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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                 | 516096                                                                                                                                                                |
| Number of I/O                  | 341                                                                                                                                                                   |
| Number of Gates                | 3000000                                                                                                                                                               |
| Voltage - Supply               | 1.425V ~ 1.575V                                                                                                                                                       |
| Mounting Type                  | Surface Mount                                                                                                                                                         |
| Operating Temperature          | -40°C ~ 100°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/a3pe3000-2fgg484i">https://www.e-xfl.com/product-detail/microchip-technology/a3pe3000-2fgg484i</a> |

**Specify I/O States During Programming**

Load from file... Save to file... ☐ Show BSR Details

|  | Port Name  | Macro Cell            | Pin Number | I/O State (Output Only) |
|--|------------|-----------------------|------------|-------------------------|
|  | BIST       | ADLIB:INBUF           | T2         | 1                       |
|  | BYPASS_IO  | ADLIB:INBUF           | K1         | 1                       |
|  | CLK        | ADLIB:INBUF           | B1         | 1                       |
|  | ENOUT      | ADLIB:INBUF           | J16        | 1                       |
|  | LED        | ADLIB:OUTBUF          | M3         | 0                       |
|  | MONITOR[0] | ADLIB:OUTBUF          | B5         | 0                       |
|  | MONITOR[1] | ADLIB:OUTBUF          | C7         | Z                       |
|  | MONITOR[2] | ADLIB:OUTBUF          | D9         | Z                       |
|  | MONITOR[3] | ADLIB:OUTBUF          | D7         | Z                       |
|  | MONITOR[4] | ADLIB:OUTBUF          | A11        | Z                       |
|  | OEa        | ADLIB:INBUF           | E4         | Z                       |
|  | OEb        | ADLIB:INBUF           | F1         | Z                       |
|  | OSC_EN     | ADLIB:INBUF           | K3         | Z                       |
|  | PAD[10]    | ADLIB:BIBUF_LVCMOS33U | M8         | Z                       |
|  | PAD[11]    | ADLIB:BIBUF_LVCMOS33D | R7         | Z                       |
|  | PAD[12]    | ADLIB:BIBUF_LVCMOS33U | D11        | Z                       |
|  | PAD[13]    | ADLIB:BIBUF_LVCMOS33D | C12        | Z                       |
|  | PAD[14]    | ADLIB:BIBUF_LVCMOS33U | R6         | Z                       |

Help OK Cancel

**Figure 1-3 • I/O States During Programming Window**

- Click OK to return to the FlashPoint – Programming File Generator window.  
I/O States during programming are saved to the ADB and resulting programming files after completing programming file generation.

**Table 2-2 • Recommended Operating Conditions**<sup>1</sup>

| Symbol                    | Parameter                            |                               | Commercial     | Industrial     | Units |
|---------------------------|--------------------------------------|-------------------------------|----------------|----------------|-------|
| T <sub>A</sub>            | Ambient temperature                  |                               | 0 to +70       | −40 to +85     | °C    |
| T <sub>J</sub>            | Junction temperature                 |                               | 0 to +85       | −40 to +100    | °C    |
| VCC                       | 1.5 V DC core supply voltage         |                               | 1.425 to 1.575 | 1.425 to 1.575 | V     |
| VJTAG                     | JTAG DC voltage                      |                               | 1.4 to 3.6     | 1.4 to 3.6     | V     |
| VPUMP                     | Programming voltage                  | Programming Mode <sup>2</sup> | 3.15 to 3.45   | 3.15 to 3.45   | V     |
|                           |                                      | Operation <sup>3</sup>        | 0 to 3.6       | 0 to 3.6       | V     |
| VCCPLL                    | Analog power supply (PLL)            |                               | 1.425 to 1.575 | 1.425 to 1.575 | V     |
| VCCI and VMV <sup>4</sup> | 1.5 V DC supply voltage              |                               | 1.425 to 1.575 | 1.425 to 1.575 | V     |
|                           | 1.8 V DC supply voltage              |                               | 1.7 to 1.9     | 1.7 to 1.9     | V     |
|                           | 2.5 V DC supply voltage              |                               | 2.3 to 2.7     | 2.3 to 2.7     | V     |
|                           | 3.3 V DC supply voltage              |                               | 3.0 to 3.6     | 3.0 to 3.6     | V     |
|                           | 3.0 V DC supply voltage <sup>5</sup> |                               | 2.7 to 3.6     | 2.7 to 3.6     | V     |
|                           | LVDS/B-LVDS/M-LVDS differential I/O  |                               | 2.375 to 2.625 | 2.375 to 2.625 | V     |
|                           | LVPECL differential I/O              |                               | 3.0 to 3.6     | 3.0 to 3.6     | V     |

**Notes:**

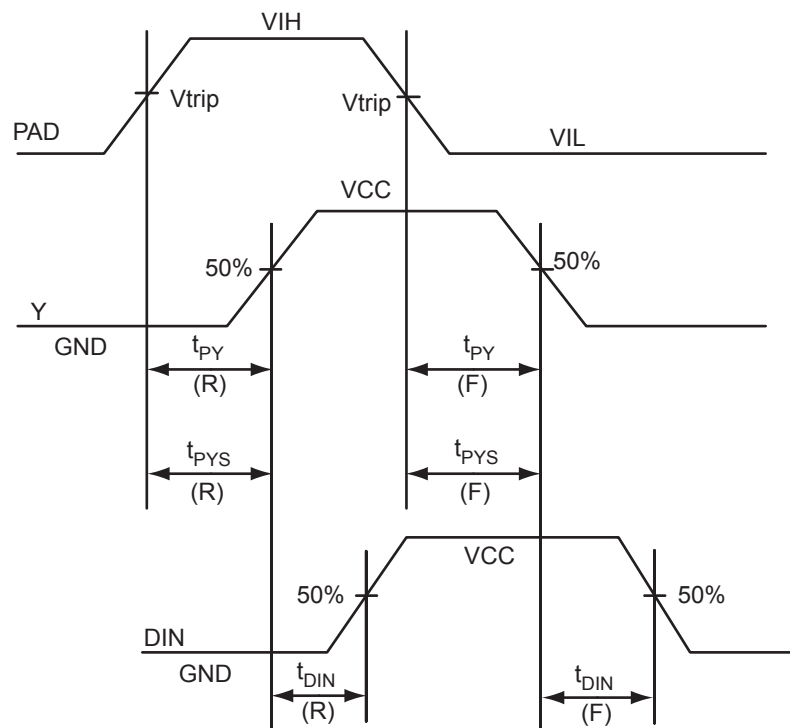
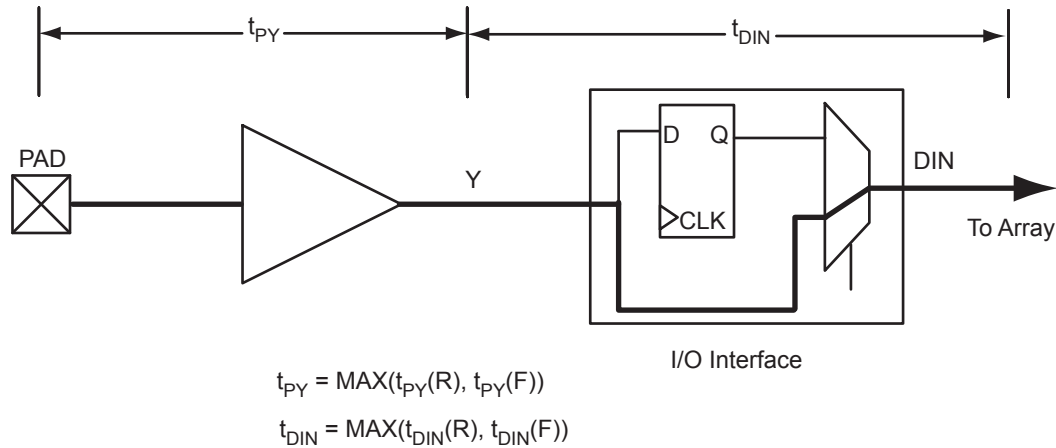
1. All parameters representing voltages are measured with respect to GND unless otherwise specified.
2. The programming temperature range supported is  $T_{\text{ambient}} = 0^{\circ}\text{C}$  to  $85^{\circ}\text{C}$ .
3. VPUMP can be left floating during normal operation (not programming mode).
4. The ranges given here are for power supplies only. The recommended input voltage ranges specific to each I/O standard are given in [Table 2-13 on page 2-16](#). VMV and VCCI should be at the same voltage within a given I/O bank. VMV pins must be connected to the corresponding VCCI pins. See the "[VMVx I/O Supply Voltage \(quiet\)](#)" section on [page 3-1](#) for further information.
5. To ensure targeted reliability standards are met across ambient and junction operating temperatures, Microsemi recommends that the user follow best design practices using Microsemi's timing and power simulation tools.
6. 3.3 V wide range is compliant to the JESD8-B specification and supports 3.0 V VCCI operation.

