
INTERTEK TESTING SERVICES

Table of Contents

1.0 General Description	2
1.1 Product Description	2
1.2 Related Submittal(s) Grants	2
1.3 Test Methodology.....	3
1.4 Test Facility	3
2.0 System Test Configuration	5
2.1 Justification	5
2.2 EUT Exercising Software	5
2.3 Special Accessories	5
2.4 Equipment Modification	6
2.5 Support Equipment List and Description.....	6
3.0 Emission Results	8
3.1 Field Strength Calculation.....	9
3.1 Field Strength Calculation (cont).....	10
3.2 Radiated Emission Configuration Photograph.....	11
3.3 Radiated Emission Data.....	13
3.4 Line Conducted Configuration Photograph (cont)	15
3.5 Line Conducted Emission Data	18
3.6 TV Interface Device Output and Spurious Conducted Emission Configuration	23
3.7 TV Interface Device Output and Spurious Conducted Emission Data.....	24
3.8 Antenna Transfer Switch Measurement Configuration.....	29
3.9 Antenna Transfer Switch Measurement Data.....	30
4.0 Equipment Photographs	33
5.0 Product Labelling	35
5.1 Label Artwork.....	36
5.2 Label Location	37
6.0 Technical Specifications	39
6.1 Block Diagram	40
6.2 Schematic Diagram	41

INTERTEK TESTING SERVICES

Table of Contents (Cont'd...)

7.0 <u>Instruction Manual</u>	43
8.0 <u>Miscellaneous Information</u>	45
8.1 Discussion of Pulse Desensitization.....	46
8.2 Calculation of Average Factor	47
8.3 Emissions Test Procedures	48

INTERTEK TESTING SERVICES

List of Figures

Figure 5.1	Label Artwork	36
Figure 5.2	Label Location	37
Figure 6.1	Block Diagram	40
Figure 6.2	Schematic Diagram	41

INTERTEK TESTING SERVICES

EXHIBIT 1

GENERAL DESCRIPTION

INTERTEK TESTING SERVICES

1.0 **General Description**

1.1 Product Description

The Equipment Under Test (EUT) is a TV interface device portion of a TV interactive learning system operating at 61.23/67.25 MHz. The EUT is powered by a 120Vac to 9Vdc adaptor. There are two buttons (ON/OFF). It can be connected to TV's aerial port via a shield RF cable/an auto switch box, or TV's video and audio port via a video and audio cable. It is controlled by a remote control keyboard via infrared means.

The brief circuit description is attached in the following pages.

1.2 Related Submittal(s) Grants

This is a single application for certification of a TV interface device. The remote control keyboard is subject to the verification authorization process, in accordance with 15.101(b). A verification report has been prepared for the keyboard.

TECHNICAL DESCRIPTION OF VTECH SMART VISION INTERACTIVE,
FCC ID# G2R80-23400

This device consists of a main unit and a remote keyboard, which communicates via infra-red link. The main unit features a web-browser format, allowing users to activate many different software applications like Global Travel, Typing Challenge, and Art Studio. The main unit powers from an external AC-DC adaptor with 9V output, and the remote keyboard operates on four AA-size batteries. The main unit uses TV as output device via AV or RF cables supplied, and receives infra-red commands from remote keyboard. The keyboard can use a VTECH mouse as optional input device. When operating the keyboard, a beep sound can be produced once any key is pressed. This option can be switched ON by pressing Ctrl-K keystroke once, pressing the keystroke again disables the keyboard beep sound.

