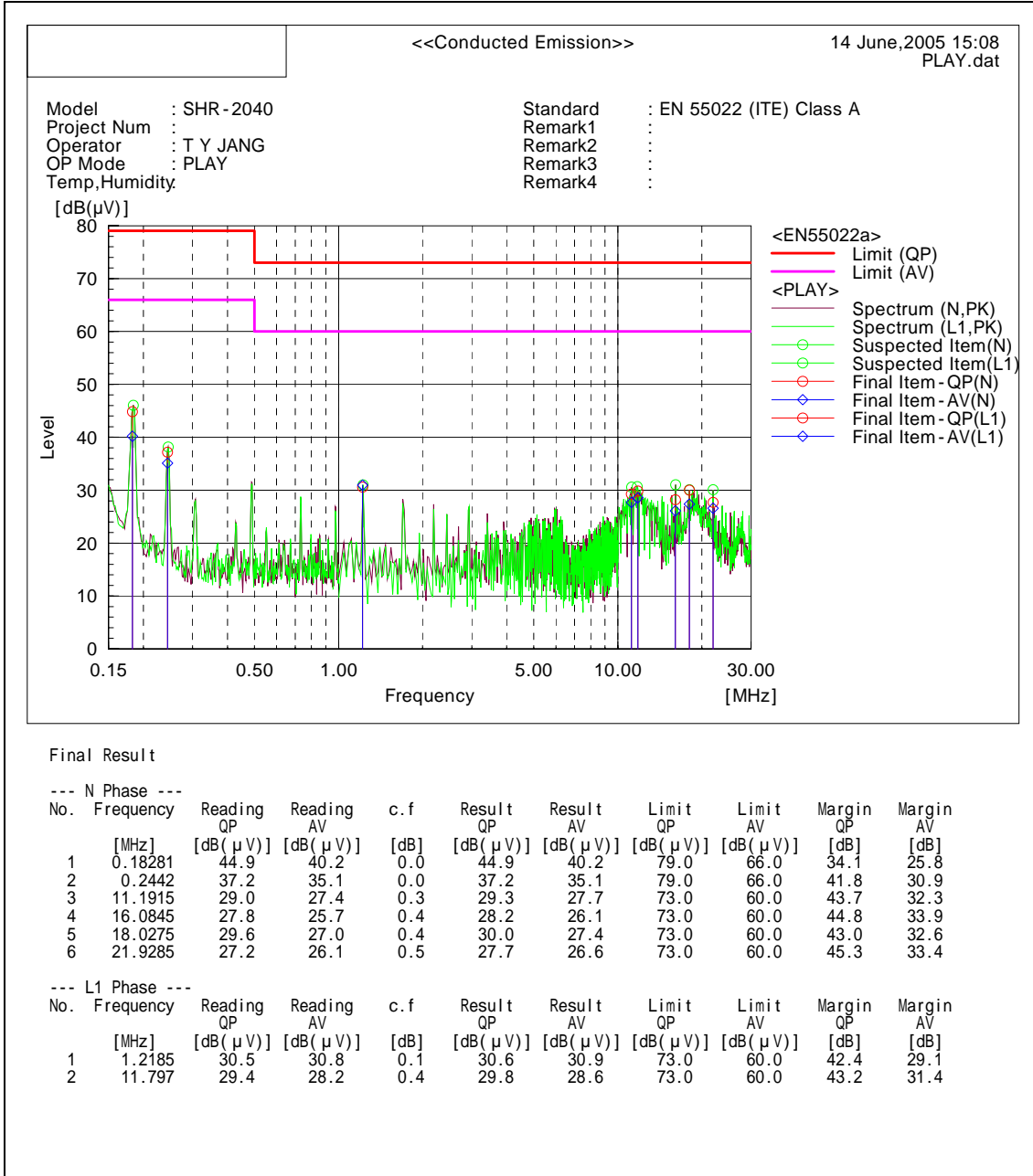
Operating Mode : DVR Record

[Graph and Data]



Operating Mode : DVR Play

[Graph and Data]



3.2 Radiated Emission

Test Information	
Test Engineer	Tae Young, Jang
Test Date	June 07, 2005
Climate Condition	Ambient Temperature : 23 Relative Humidity : 35%
Test Place	10m Semi Anechoic Chamber

