Certification of Compliance

CFR 47 Part 15 Subpart B

Test Report File No. 04-IST-0139 **Date of Issue** June 09,2004

Model(s) DV-T7D5N-QJ

Kind of Product Video Cassette Recorder (TV Interface Device)

Applicant Daewoo Electronics Corporation.
543, Dangjung-Dong, Kunpo-City, Kyounggi-DO, Korea

Manufacturer Daewoo Electronics Corporation.
295, Gondan-dong, Kumi-city, Kyungsangbuk-do, Korea.

Test Result ☒ **Positive** ☐ **Negative**

Reviewed By

J.H.LEE / EMC Group Manager

Approved By

G. Chung / Chief

- Investigations requested : Measurement to the relevant clauses of F.C.C rules and regulations Part 15 Subpart B – Unintentional Radiatiors
- The test report with appendix consists of 84 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 2001.

TABLE OF CONTENTS

Information OF TUNERS

Manufacture	Tuner Name
SAMSUNG Electric Co., Ltd.	SSTMI-US5

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	22 ℃
Humidity	47 %
Atmospheric pressure	1002 mbar

POWER SUPPLY SYSTEM USED

Power supply system	120Vac , 60Hz

PRODUCT INFORMATIONS

Power supply system	120Vac / 60Hz
Power consumption	17W
Video signal	EIA STANDARD NTSC COLOR
RF input impedance	75 ohm Unbal. (U/V one input)
RF output impedance	75 ohm Unbal.
VHF output signal	Channel 3 or 4 (selectable)
Video input signal	Phono type 1.0 ±0.2Vp-p sync negative 75ohms unbalance
Video output signal	Phono type 1.0 ±0.2Vp-p sync negative 75ohms unbalance
Audio input signal	Phono type, -8.8dBm, more then 47k ohms unbalanced
Audio output signal	Phono type, -5.8dBm, less then 1k ohms unbalanced

-EMC suppression device is not used during the test.

-Please refer to user's manual.

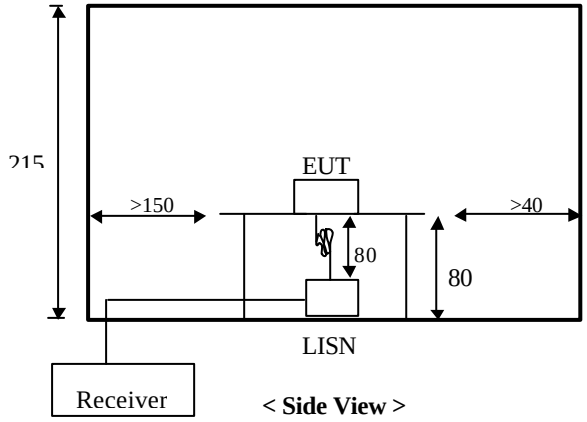
DESCRIPTIONS OF TEST

Conducted Emissions:

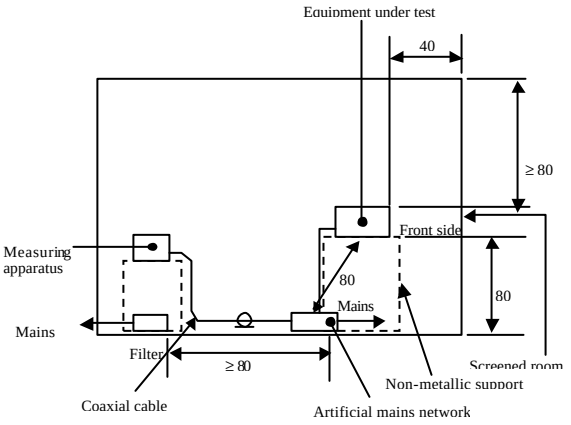
The measurement were performed over the frequency range of 0.15MHz to 30MHz using a 50Ω/50uH LISN as the input transducer to a Spectrum Analyzer or a Field Intensity Meter. The measurements were made with the detector set for "Peak" amplitude within an bandwidth of 10KHz or for "quasi-peak" within a 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 0.15 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.



< **Side View** >



< **Concept Drawing** >

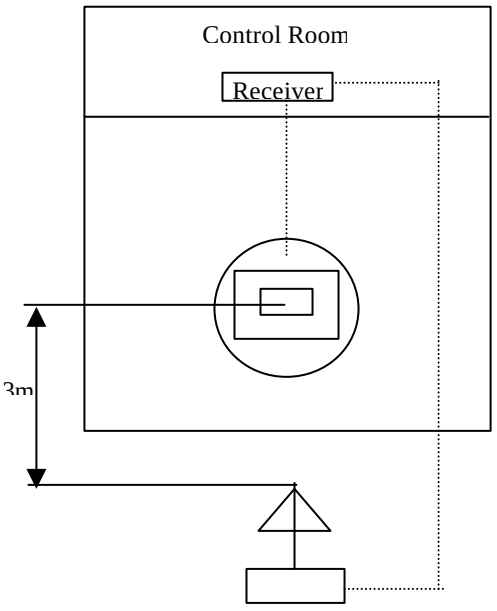
DESCRIPTION OF TEST

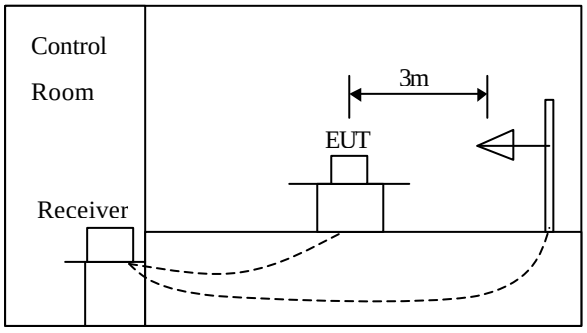
Radiated Emissions:

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-case emission.





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 ● MET ○ Not MET
Minimum limit margin 9.9 dB at 0.265 MHz
Maximum limit exceeding

Remarks : **With neutral phase, for average detect mode**
(VCR Playback mode, Tuner: SSTMI-US5 (SAMSUNG)

■ Radiated Emission

The requirements are ● MET ○ Not MET
Minimum limit margin 6.5 dB at 66.8 MHz
Maximum limit exceeding

Remarks : **VCR Record mode (Tuner: SSTMI-US5 (SAMSUNG))**

■ Output Signal Level Measurements

The requirements are ● MET ○ Not MET
Minimum limit margin
Maximum limit exceeding

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

■ Output Terminal Conducted Spurious Emission

The requirements are ● MET ○ Not MET
Minimum limit margin
Maximum limit exceeding

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

■ Transfer Switch Isolation Measurements

The requirements are ● MET ○ Not MET
Minimum limit margin
Maximum limit exceeding

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

Prepared By

Note :

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

S.I.Lee / EMC Engineer

TEST CONDITIONS AND DATA

Conducted Emissions

[Applicable]

◆ Test Equipment Used

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

Model Name	Manufacturer	Descriptions
ESH3	Rohde & Schwarz	Test Receiver
ESH3-Z2	Rohde & Schwarz	Pulse Limiter
ESH3-Z5	Rohde & Schwarz	LISN
EZM	Rohde & Schwarz	Spectrum Monitor
PM5418	FLUKE	Pattern Generator

◆ 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	22 ℃
Humidity	48 %
Atmosphere pressure	1001 mbar

