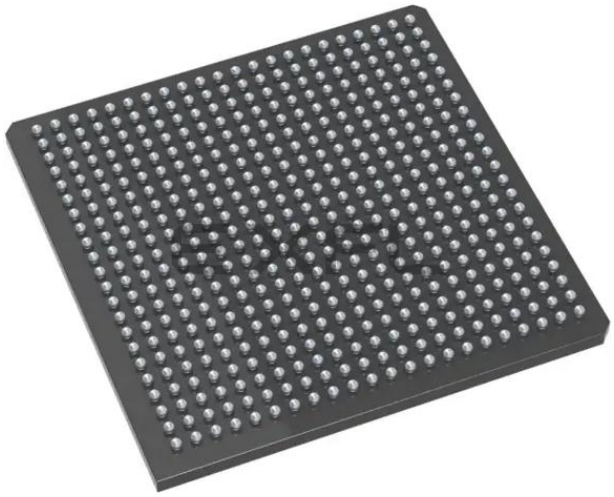

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## Understanding Embedded - FPGAs (Field Programmable Gate Array)

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 | 18144 |
| Number of Logic Elements/Cells | - |
| Total RAM Bits | 165888 |
| Number of I/O | 317 |
| Number of Gates | 1000000 |
| Voltage - Supply | 1.425V ~ 1.575V |
| Mounting Type | Surface Mount |
| Operating Temperature | -40°C ~ 85°C (TA) |
| Package / Case | 484-BGA |
| Supplier Device Package | 484-FPBGA (23x23) |
| Purchase URL | https://www.e-xfl.com/product-detail/microchip-technology/ax1000-2fg484i |

***Figure 1-2 •*** **Axcelerator Family Interconnect Elements**

## Logic Modules

Microsemi's Axcelerator family provides two types of logic modules: the register cell (R-cell) and the combinatorial cell (C-cell). The Axcelerator device can implement more than 4,000 combinatorial functions of up to five inputs (Figure 1-3).

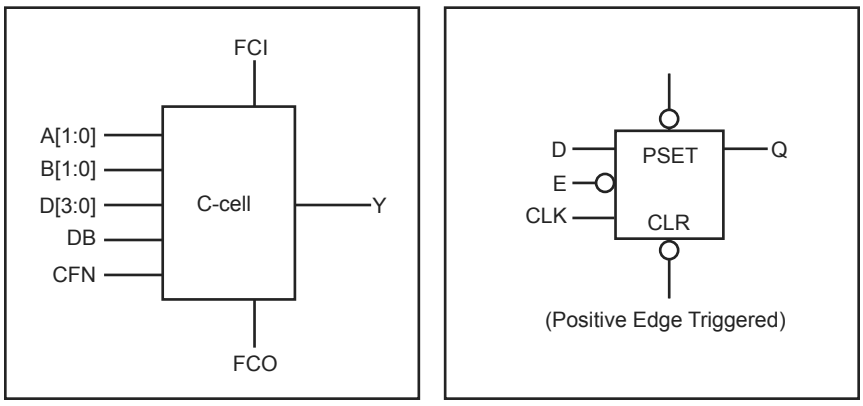


***Figure 1-3 •*** **AX C-Cell and R-Cell**

The R-cell contains a flip-flop featuring asynchronous clear, asynchronous preset, and active-low enable control signals (Figure 1-3). The R-cell registers feature programmable clock polarity selectable on a register-by-register basis. This provides additional flexibility (e.g., easy mapping of dual-data-rate functions into the FPGA) while conserving valuable clock resources. The clock source for the R-cell can be chosen from the hardwired clocks, routed clocks, or internal logic.

The SRAM blocks are arranged in a column on the west side of the tile (Figure 1-6 on page 1-4).

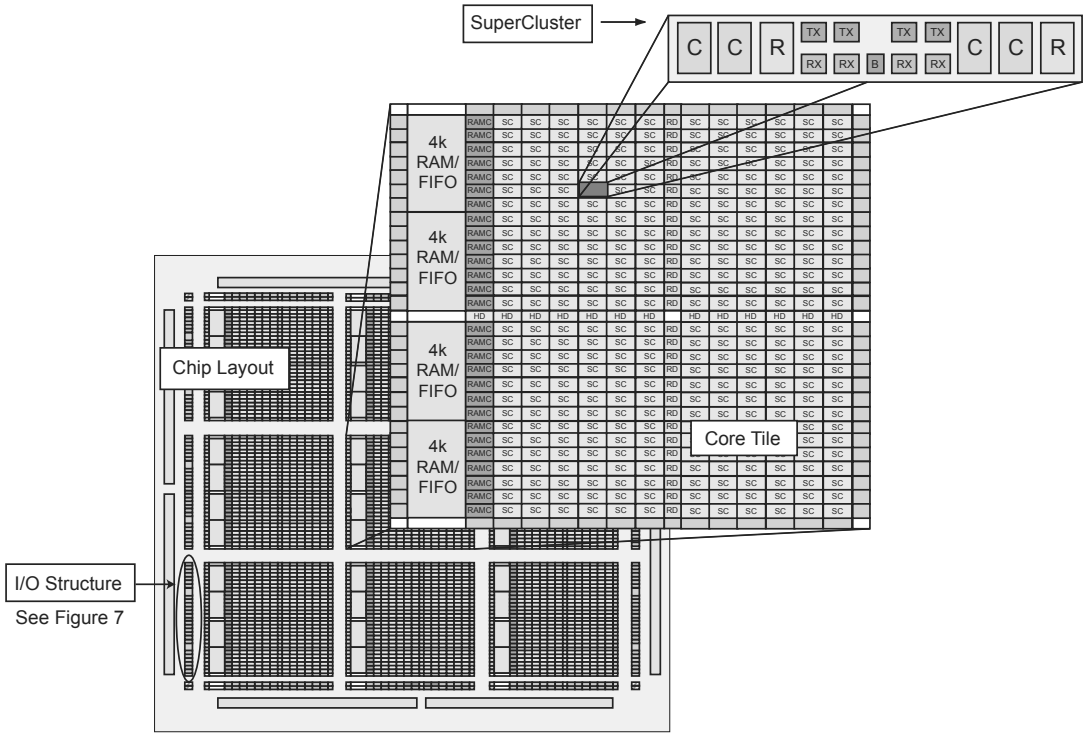


***Figure 1-6 •*** **AX Device Architecture (AX1000 shown)**

## Embedded Memory

As mentioned earlier, each core tile has either three (in a smaller tile) or four (in the regular tile) embedded SRAM blocks along the west side, and each variable-aspect-ratio SRAM block is 4,608 bits in size. Available memory configurations are: 128x36, 256x18, 512x9, 1kx4, 2kx2 or 4kx1 bits. The individual blocks have separate read and write ports that can be configured with different bit widths on each port. For example, data can be written in by eight and read out by one.

In addition, every SRAM block has an embedded FIFO control unit. The control unit allows the SRAM block to be configured as a synchronous FIFO without using core logic modules. The FIFO width and depth are programmable. The FIFO also features programmable ALMOST-EMPTY (AEMPTY) and ALMOST-FULL (AFULL) flags in addition to the normal EMPTY and FULL flags. In addition to the flag logic, the embedded FIFO control unit also contains the counters necessary for the generation of the read and write address pointers as well as control circuitry to prevent metastability and erroneous operation. The embedded SRAM/FIFO blocks can be cascaded to create larger configurations.

## I/O Logic

The Axcelerator family of FPGAs features a flexible I/O structure, supporting a range of mixed voltages with its bank-selectable I/Os: 1.5V, 1.8V, 2.5V, and 3.3V. In all, Axcelerator FPGAs support at least 14 different I/O standards (single-ended, differential, voltage-referenced). The I/Os are organized into banks, with eight banks per device (two per side). The configuration of these banks determines the I/O standards supported (see "User I/Os" on page 2-11 for more information). All I/O standards are available in each bank.

Each I/O module has an input register (InReg), an output register (OutReg), and an enable register (EnReg) (Figure 1-7 on page 1-5). An I/O Cluster includes two I/O modules, four RX modules, two TX modules, and a buffer (B) module.