**Table 2-3 • Flash Programming Limits – Retention, Storage and Operating Temperature**<sup>1</sup>

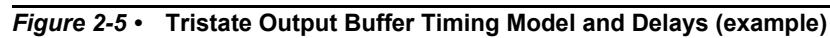
| Product Grade | Programming Cycles | Program Retention (biased/unbiased) | Maximum Storage Temperature T <sub>STG</sub> (°C) <sup>2</sup> | Maximum Operating Junction Temperature T <sub>J</sub> (°C) <sup>2</sup> |
|---------------|--------------------|-------------------------------------|----------------------------------------------------------------|-------------------------------------------------------------------------|
| Commercial    | 500                | 20 years                            | 110                                                            | 100                                                                     |
| Industrial    | 500                | 20 years                            | 110                                                            | 100                                                                     |

**Notes:**

1. This is a stress rating only; functional operation at any condition other than those indicated is not implied.
2. These limits apply for program/data retention only. Refer to [Table 2-1 on page 2-1](#) and [Table 2-2](#) for device operating conditions and absolute limits.



**Figure 2-3 • Input Buffer Timing Model and Delays (example)**



**Table 2-40 • 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  $V_{CCI} = 1.7\text{ V}$**

| Drive Strength | Speed Grade | $t_{DOUT}$ | $t_{DP}$ | $t_{DIN}$ | $t_{PY}$ | $t_{PYS}$ | $t_{EOUT}$ | $t_{ZL}$ | $t_{ZH}$ | $t_{LZ}$ | $t_{HZ}$ | $t_{ZLS}$ | $t_{ZHS}$ | Units |
|----------------|-------------|------------|----------|-----------|----------|-----------|------------|----------|----------|----------|----------|-----------|-----------|-------|
| 2 mA           | Std.        | 0.66       | 15.84    | 0.04      | 1.45     | 1.91      | 0.43       | 15.65    | 15.84    | 2.78     | 1.58     | 17.89     | 18.07     | ns    |
|                | –1          | 0.56       | 13.47    | 0.04      | 1.23     | 1.62      | 0.36       | 13.31    | 13.47    | 2.37     | 1.35     | 15.22     | 15.37     | ns    |
|                | –2          | 0.49       | 11.83    | 0.03      | 1.08     | 1.42      | 0.32       | 11.69    | 11.83    | 2.08     | 1.18     | 13.36     | 13.50     | ns    |
| 4 mA           | Std.        | 0.66       | 11.39    | 0.04      | 1.45     | 1.91      | 0.43       | 11.60    | 10.76    | 3.26     | 2.77     | 13.84     | 12.99     | ns    |
|                | –1          | 0.56       | 9.69     | 0.04      | 1.23     | 1.62      | 0.36       | 9.87     | 9.15     | 2.77     | 2.36     | 11.77     | 11.05     | ns    |
|                | –2          | 0.49       | 8.51     | 0.03      | 1.08     | 1.42      | 0.32       | 8.66     | 8.03     | 2.43     | 2.07     | 10.33     | 9.70      | ns    |
| 6 mA           | Std.        | 0.66       | 8.97     | 0.04      | 1.45     | 1.91      | 0.43       | 9.14     | 8.10     | 3.57     | 3.36     | 11.37     | 10.33     | ns    |
|                | –1          | 0.56       | 7.63     | 0.04      | 1.23     | 1.62      | 0.36       | 7.77     | 6.89     | 3.04     | 2.86     | 9.67      | 8.79      | ns    |
|                | –2          | 0.49       | 6.70     | 0.03      | 1.08     | 1.42      | 0.32       | 6.82     | 6.05     | 2.66     | 2.51     | 8.49      | 7.72      | ns    |
| 8 mA           | Std.        | 0.66       | 8.35     | 0.04      | 1.45     | 1.91      | 0.43       | 8.50     | 7.59     | 3.64     | 3.52     | 10.74     | 9.82      | ns    |
|                | –1          | 0.56       | 7.10     | 0.04      | 1.23     | 1.62      | 0.36       | 7.23     | 6.45     | 3.10     | 3.00     | 9.14      | 8.35      | ns    |
|                | –2          | 0.49       | 6.24     | 0.03      | 1.08     | 1.42      | 0.32       | 6.35     | 5.66     | 2.72     | 2.63     | 8.02      | 7.33      | ns    |
| 12 mA          | Std.        | 0.66       | 7.94     | 0.04      | 1.45     | 1.91      | 0.43       | 8.09     | 7.56     | 3.74     | 4.11     | 10.32     | 9.80      | ns    |
|                | –1          | 0.56       | 6.75     | 0.04      | 1.23     | 1.62      | 0.36       | 6.88     | 6.43     | 3.18     | 3.49     | 8.78      | 8.33      | ns    |
|                | –2          | 0.49       | 5.93     | 0.03      | 1.08     | 1.42      | 0.32       | 6.04     | 5.65     | 2.79     | 3.07     | 7.71      | 7.32      | ns    |
| 16 mA          | Std.        | 0.66       | 7.94     | 0.04      | 1.45     | 1.91      | 0.43       | 8.09     | 7.56     | 3.74     | 4.11     | 10.32     | 9.80      | ns    |
|                | –1          | 0.56       | 6.75     | 0.04      | 1.23     | 1.62      | 0.36       | 6.88     | 6.43     | 3.18     | 3.49     | 8.78      | 8.33      | ns    |
|                | –2          | 0.49       | 5.93     | 0.03      | 1.08     | 1.42      | 0.32       | 6.04     | 5.65     | 2.79     | 3.07     | 7.71      | 7.32      | ns    |

*Note:* For specific junction temperature and voltage supply levels, refer to [Table 2-6 on page 2-5](#) for derating values.

## 1.5 V LVCMOS (JESD8-11)

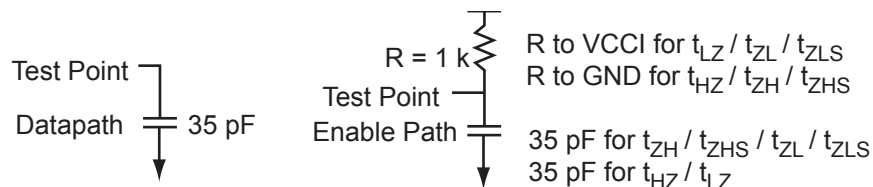
Low-Voltage CMOS for 1.5 V is an extension of the LVCMOS standard (JESD8-5) used for general-purpose 1.5 V applications. It uses a 1.5 V input buffer and a push-pull output buffer.

**Table 2-41 • Minimum and Maximum DC Input and Output Levels**

| 1.5 V<br>LVCMOS   | VIL       |             | VIH        |           | VOL         | VOH         | IOL | IOH | IOSL                    | IOSH                    | IIL <sup>1</sup> | IIH <sup>2</sup> |
|-------------------|-----------|-------------|------------|-----------|-------------|-------------|-----|-----|-------------------------|-------------------------|------------------|------------------|
| Drive<br>Strength | Min.<br>V | Max.<br>V   | Min.<br>V  | Max.<br>V | Max.<br>V   | Min.<br>V   | mA  | mA  | Max.<br>mA <sup>3</sup> | Max.<br>mA <sup>3</sup> | μA <sup>4</sup>  | μA <sup>4</sup>  |
| 2 mA              | −0.3      | 0.30 * VCCI | 0.7 * VCCI | 3.6       | 0.25 * VCCI | 0.75 * VCCI | 2   | 2   | 16                      | 13                      | 10               | 10               |
| 4 mA              | −0.3      | 0.30 * VCCI | 0.7 * VCCI | 3.6       | 0.25 * VCCI | 0.75 * VCCI | 4   | 4   | 33                      | 25                      | 10               | 10               |
| 6 mA              | −0.3      | 0.30 * VCCI | 0.7 * VCCI | 3.6       | 0.25 * VCCI | 0.75 * VCCI | 6   | 6   | 39                      | 32                      | 10               | 10               |
| 8 mA              | −0.3      | 0.30 * VCCI | 0.7 * VCCI | 3.6       | 0.25 * VCCI | 0.75 * VCCI | 8   | 8   | 55                      | 66                      | 10               | 10               |
| 12 mA             | −0.3      | 0.30 * VCCI | 0.7 * VCCI | 3.6       | 0.25 * VCCI | 0.75 * VCCI | 12  | 12  | 55                      | 66                      | 10               | 10               |

**Notes:**

1. IIL is the input leakage current per I/O pin over recommended operation conditions where  $-0.3\text{ V} < V_{IN} < V_{IL}$ .
2. 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.
3. Currents are measured at high temperature (100°C junction temperature) and maximum voltage.
4. Currents are measured at 85°C junction temperature.
5. Software default selection highlighted in gray.



