

Certification of Compliance

CFR 47 Part 15 Subpart B

Test Report File No.	05-IST-0214	Date of Issue	June 28, 2005
Model (s)	DG-R520	DAEWOO	Basic Model
	DW-Q73D2N-LS	DAEWOO	Buyer Model
	DG-R530	DAEWOO	Buyer Model
	DVR06	DAEWOO	Buyer Model
	DVR07	DAEWOO	Buyer Model
	DVR08	DAEWOO	Buyer Model
Kind of Product	DVD Recorder		
FCC ID	C5F7NF0017		
RF Frequency Range	60MHz-72MHz		
RF Channels	Ch.3 / Ch.4		
Applicant	Daewoo Electronics Corporation.		
	543, Dangjung-Dong, Kunpo-City, Kyounggi-DO, Korea		
Manufacturer	GVG Digital Technology Ltd.		
	Da Pin Precinct, Tang Xia Town, Dongguan, China		

Test Result
 Positive
 Negative

Reviewed By

Approved By



S.J.Cho / EMC Group Manager



J.H.LEE / Chief

- Investigations requested : Measurement to the relevant clauses of F.C.C rules and regulations Part 15 Subpart B - Unintentional Radiators
- The test report with appendix consists of 29 pages.
- The test result only responds to the tested sample.
- It is not allowed to copy this report even partly without the allowance of IST EMC Laboratory.
- This equipment as for has been shown to be capable of continued compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in ANSI C63.4 2003.



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Information OF TUNERS

Manufacture	Manufacture Name
LG Innotek Co., Ltd.	TADS-H151F

INFORMATIONS OF TEST LABORATORY

EMC LABORATORY of IST Co., Ltd. (*FCC Filing Lab*)
San 21-8, Goan-Ri, Baekam-Myun, Yongin-City
Kyonggi-Do, 449-860, Korea
TEL : +82 31 333 4093 FAX : +82 31 333 4094

ENVIRONMENTAL CONDITIONS

Temperature	25 °C
Humidity	49 %
Atmospheric pressure	1003 mbar

POWER SUPPLY SYSTEM USED

Power supply system	120Vac , 60Hz
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PRODUCT INFORMATIONS

FCC ID	C5F7NF0017
Power supply system	120Vac , 60Hz
Power consumption	Max. 20W (Power-off : 3.4W)
Signal system	NTSC
Antenna In	Antenna or CATV input, 75ohm
Video recording format	Sampling frequency : 27MHz Compression format : MPEG 2
Audio recording format	Sampling frequency : 48KHz Compression format : MPEG 1 Layer 2

- EMC suppression device is not used during the test.
- Please refer to user's manual.

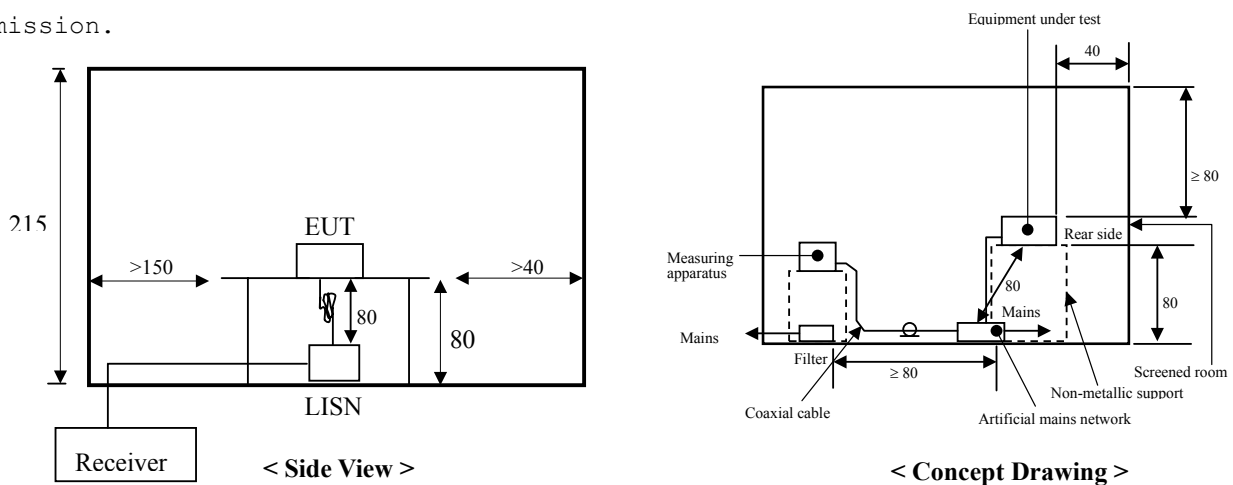
DESCRIPTIONS OF TEST

Conducted Emissions:

The measurement were performed over the frequency range of 0.45MHz to 30MHz using a 50Ω/50uH LISN as the input transducer to a Spectrum Analyzer or a Field Intensity Meter. The measurements were made with the detector set for "Peak" amplitude within an bandwidth of 10KHz or for "quasi-peak" within a bandwidth of 9KHz.

- Procedure of Test

The line-conducted facility is located inside a shielded room No.1. A 1m X 1.5m wooden table 80cm height is placed 40cm away from the vertical wall and 1.5m away from the other wall of the shielded room. The R/S ESH3-Z5 and EMCO 3825/2 LISN are bonded to bottom of the shielded room. The EUT is located on the wooden table with distance more than 80cm from the LISN and powered from the EMCO LISN .The peripheral equipment is powered from the other LISN. Power to the LISNs are filtered by a noise cut power line filters. All electrical cables are shielded by braided tinned steel tubing with inner ϕ 1.2cm. If the EUT is a DC-powered device, power will be derived from the source power supply it normally will be powered from and this supply lines will be connected to the EMCO LISN. All interconnecting cables more than 1m were shortened by non-inductive bundling to a 1m length. Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating conditions. The RF output of the LISN was connected to the R/S receiver to determine the frequency producing the maximum emission from the EUT. The frequency producing the maximum level was reexamined using Quasi-Peak mode by manual measurement, after scanned by automatic Peak mode for frequency range from 0.45 to 30MHz. The bandwidth of the receiver was set to 10kHz. The EUT, peripheral equipment, and interconnecting cables were arranged and manipulated to maximize each EME emission.



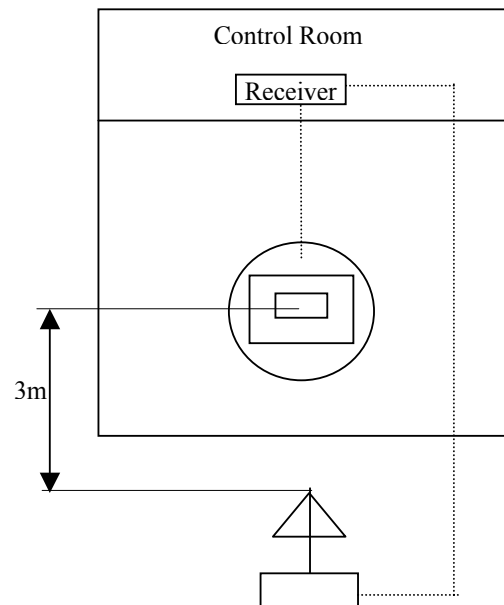
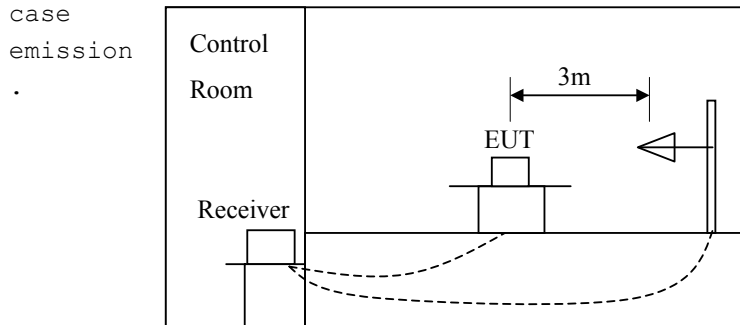
DESCRIPTION OF TEST

Radiated Emissions:

The measurement was performed over the frequency range of 30MHz to 1GHz using antenna as the input transducer to a Spectrum analyzer or a Field Intensity Meter. The measurement was made with the detector set for "quasi-peak" within a bandwidth of 120KHz.

- Procedure of Test

Preliminary measurements were made at 3 meter using bi-conical and log-periodic antennas, and spectrum analyzer to determine the frequency producing the max. emission in anechoic chamber. Appropriate precaution was taken to ensure that all emission from the EUT were maximized and investigated. The system configuration, mode of operation, turn table azimuth and height with respect to the antenna were noted for each frequency found. The spectrum was scanned from 40MHz to 300MHz using S/B bi-conical antenna and 300 to 1000MHz using S/B log-periodic antenna. Above 1GHz, linearly polarized double ridge horn antennas were used. Final measurements were made at open site with 3-meters test distance using S/B bi-log antenna or horn antenna. The OATS have been verified in regular for its normalized site attenuations. The test equipment was placed on a wooden table. Sufficient time for the EUT, peripheral equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. Each frequency found during pre-scan measurements was re-examined by manual. The detector function was set to CISPR quasi-peak mode and the bandwidth of the receiver was set to 120kHz or 1MHz depending on the frequency of type of signal. The EUT, peripheral equipment and interconnecting cables were re-configured to the set-up producing the max. emission for the frequency and were placed on top of a 0.8-meter high nonmetallic 1 x 1.5 meter table. The EUT, peripheral equipment, and interconnecting cables were re-arranged and manipulated to maximize each emission. The turntable containing the system was rotated; the antenna height was varied 1 to 4 meters and stopped at the azimuth or height producing the maximum emission. Each emission was maximized by: varying the mode of operation to the EUT and/or peripheral equipment and changing the polarity of the antenna, whichever determined the worst-



DESCRIPTION OF TEST

Output Signal level measurements :

The RF output of the TV interface device was fed to the TV receiver via coaxial cable. The signal level was measured by direct connection to the spectrum analyzer with 50/75 ohm matching transformer between the spectrum analyzer and the TV interface device. The RF output signal level measured RMS voltage was the highest RF level present at the output terminals during normal use of the device. Measurements were made of the levels of both the visual(61.25 MHz) and aural(71.25 MHz) of TV channel 3 and 4. The voltage corresponding to the peak envelope power of the video modulated signal during maximum amplitude peaks across a resistance(R ohms) matching the rated output impedance of the device, must not exceed 346.4 times the square root of (R) [uV] for all other TV interface device. The voltage corresponding to peak envelope power of the audio modulated signal, if provided by the TV interface device, must not exceed 77.5 times the square root of (R) [uV] for all other TV interface device.(Sec 15.115 (b).(1).(ii))

Output Terminal Conducted Spurious Emission :

The RF output signal was fed to the TV receiver with coaxial cable. The measurements were made by direct connection to the spectrum analyzer and TV interface device with 50/75 ohm matching transformer. The frequency range 30 to 1000MHz was investigated for significant emission. The maximum RMS voltage of any emission appearing on frequencies removed by than 4.6MHz below or 7.4MHz above the video carrier frequency on which the TV interface device is operated must not exceed 10.95 timed the square root of (R) [uV](Sec 15.115 (b).(2).(ii)) This represents the 30dB attenuation.