## Calculating Power Dissipation

***Table 2-3 •*** **Standby Current**

| Device | Temperature | ICCA | ICCDA | ICCBANK | | ICCPLL | ICCCP[1] | | IIH, IIL, IOZ[2] | Units |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Standby Current (Core) | Standby Current, Differential I/O | Standby Current per I/O Bank | | Standby Current per PLL | Standby Current, Charge Pump | | | |
| | | | | 2.5 V VCCI | 3.3 V VCCI | | Active | Bypassed Mode | | |
| AX125 | Typical at 25°C | 1.5 | 1.5 | 0.2 | 0.3 | 0.2 | 0.3 | 0.01 | ±0.01 | mA |
| | 70°C | 15 | 6 | 0.5 | 0.75 | 1 | 0.4 | 0.01 | ±0.01 | mA |
| | 85°C | 25 | 6 | 0.6 | 0.8 | 1 | 0.4 | 0.2 | ±0.01 | mA |
| | 125°C | 50 | 8 | 1 | 1.5 | 2 | 0.4 | 0.5 | ±0.01 | mA |
| AX250 | Typical at 25°C | 1.5 | 1.4 | 0.25 | 0.4 | 0.2 | 0.3 | 0.01 | ±0.01 | mA |
| | 70°C | 30 | 7 | 0.8 | 0.9 | 1 | 0.4 | 0.01 | ±0.01 | mA |
| | 85°C | 40 | 7 | 0.8 | 1 | 1 | 0.4 | 0.2 | ±0.01 | mA |
| | 125°C | 70 | 9 | 1.3 | 1.8 | 2 | 0.4 | 0.5 | ±0.01 | mA |
| AX500 | Typical at 25°C | 5 | 1.4 | 0.4 | 0.75 | 0.2 | 0.3 | 0.01 | ±0.01 | mA |
| | 70°C | 60 | 7 | 1 | 1.5 | 1 | 0.4 | 0.01 | ±0.01 | mA |
| | 85°C | 80 | 7 | 1 | 1.9 | 1 | 0.4 | 0.2 | ±0.01 | mA |
| | 125°C | 180 | 9 | 1.75 | 2.5 | 1.5 | 0.4 | 0.5 | ±0.01 | mA |
| AX1000 | Typical at 25°C | 7.5 | 1.5 | 0.5 | 1.25 | 0.2 | 0.3 | 0.01 | ±0.01 | mA |
| | 70°C | 80 | 8 | 1.5 | 3 | 1 | 0.4 | 0.01 | ±0.01 | mA |
| | 85°C | 120 | 8 | 1.5 | 3.4 | 1 | 0.4 | 0.2 | ±0.01 | mA |
| | 125°C | 200 | 10 | 3 | 4 | 1.5 | 0.4 | 0.5 | ±0.01 | mA |
| AX2000 | Typical at 25°C | 20 | 1.6 | 0.7 | 1.5 | 0.2 | 0.3 | 0.01 | ±0.01 | mA |
| | 70°C | 160 | 10 | 2 | 7 | 1 | 0.4 | 0.01 | ±0.01 | mA |
| | 85°C | 200 | 10 | 3 | 8 | 1 | 0.4 | 0.2 | ±0.01 | mA |
| | 125°C | 500 | 15 | 4 | 10 | 1.5 | 0.4 | 0.5 | ±0.01 | mA |

*Notes:*

1. *ICCCP Active is the ICCDA or the Internal Charge Pump current. ICCCP Bypassed mode is the External Charge Pump current IIH (VPUMP pin).*
2. *IIH, IIL, or IOZ values are measured with inputs at the same level as VCCI for IIH and GND for IIL and IOZ.*

## I/O Banks and Compatibility

Since each I/O bank has its own user-assigned input reference voltage (VREF) and an input/output supply voltage (VCCI), only I/Os with compatible standards can be assigned to the same bank.

Table 2-11 shows the compatible I/O standards for a common VREF (for voltage-referenced standards). Similarly, Table 2-12 shows compatible standards for a common VCCI.

***Table 2-11 •*** **Compatible I/O Standards for Different VREF Values**

| VREF | Compatible Standards |
|---|---|
| 1.5 V | SSTL 3 (Class I and II) |
| 1.25 V | SSTL 2 (Class I and II) |
| 1.0 V | GTL+ (2.5V and 3.3V Outputs) |
| 0.75 V | HSTL (Class I) |

***Table 2-12 •*** **Compatible I/O Standards for Different VCCI Values**

| VCCI[1] | Compatible Standards | VREF |
|---|---|---|
| 3.3 V | LVTTL, PCI, PCI-X, LVPECL, GTL+ 3.3 V | 1.0 |
| 3.3 V | SSTL 3 (Class I and II), LVTTL, PCI, LVPECL | 1.5 |
| 2.5 V | LVCMOS 2.5 V, GTL+ 2.5 V, LVDS[2] | 1.0 |
| 2.5 V | LVCMOS 2.5 V, SSTL 2 (Classes I and II), LVDS[2] | 1.25 |
| 1.8 V | LVCMOS 1.8 V | N/A |
| 1.5 V | LVCMOS 1.5 V, HSTL Class I | 0.75 |

*Notes:*

1. *VCCI is used for both inputs and outputs*
2. *VCCI tolerance is* ±5%

Table 2-13 summarizes the different combinations of voltages and I/O standards that can be used together in the same I/O bank.

***Table 2-13* • Legal I/O Usage Matrix**

| I/O Standard | LVTTL 3.3 V | LVCMOS 2.5 V | LVCMOS1.8 V | LVCMOS1.5 V (JESD8-11) | 3.3V PCI/PCI-X | GTL + (3.3 V) | GTL + (2.5 V) | HSTL Class I (1. 5V) | SSTL2 Class I & II (2.5 V) | SSTL3 Class I & II (3.3 V) | LVDS (2.5 V) | LVPECL (3.3 V) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LVTTL 3.3 V (VREF=1.0 V) | ✓ | – | – | – | ✓ | ✓ | – | – | – | – | – | ✓ |
| LVTTL 3.3 V(VREF=1.5 V) | ✓ | – | – | – | ✓ | – | – | – | – | ✓ | – | ✓ |
| LVCMOS 2.5 V (VREF=1.0 V) | – | ✓ | – | – | – | – | ✓ | – | – | – | ✓ | – |
| LVCMOS 2.5 V (VREF=1.25V) | – | ✓ | – | – | – | – | – | – | ✓ | – | ✓ | – |
| LVCMOS1.8 V | – | – | ✓ | – | – | – | – | – | – | – | – | – |
| LVCMOS1.5 V (VREF = 1.75 V) (JESD8-11) | – | – | – | ✓ | – | – | – | ✓ | – | – | – | – |
| 3.3 V PCI/PCI-X (VREF = 1.0 V) | ✓ | – | – | – | ✓ | ✓ | – | – | – | – | – | ✓ |
| 3.3 V PCI/PCI-X (VREF= 1.5 V) | ✓ | – | – | – | ✓ | – | – | – | – | ✓ | – | ✓ |
| GTL + (3.3 V) | ✓ | – | – | – | ✓ | ✓ | – | – | – | – | – | ✓ |
| GTL + (2.5 V) | – | ✓ | – | – | – | – | ✓ | – | – | – | – | – |
| HSTL Class I | – | – | – | ✓ | – | – | – | ✓ | – | – | – | – |
| SSTL2 Class I & II | – | ✓ | – | – | – | – | – | – | ✓ | – | ✓ | – |
| SSTL3 Class I & II | ✓ | – | – | – | ✓ | – | – | – | – | ✓ | – | ✓ |
| LVDS (VREF = 1.0 V) | – | ✓ | – | – | – | – | ✓ | – | – | – | ✓ | – |
| LVDS (VREF = 1.25 V) | – | ✓ | – | – | – | – | – | – | ✓ | – | ✓ | – |
| LVPECL (VREF = 1.0 V) | ✓ | – | – | – | ✓ | ✓ | – | – | – | – | – | ✓ |
| LVPECL (VREF = 1.5 V) | ✓ | – | – | – | ✓ | – | – | – | – | ✓ | – | ✓ |

*Notes:*

1. *Note that GTL+ 2.5 V is not supported across the full military temperature range.*
2. *A "✓" indicates whether standards can be used within a bank at the same time.*
   *Examples:*
   *a) LVTTL can be used with 3.3V PCI and GTL+ (3.3V), when $V_{REF}$ = 1.0V (GTL+ requirement).*
   *b) LVTTL can be used with 3.3V PCI and SSTL3 Class I and II, when $V_{REF}$ = 1.5V (SSTL3 requirement).*

Note that two I/O standards are compatible if:

- Their VCCI values are identical.
- Their VREF standards are identical (if applicable).

For example, if LVTTL 3.3 V (VREF= 1.0 V) is used, then the other available (i.e. compatible) I/O standards in the same bank are LVTTL 3.3 V PCI/PCI-X, GTL+, and LVPECL.

Also note that when multiple I/O standards are used within a bank, the voltage tolerance will be limited to the minimum tolerance of all I/O standards used in the bank.