**Figure 2-10 • AC Loading**

**Table 2-42 • AC Waveforms, Measuring Points, and Capacitive Loads**

| Input Low (V) | Input High (V) | Measuring Point* (V) | VREF (typ.) (V) | C <sub>LOAD</sub> (pF) |
|---------------|----------------|----------------------|-----------------|------------------------|
| 0             | 1.5            | 0.75                 | —               | 35                     |

**Note:** \*Measuring point = Vtrip. See Table 2-15 on page 2-18 for a complete table of trip points.

### Timing Characteristics

**Table 2-43 • 1.5 V LVCMOS High Slew**

Commercial-Case Conditions:  $T_J = 70^\circ\text{C}$ , Worst-Case  $V_{CC} = 1.425\text{ V}$ , Worst-Case  $V_{CCI} = 1.4\text{ V}$

| Drive Strength | Speed Grade | $t_{DOUT}$ | $t_{DP}$ | $t_{DIN}$ | $t_{PY}$ | $t_{PYS}$ | $t_{EOUT}$ | $t_{ZL}$ | $t_{ZH}$ | $t_{LZ}$ | $t_{HZ}$ | $t_{ZLS}$ | $t_{ZHS}$ | Units |
|----------------|-------------|------------|----------|-----------|----------|-----------|------------|----------|----------|----------|----------|-----------|-----------|-------|
| 2 mA           | Std.        | 0.66       | 8.53     | 0.04      | 1.70     | 2.14      | 0.43       | 7.26     | 8.53     | 3.39     | 2.79     | 9.50      | 10.77     | ns    |
|                | –1          | 0.56       | 7.26     | 0.04      | 1.44     | 1.82      | 0.36       | 6.18     | 7.26     | 2.89     | 2.37     | 8.08      | 9.16      | ns    |
|                | –2          | 0.49       | 6.37     | 0.03      | 1.27     | 1.60      | 0.32       | 5.42     | 6.37     | 2.53     | 2.08     | 7.09      | 8.04      | ns    |
| 4 mA           | Std.        | 0.66       | 5.41     | 0.04      | 1.70     | 2.14      | 0.43       | 5.22     | 5.41     | 3.75     | 3.48     | 7.45      | 7.65      | ns    |
|                | –1          | 0.56       | 4.60     | 0.04      | 1.44     | 1.82      | 0.36       | 4.44     | 4.60     | 3.19     | 2.96     | 6.34      | 6.50      | ns    |
|                | –2          | 0.49       | 4.04     | 0.03      | 1.27     | 1.60      | 0.32       | 3.89     | 4.04     | 2.80     | 2.60     | 5.56      | 5.71      | ns    |
| 6 mA           | Std.        | 0.66       | 4.80     | 0.04      | 1.70     | 2.14      | 0.43       | 4.89     | 4.75     | 3.83     | 3.67     | 7.13      | 6.98      | ns    |
|                | –1          | 0.56       | 4.09     | 0.04      | 1.44     | 1.82      | 0.36       | 4.16     | 4.04     | 3.26     | 3.12     | 6.06      | 5.94      | ns    |
|                | –2          | 0.49       | 3.59     | 0.03      | 1.27     | 1.60      | 0.32       | 3.65     | 3.54     | 2.86     | 2.74     | 5.32      | 5.21      | ns    |
| 8 mA           | Std.        | 0.66       | 4.42     | 0.04      | 1.70     | 2.14      | 0.43       | 4.50     | 3.62     | 3.96     | 4.37     | 6.74      | 5.86      | ns    |
|                | –1          | 0.56       | 3.76     | 0.04      | 1.44     | 1.82      | 0.36       | 3.83     | 3.08     | 3.37     | 3.72     | 5.73      | 4.98      | ns    |
|                | –2          | 0.49       | 3.30     | 0.03      | 1.27     | 1.60      | 0.32       | 3.36     | 2.70     | 2.96     | 3.27     | 5.03      | 4.37      | ns    |
| 12 mA          | Std.        | 0.66       | 4.42     | 0.04      | 1.70     | 2.14      | 0.43       | 4.50     | 3.62     | 3.96     | 4.37     | 6.74      | 5.86      | ns    |
|                | –1          | 0.56       | 3.76     | 0.04      | 1.44     | 1.82      | 0.36       | 3.83     | 3.08     | 3.37     | 3.72     | 5.73      | 4.98      | ns    |
|                | –2          | 0.49       | 3.30     | 0.03      | 1.27     | 1.60      | 0.32       | 3.36     | 2.70     | 2.96     | 3.27     | 5.03      | 4.37      | 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 2-5](#) for derating values.

**Table 2-44 • 1.5 V LVCMOS Low Slew**

Commercial-Case Conditions:  $T_J = 70^\circ\text{C}$ , Worst-Case  $V_{CC} = 1.425\text{ V}$ , Worst-Case  $V_{CCI} = 1.4\text{ V}$

| Drive Strength | Speed Grade | $t_{DOUT}$ | $t_{DP}$ | $t_{DIN}$ | $t_{PY}$ | $t_{PYS}$ | $t_{EOUT}$ | $t_{ZL}$ | $t_{ZH}$ | $t_{LZ}$ | $t_{HZ}$ | $t_{ZLS}$ | $t_{ZHS}$ | Units |
|----------------|-------------|------------|----------|-----------|----------|-----------|------------|----------|----------|----------|----------|-----------|-----------|-------|
| 2 mA           | Std.        | 0.66       | 14.11    | 0.04      | 1.70     | 2.14      | 0.43       | 14.37    | 13.14    | 3.40     | 2.68     | 16.61     | 15.37     | ns    |
|                | –1          | 0.56       | 12.00    | 0.04      | 1.44     | 1.82      | 0.36       | 12.22    | 11.17    | 2.90     | 2.28     | 14.13     | 13.08     | ns    |
|                | –2          | 0.49       | 10.54    | 0.03      | 1.27     | 1.60      | 0.32       | 10.73    | 9.81     | 2.54     | 2.00     | 12.40     | 11.48     | ns    |
| 4 mA           | Std.        | 0.66       | 11.23    | 0.04      | 1.70     | 2.14      | 0.43       | 11.44    | 9.87     | 3.77     | 3.36     | 13.68     | 12.10     | ns    |
|                | –1          | 0.56       | 9.55     | 0.04      | 1.44     | 1.82      | 0.36       | 9.73     | 8.39     | 3.21     | 2.86     | 11.63     | 10.29     | ns    |
|                | –2          | 0.49       | 8.39     | 0.03      | 1.27     | 1.60      | 0.32       | 8.54     | 7.37     | 2.81     | 2.51     | 10.21     | 9.04      | ns    |
| 6 mA           | Std.        | 0.66       | 10.45    | 0.04      | 1.70     | 2.14      | 0.43       | 10.65    | 9.24     | 3.84     | 3.55     | 12.88     | 11.48     | ns    |
|                | –1          | 0.56       | 8.89     | 0.04      | 1.44     | 1.82      | 0.36       | 9.06     | 7.86     | 3.27     | 3.02     | 10.96     | 9.76      | ns    |
|                | –2          | 0.49       | 7.81     | 0.03      | 1.27     | 1.60      | 0.32       | 7.95     | 6.90     | 2.87     | 2.65     | 9.62      | 8.57      | ns    |
| 8 mA           | Std.        | 0.66       | 10.02    | 0.04      | 1.70     | 2.14      | 0.43       | 10.20    | 9.23     | 3.97     | 4.22     | 12.44     | 11.47     | ns    |
|                | –1          | 0.56       | 8.52     | 0.04      | 1.44     | 1.82      | 0.36       | 8.68     | 7.85     | 3.38     | 3.59     | 10.58     | 9.75      | ns    |
|                | –2          | 0.49       | 7.48     | 0.03      | 1.27     | 1.60      | 0.32       | 7.62     | 6.89     | 2.97     | 3.15     | 9.29      | 8.56      | ns    |
| 12 mA          | Std.        | 0.66       | 10.02    | 0.04      | 1.70     | 2.14      | 0.43       | 10.20    | 9.23     | 3.97     | 4.22     | 12.44     | 11.47     | ns    |
|                | –1          | 0.56       | 8.52     | 0.04      | 1.44     | 1.82      | 0.36       | 8.68     | 7.85     | 3.38     | 3.59     | 10.58     | 9.75      | ns    |
|                | –2          | 0.49       | 7.48     | 0.03      | 1.27     | 1.60      | 0.32       | 7.62     | 6.89     | 2.97     | 3.15     | 9.29      | 8.56      | ns    |

**Note:** For specific junction temperature and voltage supply levels, refer to [Table 2-6 on page 2-5](#) for derating values.

## SSTL2 Class II

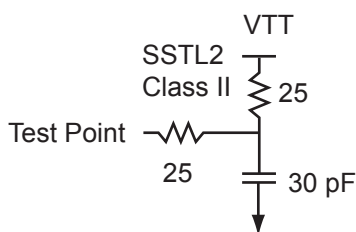
Stub-Speed Terminated Logic for 2.5 V memory bus standard (JESD8-9). ProASIC3E devices support Class II. This provides a differential amplifier input buffer and a push-pull output buffer.

**Table 2-69 • Minimum and Maximum DC Input and Output Levels**

| SSTL2 Class II | VIL    |            | VIH        |        | VOL    | VOH         | IOL | IOH | IOSL                 | IOSH                 | IIL             | IIH             |
|----------------|--------|------------|------------|--------|--------|-------------|-----|-----|----------------------|----------------------|-----------------|-----------------|
| Drive Strength | Min. V | Max. V     | Min. V     | Max. V | Max. V | Min. V      | mA  | mA  | Max. mA <sup>1</sup> | Max. mA <sup>1</sup> | μA <sup>2</sup> | μA <sup>2</sup> |
| 18 mA          | −0.3   | VREF − 0.2 | VREF + 0.2 | 3.6    | 0.35   | VCCI − 0.43 | 18  | 18  | 124                  | 169                  | 10              | 10              |

**Notes:**

1. Currents are measured at high temperature (100°C junction temperature) and maximum voltage.
2. Currents are measured at 85°C junction temperature.