I/O Functions - Main unit

1. RF output with channel-3/-4 selectable switch
2. Video and Audio outputs
3. Infra-red signal receiver
4. 40-way gold finger for external cartridge
5. Piezo-electric buzzer for auto power-off alert

I/O Functions - Keyboard

1. QWERTY alpha-numeric keyboard
2. Modular 8-pin port for VTECH mouse
3. Piezo-electric buzzer for beep sound when operating keyboard

Cables / Accessories

1. RF cable, RCA male plug to NTSC TV male plug
2. Shielded video and audio cable, twin wire

Oscillator circuits - Main unit

1. 3.579545 MHz OSC circuit
2. 6.0 MHz OSC circuit

Oscillator circuits - Keyboard

1. 4.0 MHz OSC circuit
2. 32.768kHz OSC circuit

INTERTEK TESTING SERVICES

1.3 Test Methodology

The Antenna Transfer Switch, TV Interface Device Output and Spurious conducted emission, AC mains line-conducted and radiated emission measurements were performed according to the procedures in ANSI C63.4 (1992). All measurements were performed in Open Area Test Sites. Preliminary scans were performed in the Open Area Test Sites only to determine worst case modes. For each scan, the procedure for maximizing emissions in Appendix H was followed. All Radiated tests were performed at an antenna to EUT distance of 3 meters, unless stated otherwise in the "**Justification Section**" of this Application. For TV Interface Device measurements, the measurement procedures in Appendices H6 and H8 were followed.

1.4 Test Facility

The open area test site and conducted measurement facility used to collect the emission data is located at Garment Centre, 576 Castle Peak Road, Kowloon, Hong Kong. This test facility and site measurement data have been fully placed on file with the FCC.

INTERTEK TESTING SERVICES

EXHIBIT 2

SYSTEM TEST CONFIGURATION

INTERTEK TESTING SERVICES

2.0 System Test Configuration

2.1 Justification

The system was configured for testing in a typical fashion (as a customer would normally use it), and in the confines as outlined in C63.4 (1992.) The 3m shielded aerial connection cable and 3m shielded video & audio cable were terminated by 75Ω resistors.

The EUT was powered from a 120Vac to 9Vdc adaptor.

For maximizing emissions, the EUT was rotated through 360°, the antenna height was varied from 1 meter to 4 meters above the ground plane, and the antenna polarization was changed. This step by step procedure for maximizing emissions led to the data reported in Exhibit 3.0.

The unit was operated standalone and placed in the center of the turntable.

2.2 EUT Exercising Software

There was no special software to exercise the device. Once the EUT is turned on, it will operate continuously from the internal video/audio signal.

2.3 Special Accessories

There are no special accessories necessary for compliance of this product.

INTERTEK TESTING SERVICES

2.4 Equipment Modification

Any modifications installed previous to testing by Video Technology Electronics Ltd. will be incorporated in each production model sold/leased in the United States.

No modifications were installed by Intertek Testing Services.

2.5 Support Equipment List and Description

This product was tested in a standalone configuration.

All the items listed under section 2.0 of this report are

Confirmed by:

*C. K. Lam
Assistant Manager
Intertek Testing Services
Agent for Video Technology Electronics Ltd.*

C. K. Lam _____ Signature

Aug 18, 98 _____ Date

INTERTEK TESTING SERVICES

EXHIBIT 3

EMISSION RESULTS

INTERTEK TESTING SERVICES

3.0 Emission Results

Data is included worst case configuration (the configuration which resulted in the highest emission levels). A sample calculation, configuration photographs and data tables of the emissions are included.

INTERTEK TESTING SERVICES

3.1 Field Strength Calculation

The field strength is calculated by adding the reading on the Spectrum Analyzer to the factors associated with preamplifiers (if any), antennas, cables, pulse desensitization and average factors (when specified limit is in average and measurements are made with peak detectors). A sample calculation is included below.

$$FS = RA + AF + CF - AG + PD + AV$$

where

- FS = Field Strength in dB μ V/m
- RA = Receiver Amplitude (including preamplifier) in dB μ V
- CF = Cable Attenuation Factor in dB
- AF = Antenna Factor in dB
- AG = Amplifier Gain in dB
- PD = Pulse Desensitization in dB
- AV = Average Factor in -dB

