TEST REPORT

FROM

STRATESTLABS

Test of CopyCam (Model 80)

To FCC Part 15 (2001-10)

Test Report Serial No.:
SL/EMC/0156/REVA

This report supersedes NONE

Remarks:

Equipment complied with the specification	[X]
Equipment did not comply with the specification	[ ]

This Test Report is Issued Under the Authority of:

Gordon Hurst, General Manager

Tested by Qiubo Liu, Test Technician

Checked by Leslie Bai, Technical Manager

Copy No: pdf
Issue date: Feb 8, 2002

Equipment Details:

Manufacturer:	Polyvision Corporation
Model No.:	Model 80
Serial No.:	Nil

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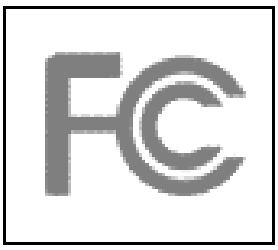

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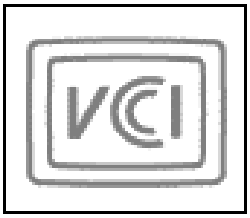

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1 Executive Summary

This test is to demonstrate the compliance of CopyCam Model 80 manufactured by Polyvision Corporation to FCC Part 15 as a Class A digital device.

In addition, the radiated emissions up to 10th Harmonics, i.e. 25GHz, was also tested as per the specified in the FCC Part 15C as Intentional radiator operating in the frequency band of 2.4GHz.

The test result has shown that the device is compliant with said specification within laboratories derived measurement uncertainty for each test.

2 Technical Details

Purpose	The test is to verify the compliance of the CopyCam 80 product to FCC Part 15B
Applicant / Client	HyperCorp 1279 Quarry Lane Suite B Pleasanton, CA 94568
Manufacturer	Polyvision Corporation
Laboratory performing the tests	StratestLabs 1533 California Circle Milpitas, CA 95035
Test report reference number	SL/EMC/0156/REVA
Date EUT received	February 8, 2002
Standard applied	FCC Part 15 (2001-10)
Dates of test (from – to)	5th 7th February 2002
No of Units:	One
Equipment Category:	Class A, Category 3
Trade Name:	CopyCam
Type No:	80
Operating frequency band	2.4GHz
Microprocessor/Clock/Oscillator Frequency (ies)	12.5MHz, 18.432MHz, 24MHz, 25MHz 33MHz, 50MHz, 100MHz
Rated Input Power	AC/DC Converter 100-240VAC, 15VDC 1Amp
Port/Connectors	Ethernet, Control Pad Interconnect

Modifications: NONE

1. None

3 Tests Required

The product was tested in accordance with the following specifications as per FCC Part 15 (2001-10).

3.1.1.1 Test Results Summary

TABLE OF REQUIRED TESTS

Test Standard	Description	Clause	Pass / Fail
Conducted Emissions			
Part 15.107	Conducted Emissions (Class A)	15.107	Pass
Radiated Emissions			
30MHz – 1GHz	Radiated Emissions (Class A)	15.109	Pass
Radiated Emissions			
1GHz – 25GHz	Radiated Emissions	15.209	Pass

4 Measurements, Examinations and Derived Results

4.1 General observations

Equipment serial number(s)		
Module:	Part number:	Serial number:
CopyCam	80	E0200042

4.2 Test Results

4.3 FCC Part 15.107: Conducted Emission Results

Frequency (MHz)	Q-P Value (dBμV)	Q-P Margin (dB)	Line
0.454	43.85	6.15	N Line
0.506	41.92	8.08	N Line
0.558	39.49	10.51	N Line
0.458	39.00	11.00	L Line
17.398	46.62	12.88	L Line
13.214	45.41	14.00	L Line

4.4 FCC Part 15.109: Radiated Emission Results

Test Distance : 10m

Frequency (MHz)	Q-P Value (dBμV/m)	Q-P Margin (dB)	Pol (H/V)	Height (m)	Azimuth (Degrees)
150	42.50	1.00	V	1.00	45
200	43.23	0.27	V	1.00	175
150	43.10	0.40	H	2.00	25
200	43.33	0.17	H	3.00	36
55.48	37.80	2.20	V	1.00	170
34.32	37.60	2.40	H	1.00	162

