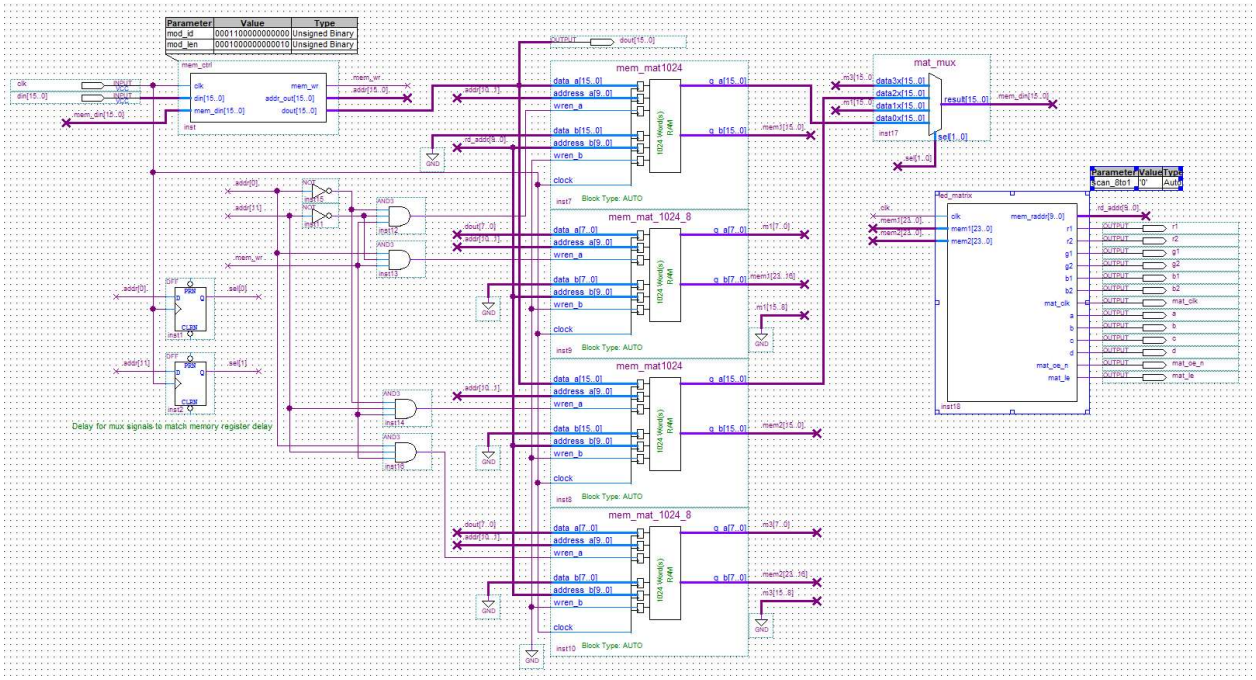
LED Matrix Controller

The controller supports full color (24-bit) for LED matrix panels with a HUB75 connector. The controller supports either 8to1 or 16to1 scan rates, with up to four 32x16 panels or one 32x64 panel. The output refresh rate is about 80 or 160 hertz for 16to1 and 8to1 scan rates. The only configuration is selection of 8to1 or 16to1 scan rates. The scan rate is selected by the “scan_8to1” parameter, where ‘1’ is 8to1 and ‘0’ is 16to1, and be sure to use the quotes.

Macro Name	Ident	Length	Logic Elements	Memory (bits)
mb_led_matrix	0x1800	4098	443	49152



LED Matrix Block Diagram

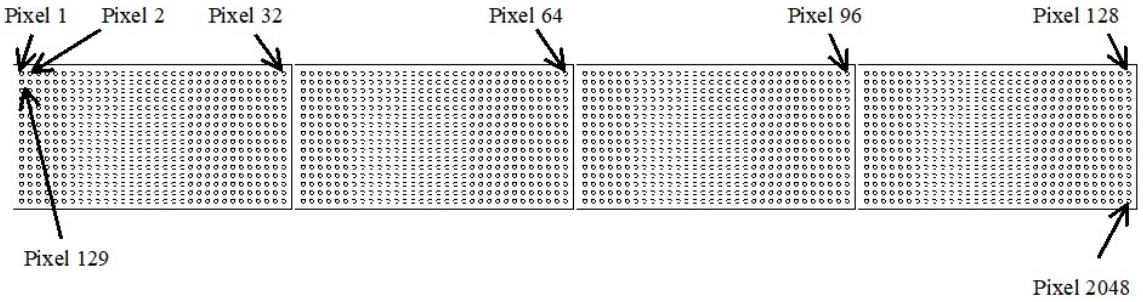
The outputs from the controller are shown below:

r1,r2:	Red led outputs 1 and 2
g1,g2:	Green led outputs 1 and 2
b1,b2:	Blue led outputs 1 and 2
a,b,c,d:	Line selection, where d is not used in 8to1

mat_clk: Output clock to matrix
mat_oe_n: Output enable, to turn on LED's in current row
mat_le: Latch enable to move input values to output latch

The controller supports FM6047 led control integrated circuits. During the output sequence register 2 and 3 are set to 0x7FFF and 0x0040 respectively.