## Timing Characteristics

***Table 2-28* • 1.8V LVCMOS I/O Module**
**Worst-Case Commercial Conditions VCCA = 1.425 V, VCCI = 1.7 V, TJ = 70°C**

| | | –2 Speed | | –1 Speed | | Std Speed | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Description** | **Min.** | **Max.** | **Min.** | **Max.** | **Min.** | **Max.** | **Units** |
| **LVCMOS18 Output Module Timing** | | | | | | | | |
| $t_{DP}$ | Input Buffer | | 3.26 | | 3.71 | | 4.37 | ns |
| $t_{PY}$ | Output Buffer | | 4.55 | | 5.18 | | 6.09 | ns |
| $t_{ENZL}$ | Enable to Pad Delay through the Output Buffer—Z to Low | | 2.82 | | 2.83 | | 2.84 | ns |
| $t_{ENZH}$ | Enable to Pad Delay through the Output Buffer—Z to High | | 3.43 | | 3.45 | | 3.46 | ns |
| $t_{ENLZ}$ | Enable to Pad Delay through the Output Buffer—Low to Z | | 6.01 | | 6.85 | | 8.05 | ns |
| $t_{ENHZ}$ | Enable to Pad Delay through the Output Buffer—High to Z | | 6.73 | | 7.67 | | 9.01 | ns |
| $t_{IOCLKQ}$ | Sequential Clock-to-Q for the I/O Input Register | | 0.67 | | 0.77 | | 0.90 | ns |
| $t_{IOCLKY}$ | Clock-to-output Y for the I/O Output Register and the I/O Enable Register | | 0.67 | | 0.77 | | 0.90 | ns |
| $t_{SUD}$ | Data Input Set-Up | | 0.23 | | 0.27 | | 0.31 | ns |
| $t_{SUE}$ | Enable Input Set-Up | | 0.26 | | 0.30 | | 0.35 | ns |
| $t_{HD}$ | Data Input Hold | | 0.00 | | 0.00 | | 0.00 | ns |
| $t_{HE}$ | Enable Input Hold | | 0.00 | | 0.00 | | 0.00 | ns |
| $t_{CPWHL}$ | Clock Pulse Width High to Low | 0.39 | | 0.39 | | 0.39 | | ns |
| $t_{CPWLH}$ | Clock Pulse Width Low to High | 0.39 | | 0.39 | | 0.39 | | ns |
| $t_{WASYN}$ | Asynchronous Pulse Width | 0.37 | | 0.37 | | 0.37 | | ns |
| $t_{REASYN}$ | Asynchronous Recovery Time | | 0.13 | | 0.15 | | 0.17 | ns |
| $t_{HASYN}$ | Asynchronous Removal Time | | 0.00 | | 0.00 | | 0.00 | ns |
| $t_{CLR}$ | Asynchronous Clear-to-Q | | 0.23 | | 0.27 | | 0.31 | ns |
| $t_{PRESET}$ | Asynchronous Preset-to-Q | | 0.23 | | 0.27 | | 0.31 | ns |

## Timing Characteristics

**Table 2-65 • AX125 Predicted Routing Delays**
**Worst-Case Commercial Conditions VCCA = 1.425 V, $T_J$ = 70°C**

| | | –2 Speed | –1 Speed | Std Speed | |
|---|---|---|---|---|---|
| **Parameter** | **Description** | **Typical** | **Typical** | **Typical** | **Units** |
| **Predicted Routing Delays** | | | | | |
| $t_{DC}$ | DirectConnect Routing Delay, FO1 | 0.11 | 0.12 | 0.15 | ns |
| $t_{FC}$ | FastConnect Routing Delay, FO1 | 0.35 | 0.39 | 0.46 | ns |
| $t_{RD1}$ | Routing delay for FO1 | 0.35 | 0.40 | 0.47 | ns |
| $t_{RD2}$ | Routing delay for FO2 | 0.38 | 0.43 | 0.51 | ns |
| $t_{RD3}$ | Routing delay for FO3 | 0.43 | 0.48 | 0.57 | ns |
| $t_{RD4}$ | Routing delay for FO4 | 0.48 | 0.55 | 0.64 | ns |
| $t_{RD5}$ | Routing delay for FO5 | 0.55 | 0.62 | 0.73 | ns |
| $t_{RD6}$ | Routing delay for FO6 | 0.64 | 0.72 | 0.85 | ns |
| $t_{RD7}$ | Routing delay for FO7 | 0.79 | 0.89 | 1.05 | ns |
| $t_{RD8}$ | Routing delay for FO8 | 0.88 | 0.99 | 1.17 | ns |
| $t_{RD16}$ | Routing delay for FO16 | 1.49 | 1.69 | 1.99 | ns |
| $t_{RD32}$ | Routing delay for FO32 | 2.32 | 2.63 | 3.10 | ns |

**Table 2-66 • AX250 Predicted Routing Delays**
**Worst-Case Commercial Conditions VCCA = 1.425 V, $T_J$ = 70°C**

| | | –2 Speed | –1 Speed | Std Speed | |
|---|---|---|---|---|---|
| **Parameter** | **Description** | **Typical** | **Typical** | **Typical** | **Units** |
| **Predicted Routing Delays** | | | | | |
| $t_{DC}$ | DirectConnect Routing Delay, FO1 | 0.11 | 0.12 | 0.15 | ns |
| $t_{FC}$ | FastConnect Routing Delay, FO1 | 0.35 | 0.39 | 0.46 | ns |
| $t_{RD1}$ | Routing delay for FO1 | 0.39 | 0.45 | 0.53 | ns |
| $t_{RD2}$ | Routing delay for FO2 | 0.41 | 0.46 | 0.54 | ns |
| $t_{RD3}$ | Routing delay for FO3 | 0.48 | 0.55 | 0.64 | ns |
| $t_{RD4}$ | Routing delay for FO4 | 0.56 | 0.63 | 0.75 | ns |
| $t_{RD5}$ | Routing delay for FO5 | 0.60 | 0.68 | 0.80 | ns |
| $t_{RD6}$ | Routing delay for FO6 | 0.84 | 0.96 | 1.13 | ns |
| $t_{RD7}$ | Routing delay for FO7 | 0.90 | 1.02 | 1.20 | ns |
| $t_{RD8}$ | Routing delay for FO8 | 1.00 | 1.13 | 1.33 | ns |
| $t_{RD16}$ | Routing delay for FO16 | 2.17 | 2.46 | 2.89 | ns |
| $t_{RD32}$ | Routing delay for FO32 | 3.55 | 4.03 | 4.74 | ns |

***Table 2-69* • AX2000 Predicted Routing Delays**
**Worst-Case Commercial Conditions VCCA = 1.425 V, $T_J$ = 70°C**

| | | –2 Speed | –1 Speed | Std Speed | |
|---|---|---|---|---|---|
| **Parameter** | **Description** | **Typical** | **Typical** | **Typical** | **Units** |
| **Predicted Routing Delays** | | | | | |
| $t_{DC}$ | DirectConnect Routing Delay, FO1 | 0.12 | 0.13 | 0.15 | ns |
| $t_{FC}$ | FastConnect Routing Delay, FO1 | 0.35 | 0.39 | 0.46 | ns |
| $t_{RD1}$ | Routing delay for FO1 | 0.50 | 0.56 | 0.66 | ns |
| $t_{RD2}$ | Routing delay for FO2 | 0.59 | 0.67 | 0.79 | ns |
| $t_{RD3}$ | Routing delay for FO3 | 0.70 | 0.80 | 0.94 | ns |
| $t_{RD4}$ | Routing delay for FO4 | 0.76 | 0.87 | 1.02 | ns |
| $t_{RD5}$ | Routing delay for FO5 | 0.98 | 1.11 | 1.31 | ns |
| $t_{RD6}$ | Routing delay for FO6 | 1.48 | 1.68 | 1.97 | ns |
| $t_{RD7}$ | Routing delay for FO7 | 1.65 | 1.87 | 2.20 | ns |
| $t_{RD8}$ | Routing delay for FO8 | 1.73 | 1.96 | 2.31 | ns |
| $t_{RD16}$ | Routing delay for FO16 | 2.58 | 2.92 | 3.44 | ns |
| $t_{RD32}$ | Routing delay for FO32 | 4.24 | 4.81 | 5.65 | ns |

## Routed Clocks

The routed clock (CLK) is a low-skew network that can drive the clock inputs of all sequential modules in the device (logically equivalent to the HCLK), but has the added flexibility in that it can drive the S0 (Enable), S1, PSET, and CLR input of a register (R-cells and I/O registers) as well as any of the inputs of any C-cell in the device. This allows CLKs to be used not only as clocks, but also for other global signals or high fanout nets. All four CLKs are available everywhere on the chip.

