



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 DOUBLE

FCC ID. : NPESVDN002

Model / Type No. : SVD-N411

Serial number : N/A

Total page of Report : 14 pages (including this page)

Date of Incoming : September 10, 2002

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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.

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**1. VERIFICATION OF COMPLIANCE**

APPLICANT : SAMJUNG Co., Ltd.
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CONTACT PERSON : Byoung-Chan, Lee / Manager
TELEPHONE NO : +82-31-234-3804
FCC ID : NPESVDN002
MODEL NO/NAME : SVD-N411
SERIAL NUMBER : N/A
DATE : October 15, 2002

DEVICE TYPE	TV INTERFACE DEVICE - UNINTENTIONAL RADIATOR
E.U.T. DESCRIPTION	CAR DOUBLE
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.



2. GENERAL INFORMATION

2.1 Product Description

The SAMJUNG Co., Ltd., Model SVD-N411 (referred to as the EUT in this report) is a CAR DOUBLE has a function for DVD & Video Cassette Player containing RF Modulator. The Verification report for the TV Tuner part shall be issued with other test report numbers. 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, 7.6MHz and 8.38 MHz	
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
RF TUNER Type NO. / MFR	TADC-H202F / LG Innotek Co., Ltd.	
POWER REQUIREMENT	DC 12V, 2A, 24W	
NUMBER OF LAYERS	1 Layer : Main Board, 2 Layers: PCB Micom., Power and Front Board	
EXTERNAL TERMINALS	2 Audio Left/Right Input & 2 Video Inputs with RCA Type, 3 Audio Left/Right Outputs & Video Outputs with RCA Type, 1 RF Output Port, 1 ANT Input Port and 1 IR Input Port.	

2.2 Model Differences:

The following list consists of added model name and their difference.

The basic and added models are identical except for following difference.

	Model	Model Differences
Basic Model	SVD-N411	With RF Tuner
Added Model	SVD-N401	Without RF Tuner

2.3 Related Submittal(s) / Grant(s)

Original submittal only



2.4 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
SVD-N411	SAMJUNG Co., Ltd.	NPESVDN002	CAR DOUBLE (EUT)	-
CTV-6010XK	KEC Corp.	N/A	Television	EUT
LSE9901B1565	Li Shin International	N/A	AC/DC Adaptor	EUT
KSA-1324V	Ki Seung Electronics	N/A	AC/DC Adaptor	Television
HM-700V	ROCKY	N/A	Headphone	EUT
LT 416	LEADER Electronics	N/A	Pattern Generator	EUT
N/A	N/A	N/A	Antenna for ANT. Input	EUT

2.5 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.

2.6 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	503S000040	N/A
PCB MICOM	JAC	503S000038	N/A
PCB POWER	JAC	503S000041	N/A
PCB FRONT	JAC	503S000039	N/A
DVD Loader	Raymedia Co., Ltd	RL-S860	N/A
RF TUNER	LG Innotek	TADC-H202F	N/A



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 DOUBLE (EUT)	N	N	1.8P), 2.0(D)
Television	N	N	1.8P), 2.0(D)
AC/DC Adaptor for EUT	N	N/A	1.8P)
AC/DC Adaptor	N	N/A	1.8P)
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 DOUBLE (EUT)	N	N/A	N	N/A
Television	N	N/A	N	N/A
AC/DC Adaptor for EUT	Y	EUT END	Y	EUT END
AC/DC Adaptor	N	N/A	Y	TV 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”



3.6 Configuration of Test System

3.6.1 Line Conducted Test :

The each cables of the EUT was connected to proper ports of the TV and/or terminated and the power of the EUT was connected to LISN, all supporting equipments were connected to another LISN. Preliminary Power line Conducted Emission test was performed by using the procedure in ANSI C63.4/1992 7.2.3 to determine the worse operating conditions

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.

$$V_{75}[\mu V] = 10^{(V_r+CF)/20}[\mu V]$$

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

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

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.

$$V_{75}[\mu V] = 10^{(V_r+CF)/20}[\mu V]$$

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

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

CF : Conversion Factor of the matching pad in dB,



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.

$$V_{75}[\mu V] = 10^{(V_r + CF - PG + AT)/20} [\mu V]$$

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

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

During Preliminary Tests, the following operating modes were investigated.

