FCC CFR47 PART 15 TV INTERFACE DEVICE

TEST REPORT

FOR

VCR

MODEL: VG4BH

FCC ID: A3LTWIN2K

REPORT NUMBER: 99U0611

ISSUE DATE: October 6, 1999

Prepared for

SAMSUNG ELECTRONICS CO., LTD.
416 MAETAN DONG, PALDAL GU
SUWON SHI, KOREA

Prepared by

COMPLIANCE ENGINEERING SERVICES, INC.
d.b.a.
COMPLIANCE CERTIFICATION SERVICES
1366 BORDEAUX DRIVE
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TEL: (408) 752-8166
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LAB CODE:200065-0

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1. VERIFICATION OF COMPLIANCE

COMPANY NAME: SAMSUNG ELECTRONICS CO., LTD.
416 MAETAN DONG, PALDAL GU
SUWON SHI, KOREA

CONTACT PERSON: BEN KIM / MANAGER

TELEPHONE NO: 408-544-5124

MODEL NO/NAME: VG4BH

SERIAL NO: N/A

DATE TESTED: OCTOBER 06, 1999

TYPE OF EQUIPMENT:	TV INTERFACE DEVICE
MEASUREMENT DISTANCE:	(X) 3 METER ( ) 10 METER
FCC RULES:	PART 15.115
MEASUREMENT PROCEDURE	ANSI C63.4:92
EQUIPMENT AUTHORIZATION PROCEDURE	CERTIFICATION
MODIFICATIONS MADE ON EUT	☐ YES ☒ NO
DEVIATIONS FROM MEASUREMENT PROCEDURE	☐ YES (refer to section 21 for comments) ☒ NO
TEST RESULT	PASSED

The above equipment was tested by Compliance Certification Services for compliance with the requirements set forth in the FCC CFR 47, PART 15. The results of testing in this report apply to the product/system which was tested only. Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.

Reviewed By

MIKE C.I. KUO / VICE PRESIDENT
COMPLIANCE CERTIFICATION SERVICES

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2. PRODUCT DESCRIPTION

CHASSIS TYPE	METAL
LIST OF EACH OSC. OR XTAL. FREQ. (FREQ.>=1 MHz)	14.31 MHz
NUMBER OF PCB LAYERS	1 LAYER
POWER REQUIREMENTS	110 V AC, 60 Hz
NO. OF EXTERNAL I/O CONNECTORS	11

External Peripheral Devices

Device Type	Manufacturer	Model Number	Serial No.	FCC ID / DoC
TV	KONKA	K1988U	N/A	N/A

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External I/O Cable Construction Description

CABLE NO: 1	
I/O Port: Antenna In	Number of I/O ports of this type: 1
Number of Conductors: 2	**Connector Type: F Connector**
Capture Type: Screw-In	**Type of Cable used: Shielded**
Cable Connector Type: Molded	**Cable Length: 4 M**
Bundled During Tests: Yes	**Data Traffic Generated: Yes**
Remark: N/A	

CABLE NO: 2	
I/O Port: RF Out	Number of I/O ports of this type: 1
Number of Conductors: 2	**Connector Type: F Connector**
Capture Type: Screw-In	**Type of Cable used: Shielded**
Cable Connector Type: Molded	**Cable Length: 1 M**
Bundled During Tests: No	**Data Traffic Generated: Yes**
Remark: N/A	

CABLE NO: 3	
I/O Port: S-Video	Number of I/O ports of this type: 1
Number of Conductors: 5	**Connector Type: S-Video**
Capture Type: Snap-In	**Type of Cable used: Unshielded**
Cable Connector Type: Molded	**Cable Length: 1.5 M**
Bundled During Tests: Yes	**Data Traffic Generated: Yes**
Remark: N/A	

CABLE NO: 4	
I/O Port: Audio Out	Number of I/O ports of this type: 4
Number of Conductors: 2	**Connector Type: RCA Jack**
Capture Type: Snap-In	**Type of Cable used: Unshielded**
Cable Connector Type: Molded	**Cable Length: 2 M**
Bundled During Tests: Yes	**Data Traffic Generated: Yes**
Remark: N/A	

CABLE NO: 5	
I/O Port: Video Out	Number of I/O ports of this type: 2
Number of Conductors: 2	**Connector Type: RCA jack**
Capture Type: Snap-In	**Type of Cable used: Unshielded**
Cable Connector Type: Molded	**Cable Length: 2 M**
Bundled During Tests: Yes	**Data Traffic Generated: Yes**
Remark: N/A	

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CABLE NO: 6	
I/O Port: Audio In	Number of I/O ports of this type: 3
Number of Conductors: 2	**Connector Type: RCA Jack**
Capture Type: Snap-In	**Type of Cable used: Unshielded**
Cable Connector Type: Molded	**Cable Length: 1.5 M**
Bundled During Tests: Yes	**Data Traffic Generated: Yes**
Remark: Dummy cables	

CABLE NO: 7	
I/O Port: Video In	Number of I/O ports of this type: 1
Number of Conductors: 2	**Connector Type: RCA Jack**
Capture Type: Snap-In	**Type of Cable used: Unshielded**
Cable Connector Type: Molded	**Cable Length: 1.5 M**
Bundled During Tests: Yes	**Data Traffic Generated: Yes**
Remark: Dummy cable	

CABLE NO: 8	
I/O Port: Power	Number of I/O ports of this type: 1
Number of Conductors: 3	**Connector Type: USA 110 Type**
Capture Type: Snap-in	**Type of Cable used: Unshielded**
Cable Connector Type: Molded	**Cable Length: 1.5 M**
Bundled During Tests: No- Radiation, Yes- Line Conduction	**Data Traffic Generated: No**
Remark: N/A	

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3. TESTED SYSTEM DETAILS

During the tests, TV is tuned to Channels 3 or 4 to play VHS tape**.**

4. TEST FACILITY

The open area test sites and conducted measurement facilities used to collect the radiated data are located at 561F Monterey Road, Morgan Hill, California, USA. The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 and CISPR Publication 22.

5. ACCREDITATION AND LISTING

The test facilities used to perform radiated and conducted emissions tests are accredited by National Voluntary Laboratory Accreditation Program for the specific scope of accreditation under Lab Code:200065-0 to perform Electromagnetic Interference tests according to FCC PART 15 AND CISPR 22 requirements. No part of this report may be used to claim or imply product endorsement by NVLAP or any agency of the US Government. In addition, the test facilities are listed with Federal Communications Commission (reference no: 31040/SIT (1300B3) and 31040/SIT(1300F2))

6. MEASUREMENT INSTRUMENTATION

Radiated emissions were measured with one or more of the following types of linearly polarized antennas: tuned dipole, biconical, log periodic, bi-log, ridged waveguide, liner horn. EMI receivers were used for line conducted readings, spectrum analyzers with pre-selectors and quasi-peak detectors were used to perform radiated measurements. Receiving equipment (i.e., receiver, analyzer, quasi-peak adapter, pre-selector) and LISNs conform to CISPR specification for "Radio Interference Measuring Apparatus and Measurement Methods," Publication 16.

Calibrated wideband preamplifiers, coaxial cables, and coaxial attenuators are also used for making measurements.

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7. MEASURING INSTRUMENT CALIBRATION

The measuring equipment which was utilized in performing the tests documented herein has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipment which is traceable to recognized national standards.

8. UNITS OF MEASUREMENT

Measurements of radiated interference are reported in terms of dB(uV/m) at a specified distance. The indicated readings on the spectrum analyzer were converted to dB(uV/m) by use of appropriate conversion factors. Measurements of conducted interference are reported in terms of dB(uV).