**Figure 2-19 • AC Loading**

**Table 2-70 • AC Waveforms, Measuring Points, and Capacitive Loads**

| Input Low (V) | Input High (V) | Measuring Point* (V) | VREF (typ.) (V) | VTT (typ.) (V) | C <sub>LOAD</sub> (pF) |
|---------------|----------------|----------------------|-----------------|----------------|------------------------|
| VREF − 0.2    | VREF + 0.2     | 1.25                 | 1.25            | 1.25           | 30                     |

**Note:** \*Measuring point = V<sub>trip</sub>. See Table 2-15 on page 2-18 for a complete table of trip points.

## Timing Characteristics

**Table 2-71 • SSTL 2 Class II**

Commercial-Case Conditions: T<sub>J</sub> = 70°C, Worst-Case VCC = 1.425 V,  
Worst-Case VCCI = 2.3 V, VREF = 1.25 V

| Speed Grade | t <sub>DOUT</sub> | t <sub>DP</sub> | t <sub>DIN</sub> | t <sub>PY</sub> | t <sub>EOUT</sub> | t <sub>ZL</sub> | t <sub>ZH</sub> | t <sub>LZ</sub> | t <sub>HZ</sub> | t <sub>ZLS</sub> | t <sub>ZHS</sub> | Units |
|-------------|-------------------|-----------------|------------------|-----------------|-------------------|-----------------|-----------------|-----------------|-----------------|------------------|------------------|-------|
| Std.        | 0.66              | 0.66            | 2.17             | 0.04            | 1.33              | 0.43            | 2.21            | 1.77            |                 |                  | 4.44             | ns    |
| −1          | 0.56              | 0.56            | 1.84             | 0.04            | 1.14              | 0.36            | 1.88            | 1.51            |                 |                  | 3.78             | ns    |
| −2          | 0.49              | 0.49            | 1.62             | 0.03            | 1.00              | 0.32            | 1.65            | 1.32            |                 |                  | 3.32             | ns    |

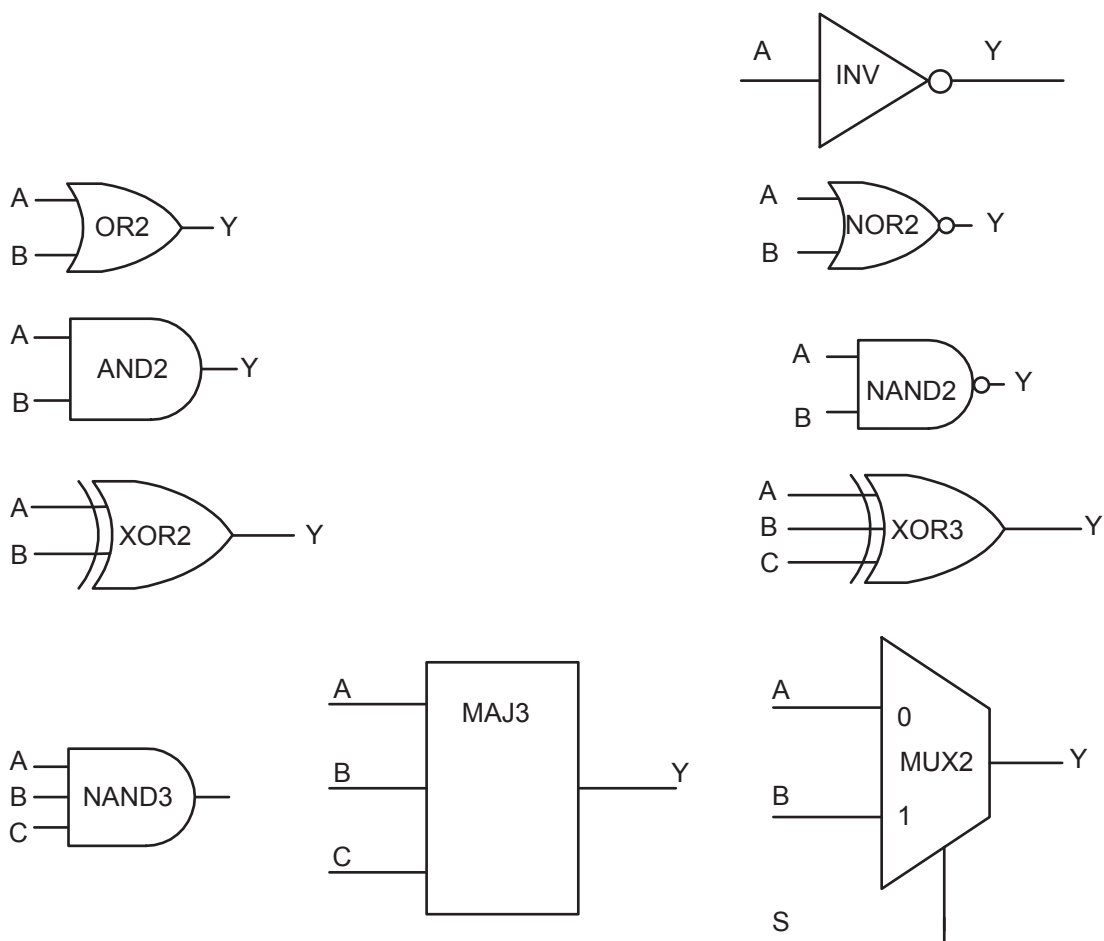
**Note:** For specific junction temperature and voltage supply levels, refer to Table 2-6 on page 2-5 for derating values.



## VersaTile Characteristics

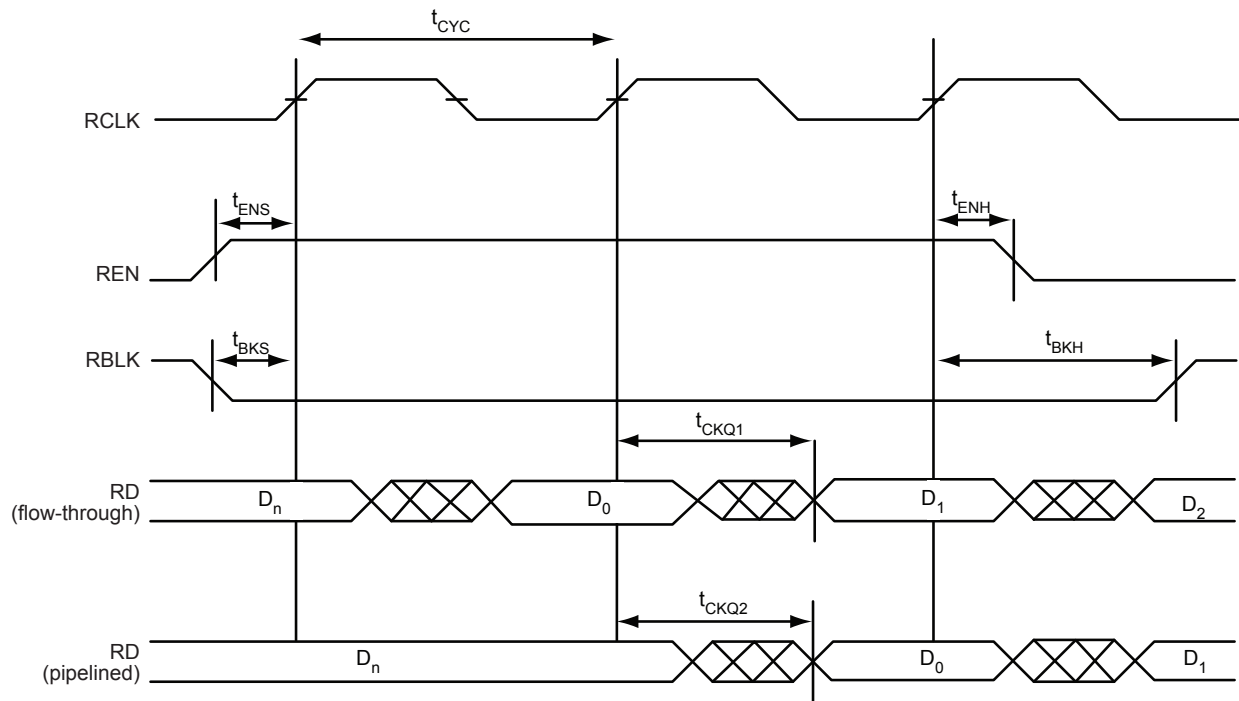
### VersaTile Specifications as a Combinatorial Module

The ProASIC3E 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](#).

