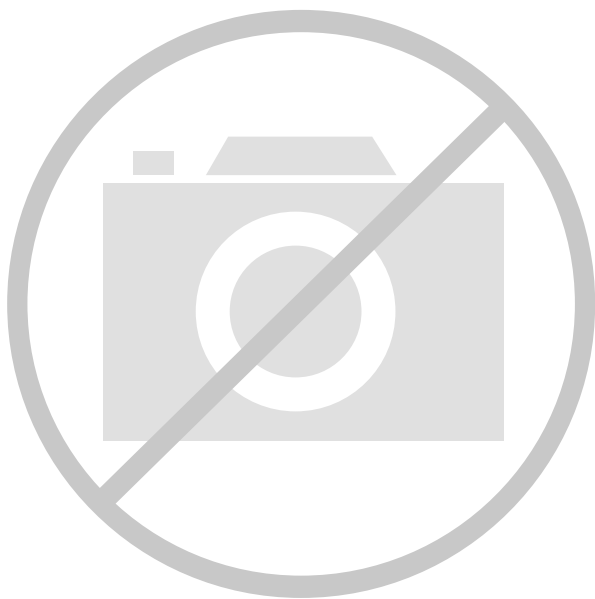




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### Understanding [Embedded - FPGAs \(Field Programmable Gate Array\)](#)

Embedded - FPGAs, or Field Programmable Gate Arrays, are advanced integrated circuits that offer unparalleled flexibility and performance for digital systems. Unlike traditional fixed-function logic devices, FPGAs can be programmed and reprogrammed to execute a wide array of logical operations, enabling customized functionality tailored to specific applications. This reprogrammability allows developers to iterate designs quickly and implement complex functions without the need for custom hardware.

### Applications of Embedded - FPGAs

The versatility of Embedded - FPGAs makes them indispensable in numerous fields. In telecommunications.

#### Details

|                                |                                                                                                                                                                       |
|--------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Product Status                 | Active                                                                                                                                                                |
| Number of LABs/CLBs            | -                                                                                                                                                                     |
| Number of Logic Elements/Cells | -                                                                                                                                                                     |
| Total RAM Bits                 | 147456                                                                                                                                                                |
| Number of I/O                  | 300                                                                                                                                                                   |
| Number of Gates                | 1000000                                                                                                                                                               |
| Voltage - Supply               | 1.425V ~ 1.575V                                                                                                                                                       |
| Mounting Type                  | Surface Mount                                                                                                                                                         |
| Operating Temperature          | 0°C ~ 85°C (TJ)                                                                                                                                                       |
| Package / Case                 | 484-BGA                                                                                                                                                               |
| Supplier Device Package        | 484-FPBGA (23x23)                                                                                                                                                     |
| Purchase URL                   | <a href="https://www.e-xfl.com/product-detail/microchip-technology/m7a3p1000-1fgg484">https://www.e-xfl.com/product-detail/microchip-technology/m7a3p1000-1fgg484</a> |

$F_{CLK}$  is the global clock signal frequency.

$N_{S-CELL}$  is the number of VersaTiles used as sequential modules in the design.

$P_{AC1}$ ,  $P_{AC2}$ ,  $P_{AC3}$ , and  $P_{AC4}$  are device-dependent.

#### **Sequential Cells Contribution— $P_{S-CELL}$**

$$P_{S-CELL} = N_{S-CELL} * (P_{AC5} + \alpha_1 / 2 * P_{AC6}) * F_{CLK}$$

$N_{S-CELL}$  is the number of VersaTiles used as sequential modules in the design. When a multi-tile sequential cell is used, it should be accounted for as 1.

$\alpha_1$  is the toggle rate of VersaTile outputs—guidelines are provided in [Table 2-16 on page 2-14](#).

$F_{CLK}$  is the global clock signal frequency.

#### **Combinatorial Cells Contribution— $P_{C-CELL}$**

$$P_{C-CELL} = N_{C-CELL} * \alpha_1 / 2 * P_{AC7} * F_{CLK}$$

$N_{C-CELL}$  is the number of VersaTiles used as combinatorial modules in the design.

$\alpha_1$  is the toggle rate of VersaTile outputs—guidelines are provided in [Table 2-16 on page 2-14](#).

$F_{CLK}$  is the global clock signal frequency.

#### **Routing Net Contribution— $P_{NET}$**

$$P_{NET} = (N_{S-CELL} + N_{C-CELL}) * \alpha_1 / 2 * P_{AC8} * F_{CLK}$$

$N_{S-CELL}$  is the number of VersaTiles used as sequential modules in the design.

$N_{C-CELL}$  is the number of VersaTiles used as combinatorial modules in the design.

$\alpha_1$  is the toggle rate of VersaTile outputs—guidelines are provided in [Table 2-16 on page 2-14](#).

$F_{CLK}$  is the global clock signal frequency.

#### **I/O Input Buffer Contribution— $P_{INPUTS}$**

$$P_{INPUTS} = N_{INPUTS} * \alpha_2 / 2 * P_{AC9} * F_{CLK}$$

$N_{INPUTS}$  is the number of I/O input buffers used in the design.

$\alpha_2$  is the I/O buffer toggle rate—guidelines are provided in [Table 2-16 on page 2-14](#).

$F_{CLK}$  is the global clock signal frequency.

#### **I/O Output Buffer Contribution— $P_{OUTPUTS}$**

$$P_{OUTPUTS} = N_{OUTPUTS} * \alpha_2 / 2 * \beta_1 * P_{AC10} * F_{CLK}$$

$N_{OUTPUTS}$  is the number of I/O output buffers used in the design.

$\alpha_2$  is the I/O buffer toggle rate—guidelines are provided in [Table 2-16 on page 2-14](#).

$\beta_1$  is the I/O buffer enable rate—guidelines are provided in [Table 2-17 on page 2-14](#).

$F_{CLK}$  is the global clock signal frequency.

**Table 2-24 • Summary of I/O Timing Characteristics—Software Default Settings**  
 –2 Speed Grade, Commercial-Case Conditions:  $T_J = 70^\circ\text{C}$ , Worst Case  $V_{CC} = 1.425\text{ V}$ ,  
 Worst-Case  $V_{CCI}$  (per standard)  
 Advanced I/O Banks

| I/O Standard                         | Drive Strength    | Equiv. Software Default Drive Strength Option <sup>1</sup> | Slew Rate | Capacitive Load (pF) | External Resistor ( $\Omega$ ) | $t_{DOUT}$ (ns) | $t_{DP}$ (ns) | $t_{DIN}$ (ns) | $t_{PY}$ (ns) | $t_{EOUT}$ (ns) | $t_{ZL}$ (ns) | $t_{ZH}$ (ns) | $t_{LZ}$ (ns) | $t_{HZ}$ (ns) | $t_{ZLS}$ (ns) | $t_{ZHS}$ (ns) | Units |
|--------------------------------------|-------------------|------------------------------------------------------------|-----------|----------------------|--------------------------------|-----------------|---------------|----------------|---------------|-----------------|---------------|---------------|---------------|---------------|----------------|----------------|-------|
| 3.3 V LVTTTL / 3.3 V LVCMOS          | 12 mA             | 12 mA                                                      | High      | 35                   | –                              | 0.45            | 2.64          | 0.03           | 0.76          | 0.32            | 2.69          | 2.11          | 2.40          | 2.68          | 4.36           | 3.78           | ns    |
| 3.3 V LVCMOS Wide Range <sup>2</sup> | 100 $\mu\text{A}$ | 12 mA                                                      | High      | 35                   | –                              | 0.45            | 4.08          | 0.03           | 0.76          | 0.32            | 4.08          | 3.20          | 3.71          | 4.14          | 6.61           | 5.74           | ns    |
| 2.5 V LVCMOS                         | 12 mA             | 12 mA                                                      | High      | 35                   | –                              | 0.45            | 2.66          | 0.03           | 0.98          | 0.32            | 2.71          | 2.56          | 2.47          | 2.57          | 4.38           | 4.23           | ns    |
| 1.8 V LVCMOS                         | 12 mA             | 12 mA                                                      | High      | 35                   | –                              | 0.45            | 2.64          | 0.03           | 0.91          | 0.32            | 2.69          | 2.27          | 2.76          | 3.05          | 4.36           | 3.94           | ns    |
| 1.5 V LVCMOS                         | 12 mA             | 12 mA                                                      | High      | 35                   | –                              | 0.45            | 3.05          | 0.03           | 1.07          | 0.32            | 3.10          | 2.67          | 2.95          | 3.14          | 4.77           | 4.34           | ns    |
| 3.3 V PCI                            | Per PCI spec      | –                                                          | High      | 10                   | 25 <sup>4</sup>                | 0.45            | 2.00          | 0.03           | 0.65          | 0.32            | 2.04          | 1.46          | 2.40          | 2.68          | 3.71           | 3.13           | ns    |
| 3.3 V PCI-X                          | Per PCI-X spec    | –                                                          | High      | 10                   | 25 <sup>4</sup>                | 0.45            | 2.00          | 0.03           | 0.62          | 0.32            | 2.04          | 1.46          | 2.40          | 2.68          | 3.71           | 3.13           | ns    |
| LVDS                                 | 24 mA             | –                                                          | High      | –                    | –                              | 0.45            | 1.37          | 0.03           | 1.20          | –               | –             | –             | –             | –             | –              | –              | ns    |
| LVPECL                               | 24 mA             | –                                                          | High      | –                    | –                              | 0.45            | 1.34          | 0.03           | 1.05          | –               | –             | –             | –             | –             | –              | –              | ns    |

