

FCC CFR47 PART 15 TV INTERFACE DEVICE



TEST REPORT

FOR

RF ADAPTOR W/ ANTENNA TRANSFER SWITCH FOR USE WITH THE
SEGA DREAMCAST, SEGA SATURN, SEGA 16 BIT,
NINTENDO 64 AND SONY PLAYSTATIONS

MODEL: P-20-201

FCC ID: NH3P-20201

REPORT NUMBER: 99C0436-1

ISSUE DATE: AUGUST 06, 1999

Prepared for

YUEHUA ELECTRON CO.,LTD. OF ZHUHAI
30 BLDG., CHUIZHU INDUSTRIAL DISTRICT
ZHUHAI, GUANGDONG PRC 519000

Prepared by

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d.b.a.

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NVLAP[®]
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1. VERIFICATION OF COMPLIANCE

COMPANY NAME: YUEHUA ELECTRON CO., LTD. OF ZHUHAI
 30 BLDG., CHUIZHU INDUSTRIAL DISTRICT
 ZHUHAI, GUANGDONG
 CHINA 519000



CONTACT PERSON: JIANG HANXIONG / MANAGER

TELEPHONE NO: (0756) 861-0916

MODEL NO/NAME: P-20-201

SERIAL NO: N/A

DATE TESTED: AUGUST 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	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
DEVIATIONS FROM MEASUREMENT PROCEDURE	<input type="checkbox"/> YES (refer to section 21 for comments) <input checked="" type="checkbox"/> NO
TEST RESULT	PASSED

The above equipment was tested by Compliance Consulting 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 CONSULTING SERVICES

2. PRODUCT DESCRIPTION

EUT is an RF adapter made for use with a game station. It is designed to operate at Channels 3 and 4 of TV, and serves as an interface device between TV and Game stations. By installing this device, the user can use TV as a monitor. The EUT is connected to TV via F jack.

CHASSIS TYPE	PLASTIC
NUMBER OF PCB LAYERS	1 LAYER
POWER SUPPLY/NAME/MODEL NO.	BUILT-IN
POWER REQUIREMENTS	120 V AC, 60 Hz
NO. OF EXTERNAL I/O CONNECTORS	2

External I/O Cable Construction Description

CABLE NO: 1	
I/O Port: Controller Port	Number of I/O ports of this type: 1
Number of Conductors: 5	Connector Type: Special
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: No
Remark: N/A	

CABLE NO: 2	
I/O Port: Output of Game St.	Number of I/O ports of this type: 1
Number of Conductors: 5	Connector Type: Special
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: No
Remark: One ferrite bead on Game station side.	

CABLE NO: 3	
I/O Port: RCA Jack	Number of I/O ports of this type: 1
Number of Conductors: 1	Connector Type: RCA Jack
Capture Type: Snap-in	Type of Cable used: Shielded
Cable Connector Type: Molded	Cable Length: 0.2 M
Bundled During Tests: No	Data Traffic Generated: No
Remark: N/A	

CABLE NO: 4	
I/O Port: Adaptor	Number of I/O ports of this type: 1
Number of Conductors: 4	Connector Type: Adaptor
Capture Type: Snap-in	Type of Cable used: Shielded
Cable Connector Type: Molded	Cable Length: 0.3 M
Bundled During Tests: No	Data Traffic Generated: No
Remark: N/A	

3. TESTED SYSTEM DETAILS

During the tests, TV is tuned to Channels 3 and 4 to activate game program. EUT was individually tested with different game stations.

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.

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.

$$FS = 52.5 + 7.4 + 1.1 - 29 = 32 \text{ dBuV/m}$$

$$\text{Level in uV/m} = \text{Common Antilogarithm} [(32 \text{ dBuV/m})/20] = 39.8 \text{ uV/m}$$

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.

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.

12. AMBIENT CONDITIONS

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

	Radiated Emission	Conducted Emission
Temperature	25°C	24°C
Humidity	76%	74%

13. EQUIPMENT MODIFICATIONS

To achieve compliance to 15.115 levels, the following change(s) were made during compliance testing:

- Mod.#1 R7 (1.2K) was replaced by 2.2 kΩ.
- Mod.#2 Added 104 capacitor to =5 V DC and GND.
- Mod.#3 Added 7 pf capacitor to C10 (56 pf) in parallel.
- Mod.#4 C14 (15 pf) was replaced by 5 pf.
- Mod.#5 100pf capacitor between RFIN and GND in antenna switch.
- Mod.#6 47 pf capacitor between Q3/C and antenna port was replaced by 10 pf in antenna switch.