Transfer Switch Isolation Measurement :

The measurements were made of the maximum RMS voltage at the antenna terminals of the switch for all positions of the transfer switch. The maximum voltage corresponds to the peak envelope power of the video signal during maximum amplitude peaks. In either position of the receiver transfer switch, the maximum voltage at the receiving antenna input terminals of the switch when terminated with a resistance (R ohms) matching the rated impedance of the antenna input of the switch, must not exceed 0.346 times the square root of (R) [uV]. (Sec 15.115 (c).(1).(ii))

SUMMARY

■ Conducted Emission

The requirements are

Minimum limit margin

Maximum limit exceeding

● MET ○ Not MET

16.3 dB at 0.199 MHz

Remarks : **With live phase.**

■ Radiated Emission

The requirements are

Minimum limit margin

Maximum limit exceeding

● MET ○ Not MET

3.1 dB at 297.0 MHz

Remarks :

■ Output Signal Level Measurements

The requirements are

Minimum limit margin

Maximum limit exceeding

● MET ○ Not MET

Remarks : **Limits are kept with more than 10dB margin**

■ Output Terminal Conducted Spurious Emission

The requirements are

Minimum limit margin

Maximum limit exceeding

● MET ○ Not MET

Remarks : **Limits are kept with more than 10dB margin**

■ Transfer Switch Isolation Measurements

The requirements are

Minimum limit margin

Maximum limit exceeding

● MET ○ Not MET

Remarks : **Limits are kept with more than 3dB margin**

Prepared By



J.H.Lee / EMC Engineer

Note :

- ■ means the test is applicable, □ is not applicable.

TEST CONDITIONS AND DATA

Conducted Emissions

[Applicable]

◆ Test Equipment Used

The test equipment used is calibrated in regular for every year.

<u>Model Name</u>	<u>Manufacturer</u>	<u>Descriptions</u>	<u>Calibration Date</u>	<u>Serial Number</u>
ESH3	Rohde & Schwarz	Test Receiver	Jul. 15, 2004	892108/018
ESH3-Z2	Rohde & Schwarz	Pulse Limiter	Jul. 15, 2004	357.8810.52
ESH3-Z5	Rohde & Schwarz	LISN	Jul. 15, 2004	862770/025
EZM	Rohde & Schwarz	Spectrum Monitor	-	-

◆ Auxiliary Equipment Used

<u>Model Name</u>	<u>Manufacturer</u>	<u>Descriptions</u>
14C5NT	Daewoo Electronics.	Color TV Receiver

◆ Accessories including cables

<u>Name</u>	<u>Length</u>	<u>Port and Descriptions</u>
RCA	1.5m	Video / Audio
S-Video	-	

◆ Environmental Conditions

Temperature	25 °C
Humidity	50 %
Atmosphere pressure	1002 mbar

◆ Test Program

DVD Playback Mode
 RF Receiving during DVD Recording Mode

◆ Test Area

Conducted Room

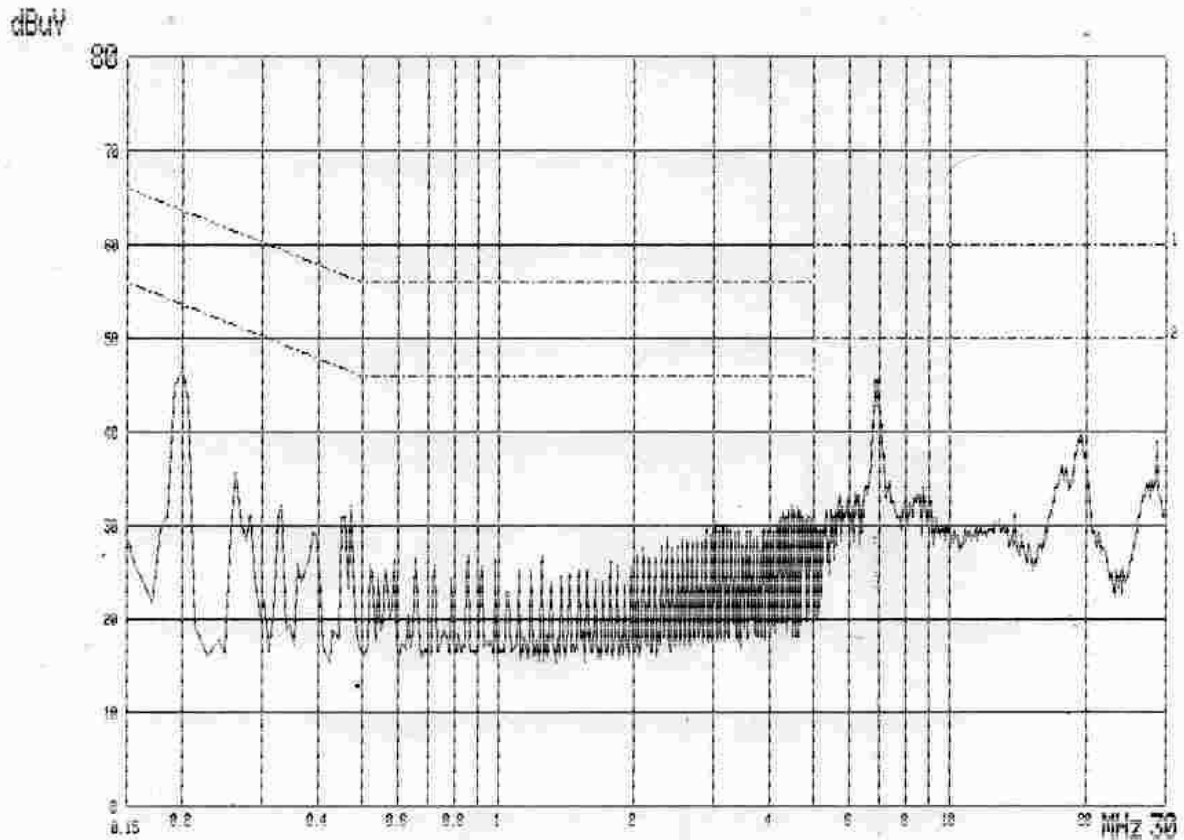
◆ Test Date

June 20, 2005

Note :

Conducted Emissions

(Mains Terminal Disturbance Voltages)



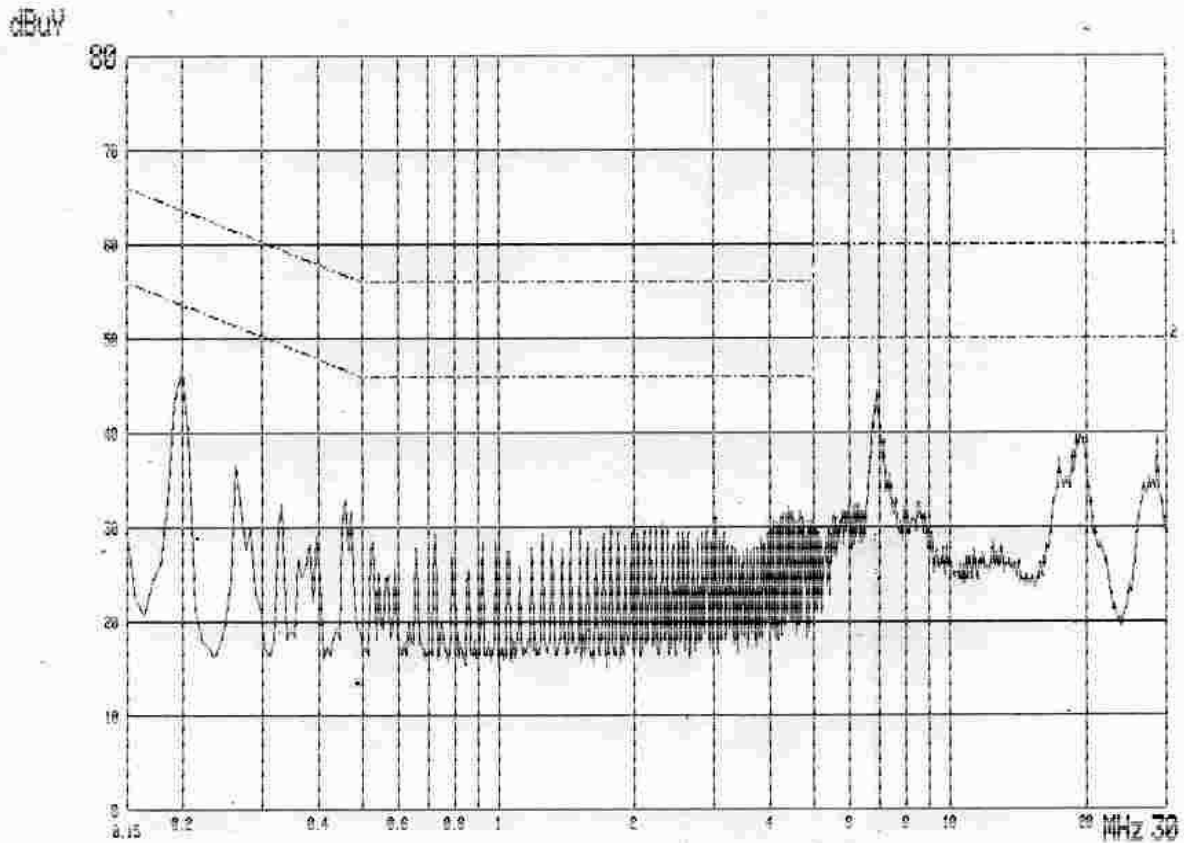
MODEL NAME : DG-R520 (DVD PLAYBACK MODE)
120V_{ac} 60Hz PHASE : LIVE

Freq. [MHz]	Measurement [dB μ V]		Limit [dB μ V]		Margin [dB]	
	Q-peak	Average	Q-peak	Average	Q-peak	Average
0.197	46.0	32.3	63.7	53.7	17.7	21.4
6.889	40.1	32.8	60.0	50.0	19.9	17.2
19.409	35.7	29.3	60.0	50.0	24.3	20.7

Note : The insertion loss, 0.8dB, is negligible compare with the margin evaluated.