The field strength is calculated by adding the Antenna Factor and Cable Factors, then by subtracting the Amplifier Gain from the measured reading. The basic equation with a sample calculation is as follows:

FS = RA + AF + CF - AG

Where FS = Field Strength
RA = Receiver Amplitude
AF = Antenna Factor
CF = Cable Attenuation Factor
AG = Amplifier Gain

Assume a receiver reading of 52.5 dBuV is obtained. The Antenna Factor of 7.4dB/m and a Cable Factor of 1.1dB is added. The Amplifier Gain of 29 dB is subtracted, giving a field strength of 32 dBuV/m. The 32 dBuV/m value was mathematically converted to its corresponding level in uV/m.

FS = 52.5 + 7.4 + 1.1 - 29 = 32 dBuV/m

Level in uV/m = Common Antilogarithm [(32 dBuV/m)/20] = 39.8 uV/m

9. ANTENNAS

The calibrated antennas used to sample the radiated field strength are mounted on a non-conductive, motorized antenna mast 3 meters from the leading edge of the turn table.

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10. CONDUCTED EMISSION TEST PROCEDURE

The EUT is located so that the distance between the boundary of the EUT and the closest surface to the LISN is 0.8m.

EUT test configuration is according to Section 7 of ANSI C63.4/1992.

Conducted disturbance shall be measured between the phase lead and the ground, and between the neutral lead and the ground. The frequency 0.450 - 30 MHz shall be investigated.

Set the EMI receiver to PEAK detector setting and sweep continuously over the frequency range to be investigated. Set resolution bandwidth to 9kHz minimum. Connect EMI receiver input cable to LINE 1 RF measurement connection on the LISN. Connect a 50ohm terminator to the unused RF connection on the LISN. For each mode of EUT operation, maximize emissions readings by manipulating cable and wire positions. Record the configuration for each EUT power cord which produces emissions closest to the limit. Repeat the same procedure for LINE 2 of each EUT power cord.

11. RADIATED EMISSION TEST PROCEDURE

The EUT and all other support equipment are placed on a wooden table 80 cm above the ground screen. Antenna to EUT distance is 3 meters. During the test, the table is rotated 360 degrees to maximize emissions and the antenna is positioned from 1 to 4 meters above the ground screen to further maximize emissions. The antenna is polarized in both vertical and horizontal positions.

EUT test configuration is according to Section 8 of ANSI C63.4/1992.

Monitor the frequency range of interest at a fixed antenna height and EUT azimuth. Frequency span should be small enough to easily differentiate between broadcast stations and intermittent ambients. Rotate EUT 360 degrees to maximize emissions received from EUT. If emission increases by more than 1 dB, or if another emission appears that is greater by 1 dB, return to azimuth where maximum occurred and perform additional cable manipulation to further maximize received emission.

Move antenna up and down to further maximize suspected highest amplitude signal. If emission increased by 1 dB or more, or if another emission appears that is greater by 1dB or more, return to antenna height where maximum signal was observed and manipulate cables to produce highest emissions, noting frequency and amplitude.

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12. AMBIENT CONDITIONS

The ambient conditions at the time of final tests were as follows:

	Radiated Emission	Conducted Emission
Temperature	25°C	25°C
Humidity	**70%**	**70%**

13. EQUIPMENT MODIFICATIONS

NOT APPLICABLE

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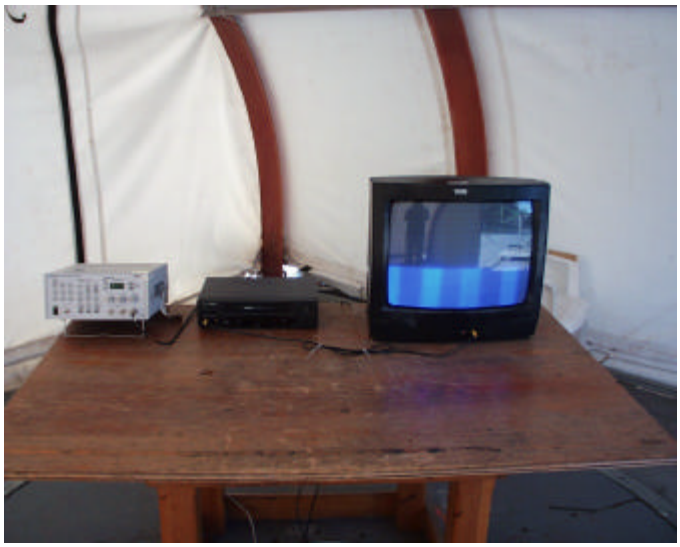
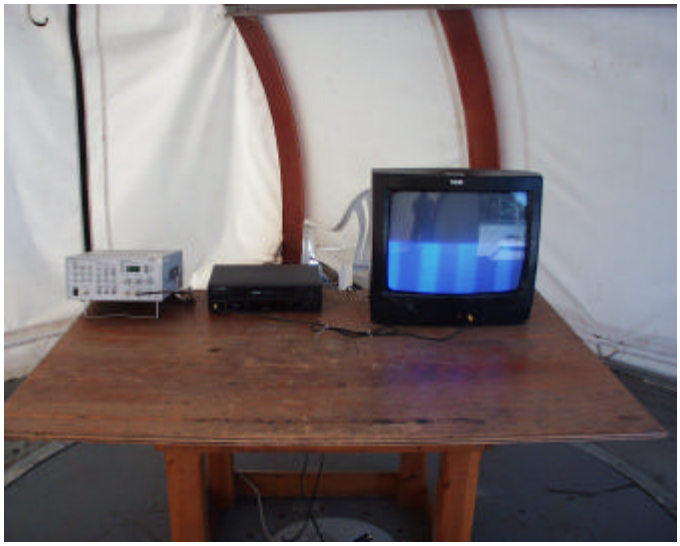
14. EUT SETUP PHOTOS





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15. TEST EQUIPMENT LIST

Equipment	Manufacturer	Model No.	Serial No.	Site	Cal Date	Due Date
EMI RECEIVER	**H.P.**	**8546A**	**3520A00259**	**A**	04/1999	04/2000
Pre-Amp	**H.P.**	**8447D**	**2944A06833**	**A**	10/1999	10/2000
Antenna	**CHASE**	**CBL6112**	**2049**	**A**	03/1999	03/2000
LISN	**Fischer**	**LISN2**	**N/A**	**Cond**	01/1999	01/2000
LISN	**Fischer**	**CISPR adapter**	**N/A**	**Cond**	01/1999	01/2000
EMI Receiver	**Rhode Schwarz**	**ESHS20**	**827129/006**	**Cond**	03/1999	03/2000
Abs. Clamp	**Fischer**	**F-201**	**251**	**Cond**	04/1999	04/2000
LISN	**Fischer**	**FCCLISN 50/250-25-2**	**114**	**Cond**	08/1999	08/2000
PATTERN GENERATOR	**Phillips**	**PM5418TX**	**LO678084**	**N/A**	6/1999	06/2000

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16. TEST RESULT SUMMARY

Model name: VG4BH
1) Test Requirements: 15.109 (a), 15.107 (a)
Technical Limits: 15.109 (a), 15.107 (a)

Test Result: please refer to radiated emission data report number 991006A1. (Channel 3 & 4)

Preliminary Radiated Emission Test			
Frequency Range Investigated		30 MHz TO 1000 MHz	
Mode of operation	Date	Data Report No.	Worst Mode
CH 3 RF RECORD	**10/06/99**	**991006A1**	☐
CHANNEL 3 RF PLAYBACK	**10/06/99**	**991006A1**	☒
CH 4 RF RECORD	**10/06/99**	**991006A1**	☐
CHANNEL 4 RF PLAYBACK	**10/06/99**	**991006A1**	☐
RECORD VITS 5Vpp	**10/06/99**	**991006A1**	☐
RECORD VITS 1Vpp	**10/06/99**	**991006A1**	☐
PLAYBACK VITS 5Vpp	**10/06/99**	**991006A1**	☐
PLAYBACK VITS 1Vpp	**10/06/99**	**991006A1**	☐

OATS No: A / 3 METER	Data Report No. 991006A1	Date 10/06/99	Tested By: PETE KREBILL

Six Highest Radiated Emission Readings							
Frequency Range Investigated				30 MHz TO 1000 MHz			
Freq (MHz)	Meter Reading (dBuV)	C.F. (dB/m)	Corrected Reading (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Reading Type (P/Q/A)	Polar (H/V)
85.90	**51.2**	**-16.19**	**35.01**	**40.00**	**-4.99**	**Q**	**V**
114.57	**47.72**	**-11.37**	**36.35**	**43.50**	**-7.15**	**P**	**V**
57.22	**46.60**	**-18.55**	**28.05**	**40.00**	**-11.95**	**P**	**V**
61.25	**52.53**	**-18.96**	**33.57**	**40.00**	**-6.43**	**P**	**V**
85.90	**47.80**	**-16.42**	**31.38**	**40.00**	**-8.62**	**P**	**H**
114.54	**48.51**	**-12.19**	**36.32**	**43.50**	**-7.18**	**P**	**H**

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Compliance Engineering Services Inc.

