

Hamamatsu Flash 4 - Speed Using HClmage									
No binning		2x2 binning		4x4 binning					
Width	Height	Width	Height	Width	Height	Speed (approx)		Fastest exposure time	
2048	2048	1024	1024	512	512	100 frames/sec		1.0037ms	
2048	1024	1024	512	512	256	200 frames/sec		1.0037ms	
2048	512	1024	256	512	128	400 frames/sec		1.0037ms	
2048	256	1024	128	512	64	800 frames/sec		1.0037ms	
2048	128	1024	64	512	32	1600 frames/sec		623.6us	
2048	64	1024	32	512	16	3200 frames/sec		311.8us	
2048	32	1024	16	512	8	6400 frames/sec		155.1us	
2048	16	1024	8	512	4	12500 frames/sec		77.9us	
2048	8	1024	4	512	2	25000 frames/sec		38.9us	

Frame size	Field Size						Binning		
	Full frame (2048)		1024	512	256	128	1x1	2x2	4x4
Objective	Field size (µm)	Pixel size (µm)	Field size (µm)	Field size (µm)	Field size (µm)	Field size (µm)	Pixel size (µm)	Pixel size (µm)	Pixel size (µm)
x5	2660.00	1.30	1330.00	665.00	332.50	166.25	1.30	2.60	5.20
x10	1330.00	0.65	665.00	332.50	166.25	83.13	0.65	1.30	2.60
x20	665.60	0.33	332.80	166.40	83.20	41.60	0.33	0.65	1.30
x40	332.80	0.16	166.40	83.20	41.60	20.80	0.16	0.33	0.65
x63	211.30	0.10	105.65	52.83	26.41	13.21	0.10	0.21	0.41
x100	133.00	0.07	66.50	33.25	16.63	8.31	0.07	0.13	0.26

Example exposures (free running mode)			
Width	Height	Exposure	Frame rate
2048	128	1ms	1000frames/sec
2048	64	500us	2000 frames/sec
2048	32	250us	4000 frames/sec
2048	16	100us	93750 frames/sec
2048	8	50us	17,000 frames/sec

Available setting ranges:

Free running mode	1ms - 10s
Free running mode (at sub array)	38.96us* - 10s
External control mode (all)	1ms – 10s

\*38.96us is min exposure time when sub-array is set to 8 lines vertically on centre axis

Calculating formula the frame rate

Free running mode (frames/sec)	$\frac{1}{\frac{Vn}{2} * 9.74us} * 10^6$
External control mode	$\frac{1}{(\frac{Vn}{2} * 9.74us) + Exp + 87.66us}$

Vn = no. of vertical lines set in the centre position on the censor

Exp = exposure time (1ms to 10s)

The exposure time setting can be set by absolute value. The actual exposure time setting is defined by the the formula, and the camera automatically calculates a larger and closest value from the specified exposure time setting.

$$\frac{Vn}{2} * 9.74us$$