**Notes:**

1. The minimum drive strength for any LVCMOS 3.3 V software configuration when run in wide range is  $\pm 100\text{ }\mu\text{A}$ . Drive strength displayed in the software is supported for normal range only. For a detailed I/V curve, refer to the IBIS models.
2. All LVCMOS 3.3 V software macros support LVCMOS 3.3 V wide range as specified in the JESD-8B specification.
3. For specific junction temperature and voltage supply levels, refer to [Table 2-6 on page 2-6](#) for derating values.
4. Resistance is used to measure I/O propagation delays as defined in PCI specifications. See [Figure 2-11 on page 2-64](#) for connectivity. This resistor is not required during normal operation.

**Table 2-26 • Summary of I/O Timing Characteristics—Software Default Settings**  
 –2 Speed Grade, Commercial-Case Conditions:  $T_J = 70^\circ\text{C}$ , Worst Case  $V_{CC} = 1.425\text{ V}$ ,  
 Worst-Case  $V_{CCI}$  (per standard)  
 Standard I/O Banks

| I/O Standard                         | Drive Strength    | Equiv. Software Default Drive Strength Option <sup>1</sup> | Slew Rate | Capacitive Load (pF) | External Resistor | $t_{DOUT}$ (ns) | $t_{DP}$ (ns) | $t_{DIN}$ (ns) | $t_{PY}$ (ns) | $t_{EOUT}$ (ns) | $t_{ZL}$ (ns) | $t_{ZH}$ (ns) | $t_{LZ}$ (ns) | $t_{HZ}$ (ns) | Units |
|--------------------------------------|-------------------|------------------------------------------------------------|-----------|----------------------|-------------------|-----------------|---------------|----------------|---------------|-----------------|---------------|---------------|---------------|---------------|-------|
| 3.3 V LVTTTL / 3.3 V LVCMOS          | 8 mA              | 8 mA                                                       | High      | 35                   | –                 | 0.45            | 3.29          | 0.03           | 0.75          | 0.32            | 3.36          | 2.80          | 1.79          | 2.01          | ns    |
| 3.3 V LVCMOS Wide Range <sup>2</sup> | 100 $\mu\text{A}$ | 8 mA                                                       | High      | 35                   | –                 | 0.45            | 5.09          | 0.03           | 1.13          | 0.32            | 5.09          | 4.25          | 2.77          | 3.11          | ns    |
| 2.5 V LVCMOS                         | 8 mA              | 8 mA                                                       | High      | 35                   | –                 | 0.45            | 3.56          | 0.03           | 0.96          | 0.32            | 3.40          | 3.56          | 1.78          | 1.91          | ns    |
| 1.8 V LVCMOS                         | 4 mA              | 4 mA                                                       | High      | 35                   | –                 | 0.45            | 4.74          | 0.03           | 0.90          | 0.32            | 4.02          | 4.74          | 1.80          | 1.85          | ns    |
| 1.5 V LVCMOS                         | 2 mA              | 2 mA                                                       | High      | 35                   | –                 | 0.45            | 5.71          | 0.03           | 1.06          | 0.32            | 4.71          | 5.71          | 1.83          | 1.83          | ns    |

**Notes:**

1. The minimum drive strength for any LVCMOS 3.3 V software configuration when run in wide range is  $\pm 100\text{ }\mu\text{A}$ . Drive strength displayed in the software is supported for normal range only. For a detailed I/V curve, refer to the IBIS models.
2. All LVCMOS 3.3 V software macros support LVCMOS 3.3 V wide range as specified in the JESD-8B specification.
3. For specific junction temperature and voltage supply levels, refer to [Table 2-6 on page 2-6](#) for derating values.

**Table 2-29 • I/O Output Buffer Maximum Resistances<sup>1</sup>**  
**Applicable to Standard Plus I/O Banks**

| Standard                             | Drive Strength              | R <sub>PULL-DOWN</sub> (Ω) <sup>2</sup> | R <sub>PULL-UP</sub> (Ω) <sup>3</sup> |
|--------------------------------------|-----------------------------|-----------------------------------------|---------------------------------------|
| 3.3 V LVTTTL / 3.3 V LVCMOS          | 2 mA                        | 100                                     | 300                                   |
|                                      | 4 mA                        | 100                                     | 300                                   |
|                                      | 6 mA                        | 50                                      | 150                                   |
|                                      | 8 mA                        | 50                                      | 150                                   |
|                                      | 12 mA                       | 25                                      | 75                                    |
|                                      | 16 mA                       | 25                                      | 75                                    |
| 3.3 V LVCMOS Wide Range <sup>4</sup> | 100 μA                      | Same as regular 3.3 V LVCMOS            | Same as regular 3.3 V LVCMOS          |
| 2.5 V LVCMOS                         | 2 mA                        | 100                                     | 200                                   |
|                                      | 4 mA                        | 100                                     | 200                                   |
|                                      | 6 mA                        | 50                                      | 100                                   |
|                                      | 8 mA                        | 50                                      | 100                                   |
|                                      | 12 mA                       | 25                                      | 50                                    |
| 1.8 V LVCMOS                         | 2 mA                        | 200                                     | 225                                   |
|                                      | 4 mA                        | 100                                     | 112                                   |
|                                      | 6 mA                        | 50                                      | 56                                    |
|                                      | 8 mA                        | 50                                      | 56                                    |
| 1.5 V LVCMOS                         | 2 mA                        | 200                                     | 224                                   |
|                                      | 4 mA                        | 100                                     | 112                                   |
| 3.3 V PCI/PCI-X                      | Per PCI/PCI-X specification | 25                                      | 75                                    |

**Notes:**

1. These maximum values are provided for informational reasons only. Minimum output buffer resistance values depend on VCCI, drive strength selection, temperature, and process. For board design considerations and detailed output buffer resistances, use the corresponding IBIS models located at <http://www.microsemi.com/soc/download/ibis/default.aspx>.
2.  $R_{(PULL-DOWN-MAX)} = (VOL_{spec}) / IOL_{spec}$
3.  $R_{(PULL-UP-MAX)} = (VCCI_{max} - VOH_{spec}) / IOH_{spec}$
4. All LVCMOS 3.3 V software macros support LVCMOS 3.3 V wide range as specified in the JESD-8B specification.

**Table 2-54 • 3.3 V LVTTTL / 3.3 V LVCMOS High Slew**  
**Commercial-Case Conditions:  $T_J = 70^\circ\text{C}$ , Worst-Case  $V_{CC} = 1.425\text{ V}$ , Worst-Case  $V_{CCI} = 3.0\text{ V}$**   
**Applicable to Standard I/O Banks**

| Drive Strength    | Equiv. Software Default Drive Strength Option <sup>1</sup> | Speed Grade | $t_{DOUT}$ | $t_{DP}$ | $t_{DIN}$ | $t_{PY}$ | $t_{EOUT}$ | $t_{ZL}$ | $t_{ZH}$ | $t_{LZ}$ | $t_{HZ}$ | Units |
|-------------------|------------------------------------------------------------|-------------|------------|----------|-----------|----------|------------|----------|----------|----------|----------|-------|
| 100 $\mu\text{A}$ | 2 mA                                                       | Std.        | 0.60       | 10.93    | 0.04      | 1.52     | 0.43       | 10.93    | 9.46     | 3.20     | 3.32     | ns    |
|                   |                                                            | –1          | 0.51       | 9.29     | 0.04      | 1.29     | 0.36       | 9.29     | 8.04     | 2.72     | 2.82     | ns    |
|                   |                                                            | –2          | 0.45       | 8.16     | 0.03      | 1.13     | 0.32       | 8.16     | 7.06     | 2.39     | 2.48     | ns    |
| 100 $\mu\text{A}$ | 4 mA                                                       | Std.        | 0.60       | 10.93    | 0.04      | 1.52     | 0.43       | 10.93    | 9.46     | 3.20     | 3.32     | ns    |
|                   |                                                            | –1          | 0.51       | 9.29     | 0.04      | 1.29     | 0.36       | 9.29     | 8.04     | 2.72     | 2.82     | ns    |
|                   |                                                            | –2          | 0.45       | 8.16     | 0.03      | 1.13     | 0.32       | 8.16     | 7.06     | 2.39     | 2.48     | ns    |
| 100 $\mu\text{A}$ | 6 mA                                                       | Std.        | 0.60       | 6.82     | 0.04      | 1.52     | 0.43       | 6.82     | 5.70     | 3.70     | 4.16     | ns    |
|                   |                                                            | –1          | 0.51       | 5.80     | 0.04      | 1.29     | 0.36       | 5.80     | 4.85     | 3.15     | 3.54     | ns    |
|                   |                                                            | –2          | 0.45       | 5.09     | 0.03      | 1.13     | 0.32       | 5.09     | 4.25     | 2.77     | 3.11     | ns    |
| 100 $\mu\text{A}$ | 8 mA                                                       | Std.        | 0.60       | 6.82     | 0.04      | 1.52     | 0.43       | 6.82     | 5.70     | 3.70     | 4.16     | ns    |
|                   |                                                            | –1          | 0.51       | 5.80     | 0.04      | 1.29     | 0.36       | 5.80     | 4.85     | 3.15     | 3.54     | ns    |
|                   |                                                            | –2          | 0.45       | 5.09     | 0.03      | 1.13     | 0.32       | 5.09     | 4.25     | 2.77     | 3.11     | ns    |