Test Equipments

Equipment	Model Name	Manufacturer	Serial No.	Calibration	
				Next Date	Interval
RF Selector	NS4900	TOYO	0303-015	N/A	N/A
Biconilog Antenna	6112B	SCHAFFNER	2767	2005-05-22	12
Mast Controller	HD2000	HD	HD20000902027	N/A	N/A
Test Software	EP5RET	TOYO	None	N/A	N/A
Test Software	EP5RE	TOYO	None	N/A	N/A
TV Signal Generator	PM5418-TDSI	PHILIPS	LO612437	2005-09-23	12
Spectrum Analyzer	E7405A	Agilent	MY42000109	2005-11-27	12
Field strength meter	ESCS30	R&S	839809/002	2006-05-04	12
RF Amplifier	8447D	Agilent	2944A10430	2005-07-20	12

EUT Test Setup

EUT set up in semi-anechoic chamber. EUT positioned at 3m from antenna in center of table.
All ports terminated into characteristic loads.

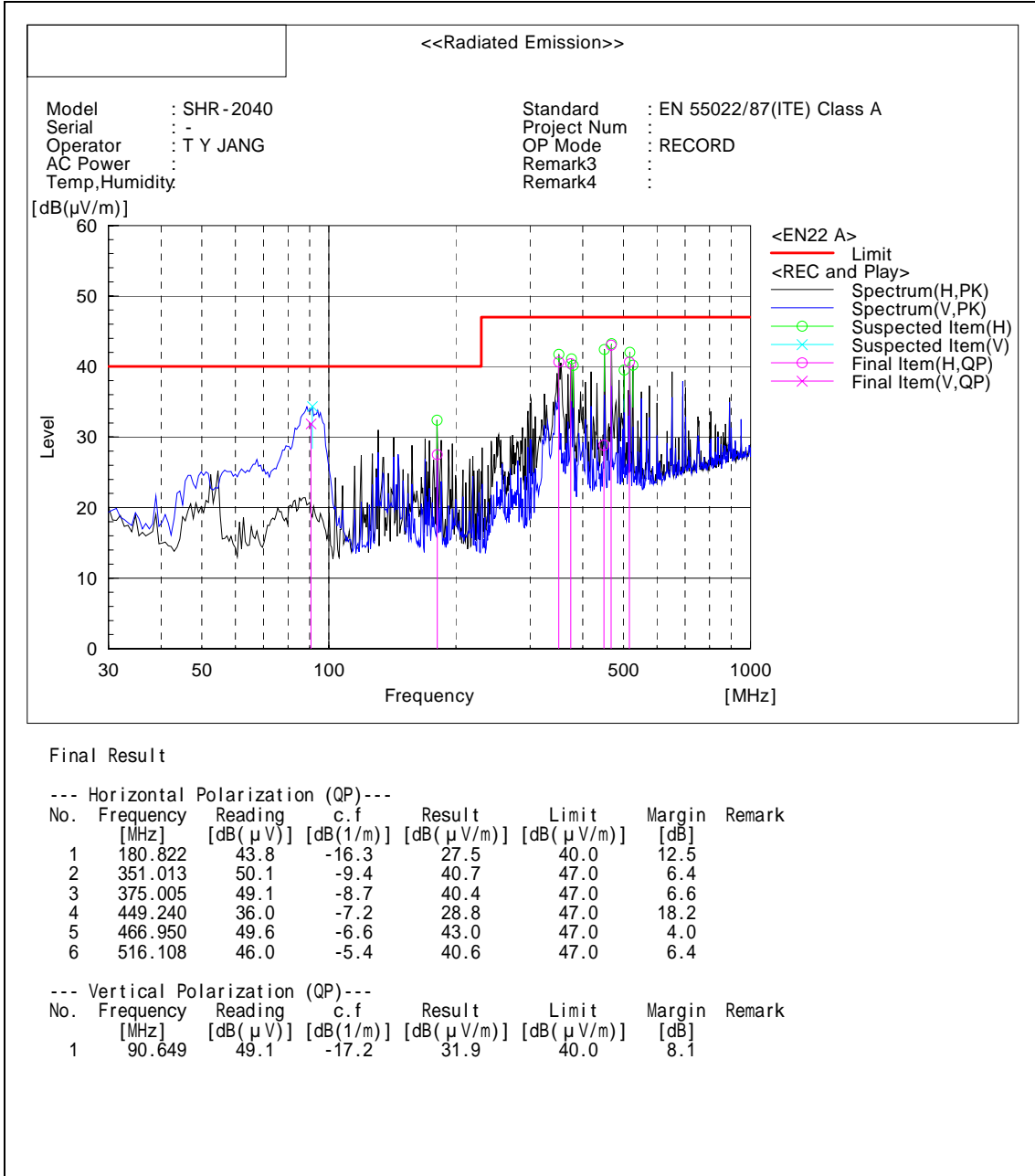
Test Result

Measurement Results	<p>Pass</p> <p>The measured emissions of the EUT have found to be below the specified limits.</p>
----------------------------	---

Test Data

Operating Mode : DVR Record

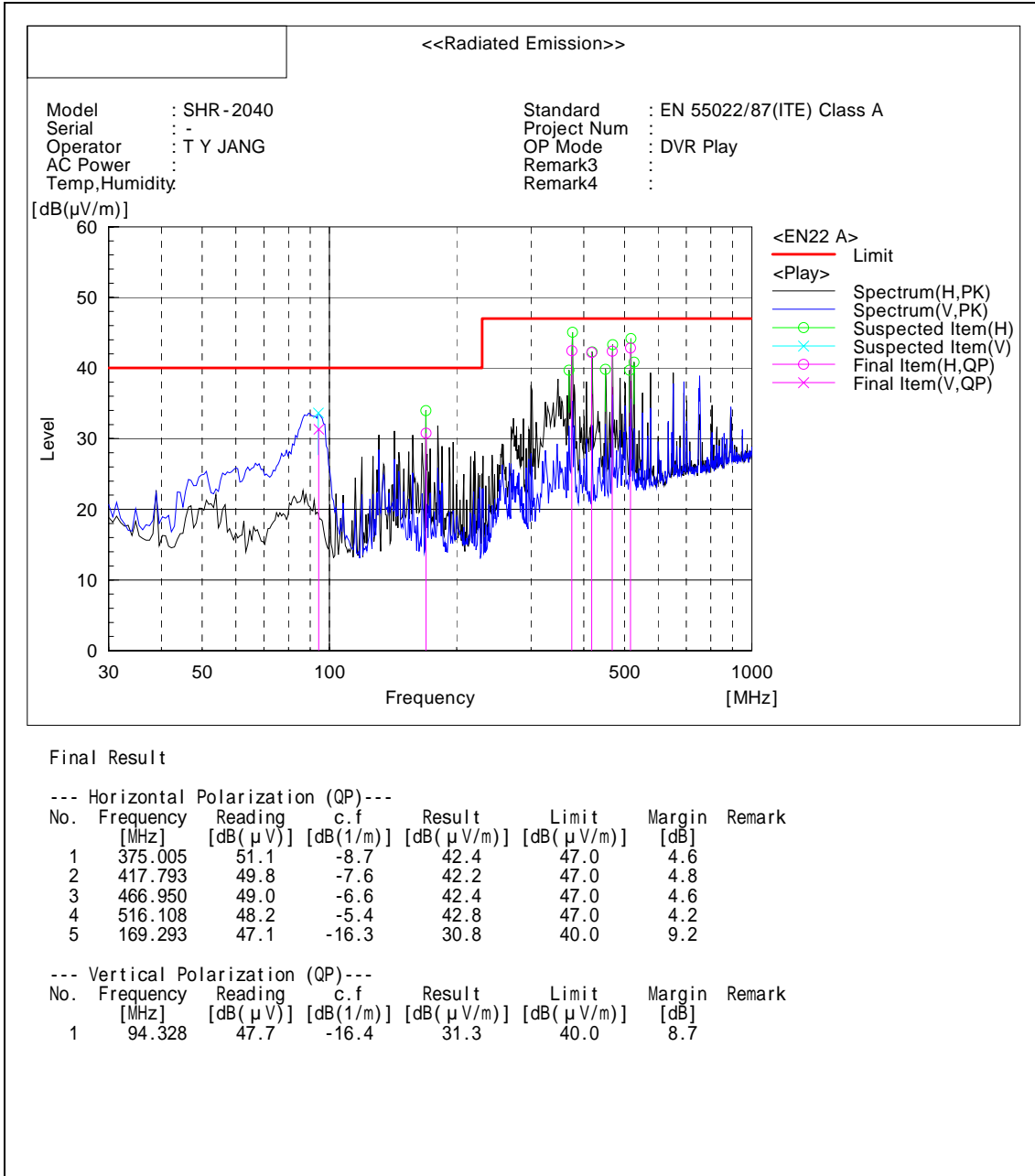
[Graph and Data]