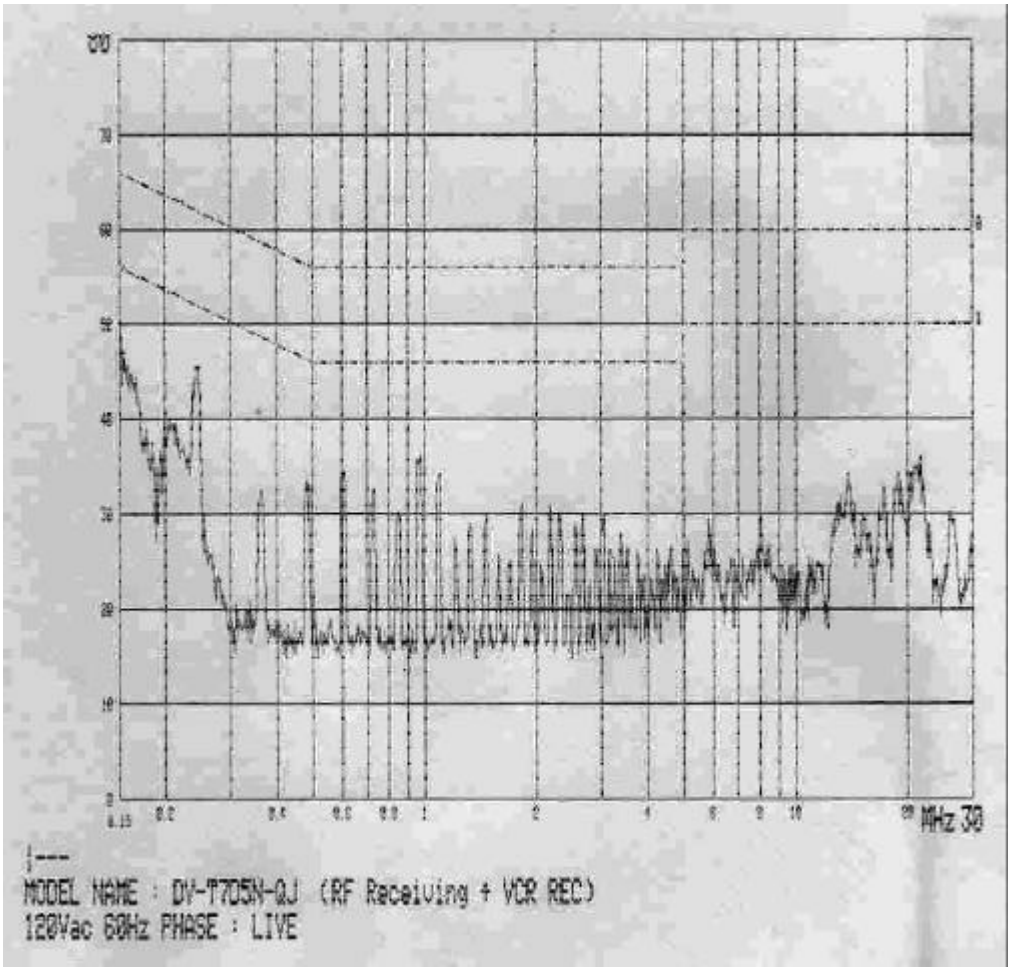
◆ Test Program RF Receiving during VCR REC, VCR Playback Mode

◆ Test Area Shielded Room #3

Note :

Conducted Emissions

(Mains Terminal Disturbance Voltages)



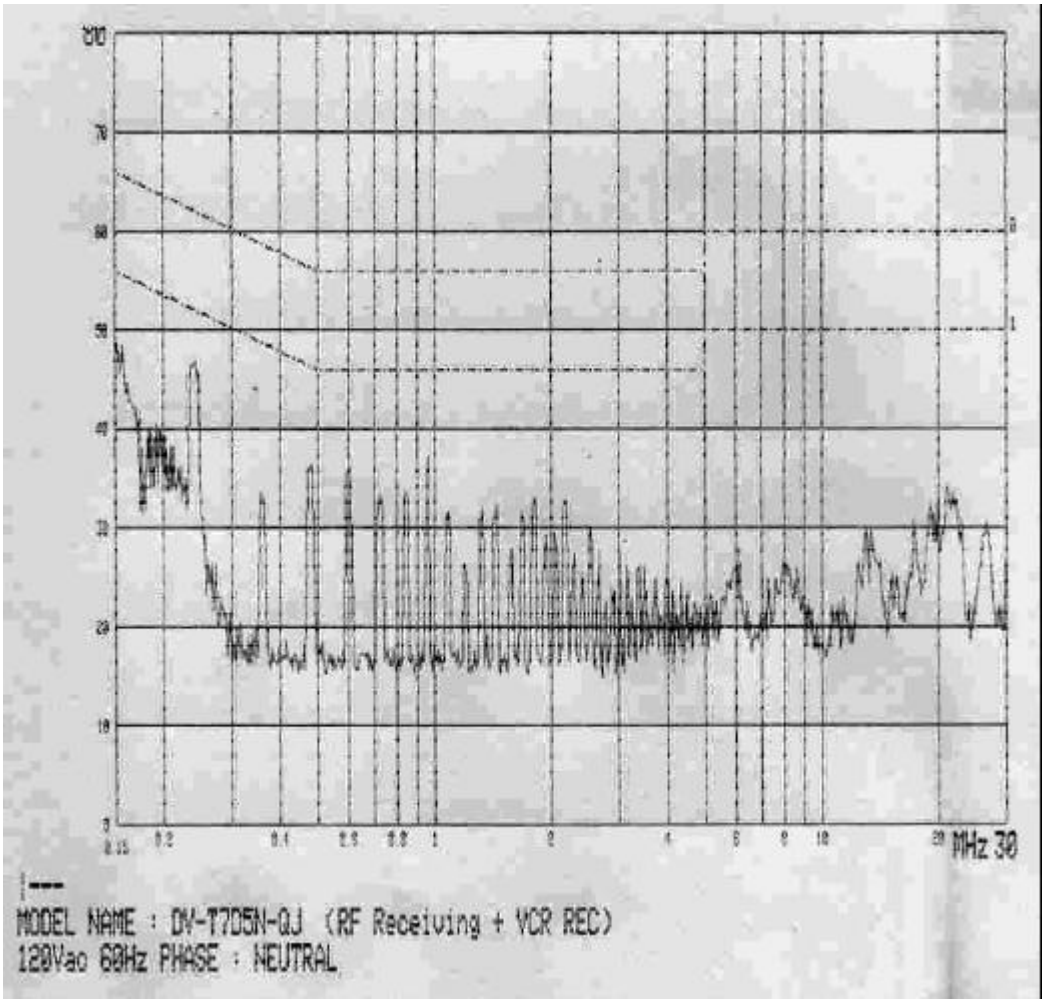
Tuner : SSTMI-US5 (SAMSUNG)

Freq. [MHz]	Measurement [dBμV]		Limit [dBμV]		Margin [dB]	
	Q-peak	Average	Q-peak	Average	Q-peak	Average
0.150	46.4	17.5	66.0	56.0	19.6	38.5
0.243	45.0	40.5	62.0	52.0	17.0	11.5
0.970	35.2	25.4	56.0	46.0	20.8	20.6

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

Conducted Emissions

(Mains Terminal Disturbance Voltages)



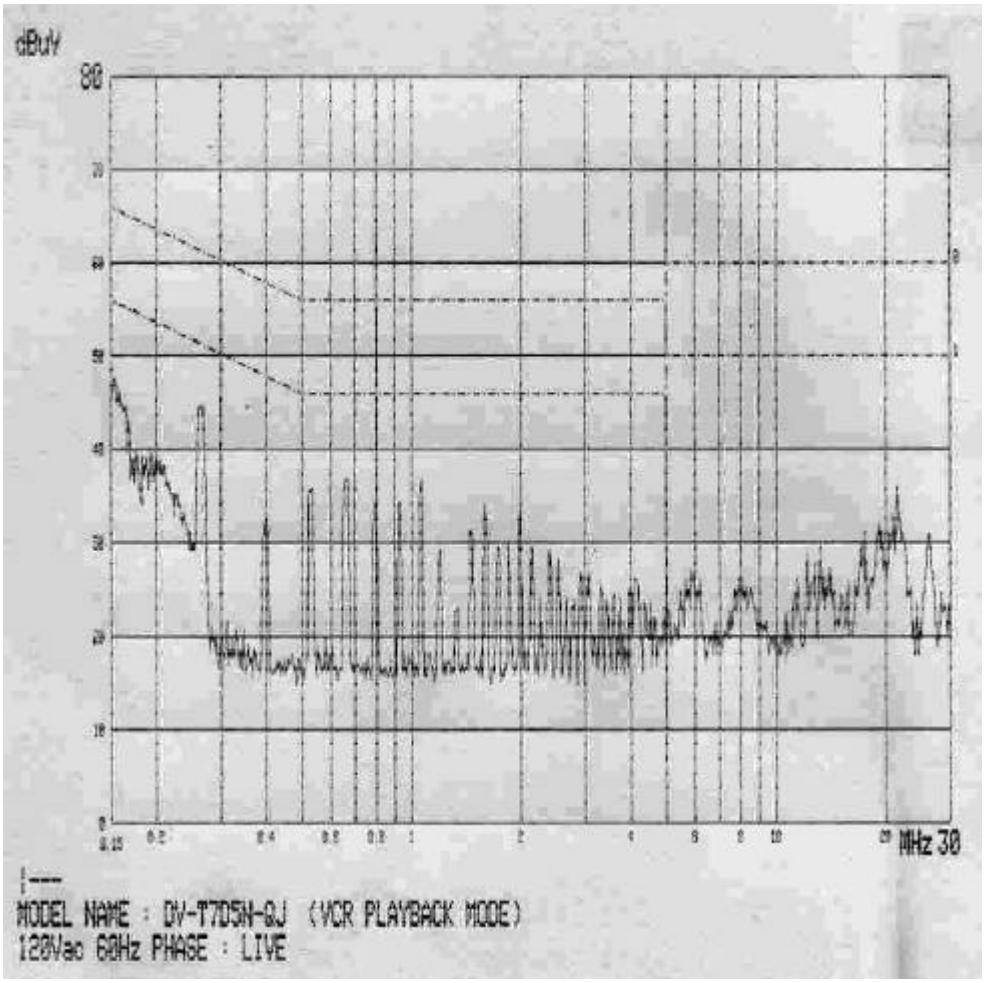
Tuner : SSTMI-US5 (SAMSUNG)