**Notes:**

1. The minimum drive strength for any LVCMOS 3.3 V software configuration when run in wide range is  $\pm 100\text{ }\mu\text{A}$ . Drive strength displayed in the software is supported for normal range only. For a detailed I/V curve, refer to the IBIS models.
2. Software default selection highlighted in gray.
3. For specific junction temperature and voltage supply levels, refer to [Table 2-6 on page 2-6](#) for derating values.

## Timing Characteristics

**Table 2-70 • 1.8 V LVC MOS High Slew**

Commercial-Case Conditions:  $T_J = 70^\circ\text{C}$ , Worst-Case  $V_{CC} = 1.425\text{ V}$ , Worst-Case  $V_{CCI} = 1.7\text{ V}$   
 Applicable to Advanced I/O Banks

| Drive Strength | Speed Grade | $t_{DOUT}$ | $t_{DP}$ | $t_{DIN}$ | $t_{PY}$ | $t_{EOUT}$ | $t_{ZL}$ | $t_{ZH}$ | $t_{LZ}$ | $t_{HZ}$ | $t_{ZLS}$ | $t_{ZHS}$ | Units |
|----------------|-------------|------------|----------|-----------|----------|------------|----------|----------|----------|----------|-----------|-----------|-------|
| 2 mA           | Std.        | 0.66       | 11.86    | 0.04      | 1.22     | 0.43       | 9.14     | 11.86    | 2.77     | 1.66     | 11.37     | 14.10     | ns    |
|                | –1          | 0.56       | 10.09    | 0.04      | 1.04     | 0.36       | 7.77     | 10.09    | 2.36     | 1.41     | 9.67      | 11.99     | ns    |
|                | –2          | 0.49       | 8.86     | 0.03      | 0.91     | 0.32       | 6.82     | 8.86     | 2.07     | 1.24     | 8.49      | 10.53     | ns    |
| 4 mA           | Std.        | 0.66       | 6.91     | 0.04      | 1.22     | 0.43       | 5.86     | 6.91     | 3.22     | 2.84     | 8.10      | 9.15      | ns    |
|                | –1          | 0.56       | 5.88     | 0.04      | 1.04     | 0.36       | 4.99     | 5.88     | 2.74     | 2.41     | 6.89      | 7.78      | ns    |
|                | –2          | 0.49       | 5.16     | 0.03      | 0.91     | 0.32       | 4.38     | 5.16     | 2.41     | 2.12     | 6.05      | 6.83      | ns    |
| 6 mA           | Std.        | 0.66       | 4.45     | 0.04      | 1.22     | 0.43       | 4.18     | 4.45     | 3.53     | 3.38     | 6.42      | 6.68      | ns    |
|                | –1          | 0.56       | 3.78     | 0.04      | 1.04     | 0.36       | 3.56     | 3.78     | 3.00     | 2.88     | 5.46      | 5.69      | ns    |
|                | –2          | 0.49       | 3.32     | 0.03      | 0.91     | 0.32       | 3.12     | 3.32     | 2.64     | 2.53     | 4.79      | 4.99      | ns    |
| 8 mA           | Std.        | 0.66       | 3.92     | 0.04      | 1.22     | 0.43       | 3.93     | 3.92     | 3.60     | 3.52     | 6.16      | 6.16      | ns    |
|                | –1          | 0.56       | 3.34     | 0.04      | 1.04     | 0.36       | 3.34     | 3.34     | 3.06     | 3.00     | 5.24      | 5.24      | ns    |
|                | –2          | 0.49       | 2.93     | 0.03      | 0.91     | 0.32       | 2.93     | 2.93     | 2.69     | 2.63     | 4.60      | 4.60      | ns    |
| 12 mA          | Std.        | 0.66       | 3.53     | 0.04      | 1.22     | 0.43       | 3.60     | 3.04     | 3.70     | 4.08     | 5.84      | 5.28      | ns    |
|                | –1          | 0.56       | 3.01     | 0.04      | 1.04     | 0.36       | 3.06     | 2.59     | 3.15     | 3.47     | 4.96      | 4.49      | ns    |
|                | –2          | 0.49       | 2.64     | 0.03      | 0.91     | 0.32       | 2.69     | 2.27     | 2.76     | 3.05     | 4.36      | 3.94      | ns    |
| 16 mA          | Std.        | 0.66       | 3.53     | 0.04      | 1.22     | 0.43       | 3.60     | 3.04     | 3.70     | 4.08     | 5.84      | 5.28      | ns    |
|                | –1          | 0.56       | 3.01     | 0.04      | 1.04     | 0.36       | 3.06     | 2.59     | 3.15     | 3.47     | 4.96      | 4.49      | ns    |
|                | –2          | 0.49       | 2.64     | 0.03      | 0.91     | 0.32       | 2.69     | 2.27     | 2.76     | 3.05     | 4.36      | 3.94      | ns    |

### Notes:

1. Software default selection highlighted in gray.
2. For specific junction temperature and voltage supply levels, refer to [Table 2-6 on page 2-6](#) for derating values.

**Table 2-71 • 1.8 V LVCMOS Low Slew**

Commercial-Case Conditions:  $T_J = 70^{\circ}\text{C}$ , Worst-Case  $V_{CC} = 1.425\text{ V}$ , Worst-Case  $V_{CCI} = 1.7\text{ V}$   
Applicable to Advanced I/O Banks

| Drive Strength | Speed Grade | $t_{DOUT}$ | $t_{DP}$ | $t_{DIN}$ | $t_{PY}$ | $t_{EOUT}$ | $t_{ZL}$ | $t_{ZH}$ | $t_{LZ}$ | $t_{HZ}$ | $t_{ZLS}$ | $t_{ZHS}$ | Units |
|----------------|-------------|------------|----------|-----------|----------|------------|----------|----------|----------|----------|-----------|-----------|-------|
| 2 mA           | Std.        | 0.66       | 15.53    | 0.04      | 1.22     | 0.43       | 14.11    | 15.53    | 2.78     | 1.60     | 16.35     | 17.77     | ns    |
|                | –1          | 0.56       | 13.21    | 0.04      | 1.04     | 0.36       | 12.01    | 13.21    | 2.36     | 1.36     | 13.91     | 15.11     | ns    |
|                | –2          | 0.49       | 11.60    | 0.03      | 0.91     | 0.32       | 10.54    | 11.60    | 2.07     | 1.19     | 12.21     | 13.27     | ns    |
| 4 mA           | Std.        | 0.66       | 10.48    | 0.04      | 1.22     | 0.43       | 10.41    | 10.48    | 3.23     | 2.73     | 12.65     | 12.71     | ns    |
|                | –1          | 0.56       | 8.91     | 0.04      | 1.04     | 0.36       | 8.86     | 8.91     | 2.75     | 2.33     | 10.76     | 10.81     | ns    |
|                | –2          | 0.49       | 7.82     | 0.03      | 0.91     | 0.32       | 7.77     | 7.82     | 2.41     | 2.04     | 9.44      | 9.49      | ns    |
| 6 mA           | Std.        | 0.66       | 8.05     | 0.04      | 1.22     | 0.43       | 8.20     | 7.84     | 3.54     | 3.27     | 10.43     | 10.08     | ns    |
|                | –1          | 0.56       | 6.85     | 0.04      | 1.04     | 0.36       | 6.97     | 6.67     | 3.01     | 2.78     | 8.88      | 8.57      | ns    |
|                | –2          | 0.49       | 6.01     | 0.03      | 0.91     | 0.32       | 6.12     | 5.86     | 2.64     | 2.44     | 7.79      | 7.53      | ns    |
| 8 mA           | Std.        | 0.66       | 7.50     | 0.04      | 1.22     | 0.43       | 7.64     | 7.30     | 3.61     | 3.41     | 9.88      | 9.53      | ns    |
|                | –1          | 0.56       | 6.38     | 0.04      | 1.04     | 0.36       | 6.50     | 6.21     | 3.07     | 2.90     | 8.40      | 8.11      | ns    |
|                | –2          | 0.49       | 5.60     | 0.03      | 0.91     | 0.32       | 5.71     | 5.45     | 2.69     | 2.55     | 7.38      | 7.12      | ns    |
| 12 mA          | Std.        | 0.66       | 7.29     | 0.04      | 1.22     | 0.43       | 7.23     | 7.29     | 3.71     | 3.95     | 9.47      | 9.53      | ns    |
|                | –1          | 0.56       | 6.20     | 0.04      | 1.04     | 0.36       | 6.15     | 6.20     | 3.15     | 3.36     | 8.06      | 8.11      | ns    |
|                | –2          | 0.49       | 5.45     | 0.03      | 0.91     | 0.32       | 5.40     | 5.45     | 2.77     | 2.95     | 7.07      | 7.12      | ns    |
| 16 mA          | Std.        | 0.66       | 7.29     | 0.04      | 1.22     | 0.43       | 7.23     | 7.29     | 3.71     | 3.95     | 9.47      | 9.53      | ns    |
|                | –1          | 0.56       | 6.20     | 0.04      | 1.04     | 0.36       | 6.15     | 6.20     | 3.15     | 3.36     | 8.06      | 8.11      | ns    |
|                | –2          | 0.49       | 5.45     | 0.03      | 0.91     | 0.32       | 5.40     | 5.45     | 2.77     | 2.95     | 7.07      | 7.12      | ns    |