Test Data

Operating Mode : DVR Play

[Graph and Data]



3.3 Harmonics

Test Information	
Test Engineer	Tae Young, Jang
Test Date	June 17, 2005
Climate Condition	Ambient Temperature : 27 Relative Humidity : 38%
Test Place	Harmonic & Flicker Test Room

Test Equipments

Equipment	Modal Name	Manufacturer	Serial No.	Calibration	
				Next Date	Interval
Power Analyzer	PM3000A	Voltech	AU112/9229	2005-07-30	12
Reference Impedance Network	NI2415	ZIMMER	-	N/A	N/A

EUT Test Setup

The EUT was set up in accordance with the requirements of the applied standard.

The power consumption, steady state harmonic currents were measured in the tested operating mode(s).

Test Result

Measurement Results	<p>Pass</p> <p>The measured emissions of the EUT have found to be below the specified limits.</p>
----------------------------	---

Test Data

Product: DVR		2005 Jun 17 8:49pm
Serial no:		Page 1 of 1
Description: Digital Video Recorder		
Test Date: 2005 Jun 17 8:26pm		
Result Name: SHR-2040		
Type of Test: EN61000:2001 Harmonics		
Limits: Class A		
Power Analyzer: Voltech PM3000A v2.20 s/n 9229		
AC Source: Mains / Manual Source		
Harmonic Results Against Chosen Limits:	Notes:	
PASS		
Test Parameter Details	User Entered	Measured
Operating Frequency:	50	49.9873
Operating Voltage:	230	231.2699
Specified Power:	0.0000	23.2852
Fundamental Current:	0.0000	0.1077
Power Factor:	0.0000	0.4109
Average Input Current:		0.2445
Maximum POHC:		0.0341
POHC Limit:		0.2514
Maximum THC:		0.2202
Minimum Power:	75	
Class Multiplier:	1.0000	
Test Duration:	00:02:30	

This Harmonics Test is not available because the power measured of the EUT is less than 75W.

3.4 Flicker

Test Information	
Test Engineer	Tae Young, Jang
Test Date	June 17, 2005
Climate Condition	Ambient Temperature : 27 (EN Limit : 15 ~35) Relative Humidity : 38% (EN Limit : 30%~60%) Atmospheric Pressure 1026 mbar (EN Limit : 860~1060)
Test Place	Harmonic & Flicker Test Room

Test Equipments

Equipment	Modal Name	Manufacturer	Serial No.	Calibration	
				Next Date	Interval
Power Analyzer	PM3300	AK08/9137	Voltech	2004-12-15	12
Reference Impedance Network	IEC Std.555	Voltech	IB10/9466	N/A	N/A

EUT Test Setup

The EUT was set up is accordance with the requirements of the applied standard.

Test Result

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

Test Data

Operating Mode : HDD Recording

PASS

	Pst	dc (%)	dmax (%)	d(t) > 3.3%(ms)
Limit	1.000	3.300	4.000	500
Reading 1	0.071	0.024	0.032	0

Operating Mode : HDD Play

PASS

	Pst	dc (%)	dmax (%)	d(t) > 3.3%(ms)
Limit	1.000	3.300	4.000	500
Reading 1	0.071	0.024	0.040	0

3.5 ESD

Test Information	
Test Engineer	Tae Young, Jang
Test Date	June 13, 2005
Climate Condition	Ambient Temperature : 23 (EN Limit : 15 ~35) Relative Humidity : 38% (EN Limit : 30%~60%) Atmospheric Pressure 1006 mbar (EN Limit : 860~1060)
Test Place	Shied Room #2

Test Equipments

Equipment	Modal Name	Manufacturer	Serial No.	Calibration	
				Next Date	Interval
ESD Tester	ESD30	EM Test	0901-23	2006-01-24	12

EUT Test Setup

The EUT was operated on a wooden table 0.8 meter above the reference ground. A HCP is lying on the table. Between the EUT and the HCP 0.5 mm is isolated base.