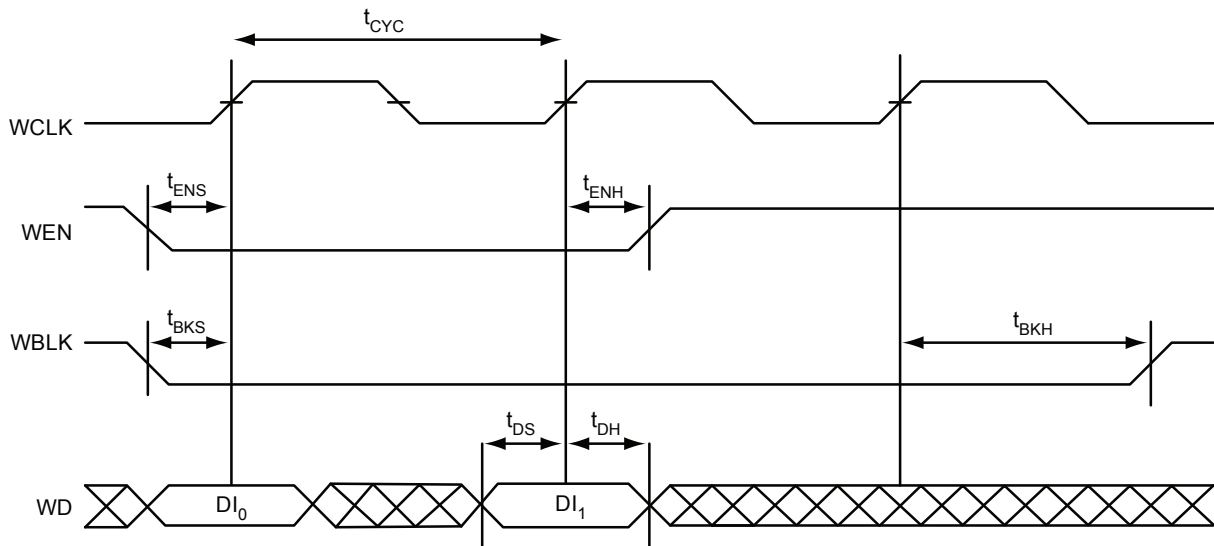


**Figure 2-34 • Sample of Combinatorial Cells**

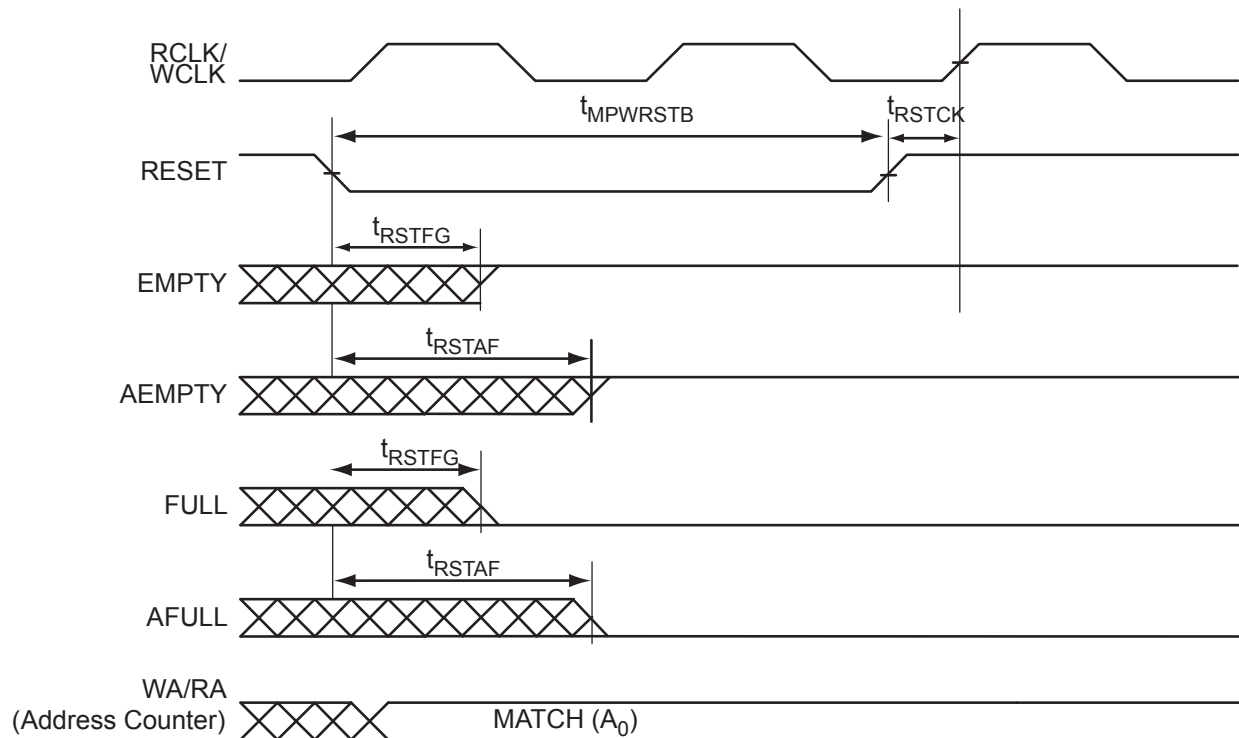
## Timing Waveforms



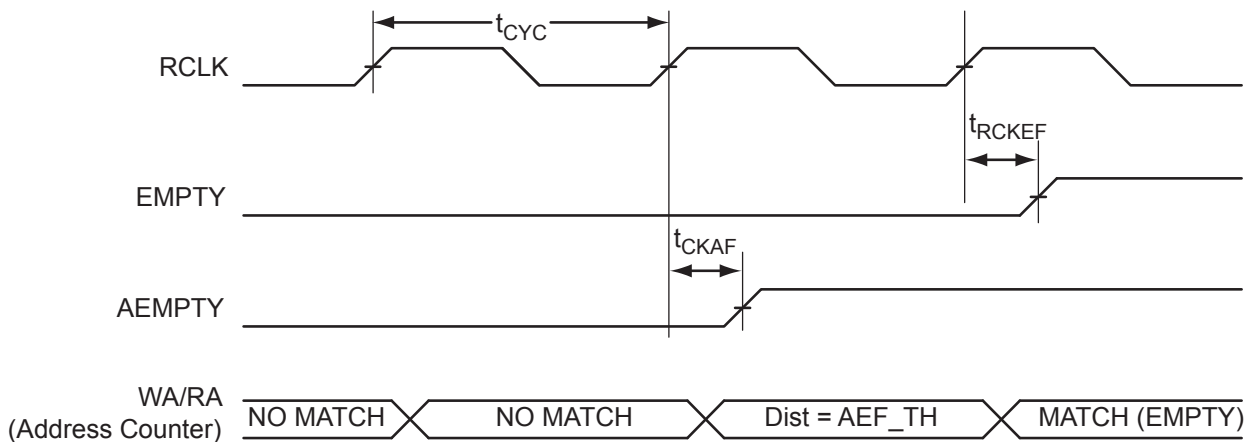
**Figure 2-47 • FIFO Read**



**Figure 2-48 • FIFO Write**



**Figure 2-49 • FIFO Reset**



**Figure 2-50 • FIFO EMPTY Flag and AEMPTY Flag Assertion**

Refer to the I/O Structure section of the [ProASIC3E FPGA Fabric User's Guide](#) for an explanation of the naming of global pins.

## JTAG Pins

Low power flash devices have a separate bank for the dedicated JTAG pins. The JTAG pins can be run at any voltage from 1.5 V to 3.3 V (nominal). VCC must also be powered for the JTAG state machine to operate, even if the device is in bypass mode; VJTAG alone is insufficient. Both VJTAG and VCC to the part must be supplied to allow JTAG signals to transition the device. Isolating the JTAG power supply in a separate I/O bank gives greater flexibility in supply selection and simplifies power supply and PCB design. If the JTAG interface is neither used nor planned for use, the VJTAG pin together with the TRST pin could be tied to GND.

### TCK

#### Test Clock

Test clock input for JTAG boundary scan, ISP, and UJTAG. The TCK pin does not have an internal pull-up/down resistor. If JTAG is not used, Microsemi recommends tying off TCK to GND through a resistor placed close to the FPGA pin. This prevents JTAG operation in case TMS enters an undesired state.

Note that to operate at all VJTAG voltages, 500  $\Omega$  to 1 k $\Omega$  will satisfy the requirements. Refer to [Table 3-1](#) for more information.

**Table 3-1 • Recommended Tie-Off Values for the TCK and TRST Pins**

| VJTAG          | Tie-Off Resistance           |
|----------------|------------------------------|
| VJTAG at 3.3 V | 200 $\Omega$ to 1 k $\Omega$ |
| VJTAG at 2.5 V | 200 $\Omega$ to 1 k $\Omega$ |
| VJTAG at 1.8 V | 500 $\Omega$ to 1 k $\Omega$ |
| VJTAG at 1.5 V | 500 $\Omega$ to 1 k $\Omega$ |

#### Notes:

1. Equivalent parallel resistance if more than one device is on the JTAG chain
2. The TCK pin can be pulled up/down.
3. The TRST pin is pulled down.

### TDI

#### Test Data Input

Serial input for JTAG boundary scan, ISP, and UJTAG usage. There is an internal weak pull-up resistor on the TDI pin.

### TDO

#### Test Data Output

Serial output for JTAG boundary scan, ISP, and UJTAG usage.

### TMS

#### Test Mode Select

The TMS pin controls the use of the IEEE 1532 boundary scan pins (TCK, TDI, TDO, TRST). There is an internal weak pull-up resistor on the TMS pin.

### TRST

#### Boundary Scan Reset Pin

The TRST pin functions as an active-low input to asynchronously initialize (or reset) the boundary scan circuitry. There is an internal weak pull-up resistor on the TRST pin. If JTAG is not used, an external pull-down resistor could be included to ensure the test access port (TAP) is held in reset mode. The resistor values must be chosen from [Table 3-1](#) and must satisfy the parallel resistance value requirement. The values in [Table 3-1](#) correspond to the resistor recommended when a single device is used, and the equivalent parallel resistor when multiple devices are connected via a JTAG chain.

In critical applications, an upset in the JTAG circuit could allow entrance to an undesired JTAG state. In such cases, Microsemi recommends tying off TRST to GND through a resistor placed close to the FPGA pin.