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

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. 3/4 (Video Tape Play mode)	
CH. 3/4 (VITS 1&5Vp-p Recording mode)	
CH. 3/4 (NTSC signal Recording mode)	
DVD Play & Recording Mode	X
Only DVD Play mode	



5. FINAL RESULT OF MEASUREMENT

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

5.1 Conducted Emission Test

Humidity Level : 40 % Temperature : 20°C
 Limits apply to : FCC CFR 47, PART 15, SUBPART B, SECTION 15.107
 Type of Test : TV INTERFACE DEVICECLASS B
 Result : PASSED BY – 8.01 dB at 0.18 MHz

EUT : CAR DOUBLE Date : October 8, 2002
 Operating Condition : DVD Play & Recording Mode
 Detector : CISPR Quasi-Peak (6 dB Bandwidth: 9 kHz)

Frequency (MHz)	Line	Quasi-Peak (dBuV)			Margin (dB)	Average (dBuV)		Margin (dB)
		Emission Level	Detector Mode	Limits		Emission level	Limits	
0.15	Hot	46.34	Peak	66.00	-19.66	-	-	-
0.18	Hot	56.48	Peak	64.49	-8.01	41.50	54.49	-12.99
0.24	Hot	48.84	Peak	62.10	-13.26	-	-	-
0.30	Hot	44.36	Peak	60.24	-15.88	-	-	-
1.72	Neutral	40.09	Peak	56.00	-15.91			
2.04	Hot	41.31	Peak	56.00	-14.69	-	-	-
4.92	Hot	38.45	Peak	56.00	-17.55	-	-	-

Line Conducted Emission Tabulated Data

Tested by: Seung-Hyun, Nam / Test Engineer



5.2. Radiated Emission Test

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

Humidity Level	: <u>40 %</u>	Temperature : <u>21°C</u>
Limits apply to	: <u>FCC CFR 47, PART 15, SUBPART B</u>	
Type of Test	: <u>TV INTERFACE DEVICE</u>	
Result	: <u>PASSED BY -4.02 dB at 215.60 MHz</u>	

EUT	: CAR DOUBLE	Date: October 9, 2002
Operating Condition	: DVD Play & Recording 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)
35.60	23.90	V	11.25	0.80	35.95	40.00	-4.05
42.45	23.20	V	10.80	0.85	34.85	40.00	-5.15
48.90	24.40	V	10.79	0.92	36.11	40.00	-3.89
108.14	25.20	V	12.76	1.19	39.15	43.50	-4.35
123.68	23.70	V	13.26	1.24	38.20	43.50	-5.30
148.52	24.10	H	13.34	1.34	38.78	43.50	-4.72
162.02	19.50	H	15.67	1.39	36.56	43.50	-6.94
215.60	26.90	H	10.93	1.65	39.48	43.50	-4.02
324.20	25.00	H	14.19	2.15	41.34	46.00	-4.66
356.80	23.70	H	14.50	2.31	40.51	46.00	-5.49
647.20	16.80	V	19.90	3.07	39.77	46.00	-6.23

Radiated Emission Tabulated Data

Tested by: Seung-Hyun, Nam / Test Engineer



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 : 50 % Temperature : 21°C
Limits apply to : FCC CFR 47, PART 15, SUBPART B (Section 15.115)

EUT : CAR DOUBLE Date: October 8, 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(dBuV)	Limit(dBuV)	Margin(dB)
3 (Visual)	61.27	55.3	6.0	61.30	69.5	-8.20
3 (Aural)	65.90	42.3	6.0	48.30	56.5	-8.20
4 (Visual)	67.26	56.90	6.0	62.90	69.5	-6.60
4 (Aural)	71.90	43.80	6.0	49.80	56.5	-6.70

MP = Impedance Matching Pad

Tested by: Seung-Hyun, Nam / Test Engineer



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 : 50 % Temperature : 21°C
 Limits apply to : FCC CFR 47, PART 15, SUBPART B (Section 15.115)

EUT : CAR DOUBLE Date: October 8, 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 (dBuV)	Margin (dB)
3	43.39	11.50	6.0	17.50	39.5	-22.00
	47.77	10.70		16.70		-22.80
	50.57	17.70		23.70		-15.80
	114.6	10.30		16.30		-23.20
	122.6	8.90		14.90		-24.60
4	41.01	11.10	6.0	17.10		-22.40
	47.06	9.90		15.90		-23.60
	50.81	15.50		21.50		-18.00
	77.80	14.10		20.10		-19.40
	114.60	10.50		16.50		-23.00

Tested by: Seung-Hyun, Nam / Test Engineer



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 : 50 % Temperature : 21°C

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

EUT	: CAR DOUBLE		Date: October 8, 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



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)

**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/02	12MONTH	■
2.	Test receiver	R/S	ESHS10	834467/007	APR/02	12MONTH	■
3.	Spectrum analyzer	HP	8568B	3026A0226	APR/02	12MONTH	■
4.	RF preselector	HP	85685A	3107A01264	APR/02	12MONTH	■
5.	Quasi-Peak Adapter	HP	85650A	3107A01542	APR/02	12MONTH	■
6.	Dipole Antenna	EMCO	3121C	9107-745	JUN/02	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/02	12MONTH	■
9.	LISN	EMCO	3825/2	9109-1867 9109-1869	JUN/02	12MONTH	■
10.	RF Amplifier	HP	8447F	3113A04554	JUN/02	N/A	
11.	Spectrum Analyzer	HP	8591A	3131A02312	APR/02	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	■