### *Timing Characteristics*

***Table 2-75 •*** **AX125 Routed Array Clock Networks**
**Worst-Case Commercial Conditions VCCA = 1.425 V, VCCI = 3.0 V, $T_J$ = 70°C**

| | | –2 Speed | | –1 Speed | | Std Speed | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Description** | **Min.** | **Max.** | **Min.** | **Max.** | **Min.** | **Max.** | **Units** |
| **Routed Array Clock Networks** | | | | | | | | |
| $t_{RCKL}$ | Input Low to High | | 3.08 | | 3.50 | | 4.12 | ns |
| $t_{RCKH}$ | Input High to Low | | 3.13 | | 3.56 | | 4.19 | ns |
| $t_{RPWH}$ | Minimum Pulse Width High | 0.57 | | 0.64 | | 0.75 | | ns |
| $t_{RPWL}$ | Minimum Pulse Width Low | 0.52 | | 0.59 | | 0.69 | | ns |
| $t_{RCKSW}$ | Maximum Skew | | 0.35 | | 0.39 | | 0.46 | ns |
| $t_{RP}$ | Minimum Period | 1.15 | | 1.31 | | 1.54 | | ns |
| $t_{RMAX}$ | Maximum Frequency | | 870 | | 763 | | 649 | MHz |

***Table 2-76 •*** **AX250 Routed Array Clock Networks**
**Worst-Case Commercial Conditions VCCA = 1.425 V, VCCI = 3.0 V, $T_J$ = 70°C**

| | | –2 Speed | | –1 Speed | | Std Speed | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Description** | **Min.** | **Max.** | **Min.** | **Max.** | **Min.** | **Max.** | **Units** |
| **Routed Array Clock Networks** | | | | | | | | |
| $t_{RCKL}$ | Input Low to High | | 2.52 | | 2.87 | | 3.37 | ns |
| $t_{RCKH}$ | Input High to Low | | 2.59 | | 2.95 | | 3.47 | ns |
| $t_{RPWH}$ | Minimum Pulse Width High | 0.57 | | 0.64 | | 0.75 | | ns |
| $t_{RPWL}$ | Minimum Pulse Width Low | 0.52 | | 0.59 | | 0.69 | | ns |
| $t_{RCKSW}$ | Maximum Skew | | 0.35 | | 0.39 | | 0.46 | ns |
| $t_{RP}$ | Minimum Period | 1.15 | | 1.31 | | 1.54 | | ns |
| $t_{RMAX}$ | Maximum Frequency | | 870 | | 763 | | 649 | MHz |

| BG729 | |
|---|---|
| AX1000 Function | Pin Number |
| IO163PB5F15 | AA14 |
| IO164NB5F15 | AE13 |
| IO164PB5F15 | AF13 |
| IO165NB5F15 | AF12 |
| IO165PB5F15 | AG12 |
| IO166NB5F15 | AD12 |
| IO166PB5F15 | AE12 |
| IO167NB5F15 | Y13 |
| IO167PB5F15 | AA13 |
| IO168NB5F15 | AD11 |
| IO168PB5F15 | AE11 |
| IO169NB5F15 | AG11 |
| IO169PB5F15 | AF11 |
| IO170NB5F15 | AB11 |
| IO170PB5F15 | AC11 |
| IO171NB5F16 | AF10 |
| IO171PB5F16 | AG10 |
| IO172NB5F16 | AD10 |
| IO172PB5F16 | AE10 |
| IO173NB5F16 | Y12 |
| IO173PB5F16 | AA12 |
| IO174NB5F16 | AB10 |
| IO174PB5F16 | AC10 |
| IO175NB5F16 | AF9 |
| IO175PB5F16 | AG9 |
| IO176NB5F16 | AD9 |
| IO176PB5F16 | AE9 |
| IO177NB5F16 | Y11 |
| IO177PB5F16 | AA11 |
| IO178NB5F16 | AF8 |
| IO178PB5F16 | AG8 |
| IO179NB5F16 | AD8 |
| IO179PB5F16 | AE8 |
| IO180NB5F16 | AB9 |
| IO180PB5F16 | AC9 |
| IO181NB5F17 | Y10 |
| IO181PB5F17 | AA10 |

| BG729 | |
|---|---|
| AX1000 Function | Pin Number |
| IO182NB5F17 | AF7 |
| IO182PB5F17 | AG7 |
| IO183NB5F17 | AD7 |
| IO183PB5F17 | AE7 |
| IO184NB5F17 | AC7 |
| IO184PB5F17 | AC8 |
| IO185NB5F17 | AF6 |
| IO185PB5F17 | AG6 |
| IO186NB5F17 | AB7 |
| IO186PB5F17 | AB8 |
| IO187NB5F17 | Y9 |
| IO187PB5F17 | AA9 |
| IO188NB5F17 | AD6 |
| IO188PB5F17 | AE6 |
| IO189NB5F17 | AB6 |
| IO189PB5F17 | AC6 |
| IO190NB5F17 | AF5 |
| IO190PB5F17 | AG5 |
| IO191NB5F17 | AA6 |
| IO191PB5F17 | AA7 |
| IO192NB5F17 | Y8 |
| IO192PB5F17 | AA8 |
| **Bank 6** | |
| IO193NB6F18 | W8 |
| IO193PB6F18 | Y7 |
| IO194NB6F18 | AB5 |
| IO194PB6F18 | AC5 |
| IO195NB6F18 | AC2 |
| IO195PB6F18 | AC3 |
| IO196NB6F18 | AC4 |
| IO196PB6F18 | AD4 |
| IO197NB6F18 | Y5 |
| IO197PB6F18 | Y6 |
| IO198NB6F18 | AB3 |
| IO198PB6F18 | AB4 |
| IO199NB6F18 | V7 |
| IO199PB6F18 | W7 |

| BG729 | |
|---|---|
| AX1000 Function | Pin Number |
| IO200NB6F18 | AA4 |
| IO200PB6F18 | AA5 |
| IO201NB6F18 | W5 |
| IO201PB6F18 | W6 |
| IO202NB6F18 | AB1 |
| IO202PB6F18 | AC1 |
| IO203NB6F19 | Y3 |
| IO203PB6F19 | AA3 |
| IO204NB6F19 | AA2 |
| IO204PB6F19 | AB2 |
| IO205NB6F19 | U8 |
| IO205PB6F19 | V8 |
| IO206NB6F19 | V5 |
| IO206PB6F19 | V6 |
| IO207NB6F19 | Y1 |
| IO207PB6F19 | AA1 |
| IO208NB6F19 | W4 |
| IO208PB6F19 | Y4 |
| IO209NB6F19 | T7 |
| IO209PB6F19 | U7 |
| IO210NB6F19 | W2 |
| IO210PB6F19 | Y2 |
| IO211NB6F19 | U5 |
| IO211PB6F19 | U6 |
| IO212NB6F19 | V3 |
| IO212PB6F19 | W3 |
| IO213NB6F19 | R9 |
| IO213PB6F19 | T8 |
| IO214NB6F20 | U4 |
| IO214PB6F20 | V4 |
| IO215NB6F20 | T5 |
| IO215PB6F20 | T6 |
| IO216NB6F20 | V1 |
| IO216PB6F20 | W1 |
| IO217NB6F20 | R7 |
| IO217PB6F20 | R8 |
| IO218NB6F20 | U2 |

| FG484 | |
|---|---|
| AX500 Function | Pin Number |
| IO54PB2F5 | H22 |
| IO55NB2F5 | L17 |
| IO55PB2F5 | K17 |
| IO56NB2F5 | K21 |
| IO56PB2F5 | K22 |
| IO58NB2F5 | L20 |
| IO58PB2F5 | K20 |
| IO59NB2F5 | L18 |
| IO59PB2F5 | K18 |
| IO60NB2F5 | M21 |
| IO60PB2F5 | L21 |
| IO61NB2F5 | L16 |
| IO61PB2F5 | K16 |
| IO62NB2F5 | M19 |
| IO62PB2F5 | L19 |
| **Bank 3** | |
| IO63NB3F6 | N16 |
| IO63PB3F6 | M16 |
| IO64NB3F6 | P22 |
| IO64PB3F6 | N22 |
| IO65NB3F6 | N20 |
| IO65PB3F6 | M20 |
| IO66NB3F6 | P21 |
| IO66PB3F6 | N21 |
| IO67NB3F6 | N18 |
| IO67PB3F6 | N19 |
| IO68NB3F6 | T22 |
| IO68PB3F6 | R22 |
| IO69NB3F6 | N17 |
| IO69PB3F6 | M17 |
| IO70NB3F6 | T21 |
| IO70PB3F6 | R21 |
| IO71NB3F6 | P18 |
| IO71PB3F6 | P19 |
| IO72NB3F6 | R20 |