In the radiated emission table which follows, the reading shown on the data table may reflect the preamplifier gain. An example of the calculations, where the reading does not reflect the preamplifier gain, follows:

$$FS = RA + AF + CF - AG + PD + AV$$

INTERTEK TESTING SERVICES

3.1 Field Strength Calculation (cont)

Example

Assume a receiver reading of 62.0 dB μ V is obtained. The antenna factor of 7.4 dB and cable factor of 1.6 dB is added. The amplifier gain of 29 dB is subtracted. The pulse desensitization factor of the spectrum analyzer was 0 dB, and the resultant average factor was -10 dB. The net field strength for comparison to the appropriate emission limit is 32 dB μ V/m. This value in dB μ V/m was converted to its corresponding level in μ V/m.

$$RA = 62.0 \text{ dB}\mu\text{V}$$

$$AF = 7.4 \text{ dB}$$

$$CF = 1.6 \text{ dB}$$

$$AG = 29.0 \text{ dB}$$

$$PD = 0 \text{ dB}$$

$$AV = -10 \text{ dB}$$

$$FS = 62 + 7.4 + 1.6 - 29 + 0 + (-10) = 32 \text{ dB}\mu\text{V/m}$$

$$\text{Level in mV/m} = \text{Common Antilogarithm} [(32 \text{ dB}\mu\text{V/m})/20] = 39.8 \mu\text{V/m}$$

INTERTEK TESTING SERVICES

3.3 Radiated Emission Data

The data on the following page lists the significant emission frequencies, the limit and the margin of compliance. Numbers with a minus sign are below the limit.

Judgement: Passed by 7.4 dB

TEST PERSONNEL:



Signature

Ken C. C. Lam, Compliance Engineer
Typed/Printed Name

August 3, 1998
Date

INTERTEK TESTING SERVICES

Company: Video Technology Electronics Ltd.
 Model: Smart Vision Interactive 80-23400 Version 2
 Mode: Standby

Date of Test: July 7, 1998

Table 1

Radiated Emissions

Polarity	Frequency (MHz)	Reading (dB μ V)	Antenna Factor (dB)	Pre-Amp Gain (dB)	Net at 3m (dB μ V/m)	Limit at 3m (dB μ V/m)	Margin (dB)
H	71.590	33.3	7	16	24.3	40.0	-15.7
H	168.241	30.3	18	16	32.3	43.5	-11.2
H	196.877	30.8	16	16	30.8	43.5	-12.7
H	211.195	31.3	17	16	32.3	43.5	-11.2
H	218.354	32.0	17	16	33.0	46.0	-13.0
H	225.514	31.4	18	16	33.4	46.0	-12.6
H	247.006	31.0	20	16	35.0	46.0	-11.0
H	304.263	32.6	22	16	38.6	46.0	-7.4
H	318.581	31.2	23	16	38.2	46.0	-7.8

- Notes:
1. Peak Detector Data unless otherwise stated.
 2. All measurements were made at 3 meter. Harmonic emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other harmonic emissions than those reported were detected at a test distance of 0.3-meter.
 3. Negative value in the margin column shows emission below limit.
 4. Horn antenna and average detector are used for the emission over 1000MHz.
- * Emission within the restricted band meets the requirement of part 15.205. The corresponding limit as per 15.209 is based on Quasi peak detector data for frequencies below 1000 MHz and average detector data for frequencies over 1000 MHz.

Test Engineer: Ken C. C. Lam

INTERTEK TESTING SERVICES

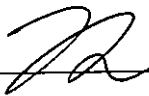
3.5 Line Conducted Emission Data

The data on the following page lists the significant emission frequencies, the limit, and the margin of compliance. Numbers with a minus sign are below the limit.

Judgement: Passed by 16.5 dB

* All readings are peak unless stated otherwise.

