



University Program Design Laboratory Package

November 1997, ver. 1.1

User Guide Supplement

This user guide supplement provides updated pin-out and timing information for the UP 1 Education Board. This supplement should be used together with the *University Program Design Laboratory Package User Guide*.

Pin-Out Information

Table 1 provides updated pin-out information for the MAX_EXPANSION port on the UP 1 Education Board.

| <i>Table 1. MAX_EXPANSION Signal Names & Device Connections (Part 1 of 2)</i> | | | |
|---|----------------------|-------------|----------------------|
| Hole Number | Signal/Pin, Note (1) | Hole Number | Signal/Pin, Note (1) |
| 1 | RAW | 2 | GND |
| 3 | VCC | 4 | GND |
| 5 | VCC | 6 | GND |
| 7 | No Connect | 8 | No Connect |
| 9 | No Connect | 10 | No Connect |
| 11 | No Connect | 12 | GCLRn/1 |
| 13 | OE1/84 | 14 | OE2/GCLK2/2 |
| 15 | 4 | 16 | 5 |
| 17 | 6 | 18 | 8 |
| 19 | 9 | 20 | 10 |
| 21 | 11 | 22 | 12 |
| 23 | 15 | 24 | 16 |
| 25 | 17 | 26 | 18 |
| 27 | 20 | 28 | 21 |
| 29 | 22 | 30 | 25 |
| 31 | 24 | 32 | 27 |
| 33 | 29 | 34 | 28 |
| 35 | 31 | 36 | 30 |
| 37 | 33 | 38 | 34 |
| 39 | 35 | 40 | 36 |
| 41 | 37 | 42 | 40 |
| 43 | 39 | 44 | 41 |
| 45 | 44 | 46 | 46 |

Table 1. MAX_EXPANSION Signal Names & Device Connections (Part 2 of 2)

| Hole Number | Signal/Pin, Note (1) | Hole Number | Signal/Pin, Note (1) |
|-------------|----------------------|-------------|----------------------|
| 47 | 45 | 48 | 48 |
| 49 | 50 | 50 | 49 |
| 51 | 52 | 52 | 51 |
| 53 | 54 | 54 | 55 |
| 55 | 56 | 56 | 57 |
| 57 | VCC | 58 | GND |
| 59 | VCC | 60 | GND |

Note:

(1) The updated pin numbers are highlighted in gray.

Table 2 shows updated pin-out information for the FLEX_EXPAN_C port on the UP 1 Education Board.

Table 2. FLEX_EXPAN_C Signal Names & Device Connections (Part 1 of 2)

| Hole Number | Signal/Pin, Note (1) | Hole Number | Signal/Pin, Note (1) |
|-------------|----------------------|-------------|----------------------|
| 1 | RAW | 2 | GND |
| 3 | VCC | 4 | GND |
| 5 | VCC | 6 | GND |
| 7 | No Connect | 8 | DI1/99 |
| 9 | DI2/92 | 10 | DI3/210 |
| 11 | DI4/212 | 12 | DEV_CLR/209 |
| 13 | DEV_OE/213 | 14 | DEV_CLK2/211 |
| 15 | 175 | 16 | 181 |
| 17 | 182 | 18 | 183 |
| 19 | 184 | 20 | 185 |
| 21 | 186 | 22 | 187 |
| 23 | 188 | 24 | 190 |
| 25 | 191 | 26 | 192 |
| 27 | 193 | 28 | 194 |
| 29 | 195 | 30 | 196 |
| 31 | 198 | 32 | 199 |
| 33 | 200 | 34 | 201 |
| 35 | 202 | 36 | 203 |
| 37 | 204 | 38 | 206 |
| 39 | 207 | 40 | 208 |
| 41 | 214 | 42 | 215 |
| 43 | 217 | 44 | 218 |

Table 2. FLEX_EXPAN_C Signal Names & Device Connections (Part 2 of 2)