Project No. : 99U0611
Report No. : 991006A1
Date : 10/06/1999
Time : 10:56
Test Engr : PETE K

>> 3 M RADIATED EMISSION DATA <<

Company : SAMSUNG
Equipment Under Test : VCR M/N VG4BH
Test Configuration : EUT/TV/VITS PATTERN GENERATOR
Type of Test : FCC CLASS B
Mode of Operation : RECORD RF/PLAYBACK RF/VITS RECORD/VITS

PLAYBACK

Freq.	dBuV	PreAmp	Ant	Cable	dBuV/m	Limit	Margin	Pol	Hgt(m)	Az
Bilog 2049 ; Pre-amp = 8447D-P1 2944A06833:										
CHANNEL 3 RF RECORD:										
85.90	50.00	-26.63	9.19	1.25	33.81	40.00	-6.19	V	1.0	270
143.18	44.15	-26.38	12.86	1.68	32.32	43.50	-11.18	V	1.0	0
171.81	40.80	-26.23	11.87	1.82	28.26	43.50	-15.24	V	1.0	180
114.53	47.59	-26.48	13.64	1.47	36.22	43.50	-7.28	V	1.0	0
214.00	36.20	-25.98	12.00	2.08	24.31	43.50	-19.19	V	1.0	0
143.18	42.45	-26.38	11.88	1.68	29.64	43.50	-13.86	H	3.0	270
357.95	43.87	-26.05	15.87	2.76	36.45	46.00	-9.55	H	1.0	180
243.40	38.70	-25.84	12.51	2.25	27.62	46.00	-18.38	H	1.5	0
171.83	44.60	-26.23	11.09	1.82	31.27	43.50	-12.23	H	3.0	0
114.54	48.90	-26.48	12.82	1.47	36.71	43.50	-6.79	H	3.0	0
85.90	48.20	-26.63	8.96	1.25	31.78	40.00	-8.22	H	4.0	270
214.00	43.20	-25.98	11.43	2.08	30.73	43.50	-12.77	H	1.5	90
CHANNEL 3 RF PLAYBACK:										
QP: 85.90	51.20	-26.63	9.19	1.25	35.01	40.00	-4.99	V	1.0	180
171.80	41.40	-26.23	11.87	1.82	28.86	43.50	-14.64	V	1.0	0
114.57	47.72	-26.48	13.65	1.47	36.35	43.50	-7.15	V	1.0	0
57.22	46.60	-26.64	7.07	1.02	28.05	40.00	-11.95	V	1.0	270
143.16	42.60	-26.38	12.87	1.68	30.77	43.50	-12.73	V	1.0	180
61.25	52.53	-26.65	6.65	1.03	33.57	40.00	-6.43	V	1.0	180
61.25	40.24	-26.65	6.98	1.03	21.61	40.00	-18.39	H	2.0	180
85.90	47.80	-26.63	8.96	1.25	31.38	40.00	-8.62	H	3.5	180
114.54	48.51	-26.48	12.82	1.47	36.32	43.50	-7.18	H	4.0	270
329.30	40.50	-25.91	15.11	2.63	32.33	46.00	-13.67	H	1.0	180
229.00	43.50	-25.91	11.98	2.17	31.74	46.00	-14.26	H	2.0	90
143.18	41.91	-26.38	11.88	1.68	29.10	43.50	-14.40	H	3.0	270
CHANNEL 4 RF RECORD:										
226.00	36.60	-25.92	11.87	2.15	24.70	46.00	-21.30	H	2.0	270
226.00	36.55	-25.92	12.47	2.15	25.25	46.00	-20.75	V	1.0	180
CHANNEL 4 RF PLAYBACK:										
All emission same or lower than channel 3 RF playback.										
RECORD VITS 5VPP:										
85.90	47.60	-26.63	9.19	1.25	31.41	40.00	-8.59	V	1.0	180

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114.50	46.80	-26.48	13.64	1.47	35.42	43.50	-8.08	V	1.0	180
143.18	42.00	-26.38	12.86	1.68	30.17	43.50	-13.33	V	1.0	90
372.20	35.17	-26.12	15.64	2.82	27.51	46.00	-18.49	V	1.0	180
85.90	46.00	-26.63	8.96	1.25	29.58	40.00	-10.42	H	3.0	180
114.50	48.12	-26.48	12.82	1.47	35.93	43.50	-7.57	H	3.0	0
214.77	42.51	-25.97	11.45	2.09	30.08	43.50	-13.42	H	2.0	0
357.90	39.36	-26.05	15.87	2.76	31.94	46.00	-14.06	H	1.5	180

RECORD VITS 1VPP:

114.50	46.41	-26.48	12.82	1.47	34.22	43.50	-9.28	H	3.0	0
85.90	45.90	-26.63	8.96	1.25	29.48	40.00	-10.52	H	3.0	180
214.77	40.67	-25.97	11.45	2.09	28.24	43.50	-15.26	H	2.0	0
85.90	47.60	-26.63	9.19	1.25	31.41	40.00	-8.59	V	1.0	180
114.50	46.50	-26.48	13.64	1.47	35.12	43.50	-8.38	V	1.0	180

PLAYBACK VITS 5VPP:

114.50	44.40	-26.48	13.64	1.47	33.02	43.50	-10.48	V	1.0	0
85.90	47.50	-26.63	9.19	1.25	31.31	40.00	-8.69	V	1.0	0
143.18	40.20	-26.38	12.86	1.68	28.37	43.50	-15.13	V	1.0	270
171.82	39.69	-26.23	11.87	1.82	27.15	43.50	-16.35	V	1.0	0
85.90	41.84	-26.63	8.96	1.25	25.42	40.00	-14.58	H	2.0	180
114.55	44.89	-26.48	12.82	1.47	32.70	43.50	-10.80	H	3.0	0
171.82	40.70	-26.23	11.09	1.82	27.37	43.50	-16.13	H	2.5	0
243.40	41.10	-25.84	12.51	2.25	30.02	46.00	-15.98	H	2.0	0

PLAYBACK VITS 1VPP:
SAME READINGS AS VITS 5VPP.