TEST PERSONNEL:



Signature

Ken C. C. Lam, Compliance Engineer
Typed/Printed Name

August 3, 1998
Date

INTERTEK TESTING SERVICES

Company: Video Technology Electronics Ltd.
Model: Smart Vision Interactive 80-23400 Version 2
Mode: Channel 3

Date of Test: July 7, 1998

Graph 1

**Conducted Emissions
Section 15.107 Requirements**

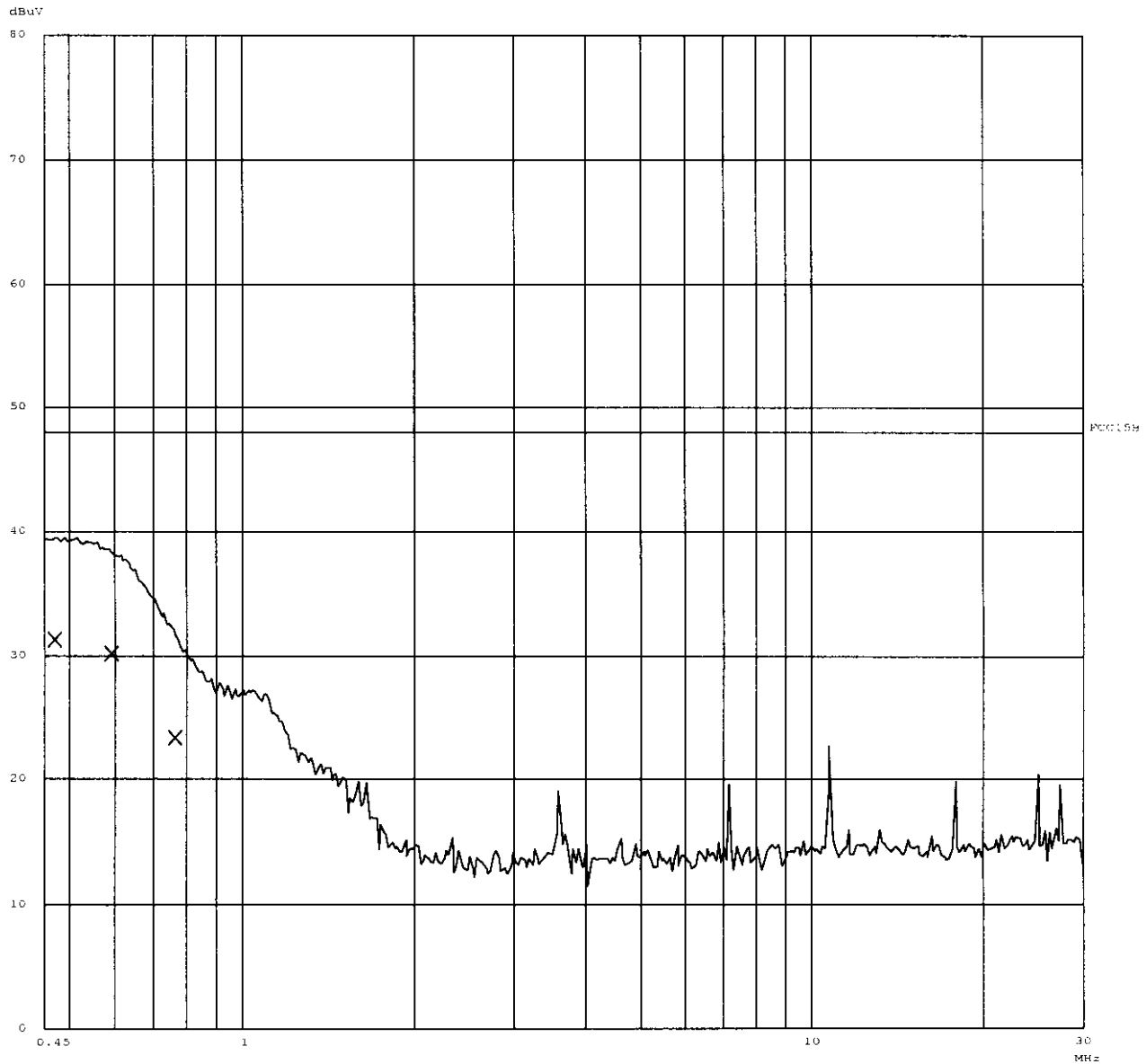
Channel 3

Tested By: Hong, Report No.: 9804625

Scan Settings (1 Range)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
450k	30M	5k	10k	PK	20ms	AUTO	LN OFF	60dB