Conducted Emissions

(Mains Terminal Disturbance Voltages)



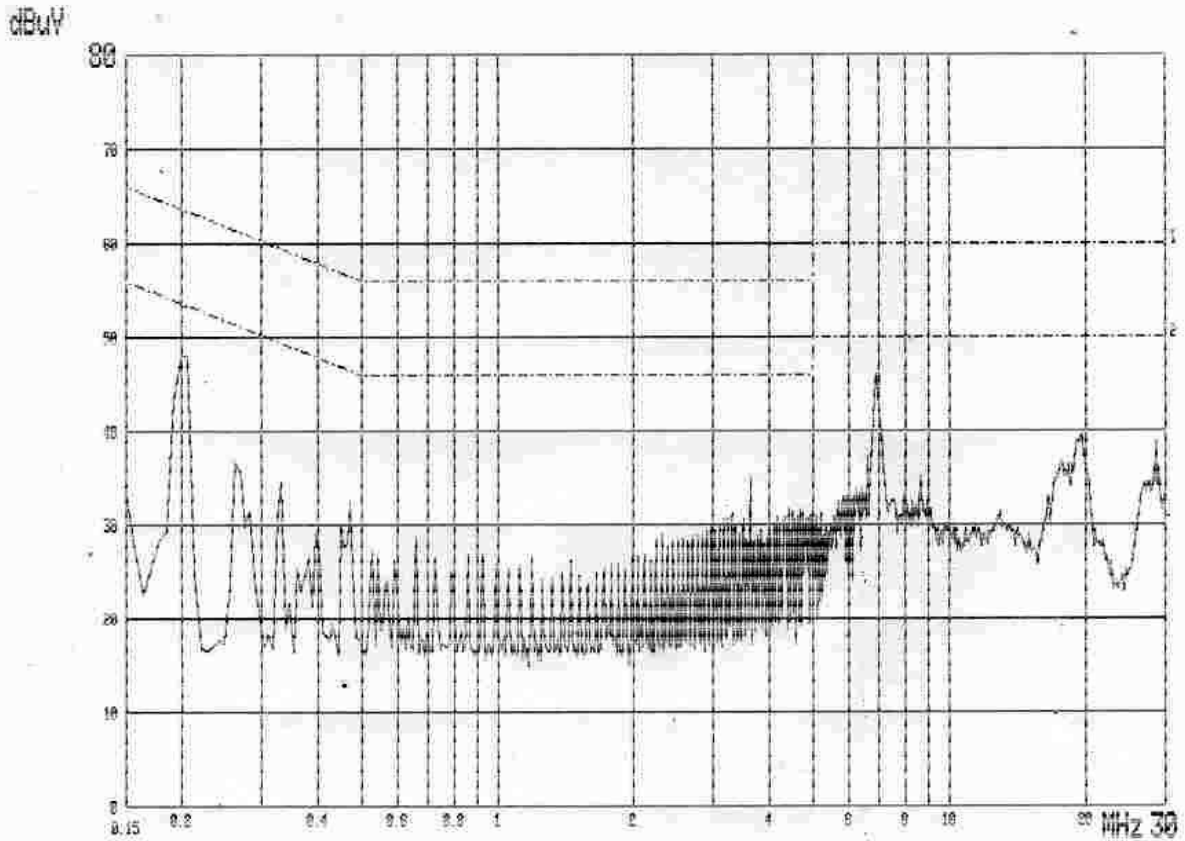
MODEL NAME : DG-R520 (DVD PLAYBACK MODE)
120Vac 60Hz PHASE : NEUTRAL

Freq. [MHz]	Measurement [dB μV]		Limit [dB μV]		Margin [dB]	
	Q-peak	Average	Q-peak	Average	Q-peak	Average
0.197	46.1	32.9	63.7	53.7	17.6	20.8
6.955	39.8	31.3	60.0	50.0	20.2	18.7
19.406	35.6	29.0	60.0	50.0	24.4	21.0

Note : The insertion loss, 0.8dB, is negligible compare with the margin evaluated.

Conducted Emissions

(Mains Terminal Disturbance Voltages)



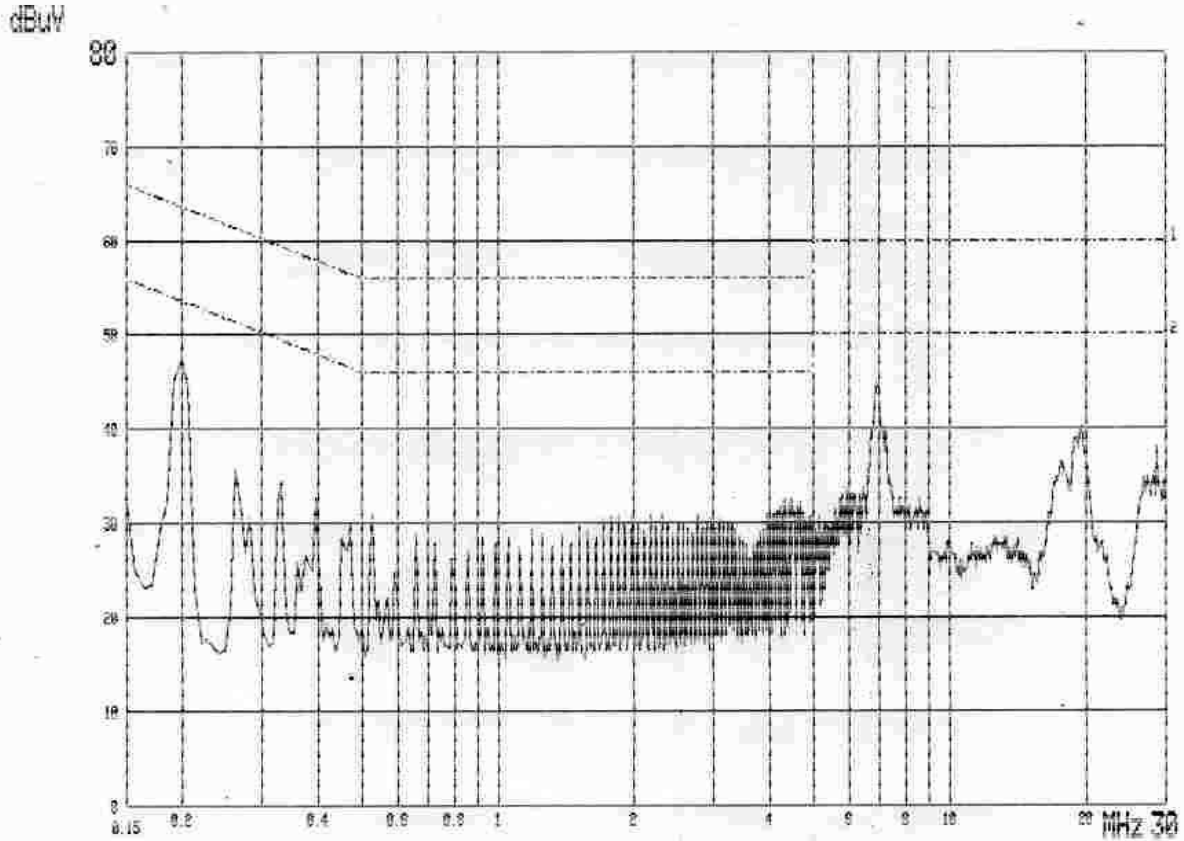
MODEL NAME : DG-R520 (RF RECEIVING DURING DVD RECORDING MODE)
120Vac 60Hz PHASE : LIVE

Freq. [MHz]	Measurement [dB μV]		Limit [dB μV]		Margin [dB]	
	Q-peak	Average	Q-peak	Average	Q-peak	Average
0.199	47.4	33.3	63.7	53.7	16.3	20.4
6.851	40.4	32.6	60.0	50.0	19.6	17.4
19.525	35.4	28.5	60.0	50.0	24.6	21.5

Note : The insertion loss, 0.8dB, is negligible compare with the margin evaluated.

Conducted Emissions

(Mains Terminal Disturbance Voltages)



MODEL NAME : DG-R520 (RF RECEIVING DURING DVD RECORDING MODE)
120Vac 60Hz PHASE : NEUTRAL

Freq. [MHz]	Measurement [dB μ V]		Limit [dB μ V]		Margin [dB]	
	Q-peak	Average	Q-peak	Average	Q-peak	Average
0.199	46.3	32.1	63.7	53.7	17.4	21.6
6.912	40.5	32.5	60.0	50.0	19.5	17.5
19.403	35.6	29.1	60.0	50.0	24.4	20.9

Note : The insertion loss, 0.8dB, is negligible compare with the margin evaluated.

TEST CONDITIONS AND DATA

Radiated Emissions

[Applicable]

◆ Test Equipment Used

The test equipment used is calibrated in regular for every year.

<u>Model Name</u>	<u>Manufacturer</u>	<u>Descriptions</u>	<u>Calibration Date</u>	<u>Serial Number</u>
ESVP	Rohde & Schwarz	Test Receiver	Jul. 15, 2004	861744/004
VULB 9160	Schwarzbeck	Antenna	Jul. 19, 2004	3048
3115	EMCO	Horn Antenna	Jul. 05, 2003	90123602
8566B	Hewlett Packard	Spectrum Analyzer	Dec. 01, 2004	3014A07159
85685A	Hewlett Packard	RF preselector	Dec. 01, 2004	2817A00760

◆ Auxiliary Equipment Used

<u>Model Name</u>	<u>Manufacturer</u>	<u>Descriptions</u>
14C5NT	Daewoo Electronics.	Color TV Receiver

◆ Accessories including cables

<u>Name</u>	<u>Length</u>	<u>Port and Descriptions</u>
RCA	1.5m	Video / Audio
S-Video	-	

◆ Environmental Conditions

Temperature	26 °C
Humidity	50 %
Atmosphere pressure	1003 mbar

◆ Test Program

DVD Playback Mode
 RF Receiving during DVD Recording Mode

◆ Test Area

Open Area Test Site #2

◆ Test Date

June 17, 2005

Note :

Radiated Emissions

(Disturbance Radiation)

[Applicable]

