



The following benchmarks provide a performance overview for a range of Matrox Odyssey Native Library (ONL) operations running on the Matrox Odyssey Xpro. A brief description of all functions, parameters and images used are included. These benchmarks are for memory-to-memory operations (i.e., image data not in cache prior to and after operation) and include host system overheads. Moreover, the Matrox Oasis (PA) is used instead of the MPC7457 or MPC7447A where beneficial. Note that significant performance gains for an application can be achieved using the Odyssey Developer's Toolkit (DTK).

	<i>512 x 512 images 1.3 GHz MPC7457 133 MHz MPX DDR266 SDRAM</i>	<i>1024 x 1024 images 1.3 GHz MPC7457 133 MHz MPX DDR266 SDRAM</i>	<i>512 x 512 images 1 GHz MPC7447 133 MHz MPX DDR266 SDRAM</i>	<i>1024 x 1024 images 1 GHz MPC7447 133 MHz MPX DDR266 SDRAM</i>
Image Processing - Integer				
Basic point-to-point (two source images) Add, subtract, multiply, min, max, or logical operation between two 8-bit images and store the results in an 8-bit destination image.	0.241 ms	0.839 ms	0.242 ms	0.841 ms
Basic point-to-point (one source image) Find maximum pixel value between an 8-bit image and a constant value and store the results in an 8-bit destination image.	0.157 ms	0.553 ms	0.160 ms	0.555 ms
Divide Divide a 16-bit image by an 8-bit image and store the result in an 8-bit destination image.	0.819 ms	3.12 ms	0.821 ms	3.13 ms
LUT map Perform a LUT mapping operation of an 8-bit source image into an 8-bit destination image.	0.282 ms	1.02 ms	0.285 ms	1.02 ms
LUT map Same as above except for 16-bit.	1.94 ms	7.52 ms	2.17 ms	8.45 ms
Frame averaging Average ten 8-bit images and store the result in an 8-bit destination image.	1.61 ms	6.18 ms	1.66 ms	6.37 ms
Binarize (constant threshold) Threshold an 8-bit image and store the result in a 1-bit destination image.	0.127 ms	0.360 ms	0.136 ms	0.361 ms
Image statistics Find the mean and standard deviation of all pixels in an 8-bit image.	0.141 ms	0.405 ms	0.147 ms	0.410 ms
Shading correction Perform a per-pixel gain and offset correction on an 8-bit image and store the result in an 8-bit destination image (gain values are 16-bit).	0.385 ms	1.46 ms	0.389 ms	1.46 ms
Bayer filter Convert an 8-bit Bayer image to RGB and store the result in a 3-band 8-bit image.	0.668 ms	2.51 ms	0.671 ms	2.52 ms
Color conversion Convert a 3-band 8-bit image to a different color space and store the result in a 3-band 8-bit destination image (this is a 3x3 matrix defined conversion, e.g. RGB to YUV).	0.472 ms	1.72 ms	0.474 ms	1.73 ms
Edge detection (Sobel) Perform a sobel edge detection on an 8-bit source image and store results in an 8-bit destination image.	0.178 ms	0.639 ms	0.180 ms	0.642 ms
Convolution (3 x 3, user-defined) Perform a 3 x 3 convolution with arbitrary coefficients on an 8-bit source image and store results in an 8-bit destination image.	0.157 ms	0.560 ms	0.160 ms	0.563 ms
Convolution (5 x 5, user-defined) Same as above except with a 5 x 5 kernel.	0.220 ms	0.797 ms	0.223 ms	0.800 ms
Convolution (5 x 5, symmetric) Same as above except with a symmetric 5 x 5 kernel.	0.172 ms	0.587 ms	0.175 ms	0.583 ms
Convolution (11 x 11, user-defined) Same as above except with a 11 x 11 kernel.	0.963 ms	3.75 ms	0.965 ms	3.75 ms
Convolution (11 x 11, symmetric) Same as above except with a symmetric 11 x 11 kernel.	0.307 ms	1.14 ms	0.310 ms	1.14 ms
Thinning/thickening (3 x 3, user-defined, binary) Perform a binary thinning/thickening on a 1-bit source image using two 3 x 3 connectivity mappings and store results in a 1-bit destination image.	0.183 ms	0.385 ms	0.192 ms	0.402 ms
Erosion/dilation (3 x 3, user-defined, grayscale) Perform a grayscale erosion/dilation on an 8-bit source image using an arbitrary 3 x 3 structuring element and store results in an 8-bit destination image.	0.158 ms	0.560 ms	0.162 ms	0.563 ms



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1024 x 1024 images
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Image Processing - Integer (cont.)