Notes

1. All possible modes of operation were investigated. Only the 6 worst case emissions measured, using the correct CISPR detectors, are reported. All other emissions were relatively insignificant.
2. A "+ve" margin indicates a PASS as it refers to the margin present below the limit line at the particular frequency.
3. Conducted Emissions Measurement Uncertainty
   All test measurements carried out are traceable to national standards. The uncertainty of the measurement at a confidence level of approximately 95% (in the case where distributions are normal), with a coverage factor of 2, in the range 9kHz – 30MHz (Average & Quasi-peak) is ±2.64dB.
4. Radiated Emissions Measurement Uncertainty
   All test measurements carried out are traceable to national standards. The uncertainty of the measurement at a confidence level of approximately 95% (in the case where distributions are normal), with a coverage factor of 2, in the range 30MHz – 1GHz (QP only @ 3m & 10m) is +5.6dB/-4.5dB (for EUTs < 0.5m X 0.5m X 0.5m).
5. Environmental Conditions

Temperature	23°C
Relative Humidity	50%
Atmospheric Pressure	1019mbar

4.5 FCC Part 15.209: Radiated Emission (1GHz-25GHz) Results

Test Distance : 1m

Frequency Range (MHz)	Peak (dBμV)	Margin (dB)	Pol (H/V)	Height (m)	Azimuth (Degrees)
1GHz – 2GHz	43.00	15.8	V	1.00	360
1GHz – 2GHz	42.83	15.97	H	1.00	360
2 – 2.3995GHz	42.33	16.47	V	1.00	360
2 – 2.3995GHz	41.17	17.63	H	1.00	360
2.4045 – 3GHz	41.83	16.97	V	1.00	360
2.4045 – 3GHz	42.33	16.47	H	1.00	360
3GHz – 5GHz	41.50	17.3	V	1.00	360
3GHz – 5GHz	41.33	17.47	H	1.00	360
5GHz – 10GHz	42.33	16.47	V	1.00	360
5GHz – 10GHz	42.83	15.97	H	1.00	360
10GHz – 15GHz	45.00	13.8	V	1.00	360
10GHz – 15GHz	44.67	14.13	H	1.00	360
15GHz – 18GHz	44.67	14.13	V	1.00	360
15GHz – 18GHz	44.50	14.3	H	1.00	360
18GHz – 20GHz	44.33	14.47	V	1.00	360
18GHz – 20GHz	44.33	14.47	H	1.00	360
20GHz – 25GHz	47.00	11.8	V	1.00	360
20GHz – 25GHz	46.67	12.13	H	1.00	360

Note 1: The limit has been derived from 3m to 1m by adding a factor of 10log(3/1).

Note 2: Details of test results are maintained within the lab.

Annex A.

Annex A.i. TEST INSTRUMENTATION & GENERAL PROCEDURES

Instrument	Model	Serial #	Calibration Due
Conducted Emissions			
R&S Test Receiver (9kHz-30MHz)	ESI 7	838496/007	22 Feb 2002
R&S Pulse Limiter	ESH3-Z2	357.8810.52	15 Oct 2002
R&S LISN (for EUT)	ESH3-Z5	836679/006	26 Sept 2002
R&S LISN (for Support)	ESH3-Z5	836679/005	Not Applicable
Radiated Emissions			
R&S Test Receiver (30MHz – 7GHz)	ESI 7	838496/007	22 Feb 2002
Schwardsbeck Biconical Antenna	VHBB 9124	SL-ANT3	14 Mar 2002
Schwardsbeck Log-Periodic Antenna	VUSLP 9111	SL-ANT4	14 Mar 2002
EMCO Horn Antenna	3115	9205-3882	21 Oct 2002
MILLIMETER Horn	261k	595	21 Oct 2002
HP Pre-amplifier	8349B	2644A03234	Output monitored
HP Spectrum Analyser	8563E	3305A00825	16 Mar 2002

Annex A.ii. CONDUCTED EMISSIONS TEST DESCRIPTION

Test Set-up

1. The EUT and supporting equipment were set up in accordance with the requirements of the standard on top of a 1.5m x 1m x 0.8m high, non-metallic table, as shown in Annex B.

2. The power supply for the EUT was fed through a 50Ω/50μH EUT LISN, connected to filtered mains.

3. The RF OUT of the EUT LISN was connected to the EMI test receiver via a low-loss coaxial cable.

4. All other supporting equipment were powered separately from another mains supply.

Test Method

1. The EUT was switched on and allowed to warm up to its normal operating condition.

2. A scan was made on the NEUTRAL line (for AC mains) or Earth line (for DC power) over the required frequency range using an EMI test receiver.