Total # of data 46
V. a2.2

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Preliminary Conducted Emission Test			
Frequency Range Investigated		450 kHz TO 30 MHz	
Mode of operation	Date	Data Report No.	Worst Mode
CH 3 RF RECORD	**10/07/99**	**99U0611**	☐
CHANNEL 3 RF PLAYBACK	**10/07/99**	**99U0611**	☐
CH 4 RF RECORD	**10/07/99**	**99U0611**	☐
CHANNEL 4 RF PLAYBACK	**10/07/99**	**99U0611**	☐
RECORD VITS 5Vpp	**10/07/99**	**99U0611**	☐
RECORD VITS 1Vpp	**10/07/99**	**99U0611**	☐
PLAYBACK VITS 5Vpp	**10/07/99**	**99U0611**	☒
PLAYBACK VITS 1Vpp	**10/07/99**	**99U0611**	☐

Conducted Room	Plot No. 99U0611	Date 10/07/99	Tested By: PETE KREBILL

Six Highest Conducted Emission Readings							
Frequency Range Investigated				450 kHz TO 30 MHz			
Freq (MHz)	Meter Reading (dBuV)	C.F. (dB)	Corrected Reading (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Reading Type (P/Q/A)	Line (L1/L2)
0.450	**42.73**	**0**	**42.73**	**48.00**	**-5.27**	**P**	**1**
4.59	**44.17**	**0**	**44.17**	**48.00**	**-3.83**	**P**	**1**
14.21	**43.25**	**0**	**43.25**	**48.00**	**-4.75**	**P**	**1**
0.450	**44.56**	**0**	**44.56**	**48.00**	**-3.44**	**P**	**2**
0.510	**43.19**	**0**	**43.19**	**48.00**	**-4.81**	**P**	**2**
4.71	**41.94**	**0**	**41.94**	**48.00**	**-6.06**	**P**	**2**

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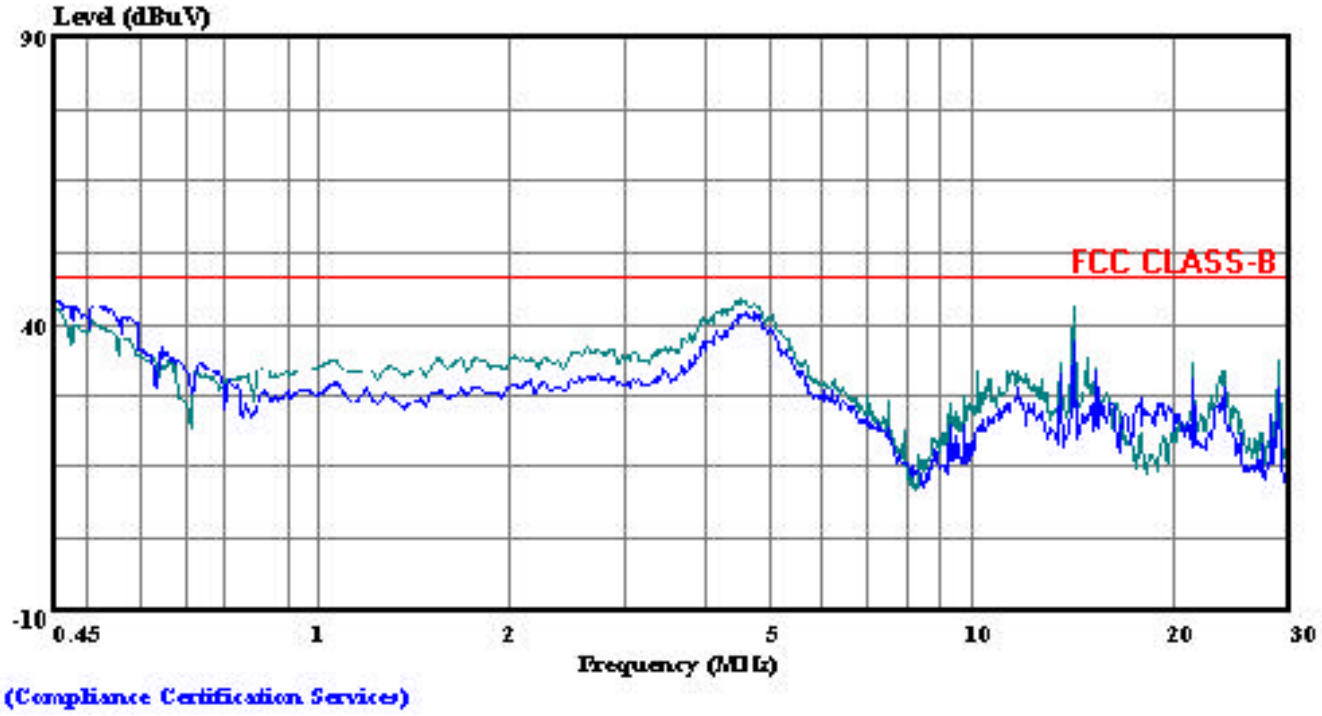

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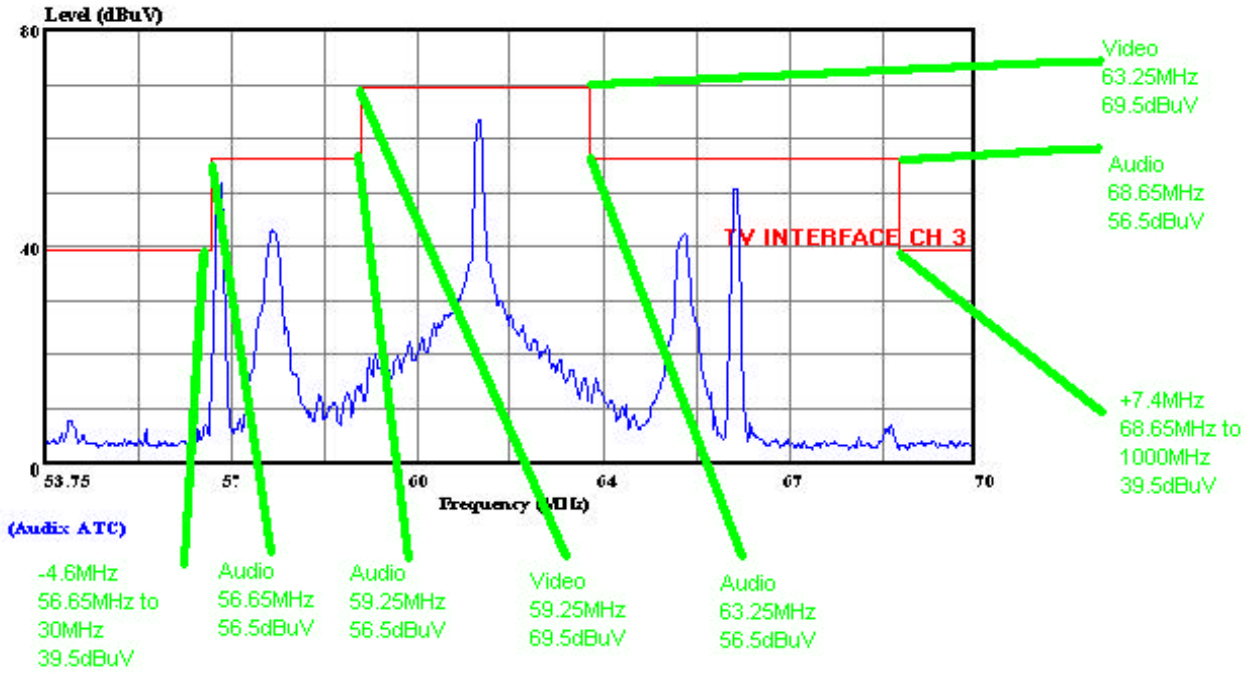
Output Signal limits and transfer switch limits:

Technical requirement: 15.115 (b)(1)(ii), (b)(2)(ii), (c)(ii)
Chart below designates plots. Mask shows compliance to FCC 15.115(b)(1)(ii) and 15.115(b)(2)(ii) measured at the RF output. Harmonics show compliance to FCC 15.115(b)(2)(ii) at the 2nd and 3rd harmonics of the fundamental output signal frequency measured at the RF output. Transfer switch plots show compliance to FCC15.115(c)(1)(ii) at the fundamental and harmonics measured at the RF antenna input. Limits are calculated using 75 ohms. Levels and frequencies are show in example mask plot below, frequencies are adjusted for channel 3 and 4 accordingly.



CHANNEL 3 EMISSION MASK FCC 15.115(b)(1)(ii) & 15.115(b)(2)(ii).