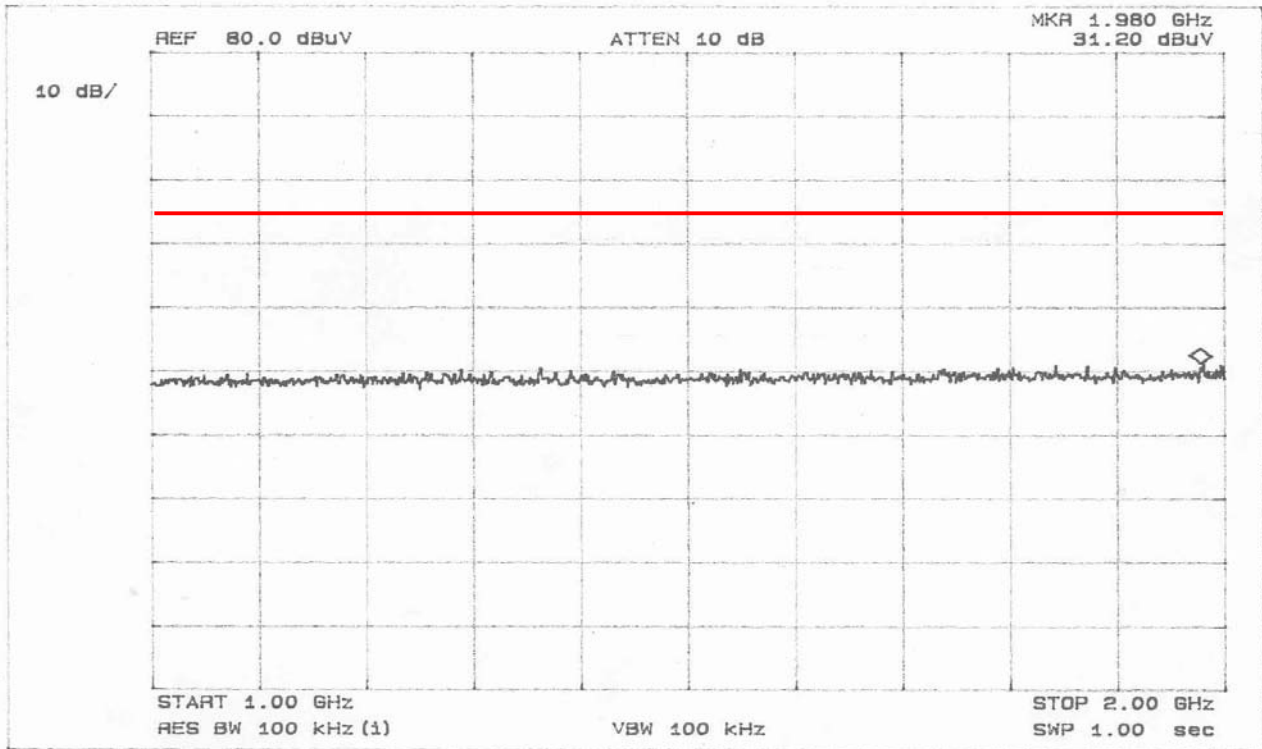
System	CH	Freq. (MHz)	Pol. (H/V)	Limits (dBuV/m)	Result (dBuV/m)	Margin (dB)
DVD Playback Mode		61.3	V	40.0	28.0	12.0
		77.3	V	40.0	22.8	17.2
		150.5	H	43.5	35.6	7.9
		297.0	H	46.0	42.8	3.2
		316.0	H	46.0	39.8	6.2
		378.0	H	46.0	36.3	9.7
		465.7	H	46.0	40.3	5.7
		593.9	H	46.0	39.5	6.5
RF Receiving during DVD Recording Mode		61.3	V	40.0	27.7	12.3
		77.3	V	40.0	21.5	18.5
		150.5	H	43.5	35.2	8.3
		297.0	H	46.0	42.9	3.1
		324.0	H	46.0	39.5	6.5
		378.0	H	46.0	36.5	9.5
		397.9	H	46.0	39.6	6.4
		465.7	H	46.0	40.0	6.0
	593.9	H	46.0	40.3	5.7	

End of data

Note :

Radiated Emissions

(Disturbance Radiation)



Radiated Emission Test 1GHz - 2GHz

Measured Data from 1GHz to 2GHz

Above 1 GHz, peak detector function mode is used with 23dB gain of preamp. The following graphs show that all data of full frequencies are meet with the limit. We automatically change our antenna polarity, when measure radiated emission. The spectrum plot was obtained with peak detect mode and maximum hold mode. It was used for plot the HP8566B spectrum analyzer, EMCO 3115 Horn antenna and HP85685A RF preselector.

(Section 15.35)

The peak value evaluation at the frequency of 1.980GHz is

$$\begin{aligned}
 &31.2\text{dB}(\text{measured}) + 23.1\text{dB}(\text{antenna factor}) + 6.7\text{dB}(\text{cable loss}) \\
 &- 23\text{dB}(\text{gain of preamp}) - 20\text{dB}(\text{corrective factor}) \\
 &= 18.0\text{dB}(\text{less than average limit } 54.0\text{dB})
 \end{aligned}$$

The peak value evaluation is less than the average limit, EUT have the margin relative to peak value more than 10dB for radiated emission for the above 1GHz.

Note :

TEST CONDITIONS AND DATA

Output Signal Level Measurements

[Applicable]

◆ Test Equipment Used

The test equipment used is calibrated in regular for every year.

<u>Model Name</u>	<u>Manufacturer</u>	<u>Descriptions</u>	<u>Calibration Date</u>	<u>Serial Number</u>
8566B	Hewlett Packard	Spectrum Analyzer	Dec. 01, 2004	3014A07159
85685A	Hewlett Packard	RF preselector	Dec. 01, 2004	2817A00760
RAM	Rohde & Schwarz	50/75ohms matching pad	-	836625/033

◆ Auxiliary Equipment Used

<u>Model Name</u>	<u>Manufacturer</u>	<u>Descriptions</u>
14C5NT	Daewoo Electronics.	Color TV Receiver

◆ Accessories including cables

<u>Name</u>	<u>Length</u>	<u>Port and Descriptions</u>
RCA	1.5m	Video / Audio

◆ Environmental Conditions

Temperature	25 °C
Humidity	49 %
Atmosphere pressure	1003 mbar

◆ Test Program DVD Playback Mode, DVD Recording Mode

◆ Test Area Compact Chamber

◆ Test Date June 23, 2005

Note : Limit Calculations

For Video Signal

$$346.4 \times 75^{1/2} = 2999\mu\text{V} = 69.54\text{dBuV} = -37.46 \text{ dBm}$$

For Audio Signal

$$77.5 \times 75^{1/2} = 671.17\mu\text{V} = 56.53\text{dBuV} = -50.46 \text{ dBm}$$

The test were performed with RF receiving as VITS. The VITS signals, 1V and 5V peak-to-peak, were used for channel 3 and channel 4 with alternate. The above test program were employed for each channel.

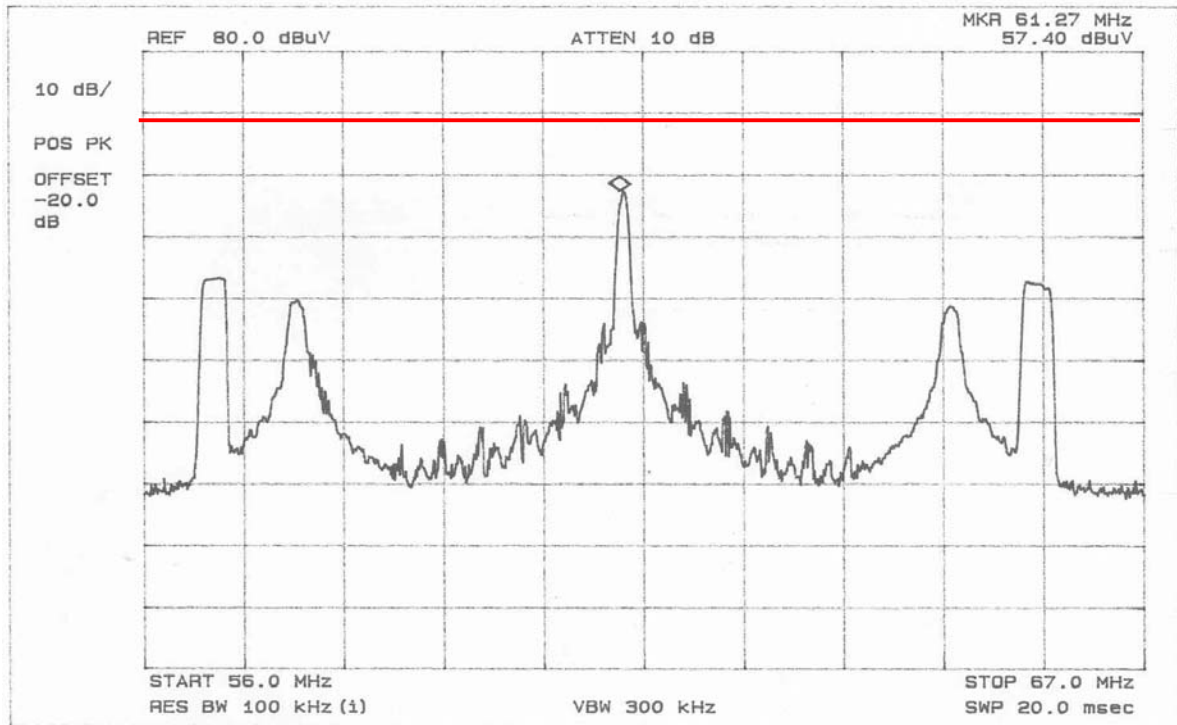
Output Signal Level Measurements

TV CH.	Freq. (MHz)	Level (dBuV)	Limit (dBuV)	Mode	Margin (dB)
3 (Pix)	61.27	57.40	69.54	Playback	12.14
3 (Aud)	56.80	43.20	56.53	Playback	13.33
3 (Pix)	61.27	57.30	69.54	Record	12.24
3 (Aud)	56.85	43.00	56.53	Record	13.53
4 (Pix)	67.24	57.50	69.54	Playback	12.04
4 (Aud)	62.79	43.50	56.53	Playback	13.03
4 (Pix)	67.24	57.60	69.54	Record	11.94
4 (Aud)	62.70	43.30	56.53	Record	13.23

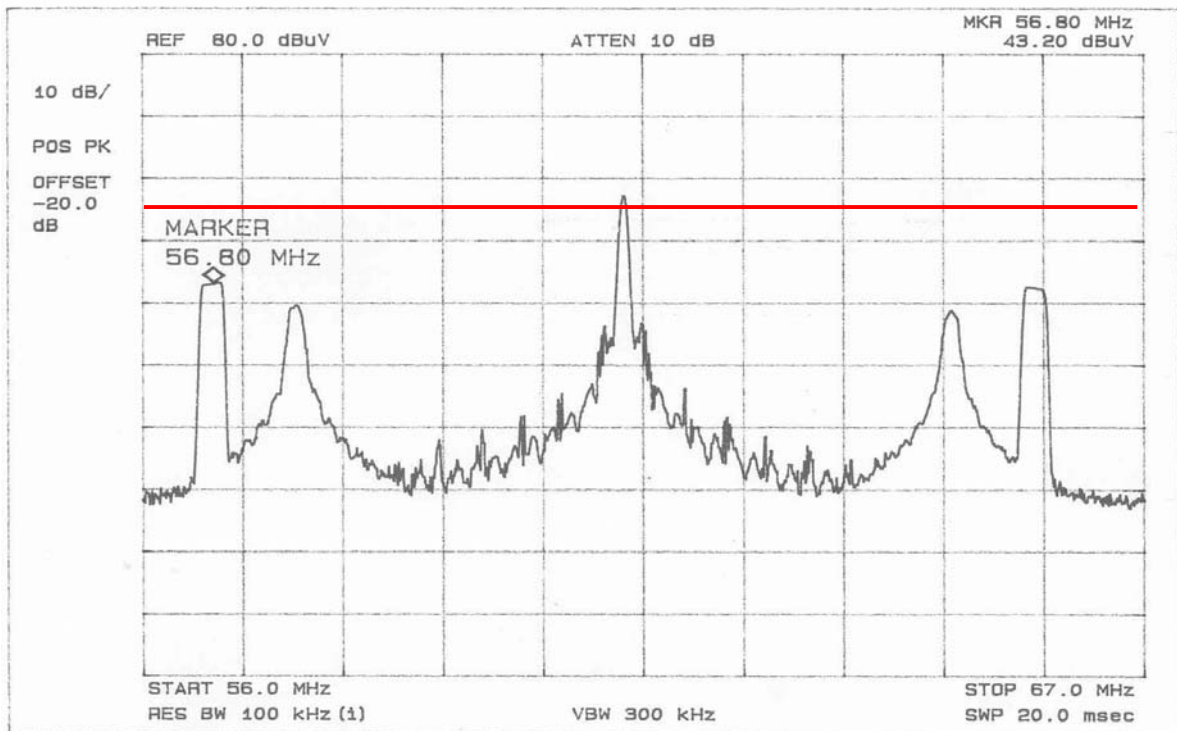
Output Signal Tabulated Data with Tuner

Note :