Note that to operate at all VJTAG voltages, 500  $\Omega$  to 1 k $\Omega$  will satisfy the requirements.

| PQ208      |                  |
|------------|------------------|
| Pin Number | A3PE600 Function |
| 108        | TDO              |
| 109        | TRST             |
| 110        | VJTAG            |
| 111        | VMV3             |
| 112        | GDA0/IO67NPB3V1  |
| 113        | GDB0/IO66NPB3V1  |
| 114        | GDA1/IO67PPB3V1  |
| 115        | GDB1/IO66PPB3V1  |
| 116        | GDC0/IO65NDB3V1  |
| 117        | GDC1/IO65PDB3V1  |
| 118        | IO62NDB3V1       |
| 119        | IO62PDB3V1       |
| 120        | IO58NDB3V0       |
| 121        | IO58PDB3V0       |
| 122        | GND              |
| 123        | VCCIB3           |
| 124        | GCC2/IO55PSB3V0  |
| 125        | GCB2/IO54PSB3V0  |
| 126        | NC               |
| 127        | IO53NDB3V0       |
| 128        | GCA2/IO53PDB3V0  |
| 129        | GCA1/IO52PPB3V0  |
| 130        | GND              |
| 131        | VCCPLC           |
| 132        | GCA0/IO52NPB3V0  |
| 133        | VCOMPLC          |
| 134        | GCB0/IO51NDB2V1  |
| 135        | GCB1/IO51PDB2V1  |
| 136        | GCC1/IO50PSB2V1  |
| 137        | IO49NDB2V1       |
| 138        | IO49PDB2V1       |
| 139        | IO48PSB2V1       |
| 140        | VCCIB2           |
| 141        | GND              |
| 142        | VCC              |
| 143        | IO47NDB2V1       |

| PQ208      |                  |
|------------|------------------|
| Pin Number | A3PE600 Function |
| 144        | IO47PDB2V1       |
| 145        | IO44NDB2V1       |
| 146        | IO44PDB2V1       |
| 147        | IO43NDB2V0       |
| 148        | IO43PDB2V0       |
| 149        | IO40NDB2V0       |
| 150        | IO40PDB2V0       |
| 151        | GBC2/IO38PSB2V0  |
| 152        | GBA2/IO36PSB2V0  |
| 153        | GBB2/IO37PSB2V0  |
| 154        | VMV2             |
| 155        | GNDQ             |
| 156        | GND              |
| 157        | VMV1             |
| 158        | GNDQ             |
| 159        | GBA1/IO35PDB1V1  |
| 160        | GBA0/IO35NDB1V1  |
| 161        | GBB1/IO34PDB1V1  |
| 162        | GND              |
| 163        | GBB0/IO34NDB1V1  |
| 164        | GBC1/IO33PDB1V1  |
| 165        | GBC0/IO33NDB1V1  |
| 166        | IO31PDB1V1       |
| 167        | IO31NDB1V1       |
| 168        | IO27PDB1V0       |
| 169        | IO27NDB1V0       |
| 170        | VCCIB1           |
| 171        | VCC              |
| 172        | IO23PPB1V0       |
| 173        | IO22PSB1V0       |
| 174        | IO23NPB1V0       |
| 175        | IO21PDB1V0       |
| 176        | IO21NDB1V0       |
| 177        | IO19PPB0V2       |
| 178        | GND              |
| 179        | IO18PPB0V2       |

| PQ208      |                  |
|------------|------------------|
| Pin Number | A3PE600 Function |
| 180        | IO19NPB0V2       |
| 181        | IO18NPB0V2       |
| 182        | IO17PPB0V2       |
| 183        | IO16PPB0V2       |
| 184        | IO17NPB0V2       |
| 185        | IO16NPB0V2       |
| 186        | VCCIB0           |
| 187        | VCC              |
| 188        | IO15PDB0V2       |
| 189        | IO15NDB0V2       |
| 190        | IO13PDB0V2       |
| 191        | IO13NDB0V2       |
| 192        | IO11PSB0V1       |
| 193        | IO09PDB0V1       |
| 194        | IO09NDB0V1       |
| 195        | GND              |
| 196        | IO07PDB0V1       |
| 197        | IO07NDB0V1       |
| 198        | IO05PDB0V0       |
| 199        | IO05NDB0V0       |
| 200        | VCCIB0           |
| 201        | GAC1/IO02PDB0V0  |
| 202        | GAC0/IO02NDB0V0  |
| 203        | GAB1/IO01PDB0V0  |
| 204        | GAB0/IO01NDB0V0  |
| 205        | GAA1/IO00PDB0V0  |
| 206        | GAA0/IO00NDB0V0  |
| 207        | GNDQ             |
| 208        | VMV0             |

| PQ208      |                   |
|------------|-------------------|
| Pin Number | A3PE3000 Function |
| 1          | GND               |
| 2          | GNDQ              |
| 3          | VMV7              |
| 4          | GAB2/IO308PSB7V4  |
| 5          | GAA2/IO309PDB7V4  |
| 6          | IO309NDB7V4       |
| 7          | GAC2/IO307PDB7V4  |
| 8          | IO307NDB7V4       |
| 9          | IO303PDB7V3       |
| 10         | IO303NDB7V3       |
| 11         | IO299PDB7V3       |
| 12         | IO299NDB7V3       |
| 13         | IO295PDB7V2       |
| 14         | IO295NDB7V2       |
| 15         | IO291PSB7V2       |
| 16         | VCC               |
| 17         | GND               |
| 18         | VCCIB7            |
| 19         | IO285PDB7V1       |
| 20         | IO285NDB7V1       |
| 21         | IO279PSB7V0       |
| 22         | GFC1/IO275PSB7V0  |
| 23         | GFB1/IO274PDB7V0  |
| 24         | GFB0/IO274NDB7V0  |
| 25         | VCOMPLF           |
| 26         | GFA0/IO273NPB6V4  |
| 27         | VCCPLF            |
| 28         | GFA1/IO273PPB6V4  |
| 29         | GND               |
| 30         | GFA2/IO272PDB6V4  |
| 31         | IO272NDB6V4       |
| 32         | GFB2/IO271PPB6V4  |
| 33         | GFC2/IO270PPB6V4  |
| 34         | IO271NPB6V4       |
| 35         | IO270NPB6V4       |
| 36         | VCC               |
| 37         | IO252PDB6V2       |
| 38         | IO252NDB6V2       |
| 39         | IO248PSB6V1       |

| PQ208      |                   |
|------------|-------------------|
| Pin Number | A3PE3000 Function |
| 40         | VCCIB6            |
| 41         | GND               |
| 42         | IO244PDB6V1       |
| 43         | IO244NDB6V1       |
| 44         | GEC1/IO236PDB6V0  |
| 45         | GEC0/IO236NDB6V0  |
| 46         | GEB1/IO235PPB6V0  |
| 47         | GEA1/IO234PPB6V0  |
| 48         | GEB0/IO235NPB6V0  |
| 49         | GEA0/IO234NPB6V0  |
| 50         | VMV6              |
| 51         | GNDQ              |
| 52         | GND               |
| 53         | VMV5              |
| 54         | GNDQ              |
| 55         | IO233NDB5V4       |
| 56         | GEA2/IO233PDB5V4  |
| 57         | IO232NDB5V4       |
| 58         | GEB2/IO232PDB5V4  |
| 59         | IO231NDB5V4       |
| 60         | GEC2/IO231PDB5V4  |
| 61         | IO230PSB5V4       |
| 62         | VCCIB5            |
| 63         | IO218NDB5V3       |
| 64         | IO218PDB5V3       |
| 65         | GND               |
| 66         | IO214PSB5V2       |
| 67         | IO212NDB5V2       |
| 68         | IO212PDB5V2       |
| 69         | IO208NDB5V1       |
| 70         | IO208PDB5V1       |
| 71         | VCC               |
| 72         | VCCIB5            |
| 73         | IO202NDB5V1       |
| 74         | IO202PDB5V1       |
| 75         | IO198NDB5V0       |
| 76         | IO198PDB5V0       |
| 77         | IO197NDB5V0       |
| 78         | IO197PDB5V0       |

| PQ208      |                   |
|------------|-------------------|
| Pin Number | A3PE3000 Function |
| 79         | IO194NDB5V0       |
| 80         | IO194PDB5V0       |
| 81         | GND               |
| 82         | IO184NDB4V3       |
| 83         | IO184PDB4V3       |
| 84         | IO180NDB4V3       |
| 85         | IO180PDB4V3       |
| 86         | IO176NDB4V2       |
| 87         | IO176PDB4V2       |
| 88         | VCC               |
| 89         | VCCIB4            |
| 90         | IO170NDB4V2       |
| 91         | IO170PDB4V2       |
| 92         | IO166NDB4V1       |
| 93         | IO166PDB4V1       |
| 94         | IO156NDB4V0       |
| 95         | GDC2/IO156PDB4V0  |
| 96         | IO154NPB4V0       |
| 97         | GND               |
| 98         | GDB2/IO155PSB4V0  |
| 99         | GDA2/IO154PPB4V0  |
| 100        | GNDQ              |
| 101        | TCK               |
| 102        | TDI               |
| 103        | TMS               |
| 104        | VMV4              |
| 105        | GND               |
| 106        | VPUMP             |
| 107        | GNDQ              |
| 108        | TDO               |
| 109        | TRST              |
| 110        | VJTAG             |
| 111        | VMV3              |
| 112        | GDA0/IO153NPB3V4  |
| 113        | GDB0/IO152NPB3V4  |
| 114        | GDA1/IO153PPB3V4  |
| 115        | GDB1/IO152PPB3V4  |
| 116        | GDC0/IO151NDB3V4  |
| 117        | GDC1/IO151PDB3V4  |