CHANNEL 3 – VITS 5Vpp PLAY BACK	
MASK	1
2nd HARMONIC	2
3rd HARMONIC	3
TRANSFER SWITCH 1st HARMONIC	4
TRANSFER SWITCH 2nd HARMONIC	5
TRANSFER SWITCH 3rd HARMONIC	6

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CHANNEL 4 – VITS 5Vpp PLAY BACK	
MASK	7
2nd HARMONIC	8
3rd HARMONIC	9
TRANSFER SWITCH 1st HARMONIC	10
TRANSFER SWITCH 2nd HARMONIC	11
TRANSFER SWITCH 3rd HARMONIC	12

L1 IN RECORD VITS 5Vpp	
MASK	13
TRANSFER SWITCH 1st HARMONIC	14

CHANNEL 3 RECORD NTSC	
MASK	15
TRANSFER SWITCH 1st HARMONIC	16

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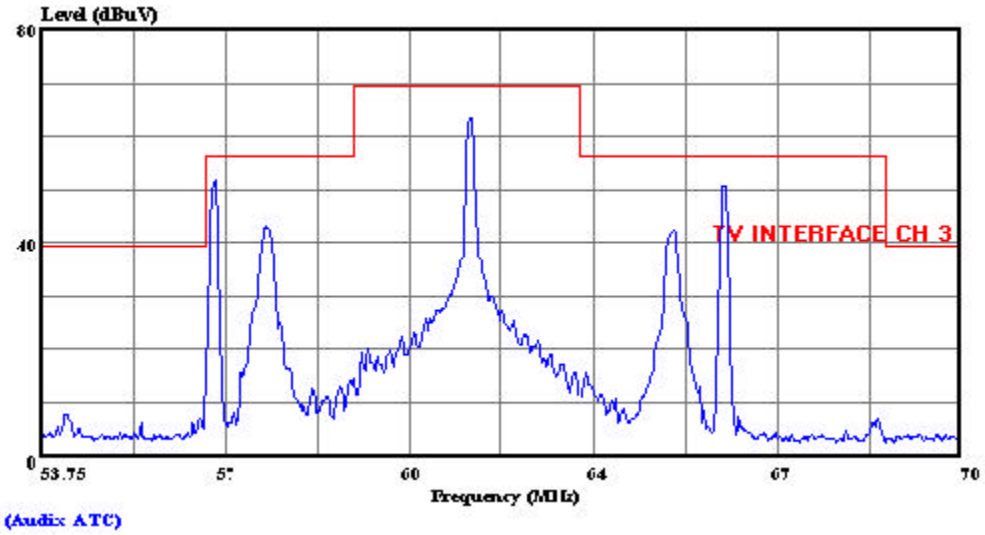

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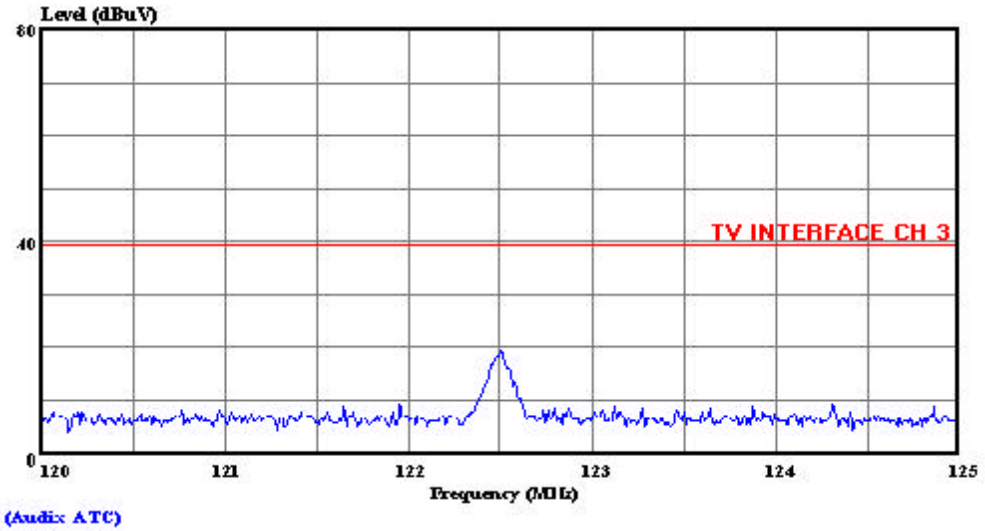

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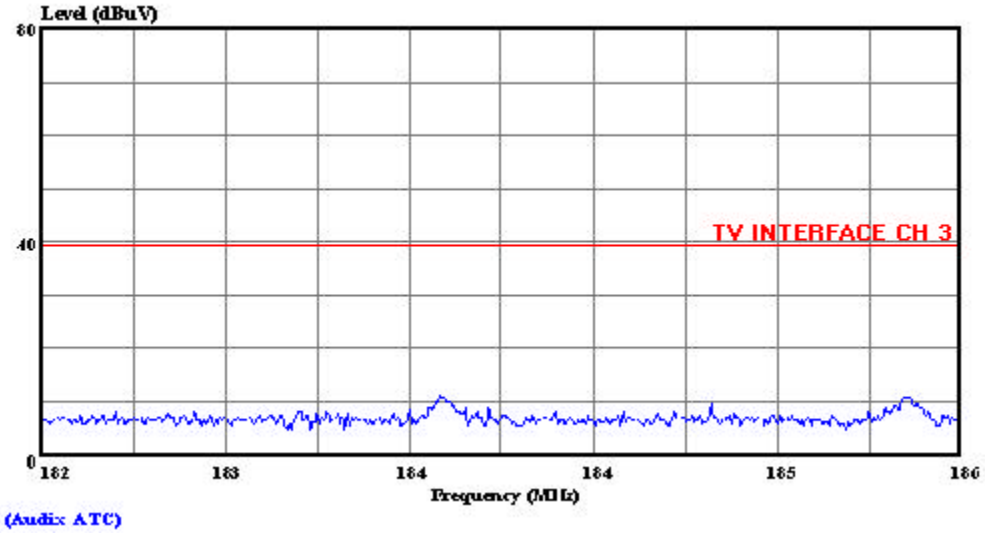

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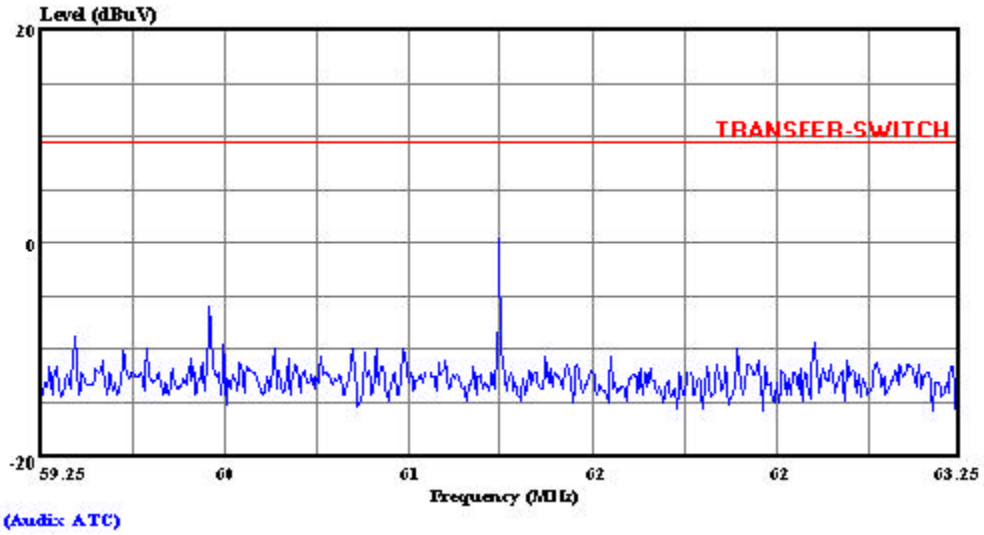