Test Result

Measurement Results	Pass No Operation errors were detected during or after the applied test.
----------------------------	---

Test Data

	No	Applied Point Name	Discharge Method	Test Level	Tested No	Criteria	Result
Indirect		Horizontal Plane	Contact	±4kV	20	B	B
Indirect		Vertical Plane	Contact	±4kV	20	B	B
Direct	1	LED	Air	±8kV	20	B	B
Direct	2	Function Button	Air	±8kV	20	B	B
Direct	3	Enter Button	Contact	±6kV	20	B	B
Direct	4	Audio-OUT	Contact	±6Kv	20	B	B
Direct	5	BNC Jack	Contact	±6kV	20	B	B
Direct	6	RCA Jack	Contact	±6kV	20	B	B
Direct	7	D-Sub Jack	Air	±8kV	20	B	B
Direct	8	LAN	Contact	±6kV	20	B	B
Direct	9	S-Video	Contact	±6kV	20	B	B
Direct	10	Power Jack	Air	±8kV	20	B	B

Test Points

FRONT



REAR



3.6 Radiated Immunity

Test Information	
Test Engineer	Tae Young, Jang
Test Date	June 16, 2005
Climate Condition	Ambient Temperature : 24 (EN Limit : 15 ~35) Relative Humidity : 37% (EN Limit : 30%~60%) Atmospheric Pressure 1020 mbar (EN Limit : 860~1060)
Test Place	Fully Anechoic Chamber

Test Equipments

Equipment	Model Name	Manufacturer	Serial No.	Calibration	
				Next Date	Interval
Amplifierr	AR200W1000M7A	AR	17282	N/A	N/A
Dual Directional Coupler	DCU	R/S	316976/001	2005.11.04	12
Signal Generator	SML03	R/S	101279	2005.11.04	12
RMS/PEAK VOLTMETER	URE3	R/S	839432/032	2005.11.05	12
Power Meter	NRVD	R/S	841501/010	2005.11.05	12
Antenna	AT1080	AR	16511	N/A	N/A

EUT Test Setup

The EUT was operated on a wooden table 0.8 meter above the reference ground. The test distance was 3 meter.

Test Result

Measurement Results	Pass No Operation errors were detected during or after the applied test.
----------------------------	---

Test Data

Test Level	Freq. Range	Modulation	Dwell Time	Test Side	Criteria		Result	
					Ver	Hor	Ver	Hor
[V/m]	[MHz]							
1 V/m	80 ~ 1000	80%AM@1KHz	3 s	Front	A	A	A	A
			3 s	Left	A	A	A	A
			3 s	Back	A	A	A	A
			3 s	Right	A	A	A	A
3 V/m	80 ~ 1000	80%AM@1KHz	3 s	Front	B	B	B	B
			3 s	Left	B	B	B	B
			3 s	Back	B	B	B	B
			3 s	Right	B	B	B	B
10 V/m	80 ~ 1000	80%AM@1KHz	3 s	Front	B	B	B	B
			3 s	Left	B	B	B	B
			3 s	Back	B	B	B	B
			3 s	Right	B	B	B	B
1 V/m	80 ~ 1000	PM with 1HZ (0.5s ON: 0.5s OFF)	3 s	Front	A	A	A	A
			3 s	Left	A	A	A	A
			3 s	Back	A	A	A	A
			3 s	Right	A	A	A	A
3 V/m	80 ~ 1000	PM with 1HZ (0.5s ON: 0.5s OFF)	3 s	Front	B	B	B	B
			3 s	Left	B	B	B	B
			3 s	Back	B	B	B	B
			3 s	Right	B	B	B	B
10 V/m	80 ~ 1000	PM with 1HZ (0.5s ON: 0.5s OFF)	3 s	Front	B	B	B	B
			3 s	Left	B	B	B	B
			3 s	Back	B	B	B	B
			3 s	Right	B	B	B	B