14. EUT SETUP PHOTOS

15. TEST EQUIPMENT LIST

Equipment	Manufacturer	Model No.	Serial No.	Site	Cal Date	Due Date
Spectrum Analyzer	H.P.	8568A	2314A02604	B	02/1999	02/2000
Pre-Amp	H.P.	8447D	2944A06589	B	08/1999	08/2000
Antenna	Eaton	94455-1	1197	B	08/1999	08/2000
Antenna	Emco	3146	2120	B	08/1999	08/2000
Pre-Amp	H.P.	8449B	3008A00369	B	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	PHILIP	PM5418TX	LO678084	N/A	06/1999	06/2000

16. TEST RESULT SUMMARY

Model name: P-20-201

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 990806F1. (Channel 3 & 4)

Preliminary Radiated Emission Test				
Frequency Range Investigated		30 MHz TO 1000 MHz		
Mode of operation	Date	Data Report No.	Worst Mode	
CHANNEL 3	08/06/99	990806F1	<input checked="" type="checkbox"/>	

OATS No: F / 3 METER	Data Report No. 990806F1		Date 08/06/99		Tested By: MIKE ZHU							
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)					
60.94	48.52	-22.12	26.4	40.0	-13.6	P	V					
60.94	45.33	-20.12	25.21	40.0	-14.79	P	H					
121.02	46.4	-17.79	28.61	43.5	-14.89	P	H					
548.42	40.87	-6.74	34.13	46.0	-11.87	P	H					
66.96	44.74	-19.99	24.75	0.0	-15.25	P	H					
334.88	43.73	-9.20	34.53	46.0	-11.47	P	H					

Compliance Engineering Services Inc.

Project No. : 99C0436
 Report No. : 990806F1
 Date : 08/06/1999
 Time : 11:45
 Test Engr : MIKE ZHU

>> 3 M RADIATED EMISSION DATA <<

M.Z.

Company : YUEHUA ELECTRON CO LTD OF ZHUHAI
 Equipment Under Test : RF ADAPTOR/ANTENNA TRANSFER SWITCH FOR USE
 WITH SEGA DREAMCAST, SEGA SATURN, SEGA 16BIT
 M/N: P-20-201

Test Configuration : BUT/TV
 Type of Test : FCC CLASS B
 Mode of Operation : NORMAL