| FG484 | |
|---|---|
| AX500 Function | Pin Number |
| IO72PB3F6 | P20 |
| IO73PB3F6 | R19 |
| IO74NB3F7 | V21 |
| IO74PB3F7 | U21 |
| IO75NB3F7 | V22 |
| IO75PB3F7 | U22 |
| IO76NB3F7 | U20 |
| IO76PB3F7 | T20 |
| IO77NB3F7 | R17 |
| IO77PB3F7 | P17 |
| IO78NB3F7 | W21 |
| IO78PB3F7 | W22 |
| IO79NB3F7 | T18 |
| IO79PB3F7 | R18 |
| IO80NB3F7 | W20 |
| IO80PB3F7 | V20 |
| IO81NB3F7 | U19 |
| IO81PB3F7 | T19 |
| IO82NB3F7 | U18 |
| IO82PB3F7 | V19 |
| IO83NB3F7 | R16 |
| IO83PB3F7 | P16 |
| **Bank 4** | |
| IO84NB4F8 | AB18 |
| IO84PB4F8 | AB19 |
| IO85NB4F8 | T15 |
| IO85PB4F8 | T16 |
| IO86NB4F8 | AA18 |
| IO86PB4F8 | AA19 |
| IO87NB4F8 | W17 |
| IO87PB4F8 | V17 |
| IO88NB4F8 | Y19 |
| IO88PB4F8 | W18 |
| IO89NB4F8 | U14 |
| IO89PB4F8 | U15 |

| FG484 | |
|---|---|
| AX500 Function | Pin Number |
| IO90NB4F8 | Y17 |
| IO90PB4F8 | Y18 |
| IO91NB4F8 | V15 |
| IO91PB4F8 | V16 |
| IO92PB4F8 | AB17 |
| IO93NB4F8 | Y15 |
| IO93PB4F8 | Y16 |
| IO94NB4F9 | AA16 |
| IO94PB4F9 | AA17 |
| IO95NB4F9 | AB14 |
| IO95PB4F9 | AB15 |
| IO96NB4F9 | W15 |
| IO96PB4F9 | W16 |
| IO97NB4F9 | AA13 |
| IO97PB4F9 | AB13 |
| IO98NB4F9 | AA14 |
| IO98PB4F9 | AA15 |
| IO100NB4F9 | Y14 |
| IO100PB4F9 | W14 |
| IO101NB4F9 | Y12 |
| IO101PB4F9 | Y13 |
| IO102NB4F9 | AA11 |
| IO102PB4F9 | AA12 |
| IO103NB4F9/CLKEN | V12 |
| IO103PB4F9/CLKEP | V13 |
| IO104NB4F9/CLKFN | W11 |
| IO104PB4F9/CLKFP | W12 |
| **Bank 5** | |
| IO105NB5F10/CLKGN | U10 |
| IO105PB5F10/CLKGP | U11 |
| IO106NB5F10/CLKHN | V9 |
| IO106PB5F10/CLKHP | V10 |
| IO107NB5F10 | Y10 |
| IO107PB5F10 | Y11 |
| IO108NB5F10 | AA9 |

| FG676 | |
|---|---|
| AX500 Function | Pin Number |
| NC | J5 |
| NC | J6 |
| NC | P22 |
| NC | R20 |
| NC | R21 |
| NC | R22 |
| NC | R4 |
| NC | R5 |
| NC | T22 |
| NC | T24 |
| NC | U22 |
| NC | U24 |
| NC | V22 |
| NC | V5 |
| NC | W21 |
| NC | W22 |
| NC | W5 |
| NC | W6 |
| NC | Y21 |
| NC | Y4 |
| NC | Y5 |
| NC | Y6 |
| PRA | E13 |
| PRB | B14 |
| PRC | Y14 |
| PRD | AD14 |
| TCK | E5 |
| TDI | B3 |
| TDO | G6 |
| TMS | D4 |
| TRST | A2 |
| VCCA | AB4 |
| VCCA | AF24 |
| VCCA | C1 |
| VCCA | C26 |

| FG676 | |
|---|---|
| AX500 Function | Pin Number |
| VCCA | J10 |
| VCCA | J11 |
| VCCA | J12 |
| VCCA | J13 |
| VCCA | J14 |
| VCCA | J15 |
| VCCA | J16 |
| VCCA | J17 |
| VCCA | K18 |
| VCCA | K9 |
| VCCA | L18 |
| VCCA | L9 |
| VCCA | M18 |
| VCCA | M9 |
| VCCA | N18 |
| VCCA | N9 |
| VCCA | P18 |
| VCCA | P9 |
| VCCA | R18 |
| VCCA | R9 |
| VCCA | T18 |
| VCCA | T9 |
| VCCA | U18 |
| VCCA | U9 |
| VCCA | V10 |
| VCCA | V11 |
| VCCA | V12 |
| VCCA | V13 |
| VCCA | V14 |
| VCCA | V15 |
| VCCA | V16 |
| VCCA | V17 |
| VCCDA | A3 |
| VCCDA | AB22 |
| VCCDA | AB5 |

| FG676 | |
|---|---|
| AX500 Function | Pin Number |
| VCCDA | AD10 |
| VCCDA | AD13 |
| VCCDA | AD17 |
| VCCDA | B1 |
| VCCDA | B17 |
| VCCDA | D24 |
| VCCDA | E14 |
| VCCDA | P2 |
| VCCDA | P23 |
| VCCIB0 | G10 |
| VCCIB0 | G8 |
| VCCIB0 | G9 |
| VCCIB0 | H10 |
| VCCIB0 | H11 |
| VCCIB0 | H12 |
| VCCIB0 | H13 |
| VCCIB0 | H9 |
| VCCIB1 | G17 |
| VCCIB1 | G18 |
| VCCIB1 | G19 |
| VCCIB1 | H14 |
| VCCIB1 | H15 |
| VCCIB1 | H16 |
| VCCIB1 | H17 |
| VCCIB1 | H18 |
| VCCIB2 | H20 |
| VCCIB2 | J19 |
| VCCIB2 | J20 |
| VCCIB2 | K19 |
| VCCIB2 | K20 |
| VCCIB2 | L19 |
| VCCIB2 | M19 |
| VCCIB2 | N19 |
| VCCIB3 | P19 |
| VCCIB3 | R19 |

| FG676 | |
|---|---|
| **AX1000 Function** | **Pin Number** |
| VCCIB4 | W18 |
| VCCIB4 | Y17 |
| VCCIB4 | Y18 |
| VCCIB4 | Y19 |
| VCCIB5 | W10 |
| VCCIB5 | W11 |
| VCCIB5 | W12 |
| VCCIB5 | W13 |
| VCCIB5 | W9 |
| VCCIB5 | Y10 |
| VCCIB5 | Y8 |
| VCCIB5 | Y9 |
| VCCIB6 | P8 |
| VCCIB6 | R8 |
| VCCIB6 | T8 |
| VCCIB6 | U7 |
| VCCIB6 | U8 |
| VCCIB6 | V7 |
| VCCIB6 | V8 |
| VCCIB6 | W7 |
| VCCIB7 | H7 |
| VCCIB7 | J7 |
| VCCIB7 | J8 |
| VCCIB7 | K7 |
| VCCIB7 | K8 |
| VCCIB7 | L8 |
| VCCIB7 | M8 |
| VCCIB7 | N8 |
| VCOMPLA | D12 |
| VCOMPLB | G13 |
| VCOMPLC | D15 |
| VCOMPLD | F14 |
| VCOMPLE | AD15 |
| VCOMPLF | AB14 |
| VCOMPLG | AD12 |

| FG676 | |
|---|---|
| **AX1000 Function** | **Pin Number** |
| VCOMPLH | Y13 |
| VPUMP | E22 |

| FG896 | |
|---|---|
| AX1000 Function | Pin Number |
| IO51PB1F4 | E21 |
| IO52NB1F4 | F22 |
| IO52PB1F4 | E22 |
| IO53NB1F4 | B25 |
| IO53PB1F4 | B24 |
| IO54NB1F5 | D24 |
| IO54PB1F5 | D23 |
| IO55NB1F5 | F23 |
| IO55PB1F5 | E23 |
| IO56NB1F5 | H21 |
| IO56PB1F5 | G21 |
| IO57NB1F5 | D25 |
| IO57PB1F5 | C25 |
| IO58NB1F5 | F24 |
| IO58PB1F5 | E24 |
| IO59NB1F5 | D26 |
| IO59PB1F5 | C26 |
| IO60NB1F5 | G23 |
| IO60PB1F5 | G22 |
| IO61NB1F5 | B27 |
| IO61PB1F5 | A27 |
| IO62NB1F5 | F25 |
| IO62PB1F5 | E25 |
| IO63NB1F5 | H23 |
| IO63PB1F5 | H22 |
| **Bank 2** | |
| IO64NB2F6 | K23 |
| IO64PB2F6 | J23 |
| IO65NB2F6 | J24 |
| IO65PB2F6 | H24 |
| IO66NB2F6 | H26 |
| IO66PB2F6 | H25 |
| IO67NB2F6 | G26 |
| IO67PB2F6 | G25 |
| IO68NB2F6 | K25 |