3.7 EFT

Test Information	
Test Engineer	Tae Young, Jang
Test Date	June 13, 2005
Climate Condition	Ambient Temperature : 23 (EN Limit : 15 ~35) Relative Humidity : 38% (EN Limit : 25%~75%) Atmospheric Pressure 1005 mbar (EN Limit : 860~1060)
Test Place	Shield Room #2

Test Equipments

Equipment	Modal Name	Manufacturer	Serial No.	Calibration	
				Next Date	Interval
EFT/Burst Generator	NSG2025	SCHAFFNER	19872	2006-05-17	12
Measurement Software	WIN2025	SCHAFFNER	-	N/A	N/A

EUT Test Setup

The EUT was operated on a wooden table 0.8 meter above the reference ground.

Test Result

Measurement Results	Pass No Operation errors were detected during or after the applied test.
----------------------------	---

Test Data

Port	Coupling	Test Level		Phase wave shape (kHz)	Polarity	Criteria	Result
		Voltage (kV)	Frequency (kHz)				
AC Port	Live	0.5	5	5/50	+/-	B	B
		1	5	5/50	+/-	B	B
		2	5	5/50	+/-	B	B
AC Port	Ground	0.5	5	5/50	+/-	B	B
		1	5	5/50	+/-	B	B
		2	5	5/50	+/-	B	B
AC Port	Neutral	0.5	5	5/50	+/-	B	B
		1	5	5/50	+/-	B	B
		2	5	5/50	+/-	B	B
AC Port	Live to Ground	0.5	5	5/50	+/-	B	B
		1	5	5/50	+/-	B	B
		2	5	5/50	+/-	B	B
AC Port	Neutral to Ground	0.5	5	5/50	+/-	B	B
		1	5	5/50	+/-	B	B
		2	5	5/50	+/-	B	B
AC Port	Live to Neutral	0.5	5	5/50	+/-	B	B
		1	5	5/50	+/-	B	B
		2	5	5/50	+/-	B	B
AC Port	Live to Neutral to Ground	0.5	5	5/50	+/-	B	B
		1	5	5/50	+/-	B	B
		2	5	5/50	+/-	B	B

3.8 Immunity to Surge

Test Information	
Test Engineer	Tae Young, Jang
Test Date	June 13, 2005
Climate Condition	Ambient Temperature : 23 (EN Limit : 15 ~35) Relative Humidity : 39% (EN Limit : 25%~75%) Atmospheric Pressure 1005mbar (EN Limit : 860~1060)
Test Place	Shield Room #2

Test Equipments

Equipment	Modal Name	Manufacturer	Serial No.	Calibration	
				Next Date	Interval
Surge Tester	NSG2050	SCHAFFNER	200242-146AR	2005-06-01	12
CDN	131	SCHAFFNER	34307	2005-06-01	12
Measurement Software	WIN2050	SCHAFFNER	-	N/A	12

EUT Test Setup

The EUT was operated on a wooden table 0.8 meter above the reference ground.

Test Result

Measurement Results	Pass No Operation errors were detected during or after the applied test.
----------------------------	---

Test Data

Port	Coupling	Test Level			Phase wave shape (μ s)	Polarity	Criteria	Result
		Voltage (kV)	Repetition Time(sec)	No				
AC Port	Live to Ground	0.5	60	40	1.2/50(8/20)	+/-	B	B
		1	60	40	1.2/50(8/20)	+/-	B	B
		2	60	40	1.2/50(8/20)	+/-	B	B
AC Port	Neutral to Ground	0.5	60	40	1.2/50(8/20)	+/-	B	B
		1	60	40	1.2/50(8/20)	+/-	B	B
		2	60	40	1.2/50(8/20)	+/-	B	B
AC Port	Live to Neutral	0.5	60	40	1.2/50(8/20)	+/-	B	B
		1	60	40	1.2/50(8/20)	+/-	B	B