Output Signal Level Measurements

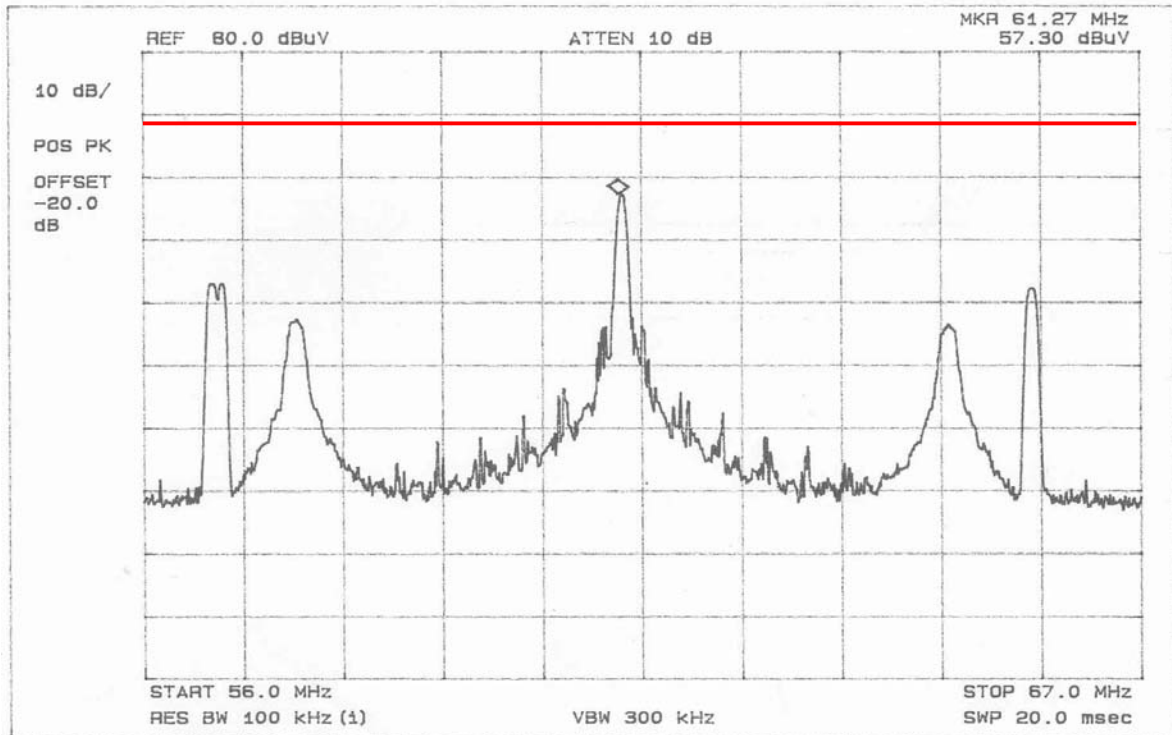


CH3 Playback (Pix)

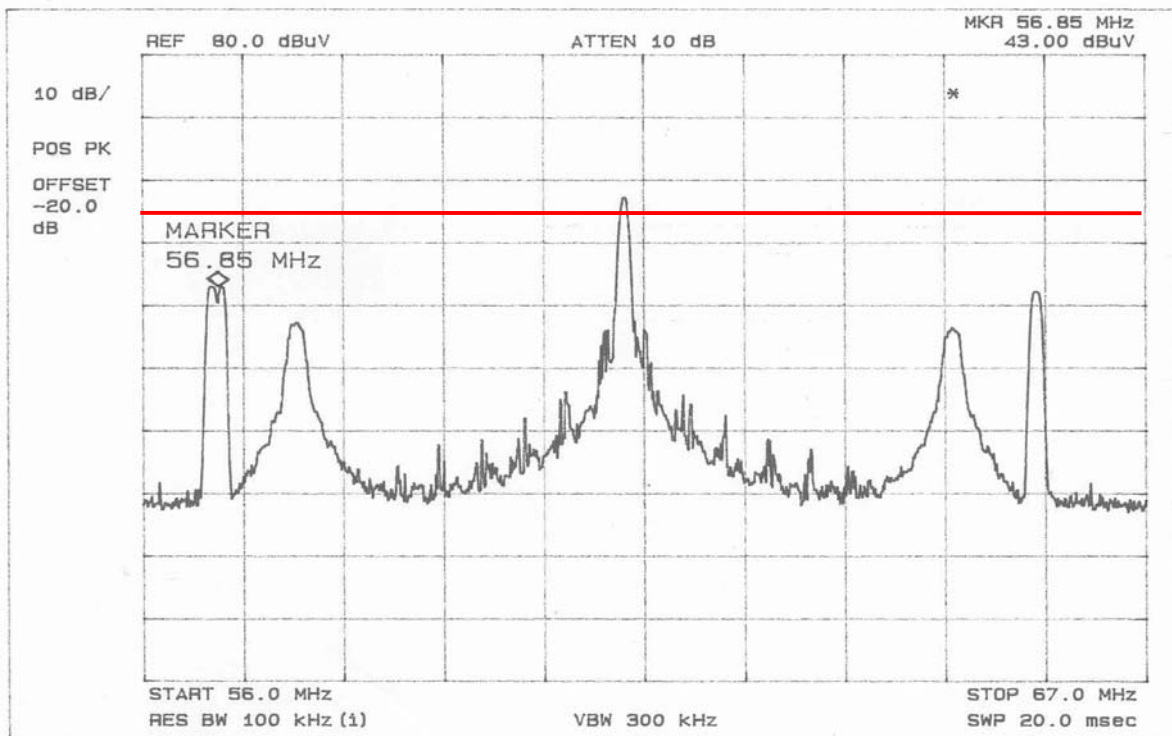


CH3 Playback (Aud)

Output Signal Level Measurements

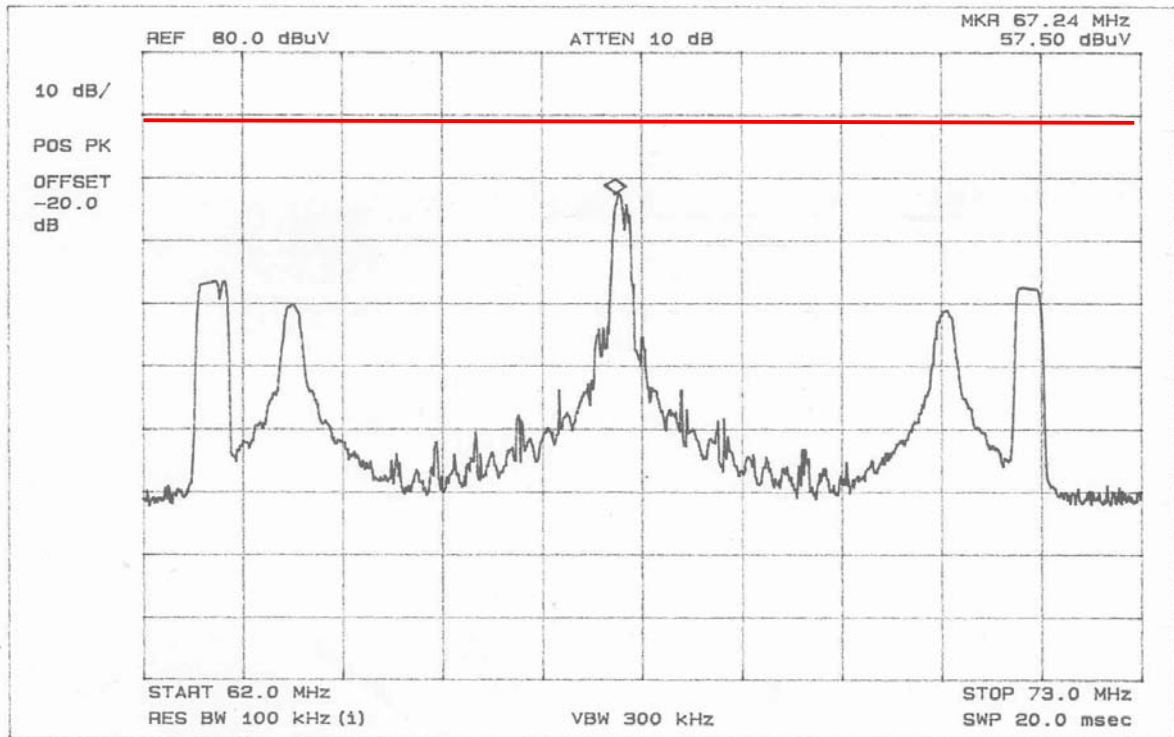


CH3 Record (Pix)