Freq. [MHz]	Measurement [dBμV]		Limit [dBμV]		Margin [dB]	
	Q-peak	Average	Q-peak	Average	Q-peak	Average
0.152	46.4	17.6	65.9	55.9	19.5	38.3
0.241	45.3	41.3	62.1	52.1	16.8	10.8
0.975	36.6	16.6	56.0	46.0	19.4	29.4

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

Conducted Emissions

(Mains Terminal Disturbance Voltages)



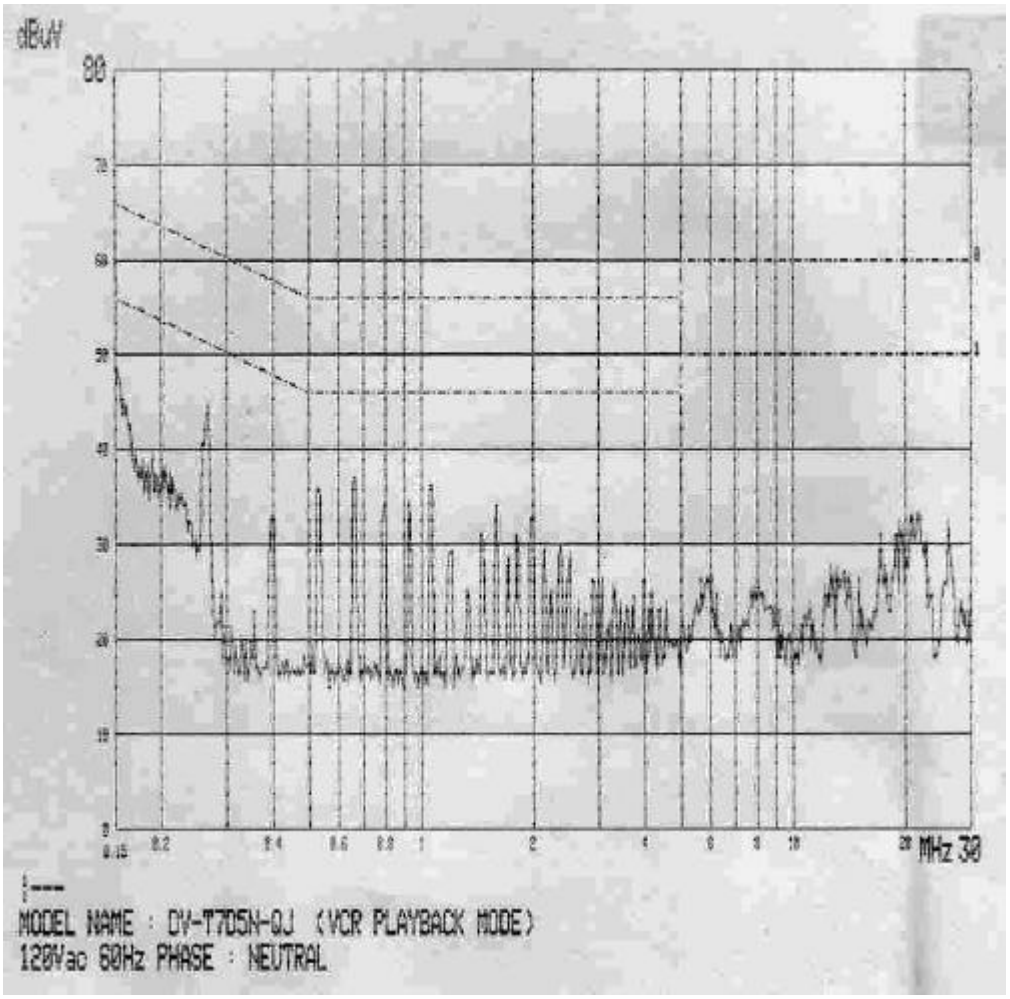
Tuner : SSTMI-US5 (SAMSUNG)

Freq. [MHz]	Measurement [dBμV]		Limit [dBμV]		Margin [dB]	
	Q-peak	Average	Q-peak	Average	Q-peak	Average
0.150	45.9	19.9	66.0	56.0	20.1	36.1
0.265	43.7	40.9	61.3	51.3	17.6	10.4
1.060	35.3	26.3	56.0	46.0	20.7	19.7

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

Conducted Emissions

(Mains Terminal Disturbance Voltages)



Tuner : SSTMI-US5 (SAMSUNG)

Freq. [MHz]	Measurement [dBμV]		Limit [dBμV]		Margin [dB]	
	Q-peak	Average	Q-peak	Average	Q-peak	Average
0.150	46.2	20.1	66.0	56.0	19.8	35.9
0.265	43.7	41.3	61.3	51.3	17.5	9.9
0.661	38.1	30.8	56.0	46.0	17.9	15.2

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.

Model Name	Manufacturer	Descriptions
ESVP	Rohde & Schwarz	Test Receiver
VULB9160	Schwarzbeck	Antenna
EZM	Rohde & Schwarz	Spectrum Monitor
PM5418	FLUKE	Pattern Generator

◆ 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	21℃
Humidity	50 %
Atmosphere pressure	1000mbar

◆ Test Program RF Receiving during VCR REC, VCR Playback Mode,

◆ Test Area Open Area Test Site #2

Note :

Radiated Emissions

(Disturbance Radiation)

[Applicable]

Tuner : SSTMI-US5 (SAMSUNG)

System	CH	Freq. (MHz)	Pol. (H/V)	Limits (dBuV/m)	Result (dBuV/m)	Margin (dB)
RF Receiving during VCR record		66.8	V	40.0	33.5	6.5
		86.1	V	40.0	32.4	7.6
		114.9	V	43.5	33.9	9.6
		129.2	H	43.5	32.7	10.8
		143.4	H	43.5	33.2	10.3
VCR Playback Mode		66.4	H	40.0	33.1	6.9
		86.0	H	40.0	32.1	7.9
		129.2	H	43.5	32.5	11.0
		143.4	V	43.5	33.7	9.8

End of data

Note :

TEST CONDITIONS AND DATA

Output Signal Level Measurements

◆ Test Equipment Used

Model Name	Manufacturer	Description
8566B	Hewlett Packard	Spectrum Analyzer
85685A	Hewlett Packard	RF preselector
RAM	Rohde & Schwarz	Matching Pad
PM5418	FLUKE	Pattern Generator

◆ 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	22℃
Humidity	47 %
Atmosphere pressure	1002mbar