Freq.	dBuV	PreAmp	Ant	Cable	dBuV/m	Limit	Margin	Pol	Hgt(m)	Az
CH3:										
Biconical 8909-1079 ; Pre-pamp = 8447D-P2 2944A07781:										
60.94	48.52	-31.32	7.56	1.64	26.40	40.00	-13.60	V	1.0	180
121.02	43.19	-31.04	11.67	2.41	26.24	43.50	-17.26	V	1.5	90
LP NSN=X100 ; Pre-pamp = 8447D-P2 2944A07781:										
243.76	39.05	-30.36	11.93	3.49	24.11	46.00	-21.89	V	1.0	90
304.71	32.43	-30.11	16.46	3.87	22.65	46.00	-23.35	V	1.0	90
365.60	34.75	-30.35	16.15	4.29	24.83	46.00	-21.17	V	1.0	60
548.42	31.12	-30.86	18.38	5.34	23.99	46.00	-22.01	V	1.0	90
Biconical 8908-1079 ; Pre-pamp = 8447D-P2 2944A07781:										
60.94	45.33	-31.32	9.57	1.64	25.21	40.00	-14.79	H	3.0	90
121.02	46.40	-31.04	10.83	2.41	28.61	43.50	-14.89	H	3.0	90
LP NSN=X100 ; Pre-pamp = 8447D-P2 2944A07781:										
243.76	37.70	-30.36	12.53	3.49	23.36	46.00	-22.64	H	1.0	90
304.71	38.06	-30.11	16.41	3.87	28.23	46.00	-17.77	H	1.0	90
365.60	38.44	-30.35	17.51	4.29	29.88	46.00	-16.12	H	1.0	90
548.42	40.87	-30.86	18.78	5.34	34.13	46.00	-11.87	H	1.0	90
CH4:										
Biconical 8908-1079 ; Pre-pamp = 8447D-P2 2944A07781:										
66.96	44.42	-31.29	7.52	1.76	22.41	40.00	-17.59	V	1.2	180
133.91	42.61	-31.00	12.09	2.52	26.22	43.50	-17.28	V	1.2	180
LP NSN=X100 ; Pre-pamp = 8447D-P2 2944A07781:										
334.88	36.41	-30.23	16.30	4.08	26.56	46.00	-19.44	V	1.0	60
401.66	33.86	-30.50	16.00	4.53	23.90	46.00	-22.10	V	1.0	90
468.84	35.25	-30.79	17.42	4.92	26.80	46.00	-19.20	V	1.0	90
535.82	35.25	-30.87	18.30	5.28	27.96	46.00	-18.04	V	1.0	90
Biconical 8908-1079 ; Pre-pamp = 8447D-P2 2944A07781:										
66.96	44.74	-31.29	9.54	1.76	24.75	40.00	-15.25	H	3.0	180
133.91	42.79	-31.00	11.33	2.52	25.64	43.50	-17.86	H	3.0	180
LP NSN=X100 ; Pre-pamp = 8447D-P2 2944A07781:										
334.88	43.73	-30.23	16.95	4.08	34.53	46.00	-11.47	H	1.0	90
401.66	38.07	-30.50	18.13	4.53	30.23	46.00	-15.77	H	1.0	90
468.84	37.01	-30.79	18.10	4.92	29.25	46.00	-16.75	H	1.0	90
535.82	33.16	-30.87	18.60	5.28	26.16	46.00	-19.84	H	1.0	90

Total # of data 24

V. f2.2

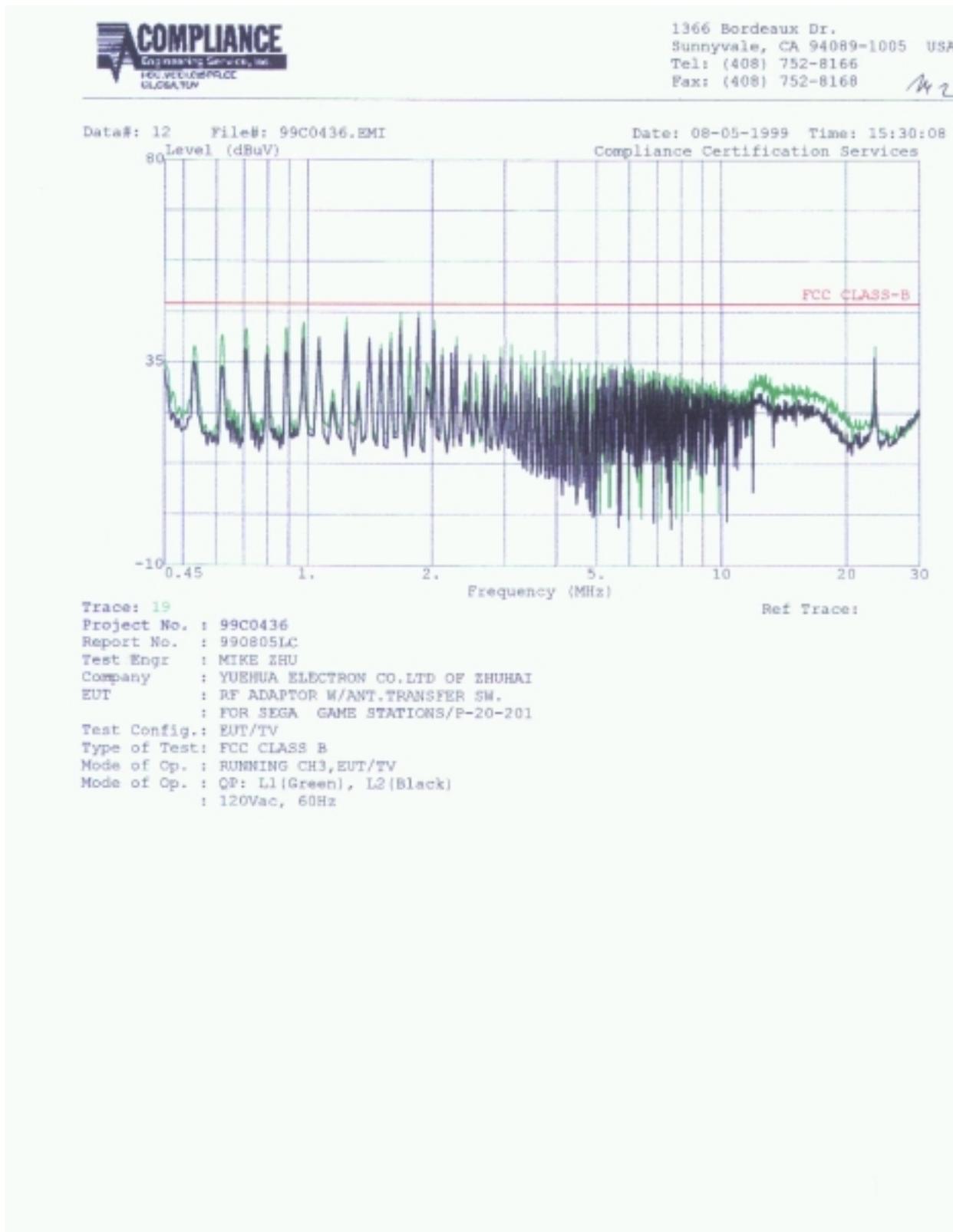
2). Conducted Emission Test:

Technical requirement: 15.107 (a)

Test Result: please refer to radiated emission data report number 99C0436. (Channel 3 & 4)

Preliminary Conducted Emission Test			
Frequency Range Investigated		450 kHz TO 30 MHz	
Mode of operation	Date	Data Report No.	Worst Mode
CHANNEL 3 OPERATION	08/05/99	99C0436	<input checked="" type="checkbox"/>

Conducted Room		Plot No.		Date		Tested By:					
		99C0436		08/05/99		MIKE ZHU					
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)				
1.68	42.83	0	42.83	48.00	-5.17	Q	L1				
1.86	44.43	0	44.43	48.00	-3.57	Q	L1				
2.02	42.16	0	42.16	48.00	-5.84	Q	L1				
1.24	45.06	0	45.06	48.00	-2.94	Q	L2				
1.68	45.92	0	45.92	48.00	-2.08	Q	L2				
1.85	46.20	0	46.20	48.00	-1.80	Q	L2				



3) Test Requirements: 15.115 (b)(1)(ii), 15.115(2)(ii)

Technical Limits: Video signal: $346.4 \times \sqrt{R}$ in microvolts

Audio signal: $77.5 \times \sqrt{R}$ in microvolts

Technical Limits: -4.6 MHz of Video carrier frequency and +7.4 MHz shall not exceed $10.95 \times \sqrt{R}$ in microvolts or 39.5 dBuV.

Test Result:

$R=75\Omega$

Video signal limits = 69.5 dBuV, audio signal limits=56.5 dBuV

CHANNEL 3 15.115(1)(ii), 15.115(2)(ii)							
	Freq. MHz	Reading (dBuV)	L1 (dB)	Adj. Reading (dBuV)	Limit (dBuV)	Margin (dB)	Plot No.
Picture	61.04	50.7	0.9	51.6	69.5	-17.9	1,7
Audio	65.55	37.8	0.9	38.7	56.5	-17.8	2
-4.6 M	56.45	34.8	0.9	35.7	39.5	-3.8	3
+7.4 M	68.43	29.3	0.9	30.2	39.5	-9.3	4
2 nd harmonic	121.87	38.4	0.9	39.3	39.5	-0.2	5,6,8

CHANNEL 4 15.115(1)(ii), 15.115(2)(ii)							
	Freq. MHz	Reading (dBuV)	L1 (dB)	Adj. Reading (dBuV)	Limit (dBuV)	Margin (dB)	Plot No.
Picture	66.99	47.0	0.9	47.9	69.5	-21.6	9,14
Audio	71.52	34.7	0.9	35.6	39.5	-20.9	10
-4.6 M	62.44	29.6	0.9	30.5	39.5	-9.0	11
+7.4 M	74.4	29.0	0.9	29.9	39.5	-9.6	12
2 nd harmonic	133.88	33.2	0.9	34.1	39.5	-5.4	13,15

L1 - Cable loss