ELECTROMAGNETIC EMISSION COMPLIANCE REPORT FOR FCC CLASS B CERTIFICATION

Test report file number	**: E024R-008**
Applicant	**: SAMJUNG Co., Ltd.**
Address	**: 152-78 Hwanggye-Ri, Taean-Eup, Hwasung-Si, Kyounggi-Do, 445-977, Korea**
Manufacturer	**: SAMJUNG Co., Ltd.**
Address	**: 152-78 Hwanggye-Ri, Taean-Eup, Hwasung-Si, Kyounggi-Do, 445-977, Korea**
Type of Equipment	**: CAR VIDEO CASSETTE RECORDER**
FCC ID.	**: NPESVRN001**
Model / Type No.	**: SVR-N404**
Serial number	**: N/A**
Total page of Report	**: 14 pages (including this page)**
Date of Incoming	**: March 28, 2002**
Date of issue	**: April 2, 2002**

SUMMARY

The equipment complies with the regulation; ***FCC CFR 47 PART 15 SUBPART B, Class B.***

This test report contains only the result of a single test of the sample supplied for the examination.

It is not a generally valid assessment of the features of the respective products of the mass-production.

Prepared by: Youm Kwon. Nam
Y. K. Nam / Assist. Chief Engineer
EMC Dept.
ONETECH Corp.

Reviewed by: Young Kwang Kwon
Y. K. Kwon / Chief Manager
EMC Dept.
ONETECH Corp.

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HEAD OFFICE : #505 SK APT. Factory 223-28, Sangdaewon 1 Dong, Jungwon-Gu, Seongnam-City, Kyunggi-Do, 462-121, Korea (TEL: +82-31-746-8500, FAX: +82-31-746-8700)

EMC Testing Dept : 426-1 Daessangryung-Ri, Chowol-Myun, Kwangju-Si, Kyounggi-Do, 464-860, Korea. (TEL: +82-31-765-8289 FAX: +82-31-766-2904)

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1. VERIFICATION OF COMPLIANCE

APPLICANT	: SAMJUNG Co., Ltd.
ADDRESS	: 152-78 Hwanggye-Ri, Taean-Eup, Hwasung-Si, Kyounggi-Do, 445-977, Korea
CONTACT PERSON	: Byoung-Chan, Lee / Manager
TELEPHONE NO	: +82-31-234-3804
FCC ID	: NPESVRN001
MODEL NO/NAME	: SVR-N404
SERIAL NUMBER	: N/A
DATE	: April 2, 2002

DEVICE TYPE	TV INTERFACE DEVICE - UNINTENTIONAL RADIATOR
E.U.T. DESCRIPTION	CAR VIDEO CASSETTE RECORDER
THIS REPORT CONCERNS	ORIGINAL GRANT
MEASUREMENT PROCEDURES	MP-3, ANSI C63.4/1992
TYPE OF EQUIPMENT TESTED	PRE-PRODUCTION
KIND OF EQUIPMENT AUTHORIZATION REQUESTED	CERTIFICATION
EQUIPMENT WILL BE OPERATED UNDER FCC RULES PART(S)	FCC PART 15 § 15.101
MODIFICATIONS ON THE EQUIPMENT TO ACHIEVE COMPLIANCE	No
FINAL TEST WAS CONDUCTED ON	3 METER OPEN AREA TEST SITE

The above equipment was tested by ONETECH Corp. for compliance with the requirement set forth in the FCC Rules and Regulations. This said equipment in the configuration described in this report, shows the maximum emission levels emanating from equipment are within the compliance requirements.

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2. GENERAL INFORMATION

2.1 Product Description

The SAMJUNG Co., Ltd., Model SVR-N404 (referred to as the EUT in this report) is a CAR VIDEO CASSETTE RECORDER containing RF Modulator. Product specification described herein was obtained from product data sheet or user' s manual.