◆ Test Program Playback and record mode

◆ Test Area Compact Chamber

Note : Limit Calculations

For Video Signal

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

For Audio Signal

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

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

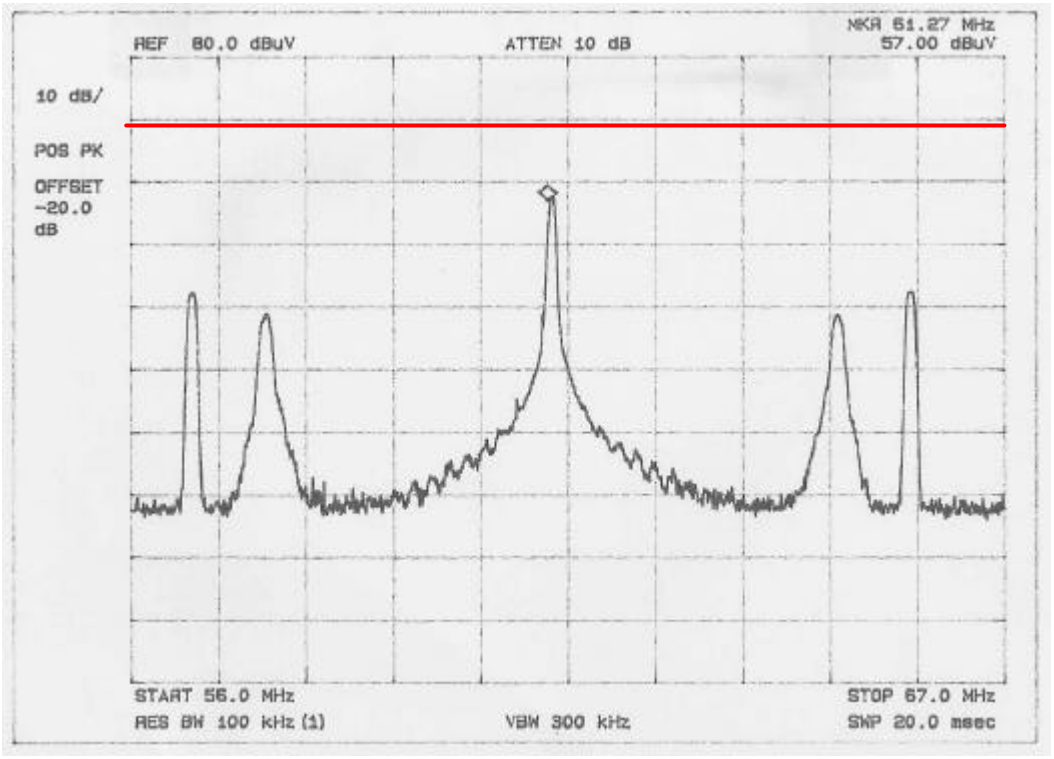
TV CH.	Freq.(MHz)	Level(dBuV)	Limit(dBuV)	Mode	Margin(dB)
3(Pix)	61.27	57.0	69.54	Playback	12.54
3(Aud)	65.81	42.4	56.53	Playback	14.13
3(Pix)	61.28	57.5	69.54	Record	12.04
3(Aud)	65.82	42.4	56.53	Record	14.13
4(Pix)	67.28	56.8	69.54	Playback	12.74
4(Aud)	71.80	41.4	56.53	Playback	15.13
4(Pix)	67.27	56.9	69.54	Record	12.64
4(Aud)	71.80	41.3	56.53	Record	15.23

Output Signal Tabulated Data with Tuner

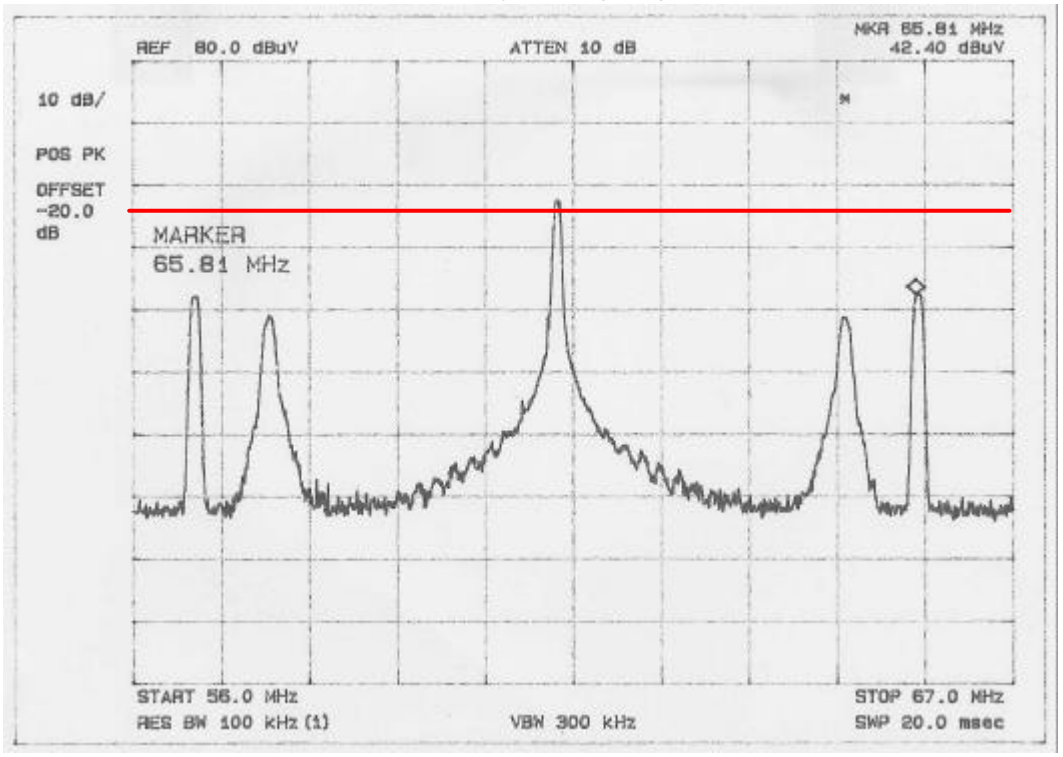
(SAMSUNG Co., Ltd. Model: **SSTMI-US5**)

Output Signal Level Measurements

Tuner: SSTMI-US5 (SAMSUNG)



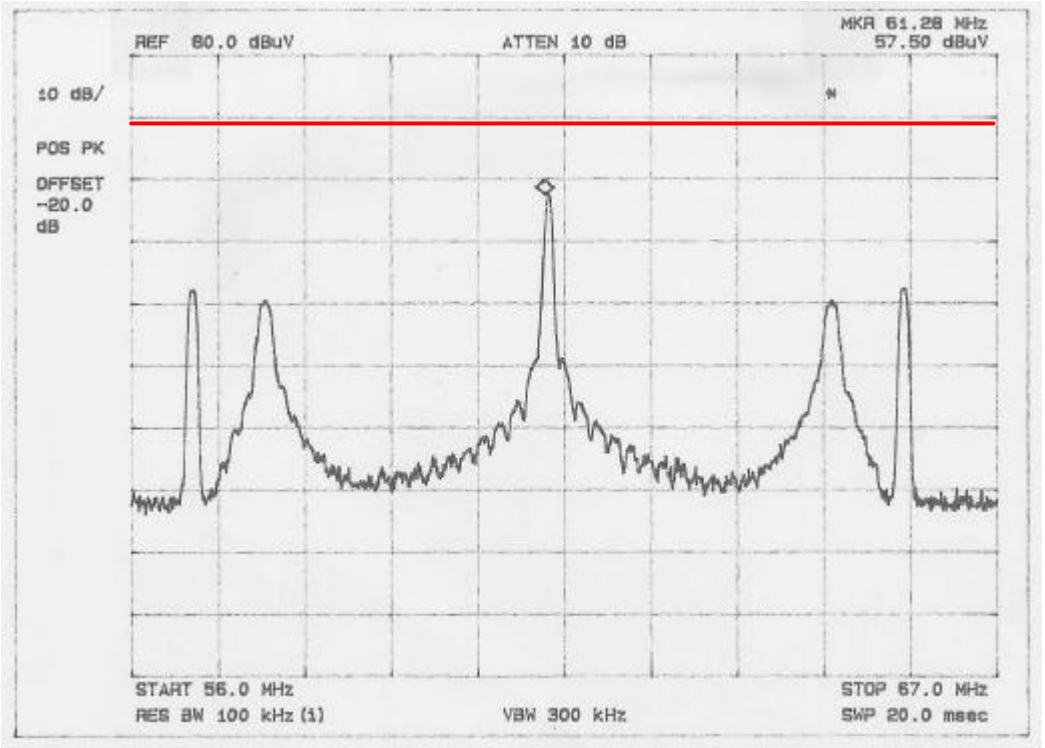
CH3 Playback (Pix)