Final Measurement: x QP	Transducer No.	Start	Stop	Name
Meas Time: 1 s	3	9k	30M	E1078
Subranges: 16				
Acc Margin: 20dB				



Ctrl. No.: N/A

INTERTEK TESTING SERVICES

Company: Video Technology Electronics Ltd.
Model: Smart Vision Interactive 80-23400 Version 2
Mode: Channel 3

Date of Test: July 7, 1998

Table 2

Conducted Emissions Section 15.107 Requirements

Channel 3

Tested By: Hong, Report No.: 9804625

Scan Settings (1 Range)

```
|----- Frequencies -----| |----- Receiver Settings -----|
Start      Stop      Step      IF BW  Detector  M-Time  Atten  Preamp  OpRge
450k       30M       5k        10k    PK        20ms   AUTO  LN  OFF  60dB
```

Final Measurement Results:

Frequency MHz	QP Level dBuV	QP Limit dBuV
0.47000	31.3	48.0
0.59000	30.1	48.0
0.76500	23.4	48.0

* limit exceeded

Ctrl. No.: N/A

INTERTEK TESTING SERVICES

Company: Video Technology Electronics Ltd.
Model: Smart Vision Interactive 80-23400 Version 2
Mode: Channel 4

Date of Test: July 7, 1998

Graph 2

Conducted Emissions
Section 15.107 Requirements

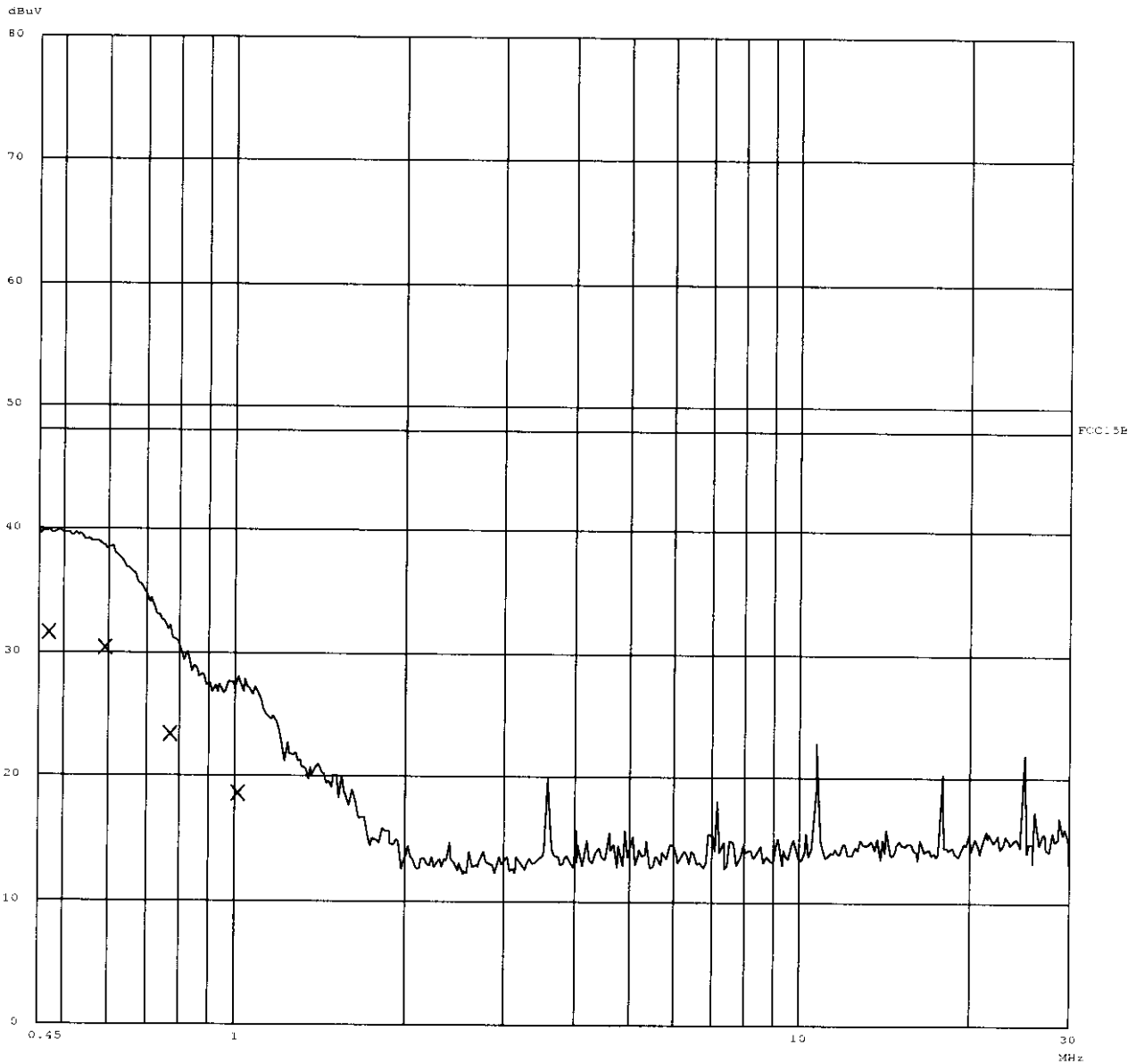
Channel 4

Tested By: Hong, Report No.: 9804625

Scan Settings (1 Range):

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
450k	30M	5k	10k	PK	20ms	AUTO	LN OFF	50dB