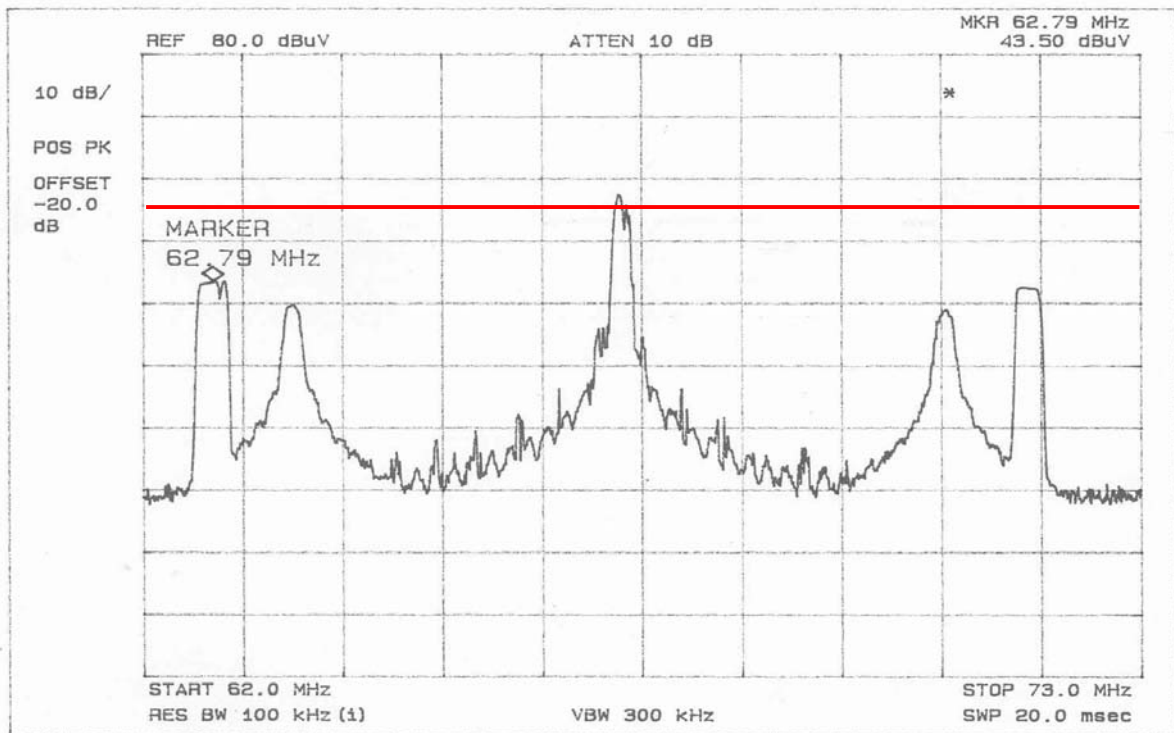


CH3 Record (Aud)

Output Signal Level Measurements

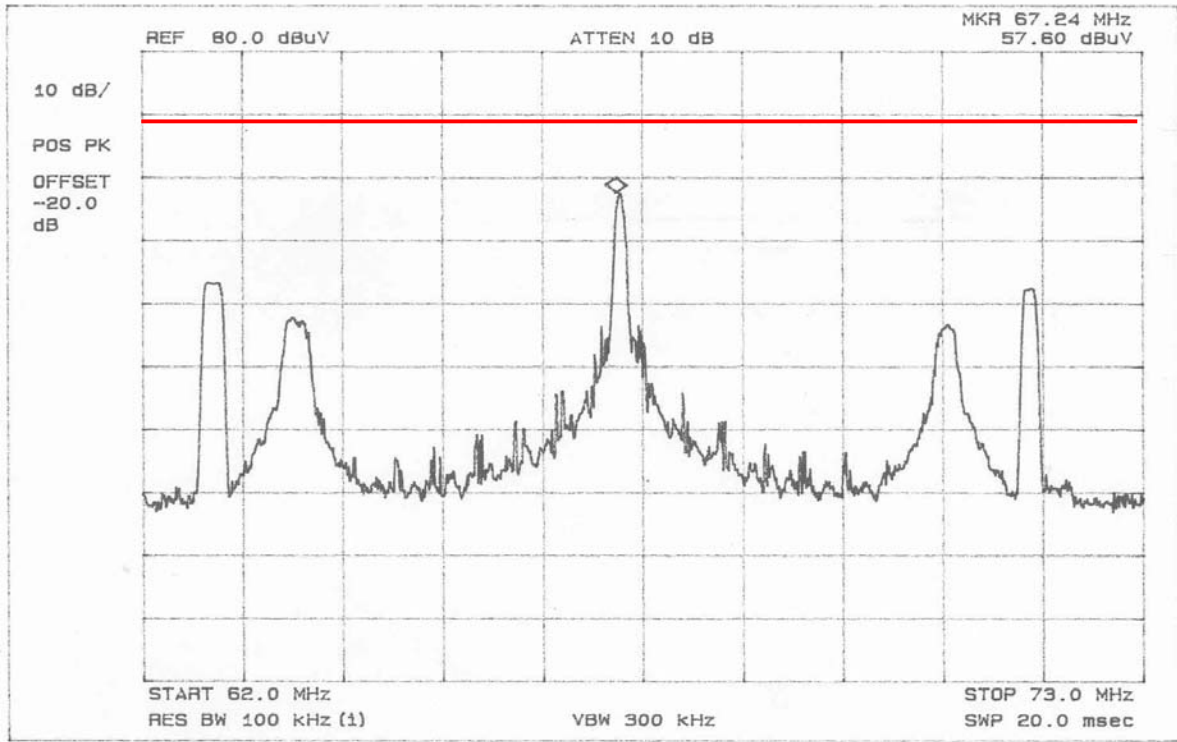


CH4 Playback (Pix)

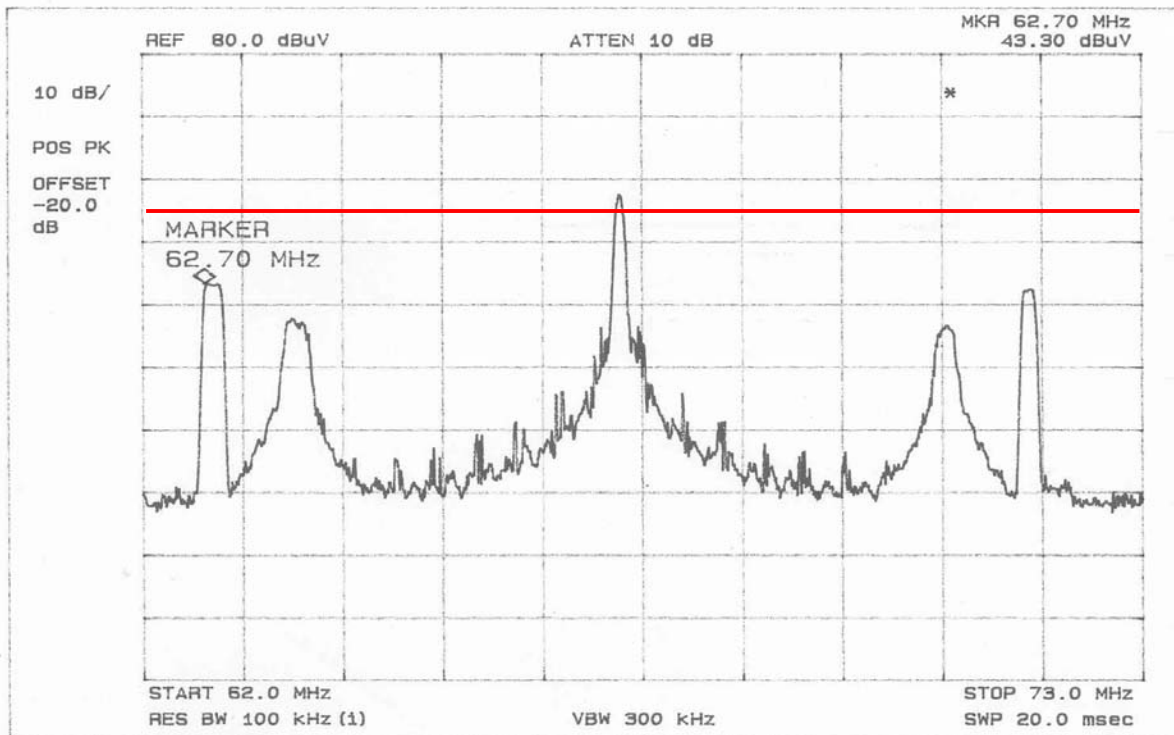


CH4 Playback (Aud)

Output Signal Level Measurements



CH4 Record (Pix)



CH4 Record (Aud)

TEST CONDITIONS AND DATA

Output Terminal Conducted Spurious Emission

[Applicable]

◆ Test Equipment Used

The test equipment used is calibrated in regular for every year.

Model Name	Manufacturer	Descriptions	Calibration Date	Serial Number
8566B	Hewlett Packard	Spectrum Analyzer	Dec. 01, 2004	3014A07159
85685A	Hewlett Packard	RF preselector	Dec. 01, 2004	2817A00760
RAM	Rohde & Schwarz	50/75ohms matching pad	-	836625/033

◆ Auxiliary Equipment Used

Model Name	Manufacturer	Descriptions
14C5NT	Daewoo Electronics.	Color TV Receiver

◆ Accessories including cables

Name	Length	Port and Descriptions
RCA	1.5m	Video / Audio

◆ Environmental Conditions

Temperature	25 °C
Humidity	49 %
Atmosphere pressure	1003 mbar

◆ Test Program DVD Playback Mode, DVD Recording Mode

◆ Test Area Compact Chamber

◆ Test Date June 23, 2005

Note : Limit Calculation (Sec 15.115(b) (2) (ii))

$$10.95 \times 75^{1/2} \text{ uV} = 95\text{uV} = 39.55 \text{ dBuV}$$

$$\text{plus } 30\text{dB} = 69.55\text{dBuV} = -37.45\text{dBm}$$

Above plus 30dB means the test result(Plots) include the modulated video and audio signal. You can see there was no significant emission more than 39.55dBuV in following test plots except the modulated signals.

The test were performed with color bar as VITS. The VITS signals, 1V and 5V peak-to-peak, were used for channel 3 and channel 4 with alternate. The above test program were employed for each channel.

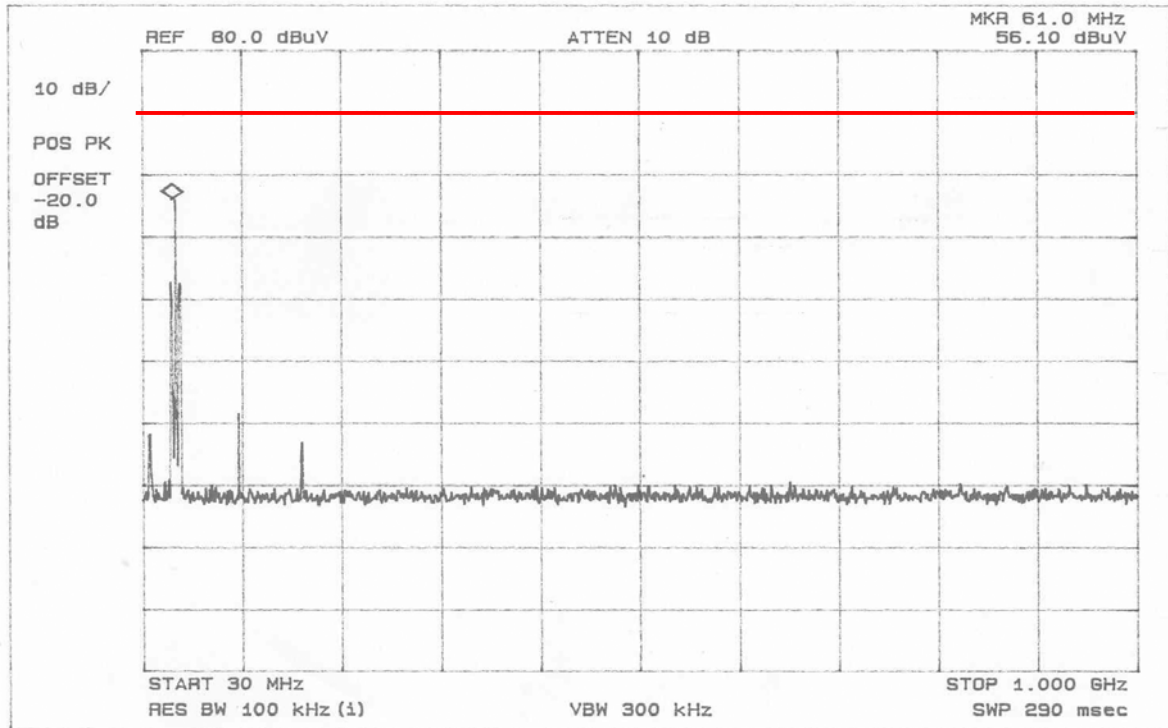
Output Terminal Conducted Spurious Emission