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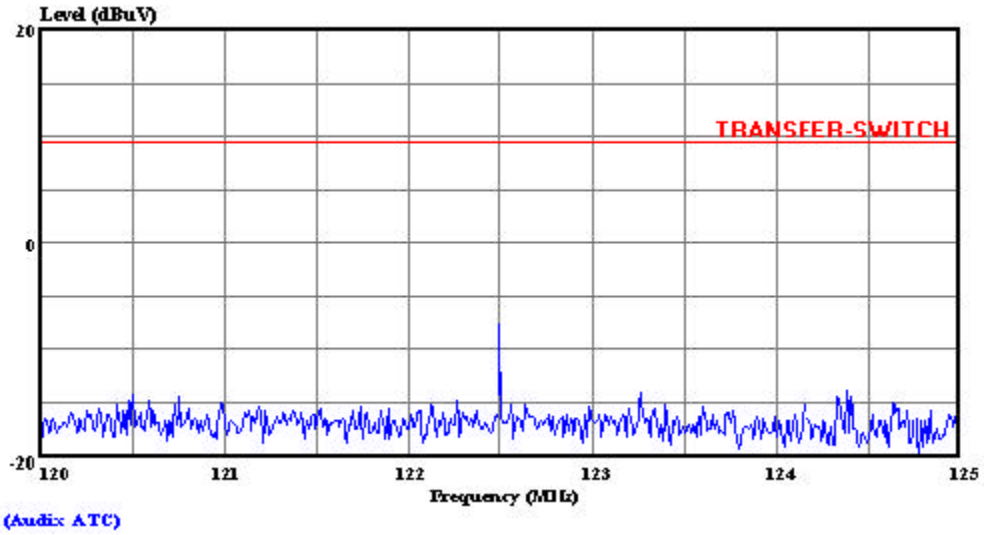

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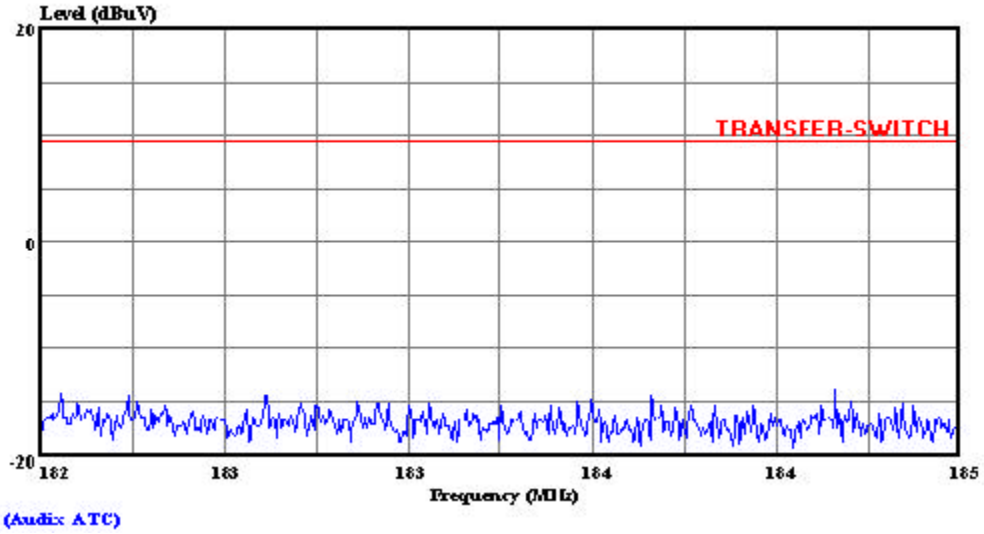

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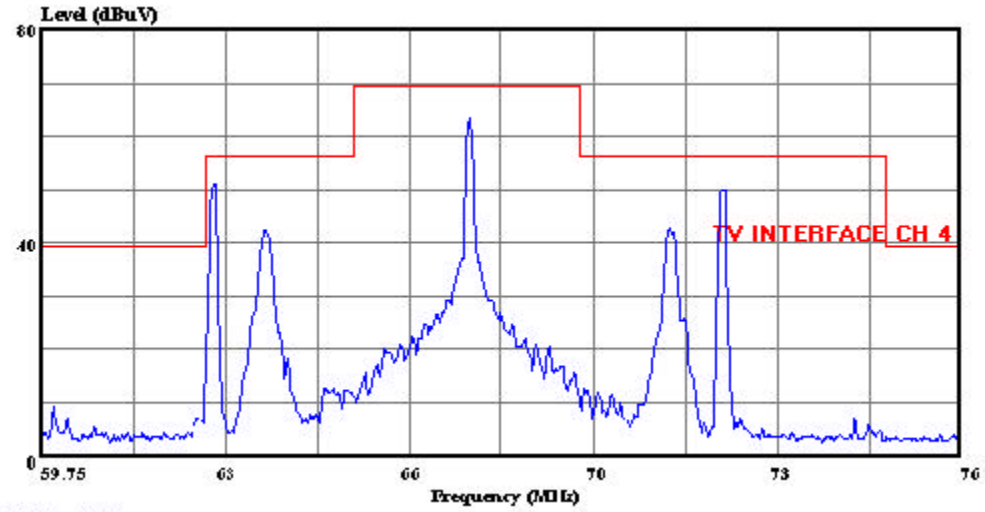

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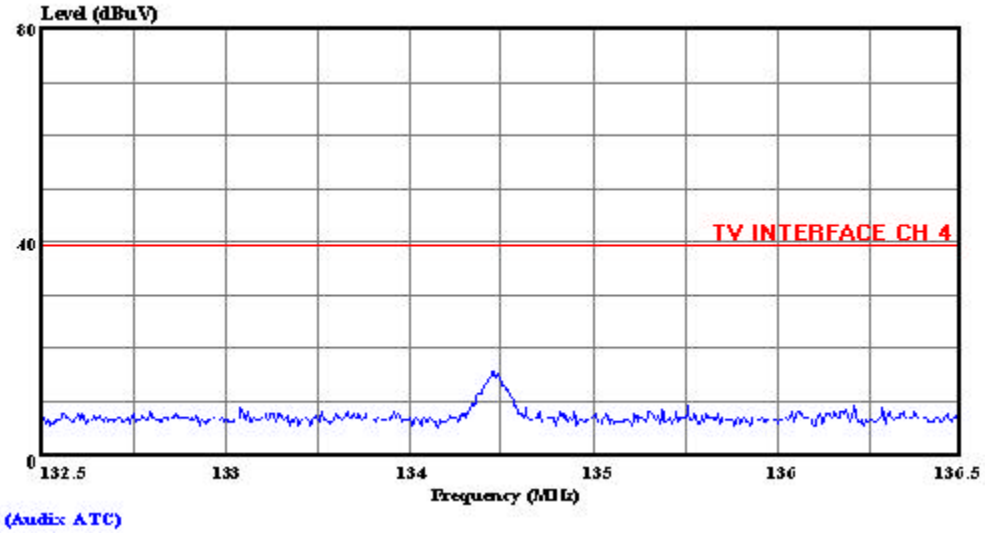