3. High peaks, relative to the limit line, were then selected.

4. The EMI test receiver was then tuned to the selected frequencies and the necessary measurements made with a receiver bandwidth setting of 10kHz. For FCC tests, only Quasi-peak measurements were made; while for CISPR/EN tests, both Quasi-peak and Average measurements were made.

5. Steps 2 to 4 were then repeated for the LIVE line (for AC mains) or DC line (for DC power).

Sample Calculation Example

At 20 MHz limit = 250 μV = 47.96 dBμV

Transducer factor of LISN, pulse limiter & cable loss at 20 MHz = 11.20 dB

Q-P reading obtained directly from EMI Receiver = 40.00 dBμV
(Calibrated for system losses)

Therefore, Q-P margin = 47.96 – 40.00 = 7.96 i.e. **7.96 dB below limit**

Annex A. iii RADIATED EMISSIONS TEST DESCRIPTION

EUT Characterisation

EUT characterisation, over the frequency range from 30MHz to 1GHz (for FCC tests, until the 5th harmonic for operating frequencies ≥ 108MHz), was done in order to minimise radiated emissions testing time while still maintaining high confidence in the test results.

The EUT was placed in the chamber, at a height of about 0.8m on a turntable. Its radiated emissions frequency profile was observed, using a spectrum analyzer /receiver with the appropriate broadband antenna placed 3m away from the EUT. Radiated emissions from the EUT were maximised by rotating the turntable manually, changing the antenna polarisation and manipulating the EUT cables while observing the frequency profile on the spectrum analyzer / receiver. Frequency points at which maximum emissions occurred, clock frequencies and operating frequencies were then noted for the formal radiated emissions test at the Open Area Test Site (OATS).

Test Set-up

1. The EUT and supporting equipment were set up in accordance with the requirements of the standard on top of a 1.5m X 1.0m X 0.8m high, non-metallic table as shown in Annex B.

2. The filtered power supply for the EUT and supporting equipment were tapped from the appropriate power sockets located on the turntable.

3. The relevant broadband antenna was set at the required test distance away from the EUT and supporting equipment boundary.

Test Method

1. The EUT was switched on and allowed to warm up to its normal operating condition.

2. The test was carried out at the selected frequency points obtained from the EUT characterisation. Maximization of the emissions, was carried out by rotating the EUT, changing the antenna polarization, and adjusting the antenna height in the following manner:

   a. Vertical or horizontal polarisation (whichever gave the higher emission level over a full rotation of the EUT) was chosen.
   b. The EUT was then rotated to the direction that gave the maximum emission.
   c. Finally, the antenna height was adjusted to the height that gave the maximum emission.

3. A Quasi-peak measurement was then made for that frequency point.

4. Steps 2 and 3 were repeated for the next frequency point, until all selected frequency points were measured.

5. The frequency range covered was from 30MHz to 1GHz (for FCC tests, until the 5th harmonic for operating frequencies ≥ 108MHz), using the Biconical antenna for frequencies from 30MHz to 230MHz, Log-periodical antenna for frequencies from 230MHz to 1GHz, and the Horn antenna above 1GHz.

Sample Calculation Example

At 300 MHz limit = 200 μV/m = 46.00 dBμV/m

Log-periodic antenna factor & cable loss at 300 MHz = 18.50 dB

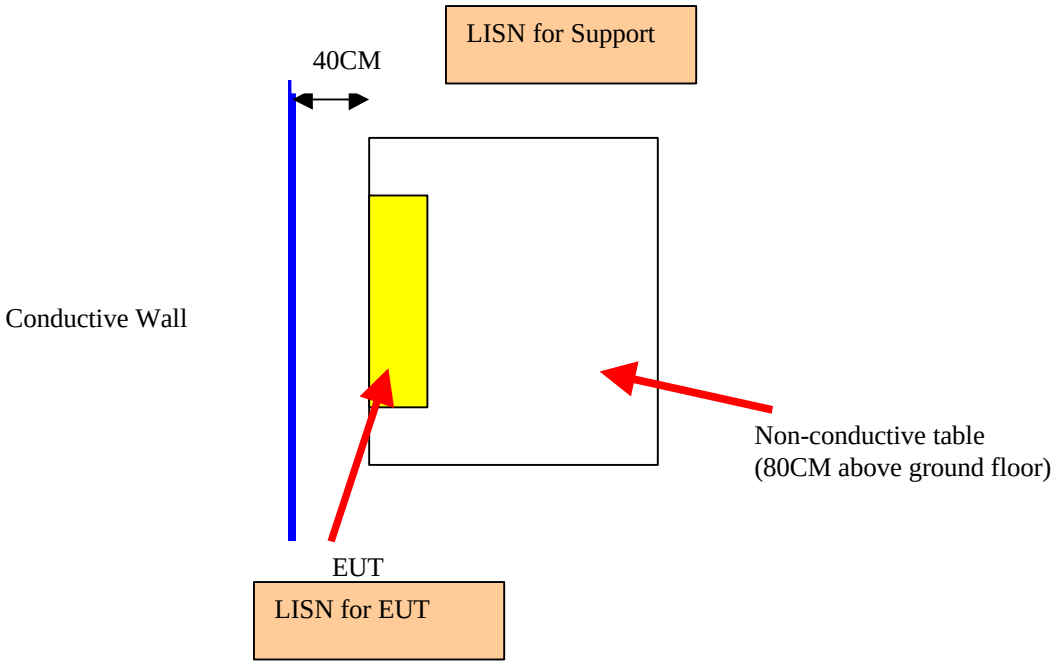
Q-P reading obtained directly from EMI Receiver = 40.00 dBμV/m
(Calibrated level including antenna factors & cable losses)