TV CH	Freq. (MHz)	Level (dBuV)	Limit (dBuV)	Mode	Margin (dB)
3	61.00	56.10	69.55	Playback	13.45
3	61.00	55.20	69.55	Record	14.35
4	66.90	57.20	69.55	Playback	12.35
4	66.90	55.60	69.55	Record	13.95

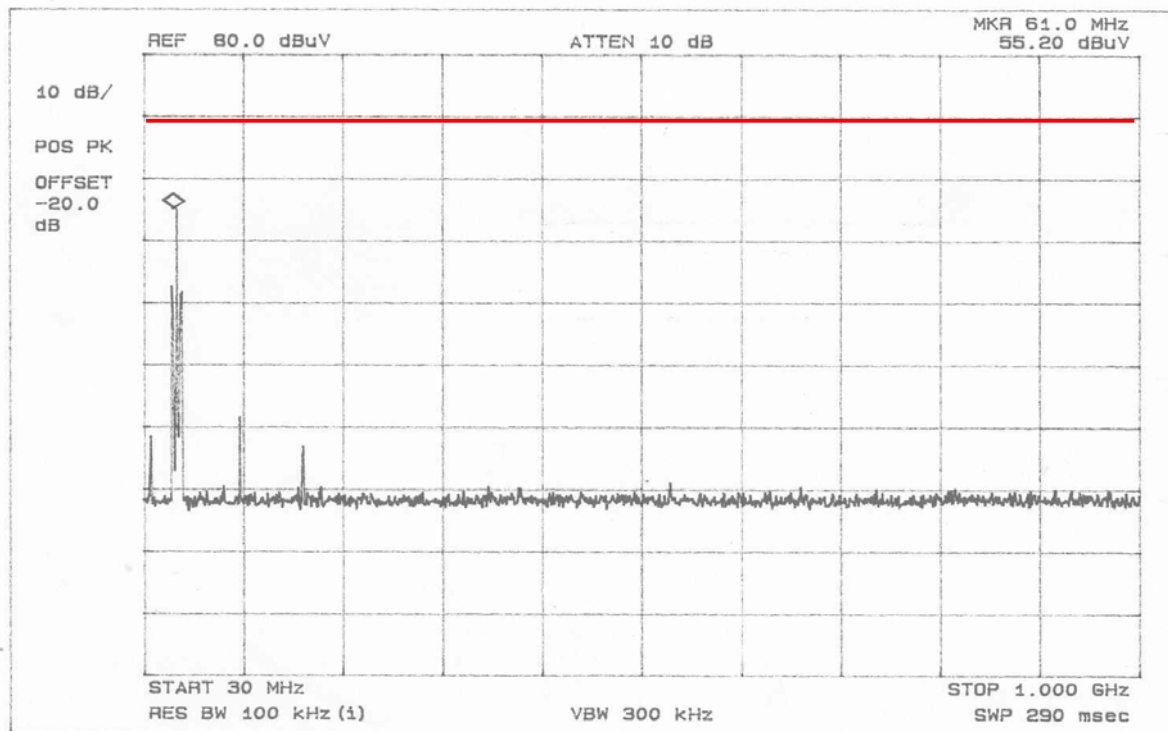
Spurious Emission Tabulated Data with Tuner

Note :