CHASSIS TYPE	Metal & Plastic (Non-Coated)	
LIST OF EACH OSC. OR CRY. FREQ.(FREQ.>=1MHz)	3.579545 MHz, 14.31818 MHz on the Main Board, 4.00 MHz on the TV Tuner Board	
RF MODULATOR FREQUENCY	CHANNEL 3	Visual Carrier: 61.25 MHz, Aural Carrier: 65.75 MHz
	CHANNEL 4	Visual Carrier: 67.25 MHz, Aural Carrier: 71.75 MHz
POWER REQUIREMENT	DC 12V, 1A, 14W	
NUMBER OF LAYERS	1 Layer : Main Board	
RF TUNER Type NO. / MFR	TADC-H202F / LG Innotek Co., Ltd.	
EXTERNAL TERMINALS	Audio (Left/Right Input & Output 2Ports), Video (Input 2Ports, Output 1Port), RF Output 1Port, ANT Input 1Port, IR Input 1Port.	

Model Differences:

	Model	Model Differences
Basic Model	SVR-N404	-
Added Model	NSV-2000T	Buyer model name : SKYSOUND (NESA International)
	VCR-102T	Buyer model name : SKYSOUND (NESA International)
	PLTVCP85	Buyer model name : HYORIM (Sound Around INC.)

* Model differences are model name according to buyer.

2.2 Related Submittal(s) / Grant(s)

Original submittal only

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2.3 Test System Details

The model numbers for all the equipments which were used in the tested system is:

Model	Manufacturer	FCC ID	Description	Connected to
SVR-N404	SAMJUNG Co., Ltd.	NPESVRN001	CAR VIDEO CASSETTE RECORDER (EUT)	-
NF-1500MAE	BTC Korea	DoC	LCD Monitor with TV	EUT
LSE	LISHIN International	N/A	AC/DC Adaptor	Monitor
LT 416	LEADER Electronics	N/A	Pattern Generator	EUT
N/A	N/A	N/A	Antenna for ANT. Input	EUT

2.4 Test Methodology

The measurement for Radiated Emission, Output signal levels and Output Terminal Conducted Spurious Emission were performed in accordance with the procedures described in MP-3 and ANSI C63.4/1992. Radiated testing was performed at a distance of 3 meters from EUT to the antenna.

2.5 Test Facility

The open area test site and conducted measurement facilities are located on at 426-1 Daessangryung-Ri, Chowol-Myun, Kwangju-Si, Kyounggi-Do, 464-080, Korea. Description details of test facilities were submitted to the Commission on January 18, 2002. (Registration Number: 92819)

3. SYSTEM TEST CONFIGURATION

3.1 Justification

This device was configured for testing in a typical way as a normal customer is supposed to be used. During the test, the following components were installed inside of the EUT.

DEVICE TYPE	MANUFACTURER	MODEL/PART NUMBER	FCC ID
MAIN BOARD	DUCKSUNGSA	503S000037	N/A
RF TUNER	LG Innotek	TADC-H202F	N/A

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3.2 EUT exercise Software

According to the requirements in Subpart B of Part 15, the measurement is made at each function of the EUT being connected with appropriate cables and peripherals.

The EUT has video/audio input and output terminals as RCA-type plugs, RF output and ANT input terminal. Therefore, every measurement was investigated in the operation modes as follows, (1) Playing VITS1Vp-p recorded tape, (2) Recording 1&5Vp-p VITS signal supplied through the video input terminal, and (3) Recording NTSC TV signal supplied through the at antenna input terminal at each Ch.3 or/and 4 for each mode applicable.

3.3 Cable Description

	Power Cord Shielded (Y/N)	**I/O cable Shielded (Y/N)**	**Length (M)**
CAR VIDEO CASSETTE RECORDER (EUT)	N	N	1.0(P), 2.0(D)
LCD Monitor with TV	N	N	1.5(P), 2.0(D)
AC/DC Adaptor	N	N/A	1.5(P)
Antenna for ANT. Input	N/A	N	0.8(D)

* The marked "(D)" means the Data Cable and "(P)" means the Power Cable.