**Note:** For specific junction temperature and voltage supply levels, refer to [Table 2-6 on page 2-6](#) for derating values.



**Table 2-90 • LVDS Minimum and Maximum DC Input and Output Levels**

| DC Parameter       | Description                 | Min.  | Typ.  | Max.  | Units |
|--------------------|-----------------------------|-------|-------|-------|-------|
| VCCI               | Supply Voltage              | 2.375 | 2.5   | 2.625 | V     |
| VOL                | Output Low Voltage          | 0.9   | 1.075 | 1.25  | V     |
| VOH                | Output High Voltage         | 1.25  | 1.425 | 1.6   | V     |
| IOL <sup>1</sup>   | Output Lower Current        | 0.65  | 0.91  | 1.16  | mA    |
| IOH <sup>1</sup>   | Output High Current         | 0.65  | 0.91  | 1.16  | mA    |
| VI                 | Input Voltage               | 0     |       | 2.925 | V     |
| IIH <sup>2,3</sup> | Input High Leakage Current  |       |       | 10    | μA    |
| IIL <sup>2,4</sup> | Input Low Leakage Current   |       |       | 10    | μA    |
| VODIFF             | Differential Output Voltage | 250   | 350   | 450   | mV    |
| VOCM               | Output Common Mode Voltage  | 1.125 | 1.25  | 1.375 | V     |
| VICM               | Input Common Mode Voltage   | 0.05  | 1.25  | 2.35  | V     |
| VIDIFF             | Input Differential Voltage  | 100   | 350   |       | mV    |

**Notes:**

1. IOL/IOH defined by VODIFF/(Resistor Network)
2. Currents are measured at 85°C junction temperature.
3. IIH is the input leakage current per I/O pin over recommended operating conditions  $V_{IH} < V_{IN} < V_{CCI}$ . Input current is larger when operating outside recommended ranges.
4. IIL is the input leakage current per I/O pin over recommended operation conditions where  $-0.3\text{ V} < V_{IN} < V_{IL}$ .

**Table 2-91 • AC Waveforms, Measuring Points, and Capacitive Loads**

| Input Low (V) | Input High (V) | Measuring Point* (V) |
|---------------|----------------|----------------------|
| 1.075         | 1.325          | Cross point          |

**Note:** \*Measuring point =  $V_{trip}$ . See Table 2-22 on page 2-22 for a complete table of trip points.

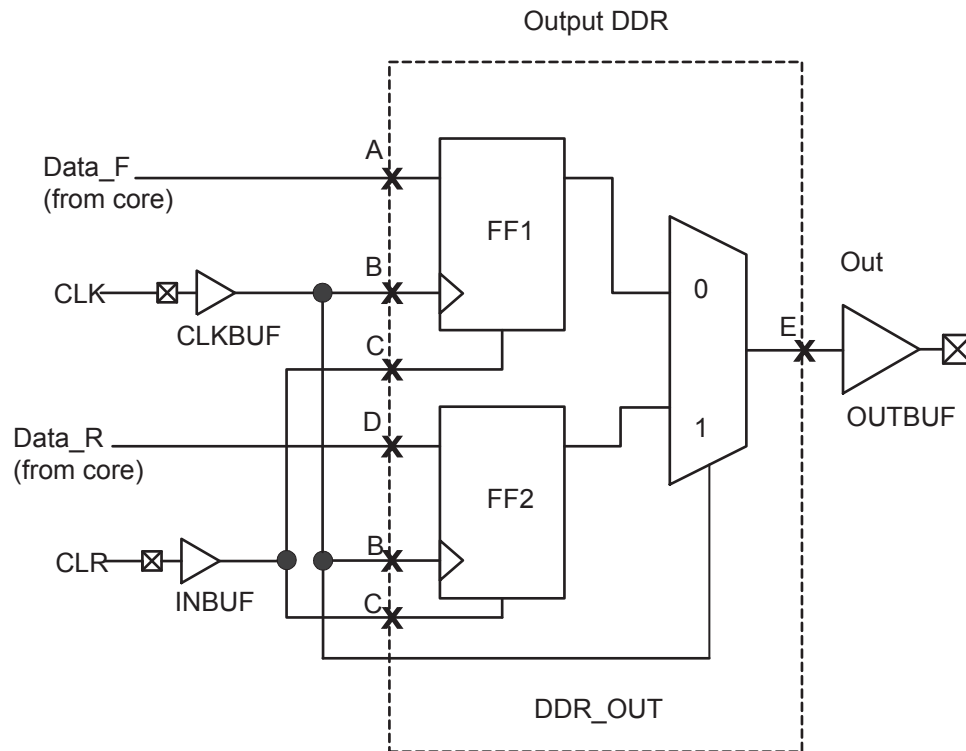
**Timing Characteristics**
**Table 2-92 • LVDS**

Commercial-Case Conditions:  $T_J = 70^\circ\text{C}$ , Worst-Case VCC = 1.425 V, Worst-Case VCCI = 2.3 V

| Speed Grade | $t_{DOUT}$ | $t_{DP}$ | $t_{DIN}$ | $t_{PY}$ | Units |
|-------------|------------|----------|-----------|----------|-------|
| Std.        | 0.66       | 1.83     | 0.04      | 1.60     | ns    |
| -1          | 0.56       | 1.56     | 0.04      | 1.36     | ns    |
| -2          | 0.49       | 1.37     | 0.03      | 1.20     | ns    |

**Note:** For specific junction temperature and voltage supply levels, refer to Table 2-6 on page 2-6 for derating values.