Final Measurement: X QP	Transducer No.	Start	Stop	Name
Meas Time: 1 s	3	9k	30M	EI078
Subranges: 16				
Acc Margin: 20dB				



Ctrl. No.: N/A

INTERTEK TESTING SERVICES

Company: Video Technology Electronics Ltd.
Model: Smart Vision Interactive 80-23400 Version 2
Mode: Channel 4

Date of Test: July 7, 1998

Table 3

**Conducted Emissions
Section 15.107 Requirements**

Channel 4

Tested By: Hong, Report No.: 9804625

Scan Settings (1 Range)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
450k	30M	5k	10k	PK	20ms	AUTO	LN OFF	60dB

Final Measurement Results:

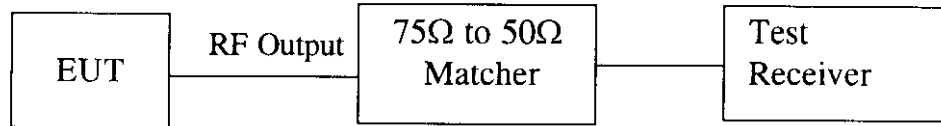
Frequency MHz	QP Level dBuV	QP Limit dBuV
0.47000	31.5	48.0
0.59000	30.4	48.0
0.77000	23.3	48.0
1.01500	18.6	48.0

* limit exceeded

Ctrl. No.: N/A

INTERTEK TESTING SERVICES

3.6 TV Interface Device Output and Spurious Conducted Emission Configuration



INTERTEK TESTING SERVICES

3.7 TV Interface Device Emission Output and Spurious Conducted Emission Data

The data on the following page lists the significant emission frequencies, the limit, and the margin of compliance. Numbers with a minus sign are below the limit.

Judgement: Passed by 4.6 dB at 161.080 MHz

* All readings are peak unless stated otherwise.