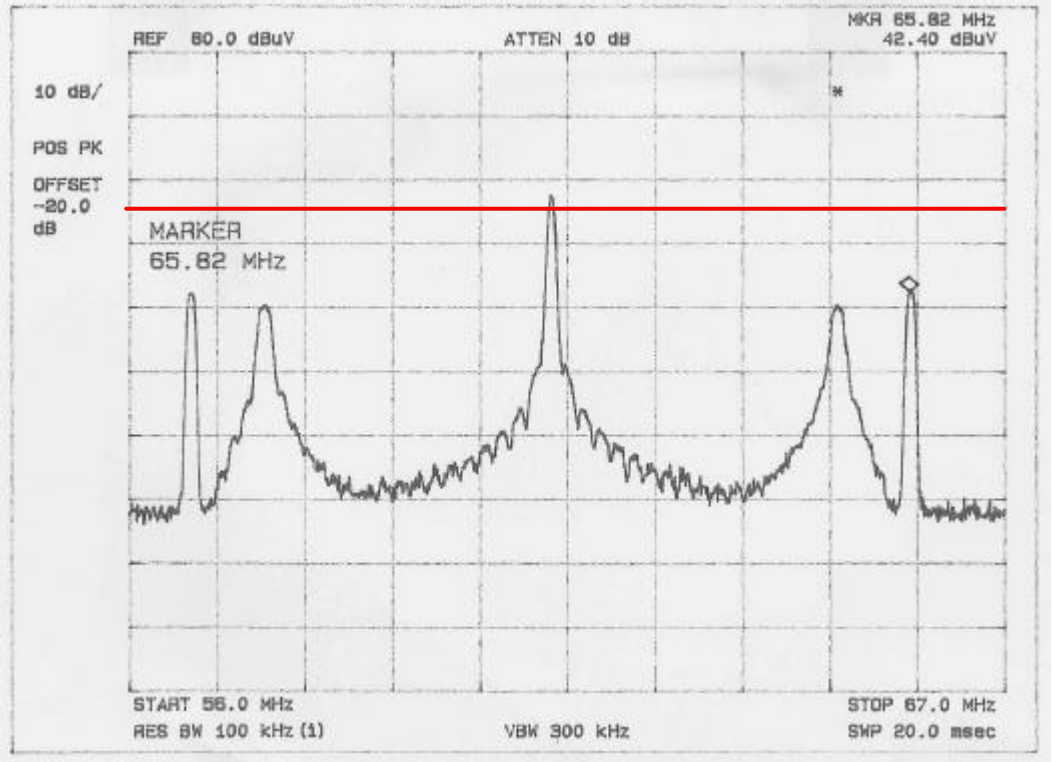
CH3 Playback (Aud)

Output Signal Level Measurements

Tuner: SSTMI-US5 (SAMSUNG)



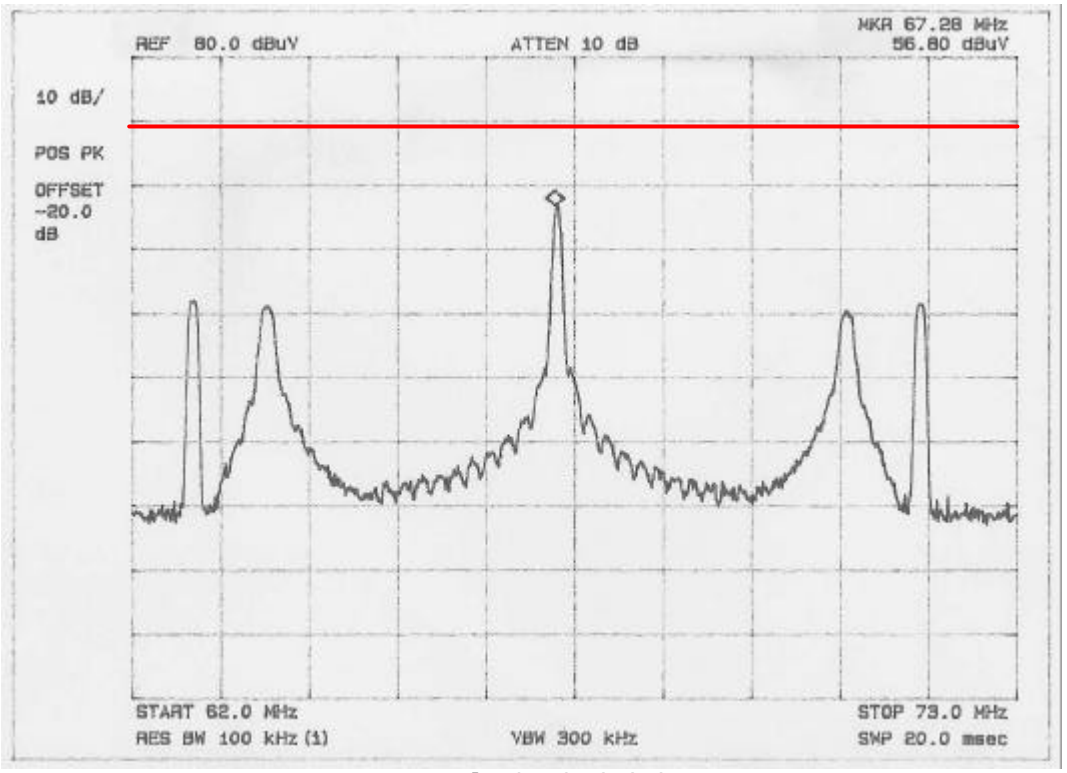
CH3 Record (Pix)



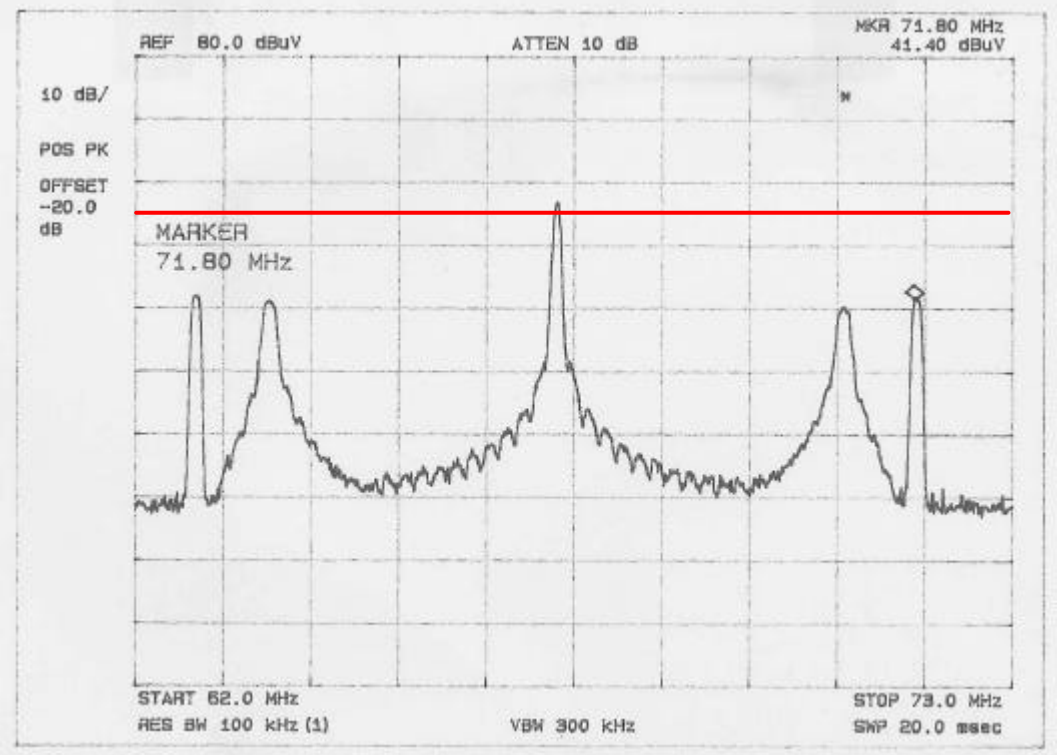
CH3 Record (Aud)

Output Signal Level Measurements

Tuner: SSTMI-US5 (SAMSUNG)



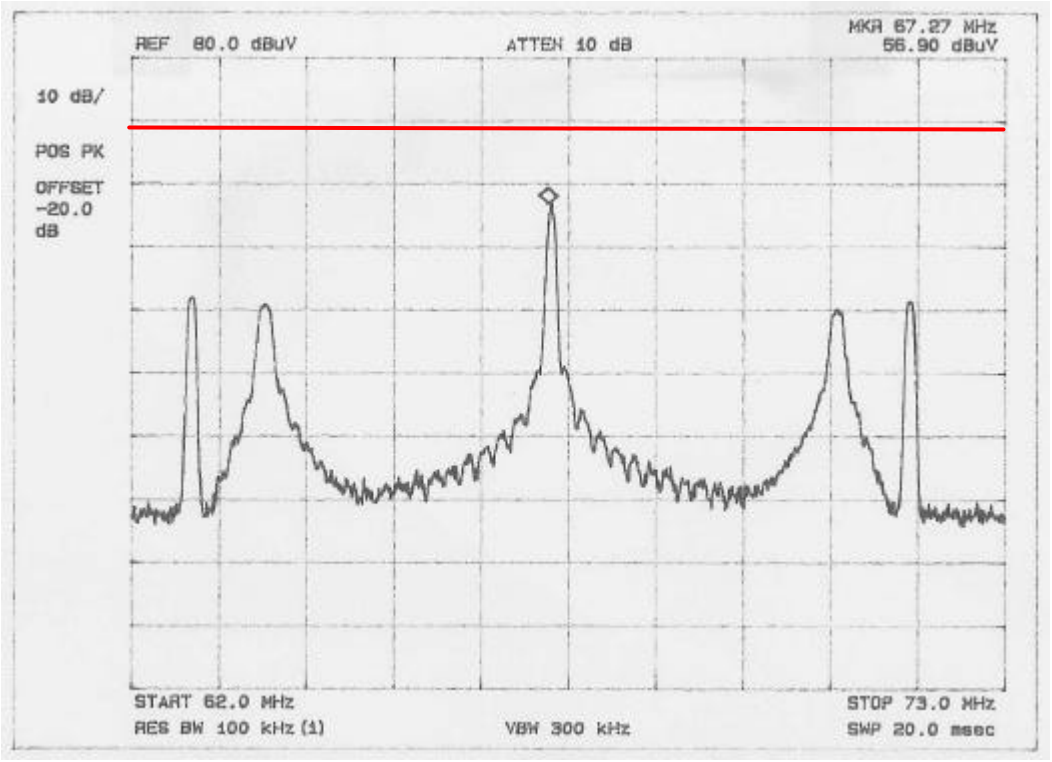
CH4 Playback (Pix)