3.4 Noise Suppression Parts on Cable

	Ferrite Bead (Y/N)	**Location**	**Metal Hood (Y/N)**	**Location**
CAR VIDEO CASSETTE RECORDER (EUT)	N	N/A	Y	BOTH END
LCD Monitor with TV	N	N/A	Y	BOTH END
AC/DC Adaptor	Y	Monitor END	Y	Monitor END
Antenna for ANT. Input	N	N/A	Y	EUT END

3.5 Equipment Modifications

To achieve compliance to FCC part 15 rules, the following change(s) was made by ONETECH Corp. during compliance testing:

"There was no Modified items during EMI test"

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3.6 Configuration of Test System

3.6.1 Line Conducted Test :

-. Not applicable, because the power of the EUT was supplied by DC 12V car battery.

3.6.2 Radiated Emission Test

Preliminary radiated emission test were conducted using the procedure in ANSI C63.4/1992 8.3.1.1 to determine the worse operating conditions. Final radiated emission test were conducted at 3meter open area test site.

3.6.3 Output Signal Level Test

The output voltage of video carrier frequency at the RF-output terminal of the EUT was measured at 3 and 4 channel connecting directly to a spectrum analyzer with 50ohm input impedance via 75-to-50ohm matching pad. Indicated voltage on screen of measuring instrument was converted to the voltage of 75ohm system.

Data conversion method is as follows.

$$V_{75}[uV] = 10^{(Vr+CF)/20}[uV]$$

here, V_{75} : Voltage at the RF-out terminal of 75ohm in uV,

Vr : Voltage read at analyzer with 50ohm input-impedance in dBuV,

CF : Conversion Factor of the matching pad in dB.

3.6.4 Output Terminal Conducted Spurious Emission test

Any other spectrum at RF-output terminal appearing on frequencies removed by more than 4.6 MHz below or 7.4 MHz above the video carrier frequency of EUT was searched at 3 and 4 channel.

Data conversion method is as follows.

$$V_{75}[uV] = 10^{(Vr+CF)/20}[uV]$$

here, V_{75} :Voltage at the RF-out terminal of 75ohm in uV,

V_r : Voltage read at analyzer with 50ohm input-impedance in dBuV,

CF : Conversion Factor of the matching pad in dB,

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3.6.5 Transfer Switch Isolation Test

As a transfer switch was equipped with EUT as an antenna-in, measurement of isolation were made at RF-input terminal with rated input impedance.

The maximum voltage of video carrier frequency of the EUT at the antenna input (RF-in) terminal of the switch was measured for both channels.

Data conversion method is as follows.

$$V_{75}[uV] = 10^{(Vr+CF-PG+AT)/20}[uV]$$

here, V_{75} : Voltage at the RF-out terminal of 75ohm in uV,

V_r : Voltage read at analyzer with 50ohm input-impedance in dBuV,

CF : Conversion Factor of the matching pad in dB,

PG : Gain of pre-amplifier in dB,

AT: Attenuation of attenuator in dB.

4. PRELIMINARY TEST

4.1 AC Power line Conducted Emission Test

-. It is not need to test this requirement, because the power of the EUT is supplied from a DC battery.

4.2 Radiated Emissions Tests

During Preliminary Tests, the following operating modes were investigated.

Operation Mode	The Worse operating condition (Please check one only)
CH. 3 (Video Tape Play mode)	X
CH. 3 (VITS 1&5Vp-p Recording mode)	
CH. 3 (NTSC signal Recording mode)	
CH. 4 (Video Tape Play mode)	
CH. 4 (VITS 1&5Vp-p Recording mode)	
CH. 4 (NTSC signal Recording mode)	

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5. FINAL RESULT OF MEASURMENT

Preliminary test was done in normal operation mode. And the final measurement was selected for the maximized emission level.