| FG896 | |
|---|---|
| AX1000 Function | Pin Number |
| IO68PB2F6 | K24 |
| IO69NB2F6 | F27 |
| IO69PB2F6 | E27 |
| IO70NB2F6 | J26 |
| IO70PB2F6 | J25 |
| IO71NB2F6 | H27 |
| IO71PB2F6 | G27 |
| IO72NB2F6 | J28 |
| IO72PB2F6 | H28 |
| IO73NB2F6 | G28 |
| IO73PB2F6 | F28 |
| IO74NB2F7 | L23 |
| IO74PB2F7 | L24 |
| IO75NB2F7 | L26 |
| IO75PB2F7 | K26 |
| IO76NB2F7 | M25 |
| IO76PB2F7 | L25 |
| IO77NB2F7 | K27 |
| IO77PB2F7 | J27 |
| IO78NB2F7 | M27 |
| IO78PB2F7 | L27 |
| IO79NB2F7 | K30 |
| IO79PB2F7 | K29 |
| IO80NB2F7 | M23 |
| IO80PB2F7 | M24 |
| IO81NB2F7 | M28 |
| IO81PB2F7 | L28 |
| IO82NB2F7 | N26 |
| IO82PB2F7 | M26 |
| IO83NB2F7 | N25 |
| IO83PB2F7 | N24 |
| IO84NB2F7 | N22 |
| IO84PB2F7 | N23 |
| IO85NB2F8 | M29 |
| IO85PB2F8 | L29 |

| FG896 | |
|---|---|
| AX1000 Function | Pin Number |
| IO86NB2F8 | N28 |
| IO86PB2F8 | N27 |
| IO87NB2F8 | P29 |
| IO87PB2F8 | P30 |
| IO88NB2F8 | P25 |
| IO88PB2F8 | P24 |
| IO89NB2F8 | P28 |
| IO89PB2F8 | P27 |
| IO90NB2F8 | P22 |
| IO90PB2F8 | P23 |
| IO91NB2F8 | R26 |
| IO91PB2F8 | P26 |
| IO92NB2F8 | R24 |
| IO92PB2F8 | R25 |
| IO93NB2F8 | R29 |
| IO93PB2F8 | R30 |
| IO94NB2F8 | R22 |
| IO94PB2F8 | R23 |
| IO95NB2F8 | T27 |
| IO95PB2F8 | R27 |
| **Bank 3** | |
| IO96NB3F9 | T29 |
| IO96PB3F9 | T30 |
| IO97NB3F9 | U29 |
| IO97PB3F9 | U30 |
| IO98NB3F9 | T22 |
| IO98PB3F9 | T23 |
| IO99NB3F9 | U26 |
| IO99PB3F9 | T26 |
| IO100NB3F9 | U24 |
| IO100PB3F9 | T24 |
| IO101NB3F9 | V28 |
| IO101PB3F9 | U28 |
| IO102NB3F9 | U23 |
| IO102PB3F9 | U22 |

| FG896 | |
|---|---|
| AX1000 Function | Pin Number |
| NC | K1 |
| NC | K2 |
| NC | L30 |
| NC | M30 |
| NC | N29 |
| NC | T1 |
| NC | U1 |
| NC | W30 |
| NC | Y1 |
| NC | Y2 |
| NC | Y30 |
| PRA | G15 |
| PRB | D16 |
| PRC | AB16 |
| PRD | AF16 |
| TCK | G7 |
| TDI | D5 |
| TDO | J8 |
| TMS | F6 |
| TRST | C4 |
| VCCA | AD6 |
| VCCA | AH26 |
| VCCA | E28 |
| VCCA | E3 |
| VCCA | L12 |
| VCCA | L13 |
| VCCA | L14 |
| VCCA | L15 |
| VCCA | L16 |
| VCCA | L17 |
| VCCA | L18 |
| VCCA | L19 |
| VCCA | M11 |
| VCCA | M20 |
| VCCA | N11 |

| FG896 | |
|---|---|
| AX1000 Function | Pin Number |
| VCCA | N20 |
| VCCA | P11 |
| VCCA | P20 |
| VCCA | R11 |
| VCCA | R20 |
| VCCA | T11 |
| VCCA | T20 |
| VCCA | U11 |
| VCCA | U20 |
| VCCA | V11 |
| VCCA | V20 |
| VCCA | W11 |
| VCCA | W20 |
| VCCA | Y12 |
| VCCA | Y13 |
| VCCA | Y14 |
| VCCA | Y15 |
| VCCA | Y16 |
| VCCA | Y17 |
| VCCA | Y18 |
| VCCA | Y19 |
| VCCPLA | G14 |
| VCCPLB | H15 |
| VCCPLC | G17 |
| VCCPLD | J16 |
| VCCPLE | AH17 |
| VCCPLF | AC16 |
| VCCPLG | AH14 |
| VCCPLH | AD15 |
| VCCDA | AD24 |
| VCCDA | AD7 |
| VCCDA | AF12 |
| VCCDA | AF13 |
| VCCDA | AF15 |
| VCCDA | AF18 |

| FG896 | |
|---|---|
| AX1000 Function | Pin Number |
| VCCDA | AF19 |
| VCCDA | C13 |
| VCCDA | C5 |
| VCCDA | D13 |
| VCCDA | D19 |
| VCCDA | D3 |
| VCCDA | E18 |
| VCCDA | F26 |
| VCCDA | G16 |
| VCCDA | T25 |
| VCCDA | T4 |
| VCCIB0 | A3 |
| VCCIB0 | B3 |
| VCCIB0 | J10 |
| VCCIB0 | J11 |
| VCCIB0 | J12 |
| VCCIB0 | K11 |
| VCCIB0 | K12 |
| VCCIB0 | K13 |
| VCCIB0 | K14 |
| VCCIB0 | K15 |
| VCCIB1 | A28 |
| VCCIB1 | B28 |
| VCCIB1 | J19 |
| VCCIB1 | J20 |
| VCCIB1 | J21 |
| VCCIB1 | K16 |
| VCCIB1 | K17 |
| VCCIB1 | K18 |
| VCCIB1 | K19 |
| VCCIB1 | K20 |
| VCCIB2 | C29 |
| VCCIB2 | C30 |
| VCCIB2 | K22 |
| VCCIB2 | L21 |

| FG1152 | |
|---|---|
| AX2000 Function | Pin Number |
| IO103PB2F9 | M28 |
| IO104NB2F9 | M34 |
| IO104PB2F9 | L34 |
| IO105NB2F9 | P27 |
| IO105PB2F9 | N27 |
| IO106NB2F9 | M32 |
| IO106PB2F9 | M31 |
| IO107NB2F10 | P25 |
| IO107PB2F10 | P26 |
| IO108NB2F10 | N33 |
| IO108PB2F10 | M33 |
| IO109NB2F10 | P29 |
| IO109PB2F10 | N29 |
| IO110NB2F10 | P30 |
| IO110PB2F10 | N30 |
| IO111NB2F10 | R24 |
| IO111PB2F10 | R25 |
| IO112NB2F10 | P31 |
| IO112PB2F10 | N31 |
| IO113NB2F10 | R28 |
| IO113PB2F10 | P28 |
| IO114NB2F10 | P32 |
| IO114PB2F10 | N32 |
| IO115NB2F10 | R30 |
| IO115PB2F10 | R29 |
| IO116NB2F10 | P34 |
| IO116PB2F10 | P33 |
| IO117NB2F10 | R27 |
| IO117PB2F10 | R26 |
| IO118NB2F11 | R34 |
| IO118PB2F11 | R33 |
| IO119NB2F11 | T24 |
| IO119PB2F11 | T25 |
| IO120NB2F11 | T33 |
| IO120PB2F11 | T34 |

| FG1152 | |
|---|---|
| AX2000 Function | Pin Number |
| IO121NB2F11 | T27 |
| IO121PB2F11 | T26 |
| IO122NB2F11 | T30 |
| IO122PB2F11 | T29 |
| IO123NB2F11 | U28 |
| IO123PB2F11 | T28 |
| IO124NB2F11 | T31 |
| IO124PB2F11 | T32 |
| IO125NB2F11 | U24 |
| IO125PB2F11 | U25 |
| IO126NB2F11 | U33 |
| IO126PB2F11 | U34 |
| IO127NB2F11 | U26 |
| IO127PB2F11 | U27 |
| IO128NB2F11 | U31 |
| IO128PB2F11 | U32 |
| **Bank 3** | |
| IO129NB3F12 | V29 |
| IO129PB3F12 | U29 |
| IO130NB3F12 | V31 |
| IO130PB3F12 | V32 |
| IO131NB3F12 | V24 |
| IO131PB3F12 | V25 |
| IO132NB3F12 | W28 |
| IO132PB3F12 | V28 |
| IO133NB3F12 | W26 |
| IO133PB3F12 | V26 |
| IO134NB3F12 | W33 |
| IO134PB3F12 | V33 |
| IO135NB3F12 | W25 |
| IO135PB3F12 | W24 |
| IO136NB3F12 | W31 |
| IO136PB3F12 | W32 |
| IO137NB3F12 | Y30 |
| IO137PB3F12 | W30 |