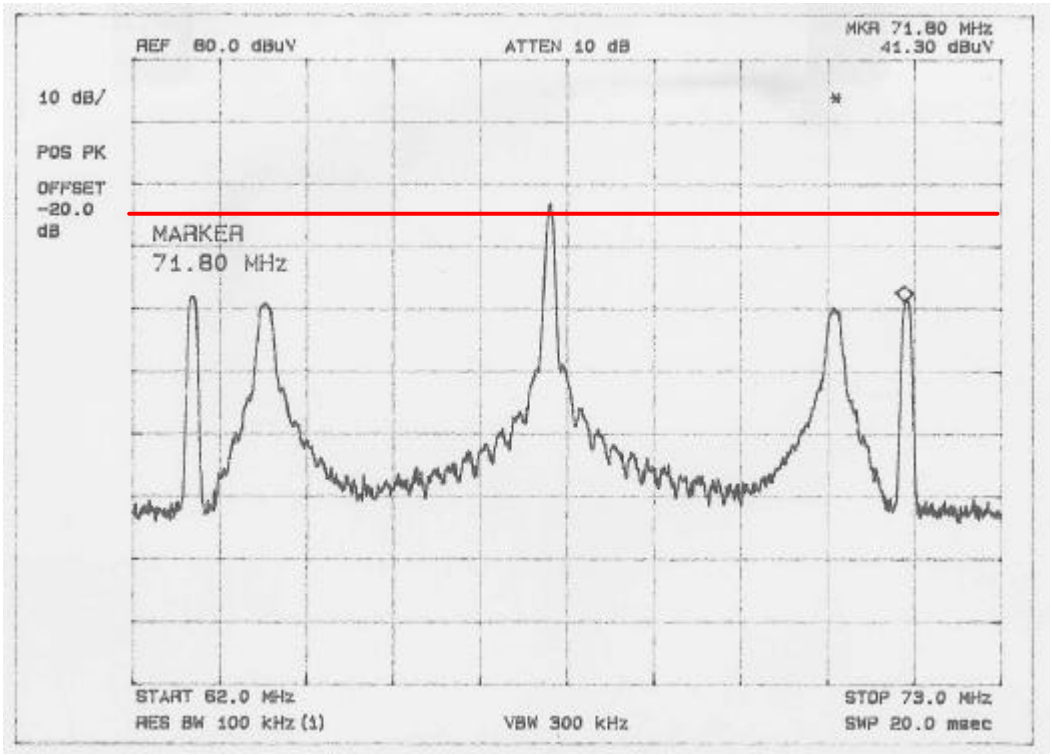
CH4 Playback (Aud)

Output Signal Level Measurements

Tuner: SSTMI-US5 (SAMSUNG)



CH4 Record (Pix)



CH4 Record (Aud)

TEST CONDITIONS AND DATA

Output Terminal Conducted Spurious Emission

◆ Test Equipment Used

Model Name	Manufacturer	Description
8566B	Hewlett Packard	Spectrum Analyzer
85685A	Hewlett Packard	RF preselector
RAM	Rohde & Schwarz	Matching Pad
PM5418	FLUKE	Pattern Generator

◆ 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	22℃
Humidity	47 %
Atmosphere pressure	1002mbar

◆ Test Program Playback and record mode

◆ Test Area Compact Chamber

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

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

plus 30dB = 69.55dBuV = -37.45dBm

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

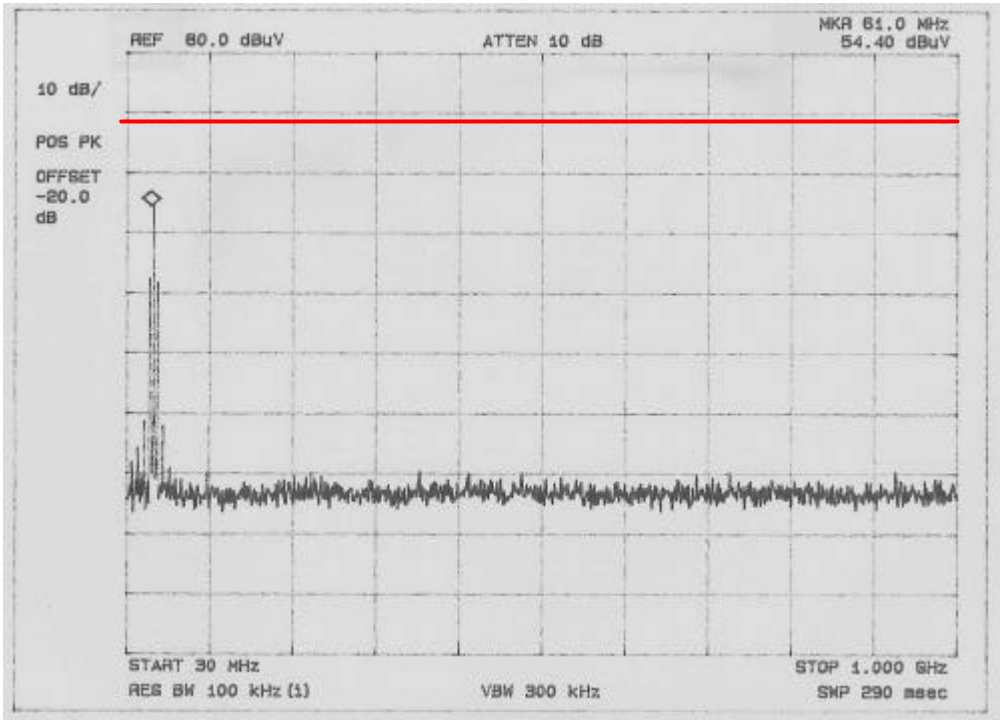
TV CH	Freq.(MHz)	Level(dBuV)	Limit(dBuV)	Mode	Margin(dB)
3	61.00	54.4	69.55	Playback	15.15
3	61.00	54.0	69.55	Record	15.55
4	66.90	52.8	69.55	Playback	16.75
4	66.90	50.2	69.55	Record	19.35

Spurious Emission Tabulated Data with Tuner

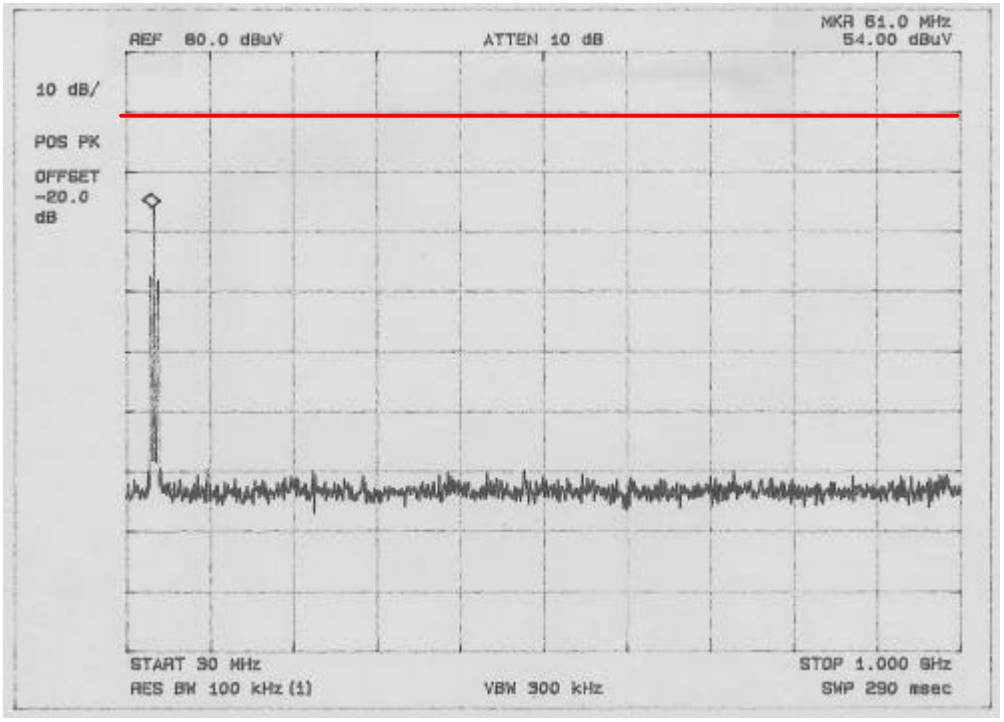
(Samsung Electronic Co., Ltd. Model: **SSTMI-US5**)