5.1. Radiated Emission Test

The following table shows the highest levels of radiated emission on both polarizations of horizontal and vertical.

Humidity Level : 40 % Temperature : 21 C
Limits apply to : FCC CFR 47, PART 15, SUBPART B
Type of Test : TV INTERFACE DEVICE
Result : PASSED BY –9.21 dB at 111.26 MHz

EUT : CAR VIDEO CASSETTE RECORDER Date: March 29, 2002
Operating Condition : CH. 3 (Video tape Play mode)
Detector : CISPR Quasi-Peak (6 dB Bandwidth: 120 kHz)
Distance : 3 Meter

Radiated Emission		Ant	Correction Factors		Total	FCC CLASS B	
Freq. (MHz)	Amp. (dBuV)	Pol.	Ant. (dBuV/m)	Cable (dB)	Amp. (dBuV/m)	Limit (dBuV/m)	Margin (dB)
111.26	19.20	V	13.88	1.21	34.29	43.50	-9.21
130.43	19.00	V	13.19	1.26	33.45	43.50	-10.05
141.50	15.00	V	13.02	1.32	29.34	43.50	-14.16
154.37	17.20	V	14.41	1.37	32.98	43.50	-10.52
222.40	14.50	H	10.74	1.69	26.93	46.00	-19.07
234.40	18.90	H	11.11	1.75	31.76	46.00	-14.24
246.80	16.40	H	11.67	1.81	29.88	46.00	-16.12
343.59	15.80	H	14.51	2.25	32.56	46.00	-13.44

Radiated Emission Tabulated Data

Tested by: Seung-Hyun, Nam / Test Engineer

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5.3 Output Terminal Signal Level Test

The following table shows that the all modes of operation and worst-case emissions were investigated

Humidity Level : 40 % Temperature : 21 C

Limits apply to : FCC CFR 47, PART 15, SUBPART B (Section 15.115)

EUT : CAR VIDEO CASSETTE RECORDER Date: March 29, 2002

Detector : SPAN : 10MHz SWP : 2 sec

RBW : 100kHz VBW : 300kHz

Output Impedance of RF-Output Terminal: 75ohm

CH	Freq.(MHz)	Reading(dBuV)	M/P Loss(dB)	Signal Level(uV)	Limit(uV)	Margin(dB)
3 (Visual)	61.26	57.3	6.0	1462.17	3000	-6.24
3 (Aural)	65.88	44.1	6.0	319.88	671	-6.43
4 (Visual)	67.25	56.9	6.0	1396.36	3000	-6.64
4 (Aural)	71.75	43.0	6.0	281.83	671	-7.53

MP = Impedance Matching Pad

*Sample Calculation at 61.26MHz = $10^{[(57.3+6.0)/20]}$ = 1462.17 uV

*Margin [dB] = 20 log (R/L) where, R : Signal Level, [uV] or [uV/m],

L : Corresponding Limit, [uV] or [uV/m].

Tested by: Seung-Hyun, Nam / Test Engineer

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5.4 Output Terminal Conducted Spurious Emissions Test

The following table shows that frequency range of 30MHz to 1000MHz removed by more than 4.6 MHz below or 7.4 MHz above the video carrier frequency of EUT was investigated at each channel.

Humidity Level : 40 % Temperature : 21 C

Limits apply to : FCC CFR 47, PART 15, SUBPART B (Section 15.115)

EUT : CAR VIDEO CASSETTE RECORDER Date: March 29, 2002

Detector : SPAN : 10MHz SWP : 2 sec

RBW : 100kHz VBW : 300kHz

Output Impedance of RF-Output Terminal: 75ohm

CH.	Freq. (MHz)	Reading (dBuV)	M/P Loss (dB)	Output Level(uV)	Limit (uV)	Margin (dB)
3	32.50	7.50	6.0	4.73	95	-26.05
	47.80	11.40		7.41		-22.15
	74.40	8.20		5.12		-25.35
	121.20	11.90		7.85		-21.65
	188.10	6.10		4.02		-27.45
4	38.47	8.20	6.0	5.12	95	-25.35
	53.78	9.90		6.23		-23.65
	80.92	8.30		5.18		-25.25
	114.60	6.00		3.98		-27.55
	189.40	6.40		4.16		-27.15

* Sample Calculation at 121.20MHz = $10^{[(11.90 + 6.0)/20]}$ = 7.85uV

*Margin [dB] = 20 log (R/L) where, R : Output Level, [uV] or [uV/m],

L : Corresponding Limit, [uV] or [uV/m].