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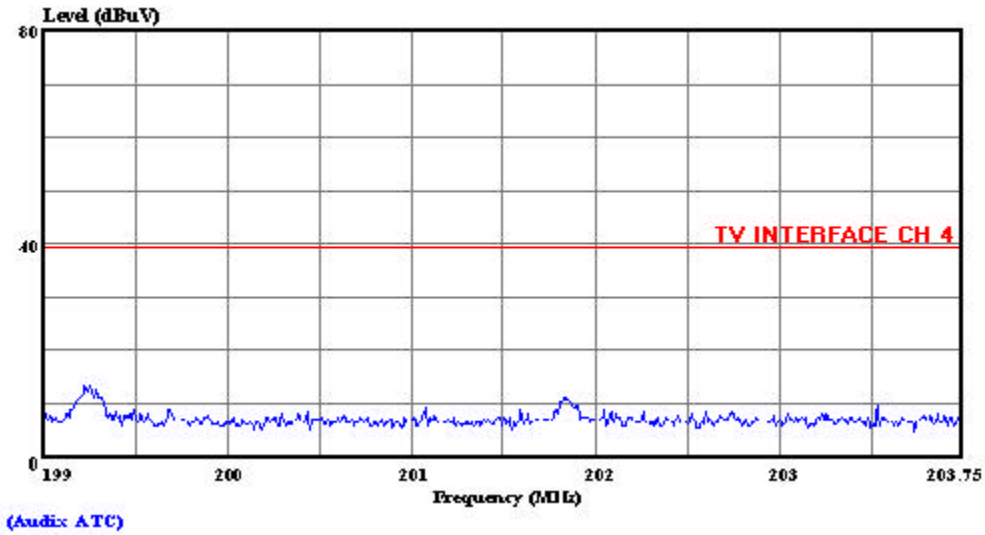

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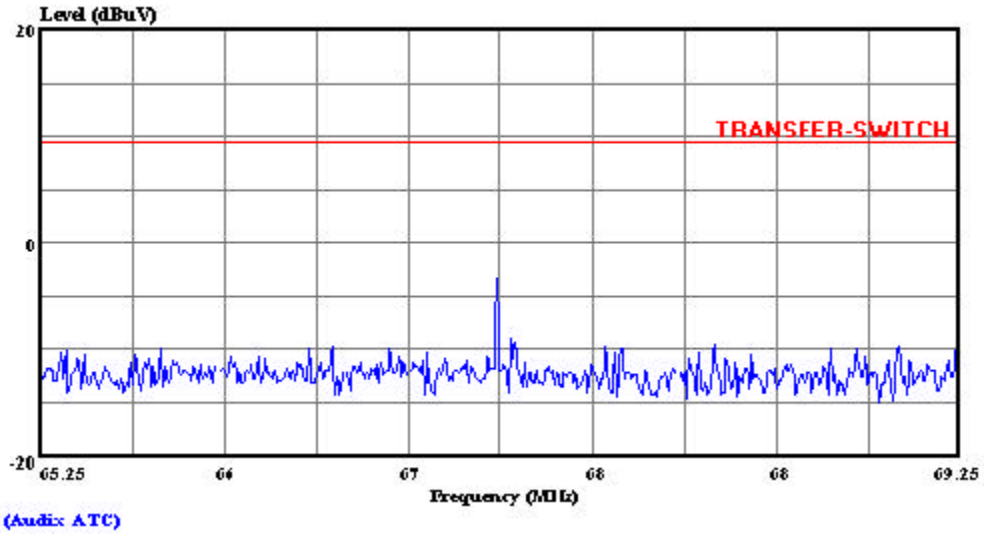

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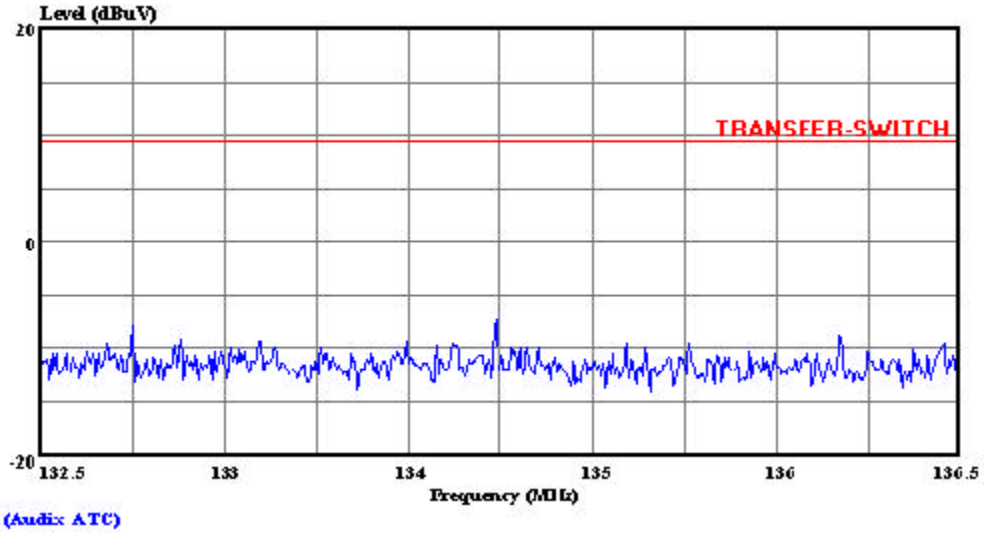

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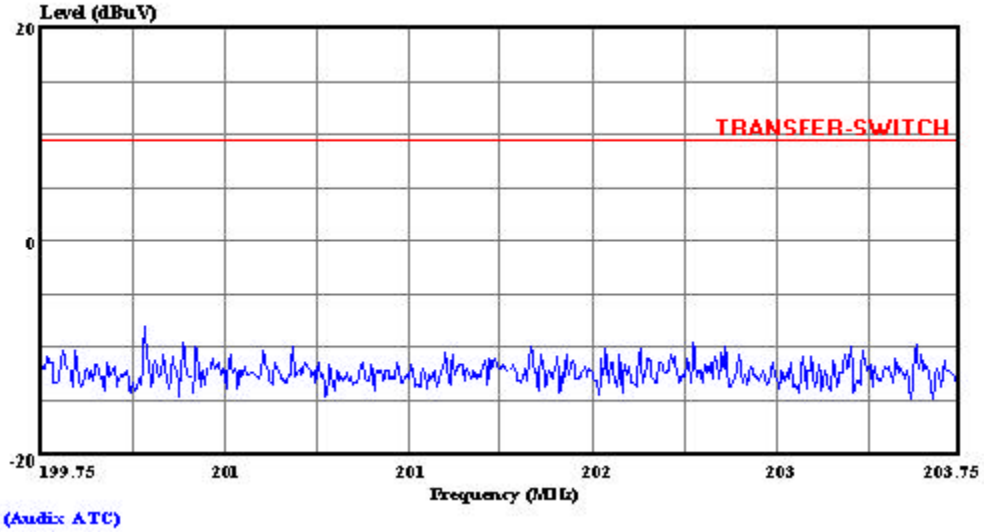

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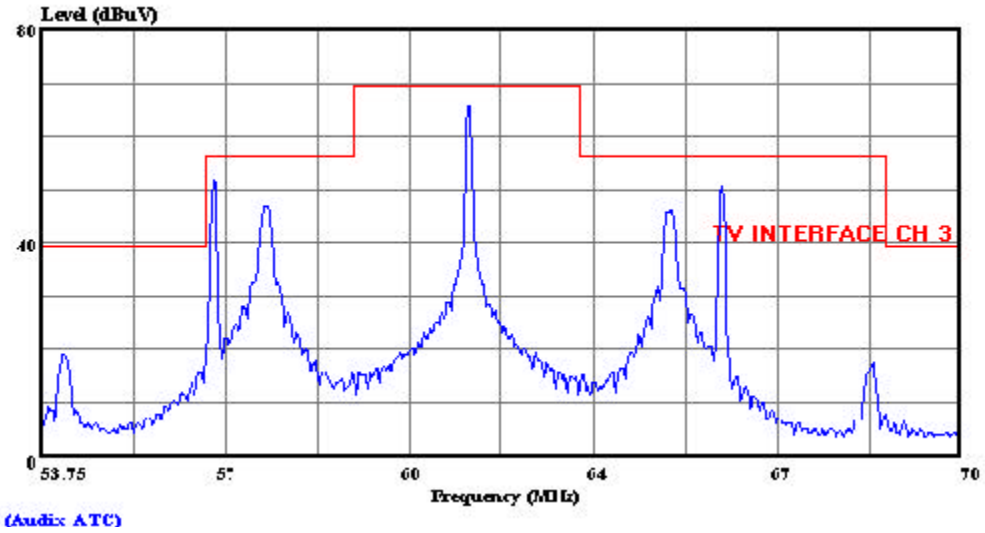