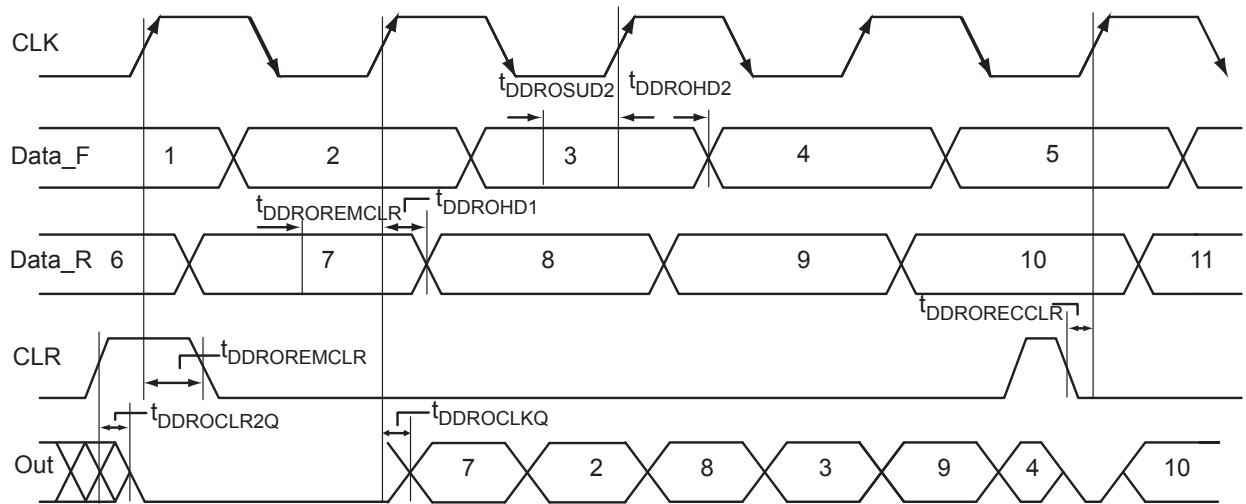
## Output DDR Module



**Figure 2-22 • Output DDR Timing Model**

**Table 2-103 • Parameter Definitions**

| Parameter Name          | Parameter Definition      | Measuring Nodes (from, to) |
|-------------------------|---------------------------|----------------------------|
| $t_{\text{DDROCLKQ}}$   | Clock-to-Out              | B, E                       |
| $t_{\text{DDROCLR2Q}}$  | Asynchronous Clear-to-Out | C, E                       |
| $t_{\text{DDROREMCLR}}$ | Clear Removal             | C, B                       |
| $t_{\text{DDRORECCLR}}$ | Clear Recovery            | C, B                       |
| $t_{\text{DDROSUD1}}$   | Data Setup Data_F         | A, B                       |
| $t_{\text{DDROSUD2}}$   | Data Setup Data_R         | D, B                       |
| $t_{\text{DDROHD1}}$    | Data Hold Data_F          | A, B                       |
| $t_{\text{DDROHD2}}$    | Data Hold Data_R          | D, B                       |



**Figure 2-23 • Output DDR Timing Diagram**

### Timing Characteristics

**Table 2-104 • Output DDR Propagation Delays**

Commercial-Case Conditions:  $T_J = 70^\circ\text{C}$ , Worst-Case  $V_{CC} = 1.425\text{ V}$

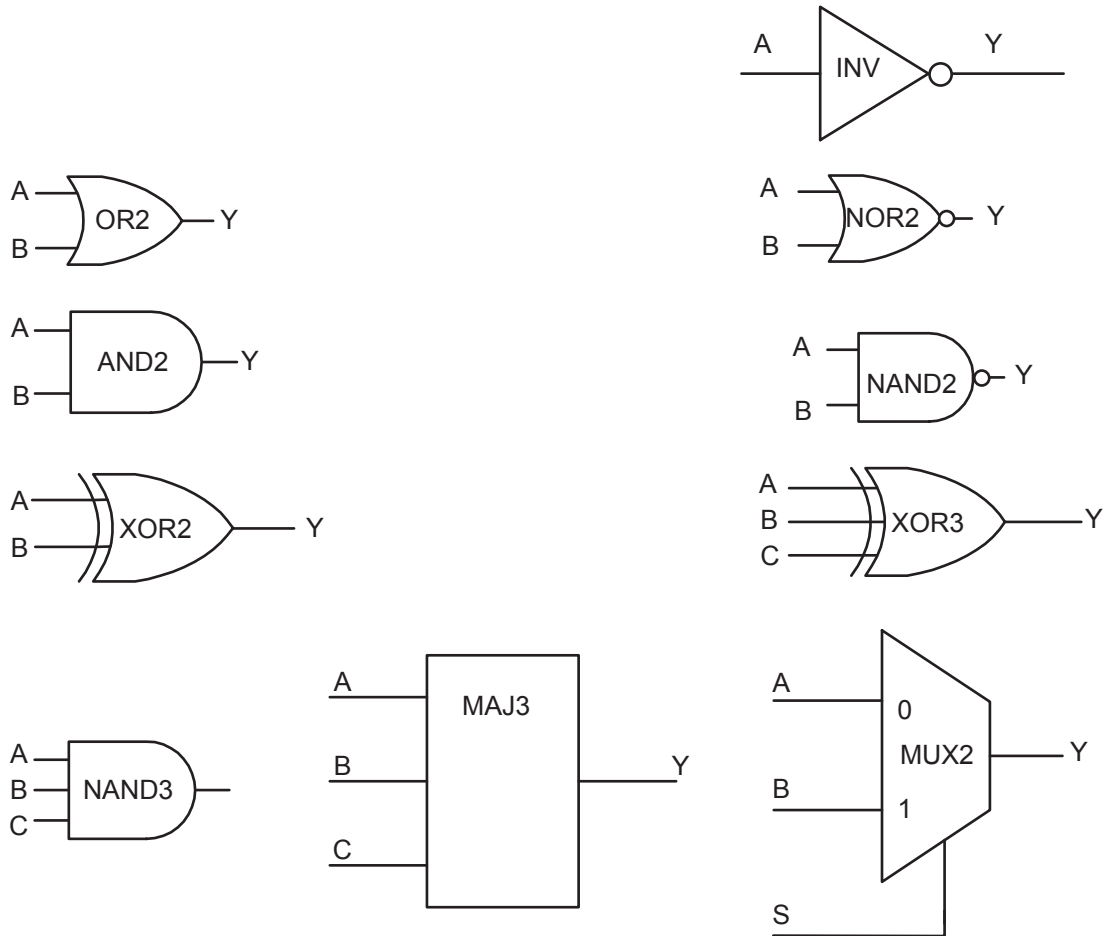
| Parameter               | Description                                           | -2   | -1   | Std. | Units |
|-------------------------|-------------------------------------------------------|------|------|------|-------|
| $t_{\text{DDROCLKQ}}$   | Clock-to-Out of DDR for Output DDR                    | 0.70 | 0.80 | 0.94 | ns    |
| $t_{\text{DDROSUD1}}$   | Data_F Data Setup for Output DDR                      | 0.38 | 0.43 | 0.51 | ns    |
| $t_{\text{DDROSUD2}}$   | Data_R Data Setup for Output DDR                      | 0.38 | 0.43 | 0.51 | ns    |
| $t_{\text{DDROHD1}}$    | Data_F Data Hold for Output DDR                       | 0.00 | 0.00 | 0.00 | ns    |
| $t_{\text{DDROHD2}}$    | Data_R Data Hold for Output DDR                       | 0.00 | 0.00 | 0.00 | ns    |
| $t_{\text{DDROCLR2Q}}$  | Asynchronous Clear-to-Out for Output DDR              | 0.80 | 0.91 | 1.07 | ns    |
| $t_{\text{DDROEMCLR}}$  | Asynchronous Clear Removal Time for Output DDR        | 0.00 | 0.00 | 0.00 | ns    |
| $t_{\text{DDROECCLR}}$  | Asynchronous Clear Recovery Time for Output DDR       | 0.22 | 0.25 | 0.30 | ns    |
| $t_{\text{DDROWCLR1}}$  | Asynchronous Clear Minimum Pulse Width for Output DDR | 0.22 | 0.25 | 0.30 | ns    |
| $t_{\text{DDROCKMPWH}}$ | Clock Minimum Pulse Width High for the Output DDR     | 0.36 | 0.41 | 0.48 | ns    |
| $t_{\text{DDROCKMPWL}}$ | Clock Minimum Pulse Width Low for the Output DDR      | 0.32 | 0.37 | 0.43 | ns    |
| $F_{\text{DDOMAX}}$     | Maximum Frequency for the Output DDR                  | 350  | 309  | 263  | MHz   |

**Note:** For specific junction temperature and voltage supply levels, refer to [Table 2-6 on page 2-6](#) for derating values.

## VersaTile Characteristics

### VersaTile Specifications as a Combinatorial Module

The ProASIC3 library offers all combinations of LUT-3 combinatorial functions. In this section, timing characteristics are presented for a sample of the library. For more details, refer to the [Fusion](#), [IGLOO®/e](#), and [ProASIC3/E Macro Library Guide](#).



**Figure 2-24 • Sample of Combinatorial Cells**

**Table 2-113 • A3P600 Global Resource**  
**Commercial-Case Conditions:  $T_J = 70^\circ\text{C}$ ,  $V_{CC} = 1.425\text{ V}$**

| Parameter     | Description                               | -2                |                   | -1                |                   | Std.              |                   | Units |
|---------------|-------------------------------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------|
|               |                                           | Min. <sup>1</sup> | Max. <sup>2</sup> | Min. <sup>1</sup> | Max. <sup>2</sup> | Min. <sup>1</sup> | Max. <sup>2</sup> |       |
| $t_{RCKL}$    | Input Low Delay for Global Clock          | 0.87              | 1.09              | 0.99              | 1.24              | 1.17              | 1.46              | ns    |
| $t_{RCKH}$    | Input High Delay for Global Clock         | 0.86              | 1.11              | 0.98              | 1.27              | 1.15              | 1.49              | ns    |
| $t_{RCKMPWH}$ | Minimum Pulse Width High for Global Clock | 0.75              |                   | 0.85              |                   | 1.00              |                   | ns    |
| $t_{RCKMPWL}$ | Minimum Pulse Width Low for Global Clock  | 0.85              |                   | 0.96              |                   | 1.13              |                   | ns    |
| $t_{RCKSW}$   | Maximum Skew for Global Clock             |                   | 0.26              |                   | 0.29              |                   | 0.34              | ns    |

**Notes:**

1. Value reflects minimum load. The delay is measured from the CCC output to the clock pin of a sequential element, located in a lightly loaded row (single element is connected to the global net).
2. Value reflects maximum load. The delay is measured on the clock pin of the farthest sequential element, located in a fully loaded row (all available flip-flops are connected to the global net in the row).
3. For specific junction temperature and voltage supply levels, refer to [Table 2-6 on page 2-6](#) for derating values.