| FG1152 | |
|---|---|
| AX2000 Function | Pin Number |
| IO138NB3F12 | Y29 |
| IO138PB3F12 | W29 |
| IO139NB3F13 | Y27 |
| IO139PB3F13 | W27 |
| IO140NB3F13 | AA33 |
| IO140PB3F13 | Y33 |
| IO141NB3F13 | Y25 |
| IO141PB3F13 | Y24 |
| IO142NB3F13 | AA31 |
| IO142PB3F13 | Y31 |
| IO143NB3F13 | AA28 |
| IO143PB3F13 | Y28 |
| IO144NB3F13 | AA34 |
| IO144PB3F13 | Y34 |
| IO145NB3F13 | AA26 |
| IO145PB3F13 | Y26 |
| IO146NB3F13 | AA29 |
| IO146PB3F13 | AA30 |
| IO147NB3F13 | AB30 |
| IO147PB3F13 | AB29 |
| IO148NB3F13 | AB32 |
| IO148PB3F13 | AA32 |
| IO149NB3F13 | AB27 |
| IO149PB3F13 | AA27 |
| IO150NB3F14 | AC31 |
| IO150PB3F14 | AB31 |
| IO151NB3F14 | AD33 |
| IO151PB3F14 | AC33 |
| IO152NB3F14 | AC28 |
| IO152PB3F14 | AB28 |
| IO153NB3F14 | AB25 |
| IO153PB3F14 | AA25 |
| IO154NB3F14 | AD32 |
| IO154PB3F14 | AC32 |
| IO155NB3F14 | AD29 |

| CQ208 | |
|---|---|
| AX500 Function | Pin Number |
| **Bank 0** | |
| IO03NB0F0 | 198 |
| IO03PB0F0 | 199 |
| IO04NB0F0 | 197 |
| IO19NB0F1/HCLKAN | 191 |
| IO19PB0F1/HCLKAP | 192 |
| IO20NB0F1/HCLKBN | 185 |
| IO20PB0F1/HCLKBP | 186 |
| **Bank 1** | |
| IO21NB1F2/HCLKCN | 180 |
| IO21PB1F2/HCLKCP | 181 |
| IO22NB1F2/HCLKDN | 174 |
| IO22PB1F2/HCLKDP | 175 |
| IO23NB1F2 | 170 |
| IO23PB1F2 | 171 |
| IO37NB1F3 | 165 |
| IO37PB1F3 | 166 |
| IO39NB1F3 | 161 |
| IO39PB1F3 | 162 |
| IO41NB1F3 | 159 |
| IO41PB1F3 | 160 |
| **Bank 2** | |
| IO43NB2F4 | 151 |
| IO43PB2F4 | 153 |
| IO44NB2F4 | 152 |
| IO44PB2F4 | 154 |
| IO45PB2F4 | 148 |
| IO46NB2F4 | 146 |
| IO46PB2F4 | 147 |
| IO48NB2F4 | 144 |
| IO48PB2F4 | 145 |
| IO57NB2F5 | 139 |
| IO57PB2F5 | 140 |
| IO58PB2F5 | 141 |
| IO59NB2F5 | 137 |
| IO59PB2F5 | 138 |
| IO61NB2F5 | 132 |

| CQ208 | |
|---|---|
| AX500 Function | Pin Number |
| IO61PB2F5 | 134 |
| IO62NB2F5 | 131 |
| IO62PB2F5 | 133 |
| **Bank 3** | |
| IO63NB3F6 | 127 |
| IO63PB3F6 | 129 |
| IO64NB3F6 | 126 |
| IO64PB3F6 | 128 |
| IO66NB3F6 | 122 |
| IO66PB3F6 | 123 |
| IO68NB3F6 | 120 |
| IO68PB3F6 | 121 |
| IO77NB3F7 | 116 |
| IO77PB3F7 | 117 |
| IO79NB3F7 | 114 |
| IO79PB3F7 | 115 |
| IO81NB3F7 | 110 |
| IO81PB3F7 | 111 |
| IO82NB3F7 | 108 |
| IO82PB3F7 | 109 |
| IO83NB3F7 | 106 |
| IO83PB3F7 | 107 |
| **Bank 4** | |
| IO84PB4F8 | 103 |
| IO85NB4F8 | 100 |
| IO86NB4F8 | 101 |
| IO86PB4F8 | 102 |
| IO87NB4F8 | 96 |
| IO87PB4F8 | 97 |
| IO101NB4F9 | 91 |
| IO101PB4F9 | 92 |
| IO103NB4F9/CLKEN | 87 |
| IO103PB4F9/CLKEP | 88 |
| IO104NB4F9/CLKFN | 81 |
| IO104PB4F9/CLKFP | 82 |
| **Bank 5** | |
| IO105NB5F10/CLKGN | 76 |

| CQ208 | |
|---|---|
| AX500 Function | Pin Number |
| IO105PB5F10/CLKGP | 77 |
| IO106NB5F10/CLKHN | 70 |
| IO106PB5F10/CLKHP | 71 |
| IO107NB5F10 | 66 |
| IO107PB5F10 | 67 |
| IO119NB5F11 | 62 |
| IO121NB5F11 | 60 |
| IO121PB5F11 | 61 |
| IO123NB5F11 | 56 |
| IO123PB5F11 | 57 |
| IO125NB5F11 | 54 |
| IO125PB5F11 | 55 |
| **Bank 6** | |
| IO127NB6F12 | 47 |
| IO127PB6F12 | 49 |
| IO128NB6F12 | 48 |
| IO128PB6F12 | 50 |
| IO129NB6F12 | 42 |
| IO129PB6F12 | 43 |
| IO130PB6F12 | 44 |
| IO132NB6F12 | 40 |
| IO132PB6F12 | 41 |
| IO141NB6F13 | 35 |
| IO141PB6F13 | 36 |
| IO142PB6F13 | 37 |
| IO143NB6F13 | 33 |
| IO143PB6F13 | 34 |
| IO145NB6F13 | 28 |
| IO145PB6F13 | 30 |
| IO146NB6F13 | 27 |
| IO146PB6F13 | 29 |
| **Bank 7** | |
| IO147NB7F14 | 23 |
| IO147PB7F14 | 25 |
| IO148NB7F14 | 22 |
| IO148PB7F14 | 24 |
| IO150NB7F14 | 18 |

| CQ208 | |
|---|---|
| AX500 Function | Pin Number |
| IO150PB7F14 | 19 |
| IO152NB7F14 | 16 |
| IO152PB7F14 | 17 |
| IO161NB7F15 | 12 |
| IO161PB7F15 | 13 |
| IO163NB7F15 | 10 |
| IO163PB7F15 | 11 |
| IO165PB7F15 | 7 |
| IO166NB7F15 | 5 |
| IO166PB7F15 | 6 |
| IO167NB7F15 | 3 |
| IO167PB7F15 | 4 |
| **Dedicated I/O** | |
| VCCDA | 1 |
| GND | 9 |
| GND | 15 |
| GND | 21 |
| GND | 32 |
| GND | 39 |
| GND | 46 |
| GND | 51 |
| GND | 59 |
| GND | 65 |
| GND | 69 |
| GND | 90 |
| GND | 94 |
| GND | 99 |
| GND | 104 |
| GND | 113 |
| GND | 119 |
| GND | 125 |
| GND | 136 |
| GND | 143 |
| GND | 150 |
| GND | 155 |
| GND | 164 |
| GND | 169 |

| CQ208 | |
|---|---|
| AX500 Function | Pin Number |
| GND | 173 |
| GND | 194 |
| GND | 196 |
| GND | 201 |
| GND/LP | 208 |
| PRA | 184 |
| PRB | 183 |
| PRC | 80 |
| PRD | 79 |
| TCK | 205 |
| TDI | 204 |
| TDO | 203 |
| TMS | 206 |
| TRST | 207 |
| VCCA | 2 |
| VCCA | 14 |
| VCCA | 38 |
| VCCA | 52 |
| VCCA | 64 |
| VCCA | 93 |
| VCCA | 118 |
| VCCA | 142 |
| VCCA | 156 |
| VCCA | 168 |
| VCCA | 195 |
| VCCDA | 26 |
| VCCDA | 53 |
| VCCDA | 63 |
| VCCDA | 78 |
| VCCDA | 95 |
| VCCDA | 105 |
| VCCDA | 130 |
| VCCDA | 157 |
| VCCDA | 167 |
| VCCDA | 182 |
| VCCDA | 202 |
| VCCIB0 | 193 |