Therefore, Q-P margin = 46.00 – 40.00 = 6.00 i.e. **6 dB below limit**

Annex B.

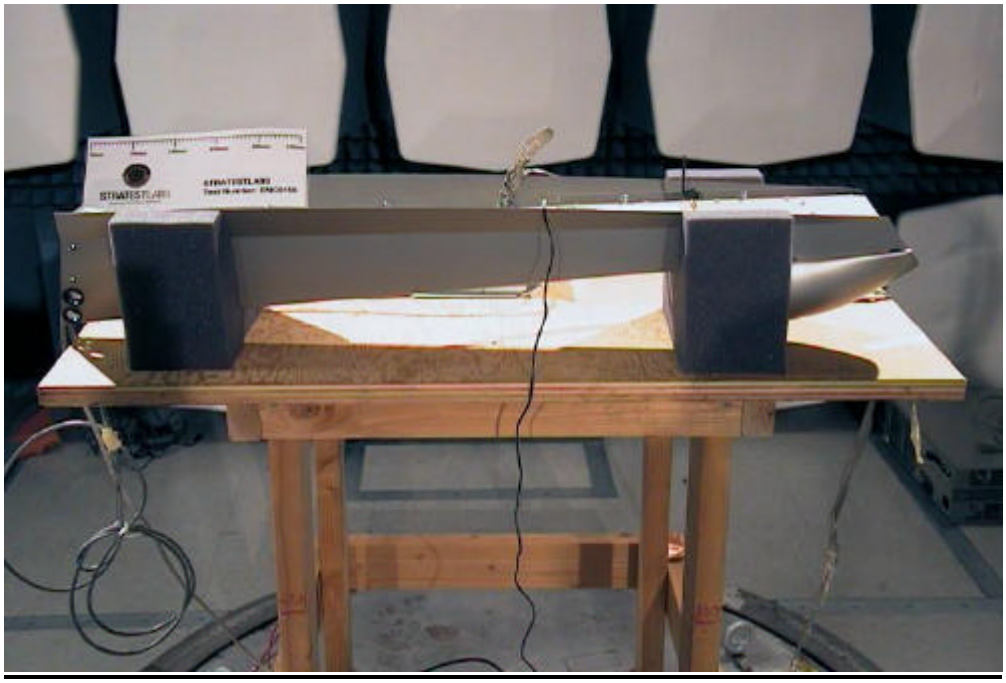
TEST PHOTOGRAPHS/DIAGRAM

Annex B.i. Photograph 1: Conducted Emissions Test Setup



Annex B.ii. Photograph 2: Radiated Emissions Test (30MHz – 1GHz)

Annex B.iii. Photograph 3: Radiated Emissions Test (1GHz – 25 GHz)



Annex C.

EUT TEST CONDITIONS

EUT Description : CopyCam
Model No : 80
Serial No : E0200042

The EUT was powered from 15V DC through AC/DC Adapter power supply.

The following is the description of how the EUT is exercised during testing.

Test	Description Of Operation
Emissions	The EUT was powered up and communication link was setup between controller and the EUT. The following scenarios were investigated, Low Channel, Top Channel, Operating Mode, Standby Mode. The worst case was identified and final measurement was made and result presented. Detail of test setup and operations are recorded and maintained in the test lab.

Annex D

USER MANUALTECHNICAL DESCRIPTION BLOCK & CIRCUIT DIAGRAMS

Not available at the time of issuance of this report.