**Table 2-114 • A3P1000 Global Resource**  
**Commercial-Case Conditions:  $T_J = 70^\circ\text{C}$ ,  $V_{CC} = 1.425\text{ V}$**

| Parameter     | Description                               | -2                |                   | -1                |                   | Std.              |                   | Units |
|---------------|-------------------------------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------|
|               |                                           | Min. <sup>1</sup> | Max. <sup>2</sup> | Min. <sup>1</sup> | Max. <sup>2</sup> | Min. <sup>1</sup> | Max. <sup>2</sup> |       |
| $t_{RCKL}$    | Input Low Delay for Global Clock          | 0.94              | 1.16              | 1.07              | 1.32              | 1.26              | 1.55              | ns    |
| $t_{RCKH}$    | Input High Delay for Global Clock         | 0.93              | 1.19              | 1.06              | 1.35              | 1.24              | 1.59              | ns    |
| $t_{RCKMPWH}$ | Minimum Pulse Width High for Global Clock | 0.75              |                   | 0.85              |                   | 1.00              |                   | ns    |
| $t_{RCKMPWL}$ | Minimum Pulse Width Low for Global Clock  | 0.85              |                   | 0.96              |                   | 1.13              |                   | ns    |
| $t_{RCKSW}$   | Maximum Skew for Global Clock             |                   | 0.26              |                   | 0.29              |                   | 0.35              | ns    |

**Notes:**

1. Value reflects minimum load. The delay is measured from the CCC output to the clock pin of a sequential element, located in a lightly loaded row (single element is connected to the global net).
2. Value reflects maximum load. The delay is measured on the clock pin of the farthest sequential element, located in a fully loaded row (all available flip-flops are connected to the global net in the row).
3. For specific junction temperature and voltage supply levels, refer to [Table 2-6 on page 2-6](#) for derating values.

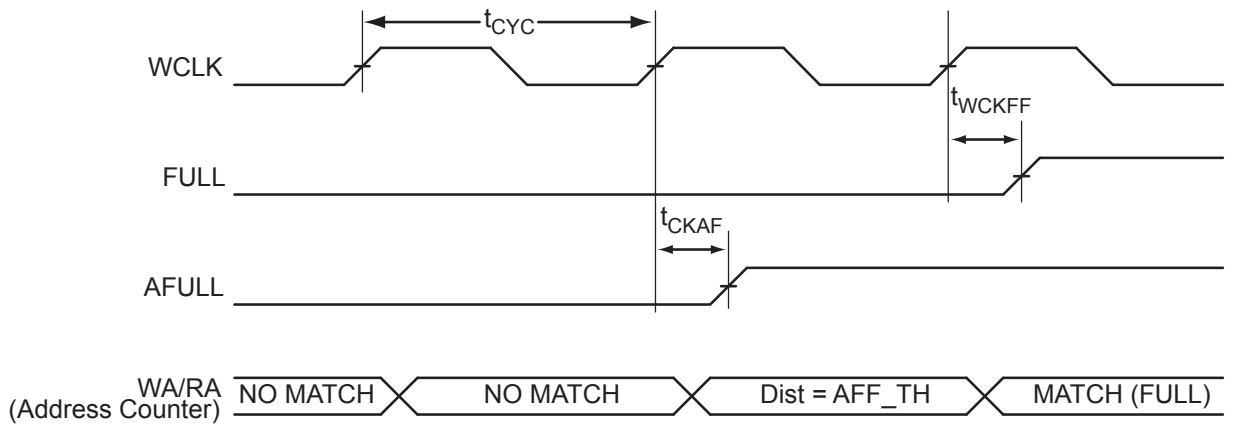


Figure 2-41 • FIFO FULL Flag and AFULL Flag Assertion

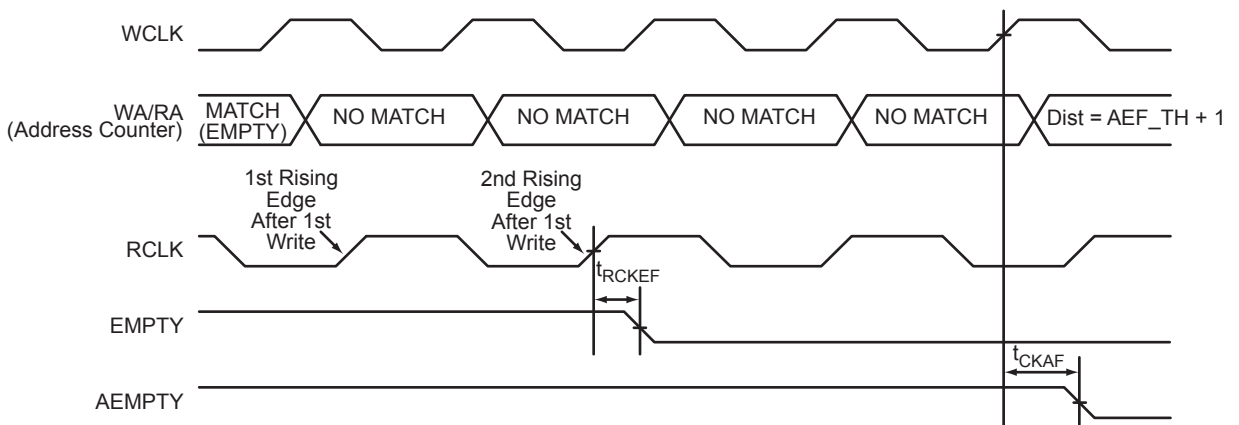


Figure 2-42 • FIFO EMPTY Flag and AEMPTY Flag Deassertion

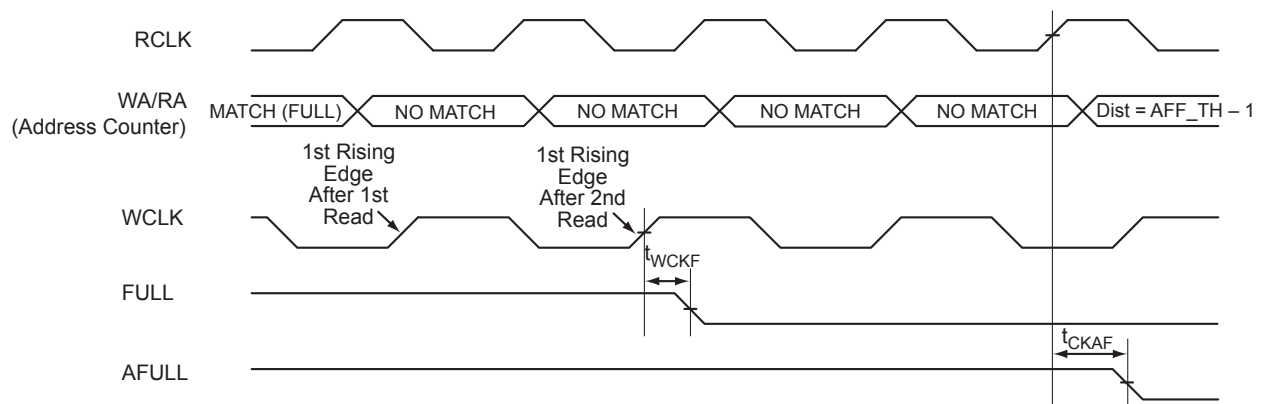
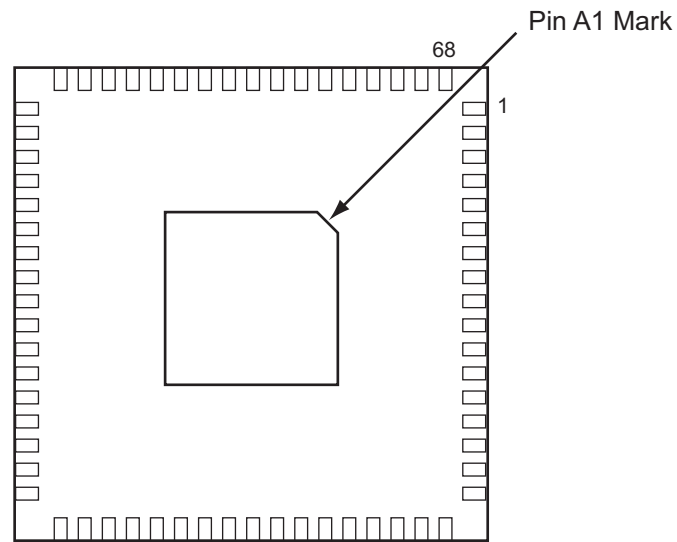


Figure 2-43 • FIFO FULL Flag and AFULL Flag Deassertion

## QN68 – Bottom View

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**Note:** The die attach paddle center of the package is tied to ground (GND).