| CQ208 | |
|---|---|
| AX500 Function | Pin Number |
| VCCIB0 | 200 |
| VCCIB1 | 163 |
| VCCIB1 | 172 |
| VCCIB2 | 135 |
| VCCIB2 | 149 |
| VCCIB3 | 112 |
| VCCIB3 | 124 |
| VCCIB4 | 89 |
| VCCIB4 | 98 |
| VCCIB5 | 58 |
| VCCIB5 | 68 |
| VCCIB6 | 31 |
| VCCIB6 | 45 |
| VCCIB7 | 8 |
| VCCIB7 | 20 |
| VCCPLA | 189 |
| VCCPLB | 187 |
| VCCPLC | 178 |
| VCCPLD | 176 |
| VCCPLE | 85 |
| VCCPLF | 83 |
| VCCPLG | 74 |
| VCCPLH | 72 |
| VCOMPLA | 190 |
| VCOMPLB | 188 |
| VCOMPLC | 179 |
| VCOMPLD | 177 |
| VCOMPLE | 86 |
| VCOMPLF | 84 |
| VCOMPLG | 75 |
| VCOMPLH | 73 |
| VPUMP | 158 |

| CQ352 | |
|---|---|
| AX500 Function | Pin Number |
| GND | 21 |
| GND | 27 |
| GND | 33 |
| GND | 39 |
| GND | 45 |
| GND | 51 |
| GND | 57 |
| GND | 63 |
| GND | 69 |
| GND | 75 |
| GND | 81 |
| GND | 88 |
| GND | 89 |
| GND | 97 |
| GND | 103 |
| GND | 109 |
| GND | 115 |
| GND | 121 |
| GND | 133 |
| GND | 145 |
| GND | 151 |
| GND | 157 |
| GND | 163 |
| GND | 169 |
| GND | 176 |
| GND | 177 |
| GND | 186 |
| GND | 192 |
| GND | 198 |
| GND | 204 |
| GND | 210 |
| GND | 216 |
| GND | 222 |
| GND | 228 |
| GND | 234 |

| CQ352 | |
|---|---|
| AX500 Function | Pin Number |
| GND | 240 |
| GND | 246 |
| GND | 252 |
| GND | 258 |
| GND | 264 |
| GND | 265 |
| GND | 274 |
| GND | 280 |
| GND | 286 |
| GND | 292 |
| GND | 298 |
| GND | 310 |
| GND | 322 |
| GND | 330 |
| GND | 334 |
| GND | 340 |
| GND | 345 |
| GND/LP | 352 |
| NC | 91 |
| NC | 117 |
| NC | 130 |
| NC | 131 |
| NC | 148 |
| NC | 174 |
| NC | 268 |
| NC | 294 |
| NC | 307 |
| NC | 308 |
| NC | 327 |
| NC | 328 |
| PRA | 312 |
| PRB | 311 |
| PRC | 135 |
| PRD | 134 |
| TCK | 349 |

| CQ352 | |
|---|---|
| AX500 Function | Pin Number |
| TDI | 348 |
| TDO | 347 |
| TMS | 350 |
| TRST | 351 |
| VCCA | 3 |
| VCCA | 14 |
| VCCA | 32 |
| VCCA | 56 |
| VCCA | 74 |
| VCCA | 87 |
| VCCA | 102 |
| VCCA | 114 |
| VCCA | 150 |
| VCCA | 162 |
| VCCA | 175 |
| VCCA | 191 |
| VCCA | 209 |
| VCCA | 233 |
| VCCA | 251 |
| VCCA | 263 |
| VCCA | 279 |
| VCCA | 291 |
| VCCA | 329 |
| VCCA | 339 |
| VCCDA | 2 |
| VCCDA | 44 |
| VCCDA | 90 |
| VCCDA | 116 |
| VCCDA | 132 |
| VCCDA | 149 |
| VCCDA | 178 |
| VCCDA | 221 |
| VCCDA | 266 |
| VCCDA | 293 |
| VCCDA | 309 |

| CG624 | |
|---|---|
| **AX2000 Function** | **Pin Number** |
| IO157PB3F14 | U20 |
| IO158NB3F14 | AB25 |
| IO158PB3F14 | AA25 |
| IO160PB3F14 | W24 |
| IO161NB3F15 | U24 |
| IO161PB3F15 | U23 |
| IO162NB3F15 | AA24 |
| IO162PB3F15 | Y24 |
| IO163NB3F15 | V22 |
| IO163PB3F15 | U22 |
| IO164NB3F15 | V23 |
| IO164PB3F15 | V24 |
| IO166NB3F15 | AB24 |
| IO167NB3F15 | V21 |
| IO167PB3F15 | U21 |
| IO168NB3F15 | Y23 |
| IO168PB3F15 | AA23 |
| IO169NB3F15 | W22* |
| IO169PB3F15 | W23* |
| IO170NB3F15 | Y22 |
| IO170PB3F15 | Y21 |
| **Bank 4** | |
| IO171NB4F16 | AC20* |
| IO171PB4F16 | AC21* |
| IO172NB4F16 | W20 |
| IO172PB4F16 | Y20 |
| IO173NB4F16 | AD21 |
| IO173PB4F16 | AD22 |
| IO174NB4F16 | AA19 |
| IO176NB4F16 | Y18 |
| IO176PB4F16 | Y19 |
| IO177NB4F16 | AB19 |

*Note: *Not routed on the same package layer and to adjacent LGA pads as its differential pair complement. Recommended to be used as a single-ended I/O.*

| CG624 | |
|---|---|
| **AX2000 Function** | **Pin Number** |
| IO177PB4F16 | AB18 |
| IO182NB4F17 | V19 |
| IO182PB4F17 | W19 |
| IO183PB4F17 | AC19 |
| IO184NB4F17 | AB17 |
| IO184PB4F17 | AC17 |
| IO185NB4F17 | AD19 |
| IO185PB4F17 | AD20 |
| IO187PB4F17 | AC18 |
| IO188NB4F17 | Y17 |
| IO188PB4F17 | AA17 |
| IO189PB4F17 | AE22 |
| IO191NB4F17 | W18 |
| IO191PB4F17 | V18 |
| IO192PB4F17 | U18 |
| IO195PB4F18 | AE21 |
| IO196NB4F18 | AB16 |
| IO197NB4F18 | AD17 |
| IO197PB4F18 | AD18 |
| IO198NB4F18 | V17 |
| IO198PB4F18 | W17 |
| IO199NB4F18 | AE19 |
| IO199PB4F18 | AE20 |
| IO200NB4F18 | AC15 |
| IO201NB4F18 | AD15 |
| IO201PB4F18 | AD16 |
| IO202NB4F18 | Y15 |
| IO202PB4F18 | Y16 |
| IO206NB4F19 | AB14 |
| IO206PB4F19 | AB15 |
| IO207NB4F19 | AE15 |
| IO207PB4F19 | AE16 |

*Note: *Not routed on the same package layer and to adjacent LGA pads as its differential pair complement. Recommended to be used as a single-ended I/O.*

| CG624 | |
|---|---|
| **AX2000 Function** | **Pin Number** |
| IO208PB4F19 | W16 |
| IO209NB4F19 | AE14 |
| IO210NB4F19 | V15 |
| IO210PB4F19 | V16 |
| IO211NB4F19 | AD14 |
| IO211PB4F19 | AC14 |
| IO212NB4F19/CLKEN | W14 |
| IO212PB4F19/CLKEP | W15 |
| IO213NB4F19/CLKFN | AC13 |
| IO213PB4F19/CLKFP | AD13 |
| **Bank 5** | |
| IO214NB5F20/CLKGN | W13 |
| IO214PB5F20/CLKGP | Y13 |
| IO215NB5F20/CLKHN | AC12 |
| IO215PB5F20/CLKHP | AD12 |
| IO216NB5F20 | U13 |
| IO216PB5F20 | V13 |
| IO217NB5F20 | AE10 |
| IO217PB5F20 | AE11 |
| IO218NB5F20 | W11 |
| IO218PB5F20 | W12 |
| IO222NB5F20 | AA11 |
| IO222PB5F20 | Y11 |
| IO223PB5F21 | AE9 |
| IO225NB5F21 | AE6 |
| IO225PB5F21 | AE7 |
| IO226NB5F21 | Y10 |
| IO226PB5F21 | W10 |
| IO227PB5F21 | T13 |
| IO228NB5F21 | AB10 |
| IO228PB5F21 | AB11 |
| IO229NB5F21 | AD9 |

*Note: *Not routed on the same package layer and to adjacent LGA pads as its differential pair complement. Recommended to be used as a single-ended I/O.*