Output Terminal Conducted Spurious Emission

Tuner: SSTMI-US5 (SAMSUNG)



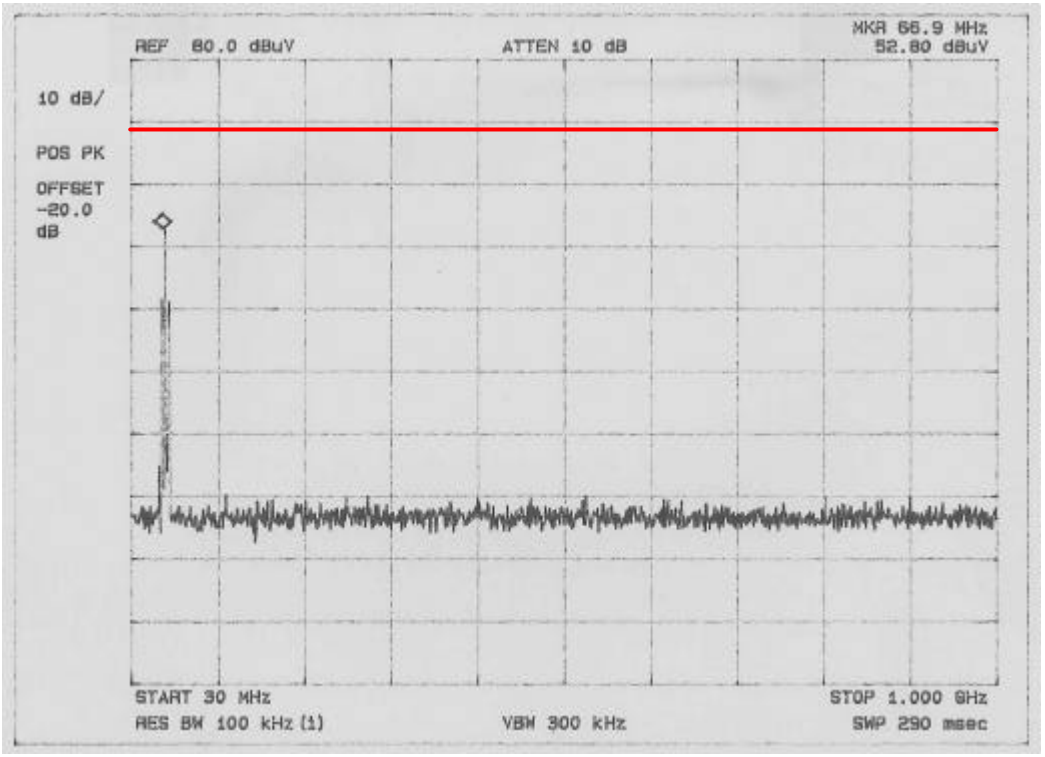
CH3 Playback



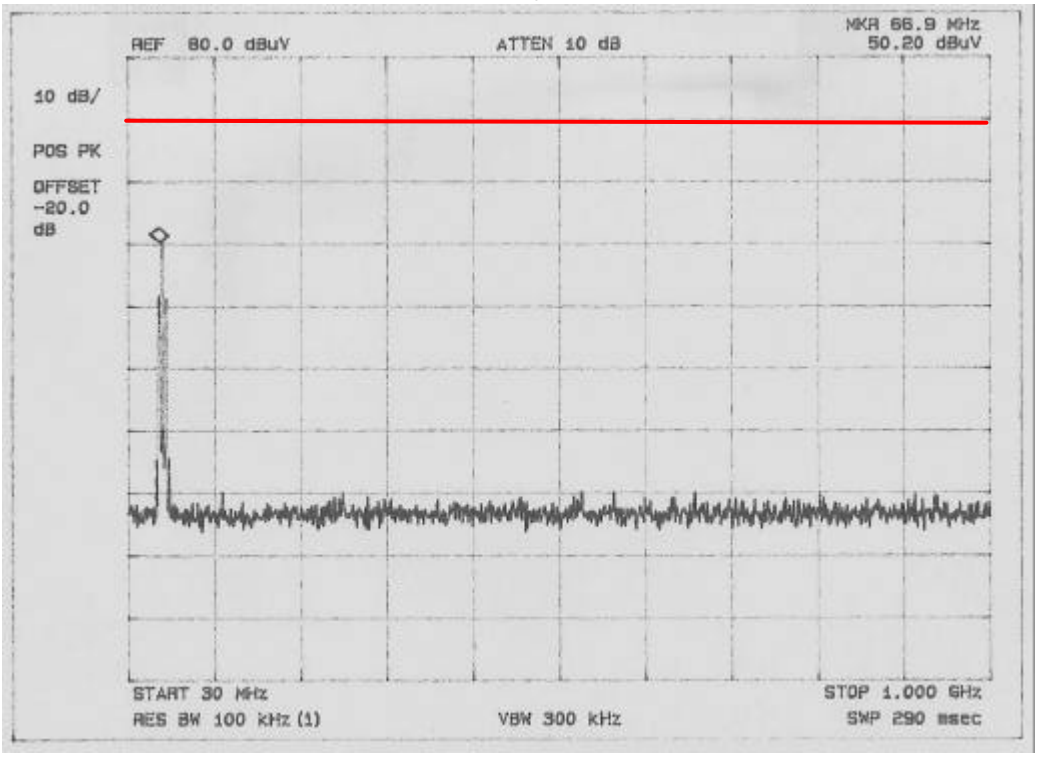
CH3 Record

Output Terminal Conducted Spurious Emission

Tuner: SSTMI-US5 (SAMSUNG)



CH4 Playback



CH4 Record

TEST CONDITIONS AND DATA

Transfer Switch Isolation Measurement

◆ Test Equipment Used

Model Name	Manufacturer	Description
8566B	Hewlett Packard	Spectrum Analyzer
85685A	Hewlett Packard	RF preselector
RAM	Rohde & Schwarz	Matching Pad
PM5418	FLUKE	Pattern Generator

◆ 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	22℃
Humidity	47 %
Atmosphere pressure	1002mbar

◆ Test Program Playback and record mode

◆ Test Area Compact Chamber

Note : Transfer switch isolation measurements were made on the Channel 3 and 4 video output frequencies of 61.25 and 67.25 MHz and both position of the transfer switch.

Limit calculation(Sec 15.115 (c)(1)(ii))

$0.346 \times 75^{1/2} = 2.996uV = 9.53dBuV = -97.46dBm$

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.

Transfer Switch Isolation Measurement

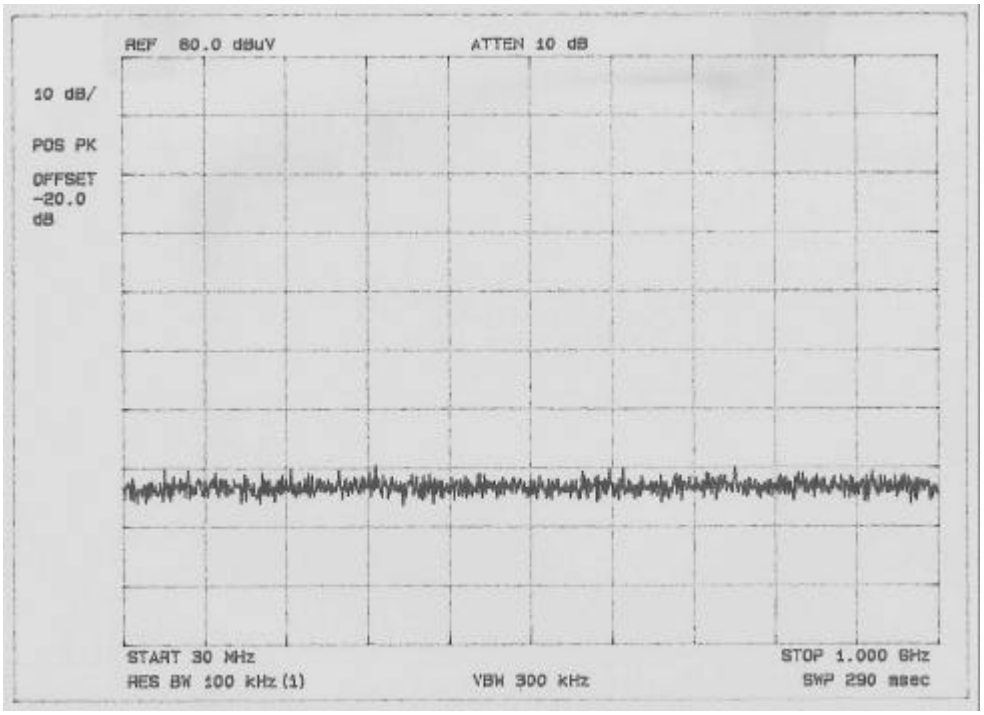
TV CH	Freq.(MHz)	Level(dBuV)	Limit(dBuV)	Mode	Margin(dB)
3	61.25	5.78	9.53	Playback	3.75
3	61.25	5.75	9.53	Record	3.78
4	67.25	5.65	9.53	Playback	3.88
4	67.25	5.62	9.53	Record	3.91