Tested by: Seung-Hyun, Nam / Test Engineer

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5.5 Transfer Switch Isolation Test

The following table shows that the maximum voltage of video carrier frequency of the EUT at the antenna input (RF-in) terminal of the switch was measured for both channels.

Humidity Level : 40 % Temperature : 21 C

Limits apply to : FCC CFR 47, PART 15, SUBPART B (Section 15.115)

EUT : CAR VIDEO CASSETTE RECORDER Date: March 29, 2002

Detector : Span : 1 MHz SWP : 30 msec

RBW : 10 kHz VBW : 30 kHz

Output Impedance of RF-Output Terminal: 75ohm

CH.	Freq. (MHz)	Meter Reading (dBuV)	M/P Loss (dB)	Preamp Gain(dB)	Attn. (dB)	Signal Level (uV)	Limit (uV)	Margin (dB)
"It was not observed any emission during the above test"								

Note : To clarify the emissions emanated from RF output terminal of the EUT, RF pre-amplifier was utilized.
The gain of pre-amplifier at each frequency measured from the EUT was obtained after sufficient warm-up for stabilization of gain.

Tested by: Seung-Hyun, Nam / Test Engineer

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6. FIELD STRENGTH CALCULATION

Meter readings are compared to the specification limit correcting for antenna and cable losses

+	Meter reading	(dBuV)
+	Cable Loss	(dB)
+	Antenna Factor (Loss)	(dB/meter)
=	Corrected Reading	(dBuV/meter)
-	Specification Limit	(dBuV/meter)
=	dB Relative to Spec	(+/- dB)

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7. LIST OF TEST EQUIPMENT

No.	EQUIPMENTS	MFR.	MODEL	SER. NO.	LAST CAL	DUE CAL	USE
1.	Test receiver	R/S	ESVS 10	827864/005	OCT/01	12MONTH	
2.	Test receiver	R/S	ESHS10	834467/007	APR/01	12MONTH	
3.	Spectrum analyzer	HP	8568B	3026A0226	APR/01	12MONTH	
4.	RF preselector	HP	85685A	3107A01264	APR/01	12MONTH	
5.	Quasi-Peak Adapter	HP	85650A	3107A01542	APR/01	12MONTH	
6.	Dipole Antenna	EMCO	3121C	9107-745	JUN/01	12MONTH	
7.	Biconical antenna	EMCO	3104C	9109-4441 9109-4443 9109-4444	MAR/02	12MONTH	
8.	Log Periodic antenna	EMCO	3146	9109-3213 9109-3214 9109-3217	JUN/01	12MONTH	
9.	LISN	EMCO	3825/2	9109-1867 9109-1869	JUN/01	12MONTH	
10.	RF Amplifier	HP	8447F	3113A04554	JUN/01	N/A	
11.	Spectrum Analyzer	HP	8591A	3131A02312	APR/01	12MONTH	
12.	Computer System Hard disk drive	HP	98581C 9153C	98543A CMC762Z9153	N/A N/A	N/A N/A	
13.	Plotter	HP	7475A	30052 22986	N/A	N/A	
14.	Position Controller	EMCO	1090	9107-1038	N/A	N/A	
15.	Turn Table	EMCO	1080-1.21	9109-1576	N/A	N/A	
16.	Antenna Master	EMCO	1070-1	9109-1624	N/A	N/A	

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