| FG484      |                   |
|------------|-------------------|
| Pin Number | A3PE1500 Function |
| C21        | NC                |
| C22        | VCCIB2            |
| D1         | NC                |
| D2         | NC                |
| D3         | NC                |
| D4         | GND               |
| D5         | GAA0/IO00NDB0V0   |
| D6         | GAA1/IO00PDB0V0   |
| D7         | GAB0/IO01NDB0V0   |
| D8         | IO09PDB0V1        |
| D9         | IO13PDB0V1        |
| D10        | IO21PDB0V2        |
| D11        | IO31NDB0V3        |
| D12        | IO37NDB1V0        |
| D13        | IO37PDB1V0        |
| D14        | IO49NDB1V2        |
| D15        | IO49PDB1V2        |
| D16        | GBB1/IO56PDB1V3   |
| D17        | GBA0/IO57NDB1V3   |
| D18        | GBA1/IO57PDB1V3   |
| D19        | GND               |
| D20        | NC                |
| D21        | IO69PDB2V1        |
| D22        | NC                |
| E1         | NC                |
| E2         | IO218PPB7V3       |
| E3         | GND               |
| E4         | GAB2/IO220PDB7V3  |
| E5         | GAA2/IO221PDB7V3  |
| E6         | GNDQ              |
| E7         | GAB1/IO01PDB0V0   |
| E8         | IO09NDB0V1        |
| E9         | IO13NDB0V1        |
| E10        | IO21NDB0V2        |
| E11        | IO31PDB0V3        |
| E12        | IO35NDB1V0        |

| FG484      |                   |
|------------|-------------------|
| Pin Number | A3PE1500 Function |
| E13        | IO41NDB1V1        |
| E14        | IO41PDB1V1        |
| E15        | GBC1/IO55PDB1V3   |
| E16        | GBB0/IO56NDB1V3   |
| E17        | GNDQ              |
| E18        | GBA2/IO58PDB2V0   |
| E19        | IO63NDB2V0        |
| E20        | GND               |
| E21        | IO69NDB2V1        |
| E22        | NC                |
| F1         | IO218NPB7V3       |
| F2         | IO216NDB7V3       |
| F3         | IO216PDB7V3       |
| F4         | IO220NDB7V3       |
| F5         | IO221NDB7V3       |
| F6         | VMV7              |
| F7         | VCCPLA            |
| F8         | GAC0/IO02NDB0V0   |
| F9         | GAC1/IO02PDB0V0   |
| F10        | IO23NDB0V2        |
| F11        | IO23PDB0V2        |
| F12        | IO35PDB1V0        |
| F13        | IO39NDB1V0        |
| F14        | IO45PDB1V1        |
| F15        | GBC0/IO55NDB1V3   |
| F16        | VCCPLB            |
| F17        | VMV2              |
| F18        | IO58NDB2V0        |
| F19        | IO63PDB2V0        |
| F20        | NC                |
| F21        | NC                |
| F22        | NC                |
| G1         | IO211NDB7V2       |
| G2         | IO211PDB7V2       |
| G3         | NC                |
| G4         | IO214PDB7V3       |

| FG484      |                   |
|------------|-------------------|
| Pin Number | A3PE1500 Function |
| G5         | IO217PDB7V3       |
| G6         | GAC2/IO219PDB7V3  |
| G7         | VCOMPLA           |
| G8         | GNDQ              |
| G9         | IO19NDB0V2        |
| G10        | IO19PDB0V2        |
| G11        | IO25PDB0V3        |
| G12        | IO33PDB1V0        |
| G13        | IO39PDB1V0        |
| G14        | IO45NDB1V1        |
| G15        | GNDQ              |
| G16        | VCOMPLB           |
| G17        | GBB2/IO59PDB2V0   |
| G18        | IO62PDB2V0        |
| G19        | IO62NDB2V0        |
| G20        | IO71PDB2V2        |
| G21        | IO71NDB2V2        |
| G22        | NC                |
| H1         | IO209PSB7V2       |
| H2         | NC                |
| H3         | VCC               |
| H4         | IO214NDB7V3       |
| H5         | IO217NDB7V3       |
| H6         | IO219NDB7V3       |
| H7         | IO215PDB7V3       |
| H8         | VMV0              |
| H9         | VCCIB0            |
| H10        | VCCIB0            |
| H11        | IO25NDB0V3        |
| H12        | IO33NDB1V0        |
| H13        | VCCIB1            |
| H14        | VCCIB1            |
| H15        | VMV1              |
| H16        | GBC2/IO60PDB2V0   |
| H17        | IO59NDB2V0        |
| H18        | IO67NDB2V1        |

| FG896      |                   |
|------------|-------------------|
| Pin Number | A3PE3000 Function |
| AG9        | IO225NPB5V3       |
| AG10       | IO223NPB5V3       |
| AG11       | IO221PDB5V3       |
| AG12       | IO221NDB5V3       |
| AG13       | IO205NPB5V1       |
| AG14       | IO199NDB5V0       |
| AG15       | IO199PDB5V0       |
| AG16       | IO187NDB4V4       |
| AG17       | IO187PDB4V4       |
| AG18       | IO181NDB4V3       |
| AG19       | IO171PPB4V2       |
| AG20       | IO165NPB4V1       |
| AG21       | IO161NPB4V0       |
| AG22       | IO159NDB4V0       |
| AG23       | IO159PDB4V0       |
| AG24       | IO158PPB4V0       |
| AG25       | GDB2/IO155PDB4V0  |
| AG26       | GDA2/IO154PPB4V0  |
| AG27       | GND               |
| AG28       | VJTAG             |
| AG29       | VCC               |
| AG30       | IO149NDB3V4       |
| AH1        | GND               |
| AH2        | IO233NPB5V4       |
| AH3        | VCC               |
| AH4        | GEB2/IO232PPB5V4  |
| AH5        | VCCIB5            |
| AH6        | IO219NDB5V3       |
| AH7        | IO219PDB5V3       |
| AH8        | IO227NDB5V4       |
| AH9        | IO227PDB5V4       |
| AH10       | IO225PPB5V3       |
| AH11       | IO223PPB5V3       |
| AH12       | IO211NDB5V2       |
| AH13       | IO211PDB5V2       |
| AH14       | IO205PPB5V1       |

| FG896      |                   |
|------------|-------------------|
| Pin Number | A3PE3000 Function |
| AH15       | IO195NDB5V0       |
| AH16       | IO185NDB4V3       |
| AH17       | IO185PDB4V3       |
| AH18       | IO181PDB4V3       |
| AH19       | IO177NDB4V2       |
| AH20       | IO171NPB4V2       |
| AH21       | IO165PPB4V1       |
| AH22       | IO161PPB4V0       |
| AH23       | IO157NDB4V0       |
| AH24       | IO157PDB4V0       |
| AH25       | IO155NDB4V0       |
| AH26       | VCCIB4            |
| AH27       | TDI               |
| AH28       | VCC               |
| AH29       | VPUMP             |
| AH30       | GND               |
| AJ1        | GND               |
| AJ2        | GND               |
| AJ3        | GEA2/IO233PPB5V4  |
| AJ4        | VCC               |
| AJ5        | IO217NPB5V2       |
| AJ6        | VCC               |
| AJ7        | IO215NPB5V2       |
| AJ8        | IO213NDB5V2       |
| AJ9        | IO213PDB5V2       |
| AJ10       | IO209NDB5V1       |
| AJ11       | IO209PDB5V1       |
| AJ12       | IO203NDB5V1       |
| AJ13       | IO203PDB5V1       |
| AJ14       | IO197NDB5V0       |
| AJ15       | IO195PDB5V0       |
| AJ16       | IO183NDB4V3       |
| AJ17       | IO183PDB4V3       |
| AJ18       | IO179NPB4V3       |
| AJ19       | IO177PDB4V2       |
| AJ20       | IO173NDB4V2       |

| FG896      |                   |
|------------|-------------------|
| Pin Number | A3PE3000 Function |
| AJ21       | IO173PDB4V2       |
| AJ22       | IO163NDB4V1       |
| AJ23       | IO163PDB4V1       |
| AJ24       | IO167NPB4V1       |
| AJ25       | VCC               |
| AJ26       | IO156NPB4V0       |
| AJ27       | VCC               |
| AJ28       | TMS               |
| AJ29       | GND               |
| AJ30       | GND               |
| AK2        | GND               |
| AK3        | GND               |
| AK4        | IO217PPB5V2       |
| AK5        | GND               |
| AK6        | IO215PPB5V2       |
| AK7        | GND               |
| AK8        | IO207NDB5V1       |
| AK9        | IO207PDB5V1       |
| AK10       | IO201NDB5V0       |
| AK11       | IO201PDB5V0       |
| AK12       | IO193NDB4V4       |
| AK13       | IO193PDB4V4       |
| AK14       | IO197PDB5V0       |
| AK15       | IO191NDB4V4       |
| AK16       | IO191PDB4V4       |
| AK17       | IO189NDB4V4       |
| AK18       | IO189PDB4V4       |
| AK19       | IO179PPB4V3       |
| AK20       | IO175NDB4V2       |
| AK21       | IO175PDB4V2       |
| AK22       | IO169NDB4V1       |
| AK23       | IO169PDB4V1       |
| AK24       | GND               |
| AK25       | IO167PPB4V1       |
| AK26       | GND               |
| AK27       | GDC2/IO156PPB4V0  |