Output Terminal Conducted Spurious Emission

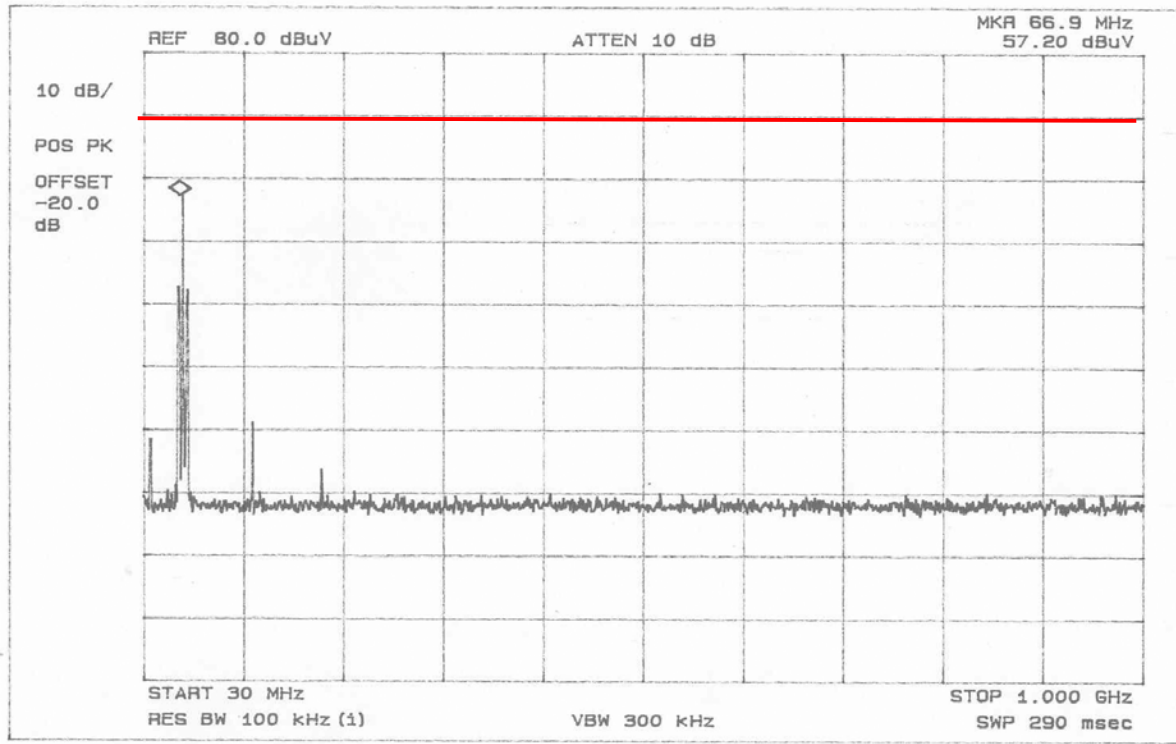


CH3 Playback

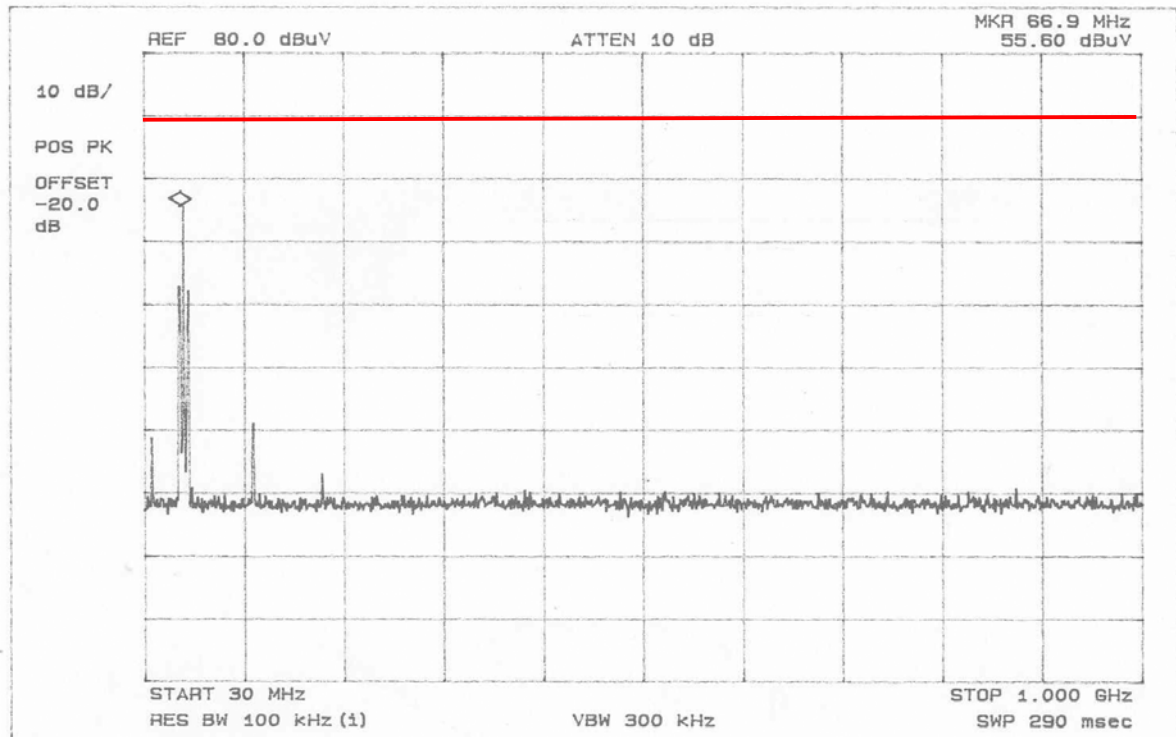


CH3 Record

Output Terminal Conducted Spurious Emission



CH4 Playback



CH4 Record

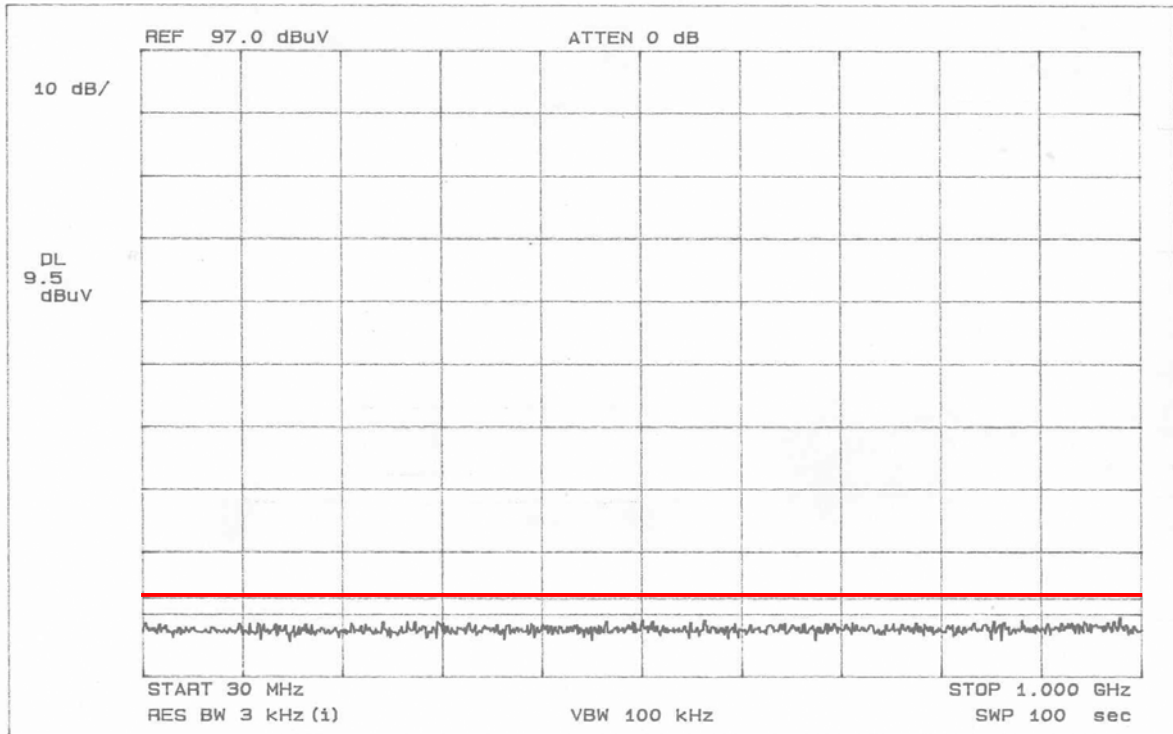
Transfer Switch Isolation Measurement

TV CH	Freq. (MHz)	Level (dBuV)	Limit (dBuV)	Mode	Margin (dB)
3	61.25	5.23	9.53	Playback	4.30
3	61.25	5.20	9.53	Record	4.33
4	67.25	5.05	9.53	Playback	4.48
4	67.25	5.25	9.53	Record	4.28

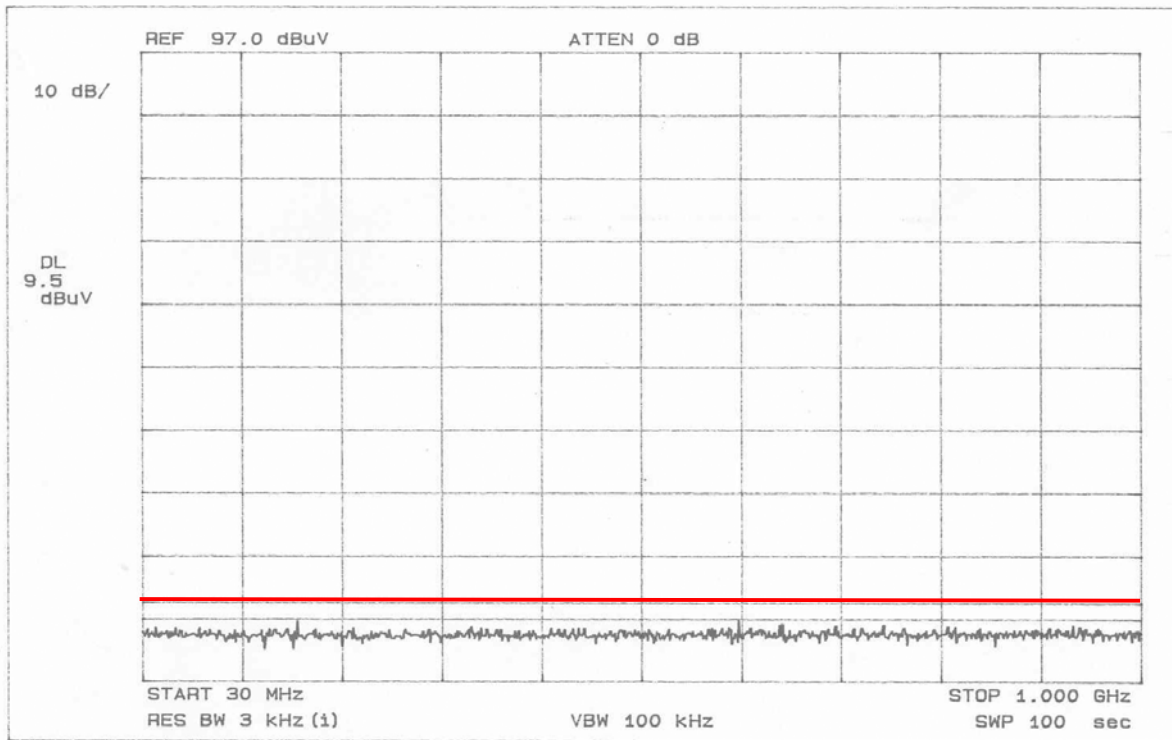
Transfer Switch Tabulated Data with Tuner

Note :

Transfer Switch Isolation Measurement

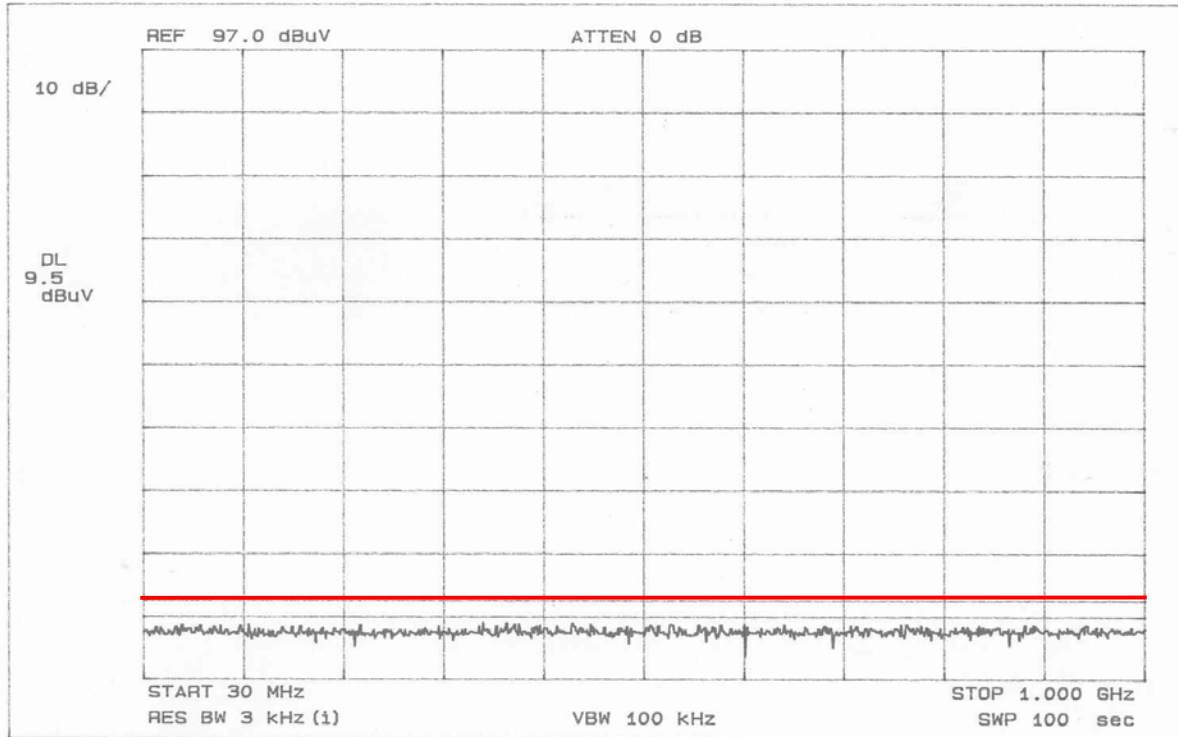


CH3 Playback

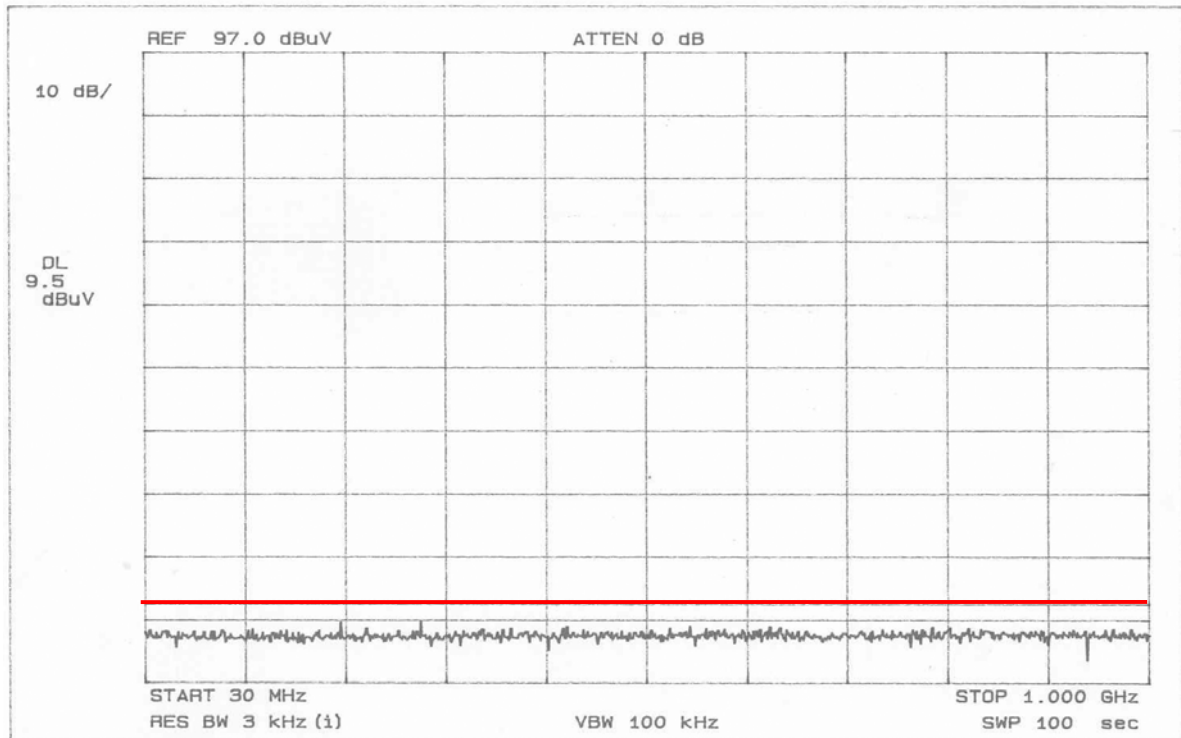


CH3 Record

Transfer Switch Isolation Measurement



CH4 Playback



CH4 Record