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### **Note**

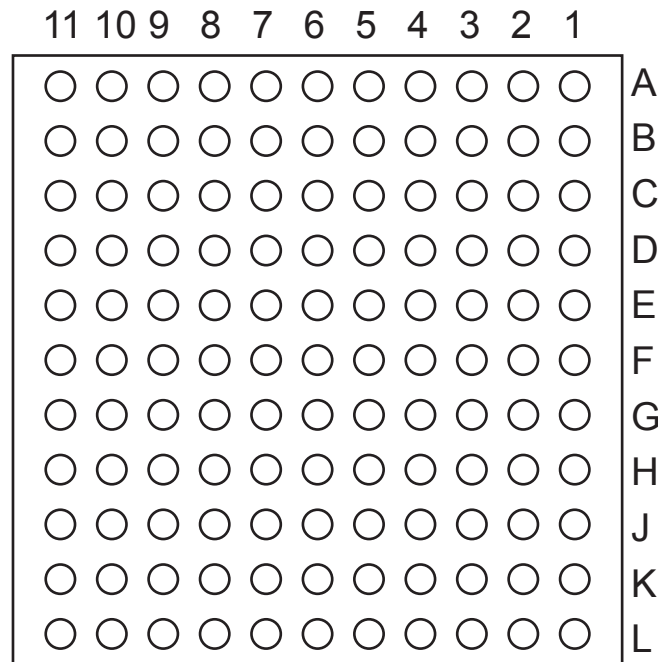
For more information on package drawings, see [PD3068: Package Mechanical Drawings](#).

| <b>QN132</b>      |                        |
|-------------------|------------------------|
| <b>Pin Number</b> | <b>A3P030 Function</b> |
| C17               | IO51RSB1               |
| C18               | NC                     |
| C19               | TCK                    |
| C20               | NC                     |
| C21               | VPUMP                  |
| C22               | VJTAG                  |
| C23               | NC                     |
| C24               | NC                     |
| C25               | NC                     |
| C26               | GDB0/IO38RSB0          |
| C27               | NC                     |
| C28               | VCCIB0                 |
| C29               | IO32RSB0               |
| C30               | IO29RSB0               |
| C31               | IO28RSB0               |
| C32               | IO25RSB0               |
| C33               | NC                     |
| C34               | NC                     |
| C35               | VCCIB0                 |
| C36               | IO17RSB0               |
| C37               | IO14RSB0               |
| C38               | IO11RSB0               |
| C39               | IO07RSB0               |
| C40               | IO04RSB0               |
| D1                | GND                    |
| D2                | GND                    |
| D3                | GND                    |
| D4                | GND                    |



## CS121 – Bottom View

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*Note:* The die attach paddle center of the package is tied to ground (GND).

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### **Note**

For more information on package drawings, see [PD3068: Package Mechanical Drawings](#).

| PQ208      |                 |
|------------|-----------------|
| Pin Number | A3P250 Function |
| 1          | GND             |
| 2          | GAA2/IO118UDB3  |
| 3          | IO118VDB3       |
| 4          | GAB2/IO117UDB3  |
| 5          | IO117VDB3       |
| 6          | GAC2/IO116UDB3  |
| 7          | IO116VDB3       |
| 8          | IO115UDB3       |
| 9          | IO115VDB3       |
| 10         | IO114UDB3       |
| 11         | IO114VDB3       |
| 12         | IO113PDB3       |
| 13         | IO113NDB3       |
| 14         | IO112PDB3       |
| 15         | IO112NDB3       |
| 16         | VCC             |
| 17         | GND             |
| 18         | VCCIB3          |
| 19         | IO111PDB3       |
| 20         | IO111NDB3       |
| 21         | GFC1/IO110PDB3  |
| 22         | GFC0/IO110NDB3  |
| 23         | GFB1/IO109PDB3  |
| 24         | GFB0/IO109NDB3  |
| 25         | VCOMPLF         |
| 26         | GFA0/IO108NPB3  |
| 27         | VCCPLF          |
| 28         | GFA1/IO108PPB3  |
| 29         | GND             |
| 30         | GFA2/IO107PDB3  |
| 31         | IO107NDB3       |
| 32         | GFB2/IO106PDB3  |
| 33         | IO106NDB3       |
| 34         | GFC2/IO105PDB3  |
| 35         | IO105NDB3       |
| 36         | NC              |

| PQ208      |                 |
|------------|-----------------|
| Pin Number | A3P250 Function |
| 37         | IO104PDB3       |
| 38         | IO104NDB3       |
| 39         | IO103PSB3       |
| 40         | VCCIB3          |
| 41         | GND             |
| 42         | IO101PDB3       |
| 43         | IO101NDB3       |
| 44         | GEC1/IO100PDB3  |
| 45         | GEC0/IO100NDB3  |
| 46         | GEB1/IO99PDB3   |
| 47         | GEB0/IO99NDB3   |
| 48         | GEA1/IO98PDB3   |
| 49         | GEA0/IO98NDB3   |
| 50         | VMV3            |
| 51         | GNDQ            |
| 52         | GND             |
| 53         | NC              |
| 54         | NC              |
| 55         | GEA2/IO97RSB2   |
| 56         | GEB2/IO96RSB2   |
| 57         | GEC2/IO95RSB2   |
| 58         | IO94RSB2        |
| 59         | IO93RSB2        |
| 60         | IO92RSB2        |
| 61         | IO91RSB2        |
| 62         | VCCIB2          |
| 63         | IO90RSB2        |
| 64         | IO89RSB2        |
| 65         | GND             |
| 66         | IO88RSB2        |
| 67         | IO87RSB2        |
| 68         | IO86RSB2        |
| 69         | IO85RSB2        |
| 70         | IO84RSB2        |
| 71         | VCC             |
| 72         | VCCIB2          |

| PQ208      |                 |
|------------|-----------------|
| Pin Number | A3P250 Function |
| 73         | IO83RSB2        |
| 74         | IO82RSB2        |
| 75         | IO81RSB2        |
| 76         | IO80RSB2        |
| 77         | IO79RSB2        |
| 78         | IO78RSB2        |
| 79         | IO77RSB2        |
| 80         | IO76RSB2        |
| 81         | GND             |
| 82         | IO75RSB2        |
| 83         | IO74RSB2        |
| 84         | IO73RSB2        |
| 85         | IO72RSB2        |
| 86         | IO71RSB2        |
| 87         | IO70RSB2        |
| 88         | VCC             |
| 89         | VCCIB2          |
| 90         | IO69RSB2        |
| 91         | IO68RSB2        |
| 92         | IO67RSB2        |
| 93         | IO66RSB2        |
| 94         | IO65RSB2        |
| 95         | IO64RSB2        |
| 96         | GDC2/IO63RSB2   |
| 97         | GND             |
| 98         | GDB2/IO62RSB2   |
| 99         | GDA2/IO61RSB2   |
| 100        | GNDQ            |
| 101        | TCK             |
| 102        | TDI             |
| 103        | TMS             |
| 104        | VMV2            |
| 105        | GND             |
| 106        | VPUMP           |
| 107        | NC              |
| 108        | TDO             |

| FG144      |                 |
|------------|-----------------|
| Pin Number | A3P400 Function |
| A1         | GNDQ            |
| A2         | VMV0            |
| A3         | GAB0/IO02RSB0   |
| A4         | GAB1/IO03RSB0   |
| A5         | IO16RSB0        |
| A6         | GND             |
| A7         | IO30RSB0        |
| A8         | VCC             |
| A9         | IO34RSB0        |
| A10        | GBA0/IO58RSB0   |
| A11        | GBA1/IO59RSB0   |
| A12        | GNDQ            |
| B1         | GAB2/IO154UDB3  |
| B2         | GND             |
| B3         | GAA0/IO00RSB0   |
| B4         | GAA1/IO01RSB0   |
| B5         | IO14RSB0        |
| B6         | IO19RSB0        |
| B7         | IO23RSB0        |
| B8         | IO31RSB0        |
| B9         | GBB0/IO56RSB0   |
| B10        | GBB1/IO57RSB0   |
| B11        | GND             |
| B12        | VMV1            |
| C1         | IO154VDB3       |
| C2         | GFA2/IO144PPB3  |
| C3         | GAC2/IO153UDB3  |
| C4         | VCC             |
| C5         | IO12RSB0        |
| C6         | IO17RSB0        |
| C7         | IO25RSB0        |
| C8         | IO32RSB0        |
| C9         | IO53RSB0        |
| C10        | GBA2/IO60PDB1   |
| C11        | IO60NDB1        |
| C12        | GBC2/IO62PPB1   |