3.9 Conducted Immunity

Test Information	
Test Engineer	Tae Young, Jang
Test Date	June 16, 2005
Climate Condition	Ambient Temperature : 24 (EN Limit : 15 ~35) Relative Humidity : 37% (EN Limit : 30%~60%) Atmospheric Pressure 1020 mbar (EN Limit : 860~1060)
Test Place	Conducted Immunity Room

Test Equipments

Equipment	Model Name	Manufacturer	Serial No.	Calibration	
				Next Date	Interval
Amplifierr	150A220	AR	17077	N/A	N/A
Dual Directional Coupler	DCU	R/S	316976/001	2005.11.04	12
Signal Generator	SML03	R/S	101279	2005.11.04	12
RMS/PEAK VOLTMETER	URE3	R/S	839432/032	2005.11.05	12
Power Meter	NRVD	R/S	841501/010	2005.11.05	12
Antenna	AT1080	AR	16511	N/A	N/A
CDN	M016	SCHAFFNER	20571	2006-04-26	12
CDN	M016	SCHAFFNER	20573	2006-04-26	12

EUT Test Setup

The EUT was operated on a wooden table 0.8 meter above the reference ground.

Test Result

Measurement Results	Pass No Operation errors were detected during or after the applied test.
----------------------------	---

Test Data

Port Coupling	Freq. Range	Modulation	Level	Dwell Time	Coupling	Criteria	Result
AC Mains	0.15~100MHz	80% AM @1KHz	10 V	3 s	CDN	C	B
			3 V	3 s	CDN	B	B
			1 V	3 s	CDN	A	A
AC Mains	0.15~100MHz	PM with 1Hz(0.5s ON : 0.5s OFF)	10 V	3 s	CDN	C	B
			3 V	3 s	CDN	B	B
			1 V	3 s	CDN	A	A

3.10 Voltage Dip

Test Information	
Test Engineer	Tae Young, Jang
Test Date	June 13, 2005
Climate Condition	Ambient Temperature : 23 (EN Limit : 15 ~35) Relative Humidity : 38% (EN Limit : 25%~75%) Atmospheric Pressure 1005 mbar (EN Limit : 860~1060)
Test Place	Shield Room #2

Test Equipments

Equipment	Modal Name	Manufacturer	Serial No.	Calibration	
				Next Date	Interval
Measurement Software	WIN2120	SCHAFFNER	-	N/A	N/A
Voltage Dip & Interruption	NSG1007	SCHAFFNER	55407	2006-5-17	12
Voltage Dip & Interruption	NSG1007	SCHAFFNER	55408	2006-5-17	12

EUT Test Setup

The EUT was operated on a wooden table 0.8 meter above the reference ground.

Test Result

Measurement Results	Pass No Operation errors were detected during or after the applied test.
----------------------------	---

Test Data

Voltage Dips/Interference

Test Voltage		Number of Applications	Time Between Application	Angle (Degrees)	Criteria	Result
Reduction Level	Duration of reduction (s)					
Reduction 60%	0.5	10	10 s	0 180	B	B
	1	10	10 s	0 180	B	B
	5	10	10 s	0 180	B	B
	10	10	10 s	0 180	B	B
Reduction 100%	0.5	10	10 s	0	B	B
	1	10	10 s	0	B	B
	5	10	10 s	0	B	B

Voltage Variations

Test Voltage	Time for decreasing voltage	Time at reduced voltage	Time for increasing voltage	Criteria	Result
10% UP	2s	2s	2s	A	A
15% DOWN	2s	2s	2s	A	A