Transfer Switch Tabulated Data with Tuner

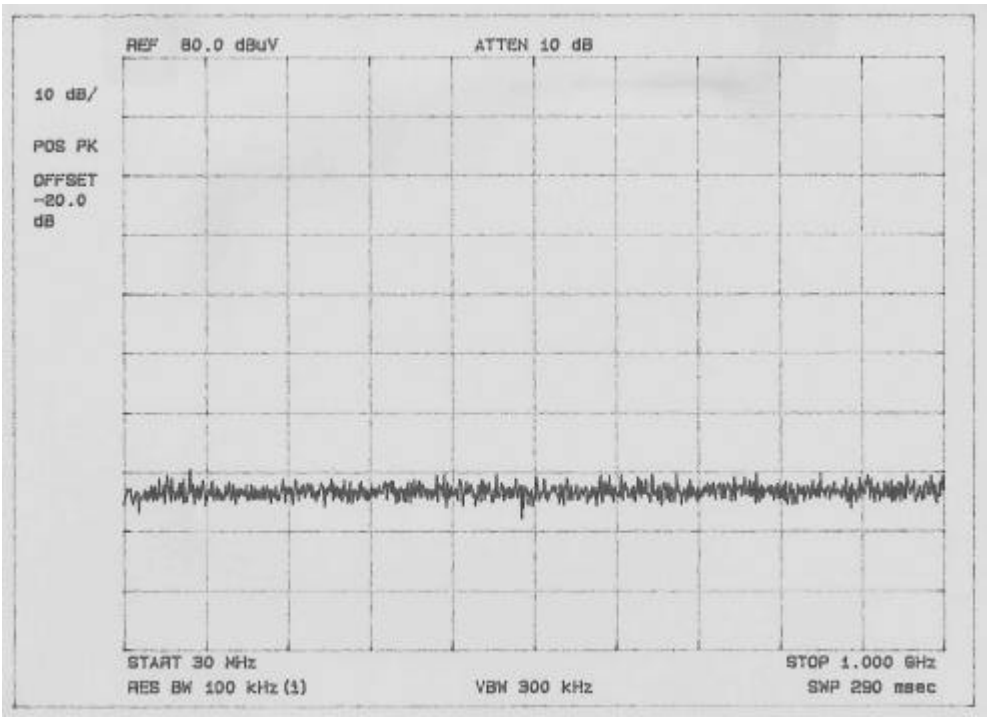
(Samsung Electronic Co., Ltd. Model: **SSTMI-US5**)

Transfer Switch Isolation Measurement

Tuner: SSTMI-US5 (SAMSUNG)



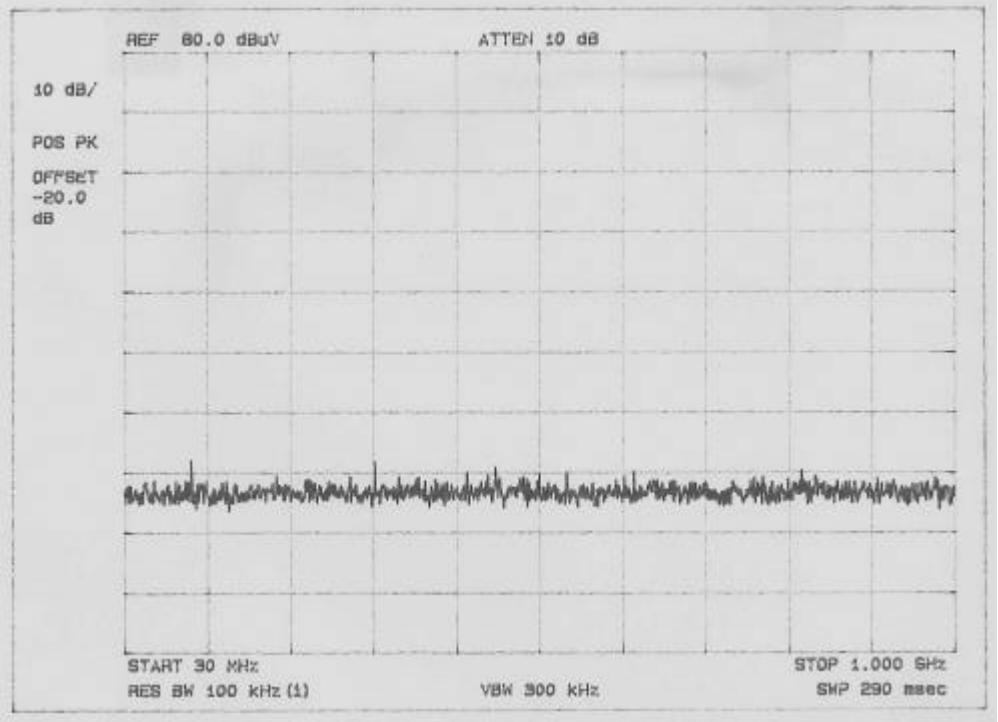
CH3 Playback



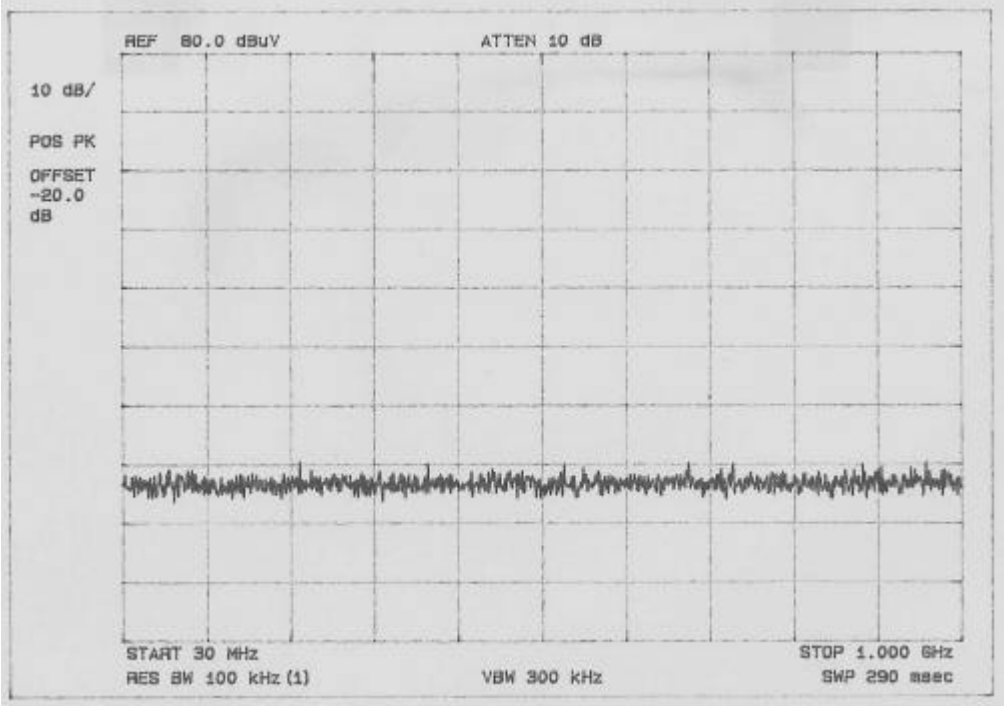
CH3 Record

Transfer Switch Isolation Measurement

Tuner: SSTMI-US5 (SAMSUNG)



CH4 Playback



CH4 Record