TEST PERSONNEL:



Signature

Ken C. C. Lam, Compliance Engineer
Typed/Printed Name

August 3, 1998
Date

INTERTEK TESTING SERVICES

Company: Video Technology Electronics Ltd.
Model: Smart Vision Interactive 80-23400 Version 2
Mode: Channel 3

Date of Test: June 30, 1998

Table 4

TV Interface Device Output Conducted Emission

Carrier	Frequency (MHz)	Reading (dB μ V)	Matcher's Insertion Loss (dB)	Measured RMS Voltage (dB μ V)	Limit (dB μ V)	Margin (dB)
Video	61.26	56.6	8.0	64.6	69.5	-4.9
Audio	56.93	41.5	8.0	49.5	56.5	-7.0
Audio	65.60	40.4	8.0	48.4	56.5	-8.1

- Notes:
1. Peak Detector Data unless otherwise stated.
 2. Negative value in the margin column shows emission below limit.
 3. The rated output impedance of the TV interface device is 75 Ω .

Test Engineer: Ken C. C. Lam

INTERTEK TESTING SERVICES

Company: Video Technology Electronics Ltd.
Model: Smart Vision Interactive 80-23400 Version 2
Mode: Channel 3

Date of Test: June 30, 1998

Table 5

TV Interface Device Spurious Conducted Emission

Frequency (MHz)	Reading (dB μ V)	Matcher's Insertion Loss (dB)	Measured RMS Voltage (dB μ V)	Limit (dB μ V)	Margin (dB)
48.280	18.1	8.0	26.1	39.5	-13.4
52.610	17.3	8.0	25.3	39.5	-14.2
54.110	19.0	8.0	27.0	39.5	-12.5
69.910	17.6	8.0	25.6	39.5	-13.9
122.520	22.4	8.5	30.9	39.5	-8.6
139.600	24.7	8.5	33.2	39.5	-6.3
143.190	22.3	8.5	30.8	39.5	-8.7
146.750	25.2	8.5	33.7	39.5	-5.8
153.900	22.9	9.7	32.6	39.5	-6.9
161.090	23.1	9.7	32.8	39.5	-6.7

- Notes:
1. Peak Detector Data unless otherwise stated.
 2. Negative value in the margin column shows emission below limit.
 3. The rated output impedance of the TV interface device is 75 Ω .
 4. Any Emissions in the range from 30 MHz to 4.6 MHz below the video carrier frequency, and any emissions in the range from 7.4 MHz above the video carrier frequency were recorded.

Test Engineer: Ken C. C. Lam

INTERTEK TESTING SERVICES

Company: Video Technology Electronics Ltd.
Model: Smart Vision Interactive 80-23400 Version 2
Mode: Channel 4

Date of Test: June 30, 1998

Table 6

TV Interface Device Output Conducted Emission

Carrier	Frequency (MHz)	Reading (dB μ V)	Matcher's Insertion Loss (dB)	Measured RMS Voltage (dB μ V)	Limit (dB μ V)	Margin (dB)
Video	67.27	56.5	8.0	64.5	69.5	-5.0
Audio	62.94	41.1	8.0	49.1	56.5	-7.4
Audio	71.61	40.8	8.0	42.8	56.5	-7.7

- Notes:
1. Peak Detector Data unless otherwise stated.
 2. Negative value in the margin column shows emission below limit.
 3. The rated output impedance of the TV interface device is 75 Ω .

Test Engineer: Ken C. C. Lam

INTERTEK TESTING SERVICES

Company: Video Technology Electronics Ltd.
Model: Smart Vision Interactive 80-23400 Version 2
Mode: Channel 4