Erosion/dilation (5 x 5, user-defined, grayscale) Perform a grayscale erosion/dilation on an 8-bit source image using an arbitrary 5 x 5 structuring element and store results in an 8-bit destination image	0.221 ms	0.798 ms	0.225 ms	0.801 ms
Erosion/dilation (5 x 5, symmetric, grayscale) Same as above except with a symmetric 5 x 5 structuring element.	0.173 ms	0.583 ms	0.176 ms	0.584 ms
Erosion/dilation (11 x 11, user-defined, binary) Perform a binary erosion/dilation on an 1-bit source image using an arbitrary 11 x 11 structuring element and store results in an 1-bit destination image.	0.262 ms	0.494 ms	0.264 ms	0.496 ms
Erosion/dilation (11 x 11, user-defined, grayscale) Perform a grayscale erosion/dilation on an 8-bit source image using an arbitrary 11 x 11 structuring element and store results in an 8-bit destination image.	0.968 ms	3.76 ms	0.972 ms	3.76 ms
Erosion/dilation (11 x 11, symmetric, grayscale) Same as above except with a symmetric 11 x 11 structuring element.	0.311 ms	1.14 ms	0.315 ms	1.14 ms
Median Filter (3 x 3 square) Perform a median filter operation on an 8-bit source image using a predefined 3 x 3 square kernel (9 filter elements) and store results in an 8-bit destination image.	1.02 ms	4.48 ms	1.13 ms	4.70 ms
Median Filter (3 x 3 cross) Same as above except with a 3 x 3 cross kernel (5 filter elements).	0.394 ms	1.50 ms	0.395 ms	1.50 ms
Warp Polynomial (nearest neighbor interpolation) Warping using a first-order polynomial mapping with nearest neighbor interpolation on an 8-bit source image and store results in an 8-bit destination image.	2.34 ms	8.93 ms	2.47 ms	9.85 ms
Warp Polynomial (bilinear interpolation) Same as above except using bilinear interpolation.	5.56 ms	21.5 ms	6.72 ms	26.31 ms

Image Processing - Floating point

Floating point (two source images) Add, subtract, multiply, min or max between two 32-bit floating point images and store the results in a 32-bit floating point destination image.	3.88 ms	15.47 ms	4.10 ms	16.26 ms
Floating point (one source image) Add, subtract, multiply, min or max between a 32-bit floating point image and a constant and store the results in a 32-bit floating point destination image.	2.40 ms	9.53 ms	2.47 ms	9.83 ms
Floating point divide Divide two 32-bit floating point images.	4.27 ms	17.0 ms	4.58 ms	18.23 ms
Floating point square root Perform a square root function on a 32-bit floating point image.	3.10 ms	12.33 ms	3.36 ms	13.38 ms
Floating point logarithm Perform a natural logarithm function on a 32-bit floating point image.	4.58 ms	18.27 ms	5.24 ms	20.90 ms
FFT (real) Perform a real to complex FFT on a 32-bit source image source and store results in a 32-bit destination image.	18.8 ms	89.3 ms	21.47 ms	220.1 ms
FFT (complex) Same as above except for a complex to complex FFT.	21.4 ms	100.2 ms	24.6 ms	234.0 ms

Blob Analysis¹

Calculate Area (100 blobs)	0.311 ms	0.739 ms	0.401 ms	0.949 ms
Calculate Area and Binary Center of Gravity (100 blobs)	0.376 ms	0.840 ms	0.479 ms	1.08 ms
Calculate Area and Grayscale Center of Gravity (100 blobs)	1.62 ms	4.61 ms	2.09 ms	5.52 ms



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Pattern Matching (Normalized Grayscale Correlation)¹

Find a Model (256 x 256, no rotation)

Perform a pattern match of a 256 x 256 model in an 8-bit grayscale image. The whole image is searched and the model position is located with 0.25 pixel accuracy.

Find a Model (128 x 128, no rotation)

As above except perform a pattern match of a 128 x 128 model.

Find a Model (64 x 64, no rotation)

As above except perform a pattern match of a 64 x 64 model.

Find a Model (32 x 32, no rotation)

As above except perform a pattern match of a 32 x 32 model.

1.21 ms	1.26 ms	1.48 ms	1.55 ms
0.477 ms	1.40 ms	0.536 ms	1.62 ms
0.688 ms	2.38 ms	0.784 ms	2.61 ms
1.48 ms	6.84 ms	1.87 ms	7.98 ms

ENDNOTE

1. Speed will vary with image content.

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