| FG144      |                 |
|------------|-----------------|
| Pin Number | A3P400 Function |
| D1         | IO149NDB3       |
| D2         | IO149PDB3       |
| D3         | IO153VDB3       |
| D4         | GAA2/IO155UPB3  |
| D5         | GAC0/IO04RSB0   |
| D6         | GAC1/IO05RSB0   |
| D7         | GBC0/IO54RSB0   |
| D8         | GBC1/IO55RSB0   |
| D9         | GBB2/IO61PDB1   |
| D10        | IO61NDB1        |
| D11        | IO62NPB1        |
| D12        | GCB1/IO68PPB1   |
| E1         | VCC             |
| E2         | GFC0/IO147NDB3  |
| E3         | GFC1/IO147PDB3  |
| E4         | VCCIB3          |
| E5         | IO155VPB3       |
| E6         | VCCIB0          |
| E7         | VCCIB0          |
| E8         | GCC1/IO67PDB1   |
| E9         | VCCIB1          |
| E10        | VCC             |
| E11        | GCA0/IO69NDB1   |
| E12        | IO70NDB1        |
| F1         | GFB0/IO146NPB3  |
| F2         | VCOMPLF         |
| F3         | GFB1/IO146PPB3  |
| F4         | IO144NPB3       |
| F5         | GND             |
| F6         | GND             |
| F7         | GND             |
| F8         | GCC0/IO67NDB1   |
| F9         | GCB0/IO68NPB1   |
| F10        | GND             |
| F11        | GCA1/IO69PDB1   |
| F12        | GCA2/IO70PDB1   |

| FG144      |                 |
|------------|-----------------|
| Pin Number | A3P400 Function |
| G1         | GFA1/IO145PPB3  |
| G2         | GND             |
| G3         | VCCPLF          |
| G4         | GFA0/IO145NPB3  |
| G5         | GND             |
| G6         | GND             |
| G7         | GND             |
| G8         | GDC1/IO77UPB1   |
| G9         | IO72NDB1        |
| G10        | GCC2/IO72PDB1   |
| G11        | IO71NDB1        |
| G12        | GCB2/IO71PDB1   |
| H1         | VCC             |
| H2         | GFB2/IO143PDB3  |
| H3         | GFC2/IO142PSB3  |
| H4         | GEC1/IO137PDB3  |
| H5         | VCC             |
| H6         | IO75PDB1        |
| H7         | IO75NDB1        |
| H8         | GDB2/IO81RSB2   |
| H9         | GDC0/IO77VPB1   |
| H10        | VCCIB1          |
| H11        | IO73PSB1        |
| H12        | VCC             |
| J1         | GEB1/IO136PDB3  |
| J2         | IO143NDB3       |
| J3         | VCCIB3          |
| J4         | GEC0/IO137NDB3  |
| J5         | IO125RSB2       |
| J6         | IO116RSB2       |
| J7         | VCC             |
| J8         | TCK             |
| J9         | GDA2/IO80RSB2   |
| J10        | TDO             |
| J11        | GDA1/IO79UDB1   |
| J12        | GDB1/IO78UDB1   |

| <b>FG144</b>      |                         |
|-------------------|-------------------------|
| <b>Pin Number</b> | <b>A3P1000 Function</b> |
| K1                | GEB0/IO189NDB3          |
| K2                | GEA1/IO188PDB3          |
| K3                | GEA0/IO188NDB3          |
| K4                | GEA2/IO187RSB2          |
| K5                | IO169RSB2               |
| K6                | IO152RSB2               |
| K7                | GND                     |
| K8                | IO117RSB2               |
| K9                | GDC2/IO116RSB2          |
| K10               | GND                     |
| K11               | GDA0/IO113NDB1          |
| K12               | GDB0/IO112NDB1          |
| L1                | GND                     |
| L2                | VMV3                    |
| L3                | GEB2/IO186RSB2          |
| L4                | IO172RSB2               |
| L5                | VCCIB2                  |
| L6                | IO153RSB2               |
| L7                | IO144RSB2               |
| L8                | IO140RSB2               |
| L9                | TMS                     |
| L10               | VJTAG                   |
| L11               | VMV2                    |
| L12               | TRST                    |
| M1                | GNDQ                    |
| M2                | GEC2/IO185RSB2          |
| M3                | IO173RSB2               |
| M4                | IO168RSB2               |
| M5                | IO161RSB2               |
| M6                | IO156RSB2               |
| M7                | IO145RSB2               |
| M8                | IO141RSB2               |
| M9                | TDI                     |
| M10               | VCCIB2                  |
| M11               | VPUMP                   |
| M12               | GNDQ                    |

| FG256      |                 |
|------------|-----------------|
| Pin Number | A3P250 Function |
| G13        | GCC1/IO48PPB1   |
| G14        | IO47NPB1        |
| G15        | IO54PDB1        |
| G16        | IO54NDB1        |
| H1         | GFB0/IO109NPB3  |
| H2         | GFA0/IO108NDB3  |
| H3         | GFB1/IO109PPB3  |
| H4         | VCOMPLF         |
| H5         | GFC0/IO110NPB3  |
| H6         | VCC             |
| H7         | GND             |
| H8         | GND             |
| H9         | GND             |
| H10        | GND             |
| H11        | VCC             |
| H12        | GCC0/IO48NPB1   |
| H13        | GCB1/IO49PPB1   |
| H14        | GCA0/IO50NPB1   |
| H15        | NC              |
| H16        | GCB0/IO49NPB1   |
| J1         | GFA2/IO107PPB3  |
| J2         | GFA1/IO108PDB3  |
| J3         | VCCPLF          |
| J4         | IO106NDB3       |
| J5         | GFB2/IO106PDB3  |
| J6         | VCC             |
| J7         | GND             |
| J8         | GND             |
| J9         | GND             |
| J10        | GND             |
| J11        | VCC             |
| J12        | GCB2/IO52PPB1   |
| J13        | GCA1/IO50PPB1   |
| J14        | GCC2/IO53PPB1   |
| J15        | NC              |
| J16        | GCA2/IO51PDB1   |

| FG256      |                 |
|------------|-----------------|
| Pin Number | A3P250 Function |
| K1         | GFC2/IO105PDB3  |
| K2         | IO107NPB3       |
| K3         | IO104PPB3       |
| K4         | NC              |
| K5         | VCCIB3          |
| K6         | VCC             |
| K7         | GND             |
| K8         | GND             |
| K9         | GND             |
| K10        | GND             |
| K11        | VCC             |
| K12        | VCCIB1          |
| K13        | IO52NPB1        |
| K14        | IO55RSB1        |
| K15        | IO53NPB1        |
| K16        | IO51NDB1        |
| L1         | IO105NDB3       |
| L2         | IO104NPB3       |
| L3         | NC              |
| L4         | IO102RSB3       |
| L5         | VCCIB3          |
| L6         | GND             |
| L7         | VCC             |
| L8         | VCC             |
| L9         | VCC             |
| L10        | VCC             |
| L11        | GND             |
| L12        | VCCIB1          |
| L13        | GDB0/IO59VPB1   |
| L14        | IO57VDB1        |
| L15        | IO57UDB1        |
| L16        | IO56PDB1        |
| M1         | IO103PDB3       |
| M2         | NC              |
| M3         | IO101NPB3       |
| M4         | GEC0/IO100NPB3  |

| FG256      |                 |
|------------|-----------------|
| Pin Number | A3P250 Function |
| M5         | VMV3            |
| M6         | VCCIB2          |
| M7         | VCCIB2          |
| M8         | NC              |
| M9         | IO74RSB2        |
| M10        | VCCIB2          |
| M11        | VCCIB2          |
| M12        | VMV2            |
| M13        | NC              |
| M14        | GDB1/IO59UPB1   |
| M15        | GDC1/IO58UDB1   |
| M16        | IO56NDB1        |
| N1         | IO103NDB3       |
| N2         | IO101PPB3       |
| N3         | GEC1/IO100PPB3  |
| N4         | NC              |
| N5         | GNDQ            |
| N6         | GEA2/IO97RSB2   |
| N7         | IO86RSB2        |
| N8         | IO82RSB2        |
| N9         | IO75RSB2        |
| N10        | IO69RSB2        |
| N11        | IO64RSB2        |
| N12        | GNDQ            |
| N13        | NC              |
| N14        | VJTAG           |
| N15        | GDC0/IO58VDB1   |
| N16        | GDA1/IO60UDB1   |
| P1         | GEB1/IO99PDB3   |
| P2         | GEB0/IO99NDB3   |
| P3         | NC              |
| P4         | NC              |
| P5         | IO92RSB2        |
| P6         | IO89RSB2        |
| P7         | IO85RSB2        |
| P8         | IO81RSB2        |