| FG896      |                   |
|------------|-------------------|
| Pin Number | A3PE3000 Function |
| E17        | IO49PDB1V1        |
| E18        | IO50PDB1V1        |
| E19        | IO58PDB1V2        |
| E20        | IO60NDB1V2        |
| E21        | IO77PDB1V4        |
| E22        | IO68NDB1V3        |
| E23        | IO68PDB1V3        |
| E24        | VCCIB1            |
| E25        | IO74PDB1V4        |
| E26        | VCC               |
| E27        | GBB1/IO80PPB1V4   |
| E28        | VCCIB2            |
| E29        | IO82NPB2V0        |
| E30        | GND               |
| F1         | IO296PPB7V2       |
| F2         | VCC               |
| F3         | IO306PDB7V4       |
| F4         | IO297PDB7V2       |
| F5         | VMV7              |
| F6         | GND               |
| F7         | GNDQ              |
| F8         | IO12NDB0V1        |
| F9         | IO12PDB0V1        |
| F10        | IO10PDB0V1        |
| F11        | IO16PDB0V1        |
| F12        | IO22NDB0V2        |
| F13        | IO30NDB0V3        |
| F14        | IO30PDB0V3        |
| F15        | IO36PDB0V4        |
| F16        | IO48NDB1V0        |
| F17        | IO48PDB1V0        |
| F18        | IO50NDB1V1        |
| F19        | IO58NDB1V2        |
| F20        | IO60PDB1V2        |
| F21        | IO77NDB1V4        |
| F22        | IO72NDB1V3        |

| FG896      |                   |
|------------|-------------------|
| Pin Number | A3PE3000 Function |
| F23        | IO72PDB1V3        |
| F24        | GNDQ              |
| F25        | GND               |
| F26        | VMV2              |
| F27        | IO86PDB2V0        |
| F28        | IO92PDB2V1        |
| F29        | VCC               |
| F30        | IO100NPB2V2       |
| G1         | GND               |
| G2         | IO296NPB7V2       |
| G3         | IO306NDB7V4       |
| G4         | IO297NDB7V2       |
| G5         | VCCIB7            |
| G6         | GNDQ              |
| G7         | VCC               |
| G8         | VMV0              |
| G9         | VCCIB0            |
| G10        | IO10NDB0V1        |
| G11        | IO16NDB0V1        |
| G12        | IO22PDB0V2        |
| G13        | IO26PPB0V3        |
| G14        | IO38NPB0V4        |
| G15        | IO36NDB0V4        |
| G16        | IO46NDB1V0        |
| G17        | IO46PDB1V0        |
| G18        | IO56NDB1V1        |
| G19        | IO56PDB1V1        |
| G20        | IO66NDB1V3        |
| G21        | IO66PDB1V3        |
| G22        | VCCIB1            |
| G23        | VMV1              |
| G24        | VCC               |
| G25        | GNDQ              |
| G26        | VCCIB2            |
| G27        | IO86NDB2V0        |
| G28        | IO92NDB2V1        |

| FG896      |                   |
|------------|-------------------|
| Pin Number | A3PE3000 Function |
| G29        | IO100PPB2V2       |
| G30        | GND               |
| H1         | IO294PDB7V2       |
| H2         | IO294NDB7V2       |
| H3         | IO300NDB7V3       |
| H4         | IO300PDB7V3       |
| H5         | IO295PDB7V2       |
| H6         | IO299PDB7V3       |
| H7         | VCOMPLA           |
| H8         | GND               |
| H9         | IO08NDB0V0        |
| H10        | IO08PDB0V0        |
| H11        | IO18PDB0V2        |
| H12        | IO26NPB0V3        |
| H13        | IO28NDB0V3        |
| H14        | IO28PDB0V3        |
| H15        | IO38PPB0V4        |
| H16        | IO42NDB1V0        |
| H17        | IO52NDB1V1        |
| H18        | IO52PDB1V1        |
| H19        | IO62NDB1V2        |
| H20        | IO62PDB1V2        |
| H21        | IO70NDB1V3        |
| H22        | IO70PDB1V3        |
| H23        | GND               |
| H24        | VCOMPLB           |
| H25        | GBC2/IO84PDB2V0   |
| H26        | IO84NDB2V0        |
| H27        | IO96PDB2V1        |
| H28        | IO96NDB2V1        |
| H29        | IO89PDB2V0        |
| H30        | IO89NDB2V0        |
| J1         | IO290NDB7V2       |
| J2         | IO290PDB7V2       |
| J3         | IO302NDB7V3       |
| J4         | IO302PDB7V3       |

| FG896      |                   |
|------------|-------------------|
| Pin Number | A3PE3000 Function |
| W29        | IO131PDB3V2       |
| W30        | IO123NDB3V1       |
| Y1         | IO266PDB6V4       |
| Y2         | IO250PDB6V2       |
| Y3         | IO250NDB6V2       |
| Y4         | IO246PDB6V1       |
| Y5         | IO247NDB6V1       |
| Y6         | IO247PDB6V1       |
| Y7         | IO249NPB6V1       |
| Y8         | IO245PDB6V1       |
| Y9         | IO253NDB6V2       |
| Y10        | GEB0/IO235NPB6V0  |
| Y11        | VCC               |
| Y12        | VCC               |
| Y13        | VCC               |
| Y14        | VCC               |
| Y15        | VCC               |
| Y16        | VCC               |
| Y17        | VCC               |
| Y18        | VCC               |
| Y19        | VCC               |
| Y20        | VCC               |
| Y21        | IO142PPB3V3       |
| Y22        | IO134NDB3V2       |
| Y23        | IO138NDB3V3       |
| Y24        | IO140NDB3V3       |
| Y25        | IO140PDB3V3       |
| Y26        | IO136PPB3V2       |
| Y27        | IO141NDB3V3       |
| Y28        | IO135NDB3V2       |
| Y29        | IO131NDB3V2       |
| Y30        | IO133PDB3V2       |

| Revision                    | Changes                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Page       |
|-----------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|
| Revision 10<br>(March 2012) | The "In-System Programming (ISP) and Security" section and "Security" section were revised to clarify that although no existing security measures can give an absolute guarantee, Microsemi FPGAs implement the best security available in the industry (SAR 34669).                                                                                                                                                                                                            | I, 1-1     |
|                             | The Y security option and Licensed DPA Logo were added to the "ProASIC3E Ordering Information" section. The trademarked Licensed DPA Logo identifies that a product is covered by a DPA counter-measures license from Cryptography Research (SAR 34727).                                                                                                                                                                                                                        | III        |
|                             | The following sentence was removed from the "Advanced Architecture" section:<br>"In addition, extensive on-chip programming circuitry allows for rapid, single-voltage (3.3 V) programming of IGLOOe devices via an IEEE 1532 JTAG interface" (SAR 34689).                                                                                                                                                                                                                      | 1-3        |
|                             | The "Specifying I/O States During Programming" section is new (SAR 34699).                                                                                                                                                                                                                                                                                                                                                                                                      | 1-6        |
|                             | VCCPLL in Table 2-2 • Recommended Operating Conditions <sup>1</sup> was corrected from "1.4 to 1.6 V" to "1.425 to 1.575 V" (SAR 33851).<br>The T <sub>J</sub> symbol was added to the table and notes regarding T <sub>A</sub> and T <sub>J</sub> were removed. The second of two parameters in the VCCI and VMV row, called "3.3 V DC supply voltage," was corrected to "3.0 V DC supply voltage" (SAR 37227).                                                                | 2-2        |
|                             | The reference to guidelines for global spines and VersaTile rows, given in the "Global Clock Contribution—P <sub>CLOCK</sub> " section, was corrected to the "Spine Architecture" section of the Global Resources chapter in the <i>ProASIC3E FPGA Fabric User's Guide</i> (SAR 34735).                                                                                                                                                                                         | 2-9        |
|                             | t <sub>DOUT</sub> was corrected to t <sub>DIN</sub> in Figure 2-3 • Input Buffer Timing Model and Delays (example) (SAR 37109).                                                                                                                                                                                                                                                                                                                                                 | 2-13       |
|                             | The typo related to the values for 3.3 V LVCMOS Wide Range in Table 2-17 • Summary of I/O Timing Characteristics—Software Default Settings was corrected (SAR 37227).                                                                                                                                                                                                                                                                                                           | 2-19       |
|                             | The notes regarding drive strength in the "Summary of I/O Timing Characteristics – Default I/O Software Settings" section and "3.3 V LVCMOS Wide Range" section and tables were revised for clarification. They now state that the minimum drive strength for the default software configuration when run in wide range is ±100 µA. The drive strength displayed in software is supported in normal range only. For a detailed I/V curve, refer to the IBIS models (SAR 34763). | 2-18, 2-27 |