Date of Test: June 30, 1998

Table 7

TV Interface Device Spurious Conducted Emission

Frequency (MHz)	Reading (dB μ V)	Matcher's Insertion Loss (dB)	Measured RMS Voltage (dB μ V)	Limit (dB μ V)	Margin (dB)
39.360	18.3	8.0	26.3	39.5	-13.2
54.280	18.3	8.0	26.3	39.5	-13.2
58.610	17.5	8.0	25.5	39.5	-14.0
75.930	18.2	8.0	26.2	39.5	-13.3
80.270	18.4	8.0	26.4	39.5	-13.1
96.650	19.0	8.0	27.0	39.5	-12.5
134.540	20.0	8.5	28.5	39.5	-11.0
139.600	22.8	8.5	31.3	39.5	-8.2
143.180	23.2	8.5	31.7	39.5	-7.8
146.760	25.9	8.5	34.4	39.5	-5.1
153.920	23.3	9.7	33.0	39.5	-6.5
157.500	17.0	9.7	26.7	39.5	-12.8
161.080	25.2	9.7	34.9	39.5	-4.6

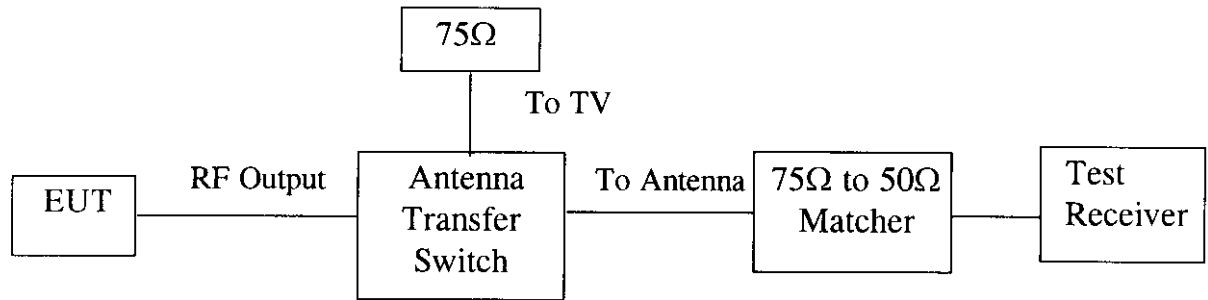
- Notes:
1. Peak Detector Data unless otherwise stated.
 2. Negative value in the margin column shows emission below limit.
 3. The rated output impedance of the TV interface device is 75 Ω .
 4. Any Emissions in the range from 30 MHz to 4.6 MHz below the video carrier frequency, and any emissions in the range from 7.4 MHz above the video carrier frequency were recorded.

Test Engineer: Ken C. C. Lam

FCC ID: G2R80-23400

INTERTEK TESTING SERVICES

3.8 Antenna Transfer Switch Measurement Configuration



INTERTEK TESTING SERVICES

3.9 Antenna Transfer Switch Measurement Data

The data on the following page lists the significant emission frequencies, the limit, and the margin of compliance. Numbers with a minus sign are below the limit.

Judgement: Passed by 2.0 dB at 67.265 MHz

* All readings are peak unless stated otherwise.

TEST PERSONNEL:



Signature

Ken C. C. Lam, Compliance Engineer
Typed/Printed Name

August 3, 1998
Date

INTERTEK TESTING SERVICES

Company: Video Technology Electronics Ltd.
Model: Smart Vision Interactive 80-23400 Version 2

Date of Test: July 22, 1998

Table 8

Antenna Transfer Switch Data

Frequency (MHz)	Reading (dB μ V)	Matcher's Insertion Loss (dB)	Pre-Amp Gain (dB)	Measured RMS Voltage (dB μ V)	Limit (dB μ V)	Margin (dB)
61.26	21.4	8	22	7.4	9.5	-2.1
67.27	21.5	8	22	7.5	9.5	-2.0

- Notes:
1. Peak Detector Data unless otherwise stated.
 2. Negative value in the margin column shows emission below limit.
 3. The rated output impedance of the TV interface device is 75 Ω .

Test Engineer: Ken C. C. Lam

INTERTEK TESTING SERVICES

EXHIBIT 4

EQUIPMENT PHOTOGRAPHS

INTERTEK TESTING SERVICES

4.0 Equipment Photographs

Photographs of the tested EUT are attached.