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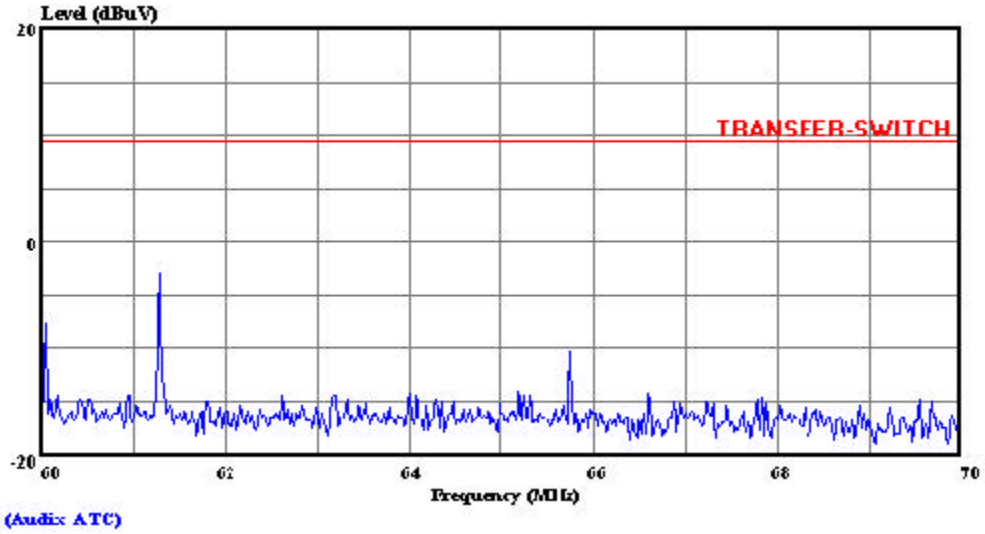

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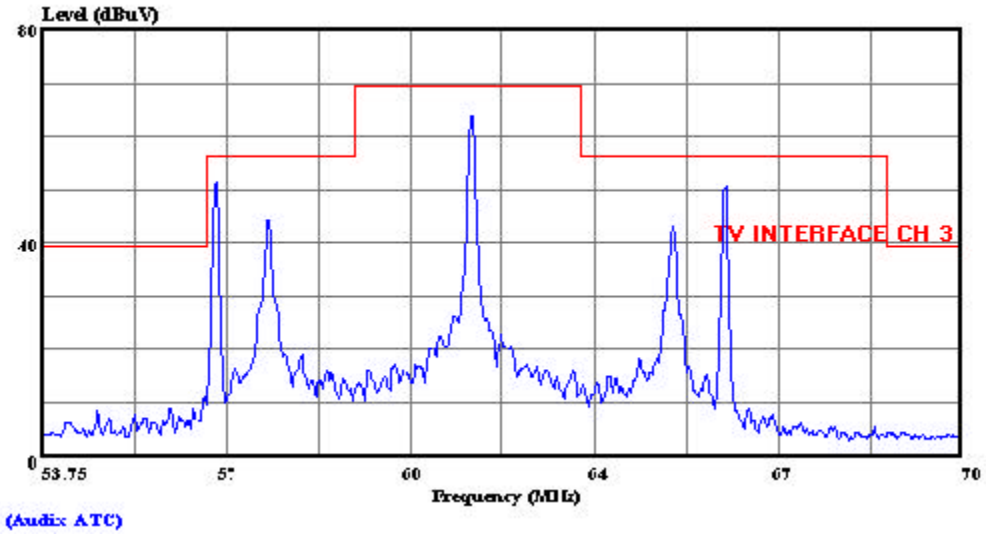

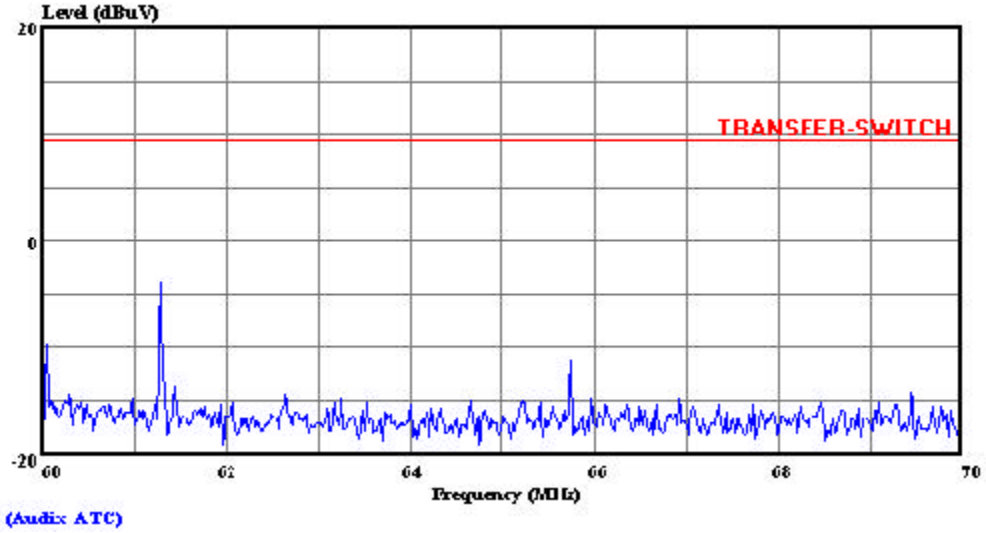

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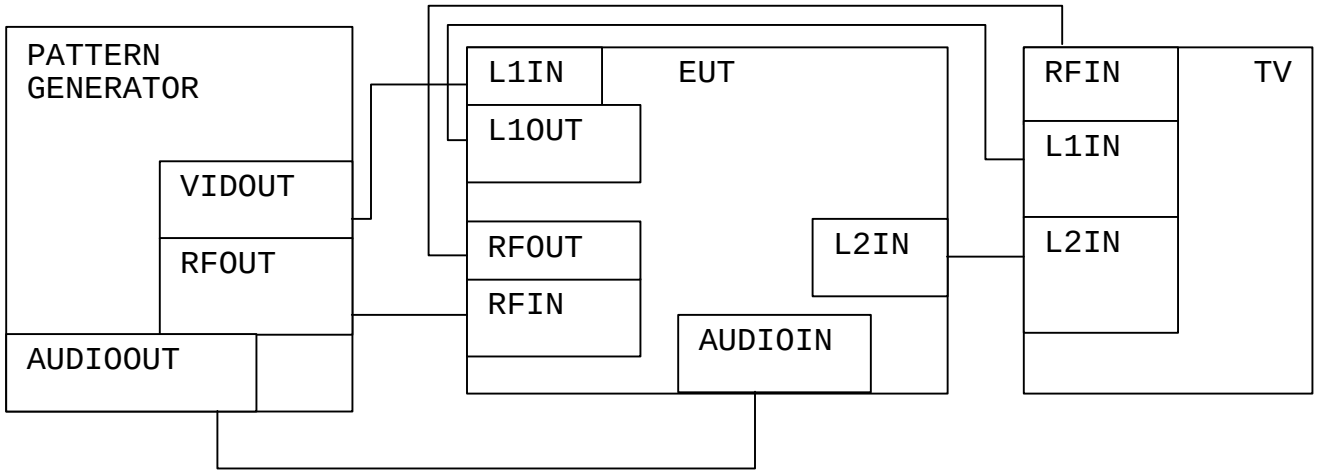
17. Configuration Block Diagram



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