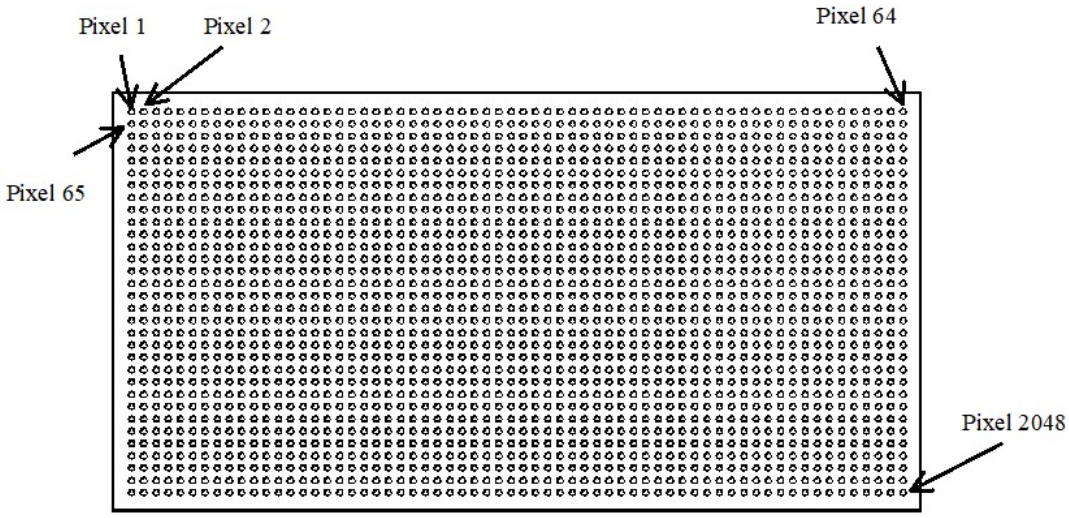
The memory maps for the two topologies are shown below. The red and blue byte values are in the least significant bytes of the 16-bit words.



Memory Map Diagram 8to1

Address	Read/Write	Value	
Base	Read	0x1800	Ident
Base + 1	Read	0x1002	Length
Base + 2	Read/Write	Pixel #1	Red/Green
Base + 3	Read/Write	Pixel #1	Blue/NA
Base + 4	Read/Write	Pixel #2	Red/Green
Base + 5	Read/Write	Pixel #2	Blue/NA
. . .			
Base + 64	Read/Write	Pixel #32	Red/Green
Base + 65	Read/Write	Pixel #32	Blue/NA
Base + 66	Read/Write	Pixel #33	Red/Green
Base + 67	Read/Write	Pixel #33	Blue/NA
. . .			
Base + 258	Read/Write	Pixel #129	Red/Green
Base + 259	Read/Write	Pixel #129	Blue/NA
. . .			
Base + 4096	Read/Write	Pixel #2048	Red/Green
Base + 4097	Read/Write	Pixel #2048	Blue/NA

Memory Map 8to1



Memory Map Diagram 16to1

Address	Read/Write	Value	
Base	Read	0x1800	Ident
Base + 1	Read	0x1002	Length
Base + 2	Read/Write	Pixel #1	Red/Green
Base + 3	Read/Write	Pixel #1	Blue/NA
Base + 4	Read/Write	Pixel #2	Red/Green
Base + 5	Read/Write	Pixel #2	Blue/NA
. . .			
Base + 128	Read/Write	Pixel #64	Red/Green
Base + 129	Read/Write	Pixel #64	Blue/NA
Base + 130	Read/Write	Pixel #65	Red/Green
Base + 131	Read/Write	Pixel #65	Blue/NA
. . .			
Base + 4096	Read/Write	Pixel #2048	Red/Green
Base + 4097	Read/Write	Pixel #2048	Blue/NA

Memory Map 16to1

Revisions

August 2023 – Base