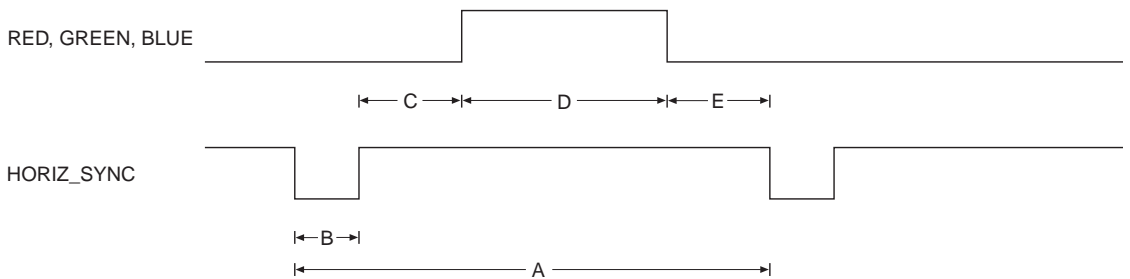
| Hole Number | Signal/Pin, Note (1) | Hole Number | Signal/Pin, Note (1) |
|-------------|----------------------|-------------|----------------------|
| 45 | 219 | 46 | 220 |
| 47 | 221 | 48 | 222 |
| 49 | 223 | 50 | 225 |
| 51 | 226 | 52 | 227 |
| 53 | 228 | 54 | 229 |
| 55 | 230 | 56 | 231 |
| 57 | VCC | 58 | GND |
| 59 | VCC | 60 | GND |

Note:

(1) The updated pin numbers are highlighted in gray.

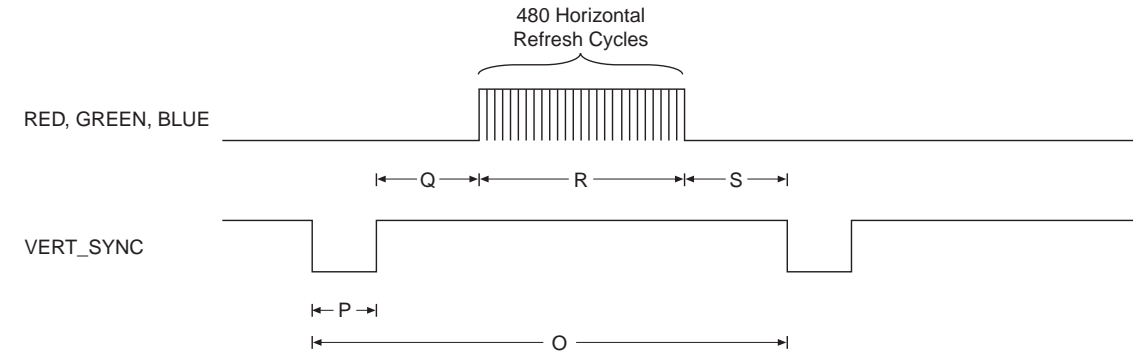
VGA Timing Information

For the VGA monitor to work properly, it must receive data at specific times with specific pulses. Horizontal and vertical synchronization pulses must occur at specified times to synchronize the monitor while it is receiving color data. Figures 1 and 2 show updated timing waveforms for color information with respect to horizontal and vertical synchronization signals.

Figure 1. Horizontal Refresh Cycle

| Parameters | A | B | C | D | E |
|------------|---------------|--------------|--------------|---------------|--------------|
| Time | 31.77 μ s | 3.77 μ s | 1.89 μ s | 25.17 μ s | 0.94 μ s |

Figure 2. Vertical Refresh Cycle




| Parameters | O | P | Q | R | S |
|------------|---------|-------|---------|----------|---------|
| Time | 16.6 ms | 64 μs | 1.02 ms | 15.25 ms | 0.35 ms |

The following updated equations determine the time required for a monitor to update each pixel and to update a whole screen.


$$T_{\text{pixel}} = 1/f_{\text{CLK}} = 40 \text{ ns}$$
$$T_{\text{ROW}} = A = B + C + D + E$$
$$= (T_{\text{pixel}} \times 640 \text{ pixels}) + \text{row} + \text{guard bands} = 31.77 \text{ μs}$$
$$T_{\text{screen}} = O = P + Q + R + S$$
$$= (T_{\text{ROW}} \times 480 \text{ rows}) + \text{guard bands} = 16.6 \text{ ms}$$

Where: T_{pixel} = Time required to update a pixel
 f_{CLK} = 25.175 MHz
 T_{ROW} = Time required to update one row
 T_{screen} = Time required to update the screen
B, C, E, P, Q, S = Guard bands



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