4. Appendix A

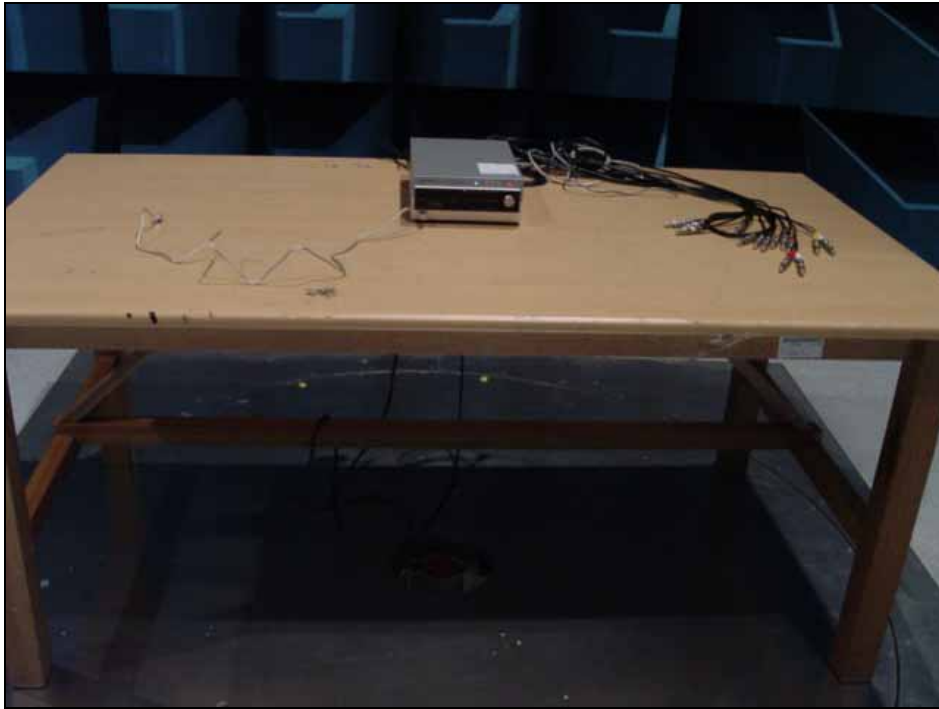
4.1 Test Photography



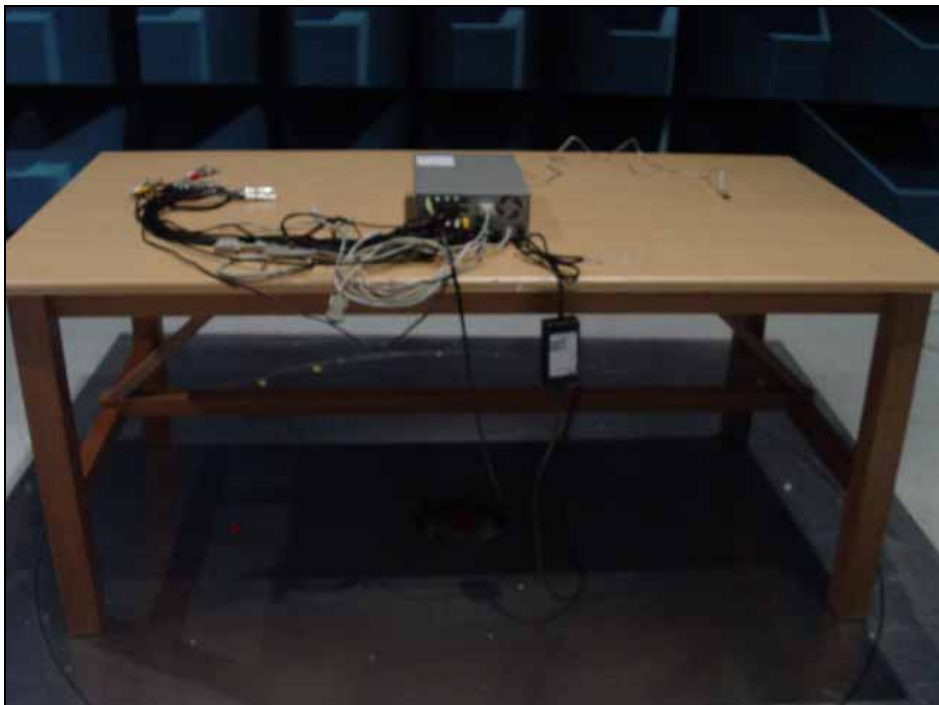
Picture 1. Conducted Emission (Front)



Picture 2. Conducted Emission (Rear)



Picture 3. Radiated Emission (Front)



Picture 4. Radiated Emission (Rear)



Picture 5. ESD



Picture 6. Radiated Immunity



Picture 7. EFT



Picture 8. Surge



Picture 9. Conducted Immunity



Picture 10. Voltage Dip

4.2 EUT Photography



Picture 11. EUT (Front)



Picture 12. EUT (Rear)