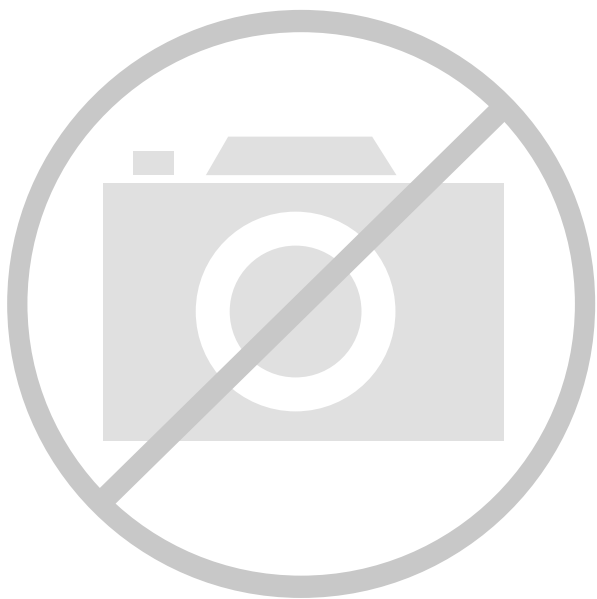




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### Understanding [Embedded - FPGAs \(Field Programmable Gate Array\)](#)

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            | 8064                                                                                                                                                          |
| Number of Logic Elements/Cells | -                                                                                                                                                             |
| Total RAM Bits                 | 73728                                                                                                                                                         |
| Number of I/O                  | 336                                                                                                                                                           |
| Number of Gates                | 500000                                                                                                                                                        |
| Voltage - Supply               | 1.425V ~ 1.575V                                                                                                                                               |
| Mounting Type                  | Surface Mount                                                                                                                                                 |
| Operating Temperature          | -55°C ~ 125°C (TA)                                                                                                                                            |
| Package / Case                 | 676-BGA                                                                                                                                                       |
| Supplier Device Package        | 676-FBGA (27x27)                                                                                                                                              |
| Purchase URL                   | <a href="https://www.e-xfl.com/product-detail/microchip-technology/ax500-1fg676m">https://www.e-xfl.com/product-detail/microchip-technology/ax500-1fg676m</a> |



## 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 <sup>1</sup> | 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             | LVC MOS 2.5 V, GTL+ 2.5 V, LVDS <sup>2</sup>                | 1.0  |
| 2.5 V             | LVC MOS 2.5 V, SSTL 2 (Classes I and II), LVDS <sup>2</sup> | 1.25 |
| 1.8 V             | LVC MOS 1.8 V                                               | N/A  |
| 1.5 V             | LVC MOS 1.5 V, HSTL Class I                                 | 0.75 |

Notes:

1. VCCI is used for both inputs and outputs
2. VCCI tolerance is  $\pm 5\%$

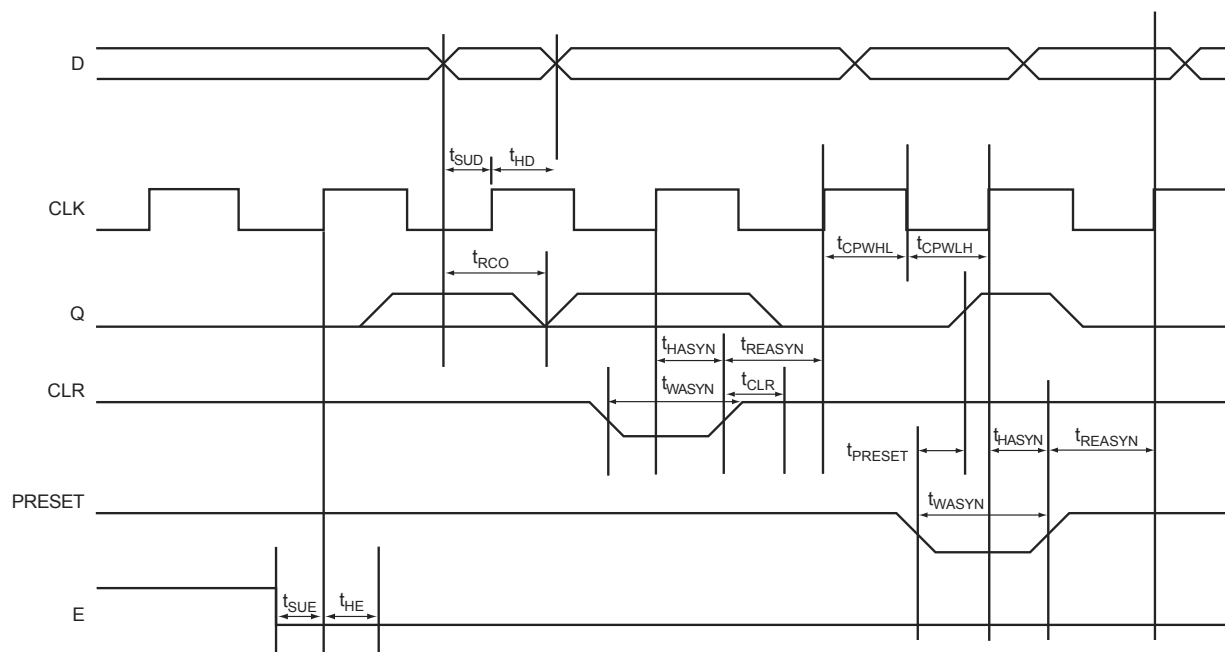
**Table 2-36 • 3.3 V PCI-X I/O Module**

**Worst-Case Commercial Conditions VCCA = 1.425 V, VCCI = 3.0 V, T<sub>J</sub> = 70°C**

|                                  |                                                                           | –2 Speed |      | –1 Speed |      | Std Speed |      | Units |
|----------------------------------|---------------------------------------------------------------------------|----------|------|----------|------|-----------|------|-------|
| Parameter                        | Description                                                               | Min.     | Max. | Min.     | Max. | Min.      | Max. |       |
| 3.3 V PCI-X Output Module Timing |                                                                           |          |      |          |      |           |      |       |
| t <sub>DP</sub>                  | Input Buffer                                                              | 1.57     |      | 1.79     |      | 2.10      |      | ns    |
| t <sub>PY</sub>                  | Output Buffer                                                             | 2.10     |      | 2.40     |      | 2.82      |      | ns    |
| t <sub>ENZL</sub>                | Enable to Pad Delay through the Output Buffer—Z to Low                    | 1.61     |      | 1.62     |      | 1.63      |      | ns    |
| t <sub>ENZH</sub>                | Enable to Pad Delay through the Output Buffer—Z to High                   | 1.59     |      | 1.60     |      | 1.61      |      | ns    |
| t <sub>ENLZ</sub>                | Enable to Pad Delay through the Output Buffer—Low to Z                    | 2.65     |      | 3.02     |      | 3.55      |      | ns    |
| t <sub>ENHZ</sub>                | Enable to Pad Delay through the Output Buffer—High to Z                   | 3.11     |      | 3.55     |      | 4.17      |      | ns    |
| t <sub>IOCLKQ</sub>              | Sequential Clock-to-Q for the I/O Input Register                          | 0.67     |      | 0.77     |      | 0.90      |      | ns    |
| t <sub>IOCLKY</sub>              | Clock-to-output Y for the I/O Output Register and the I/O Enable Register | 0.67     |      | 0.77     |      | 0.90      |      | ns    |
| t <sub>SUD</sub>                 | Data Input Set-Up                                                         | 0.23     |      | 0.27     |      | 0.31      |      | ns    |
| t <sub>SUE</sub>                 | Enable Input Set-Up                                                       | 0.26     |      | 0.30     |      | 0.35      |      | ns    |
| t <sub>HD</sub>                  | Data Input Hold                                                           | 0.00     |      | 0.00     |      | 0.00      |      | ns    |
| t <sub>HE</sub>                  | Enable Input Hold                                                         | 0.00     |      | 0.00     |      | 0.00      |      | ns    |
| t <sub>CPWHL</sub>               | Clock Pulse Width High to Low                                             | 0.39     |      | 0.39     |      | 0.39      |      | ns    |
| t <sub>CPWLH</sub>               | Clock Pulse Width Low to High                                             | 0.39     |      | 0.39     |      | 0.39      |      | ns    |
| t <sub>WASYN</sub>               | Asynchronous Pulse Width                                                  | 0.37     |      | 0.37     |      | 0.37      |      | ns    |
| t <sub>REASYN</sub>              | Asynchronous Recovery Time                                                | 0.13     |      | 0.15     |      | 0.17      |      | ns    |
| t <sub>HASYN</sub>               | Asynchronous Removal Time                                                 | 0.00     |      | 0.00     |      | 0.00      |      | ns    |
| t <sub>CLR</sub>                 | Asynchronous Clear-to-Q                                                   | 0.23     |      | 0.27     |      | 0.31      |      | ns    |
| t <sub>PRESET</sub>              | Asynchronous Preset-to-Q                                                  | 0.23     |      | 0.27     |      | 0.31      |      | ns    |



## Timing Models and Waveforms



**Figure 2-32 • R-Cell Delays**

### Timing Characteristics

**Table 2-63 • R-Cell**

Worst-Case Commercial Conditions  $V_{CCA} = 1.425\text{ V}$ ,  $V_{CCI} = 3.0\text{ V}$ ,  $T_J = 70^\circ\text{C}$

|                           |                               | –2 Speed |      | –1 Speed |      | Std Speed |      | Units |
|---------------------------|-------------------------------|----------|------|----------|------|-----------|------|-------|
| Parameter                 | Description                   | Min.     | Max. | Min.     | Max. | Min.      | Max. |       |
| R-Cell Propagation Delays |                               |          |      |          |      |           |      |       |
| t <sub>RCO</sub>          | Sequential Clock-to-Q         |          | 0.67 |          | 0.77 |           | 0.90 | ns    |
| t <sub>CLR</sub>          | Asynchronous Clear-to-Q       |          | 0.67 |          | 0.77 |           | 0.90 | ns    |
| t <sub>PRESET</sub>       | Asynchronous Preset-to-Q      |          | 0.36 |          | 0.36 |           | 0.36 | ns    |
| t <sub>SUD</sub>          | Flip-Flop Data Input Set-Up   |          | 0.34 |          | 0.34 |           | 0.34 | ns    |
| t <sub>SUE</sub>          | Flip-Flop Enable Input Set-Up |          | 0.00 |          | 0.00 |           | 0.00 | ns    |
| t <sub>HD</sub>           | Flip-Flop Data Input Hold     |          | 0.67 |          | 0.77 |           | 0.90 | ns    |
| t <sub>HE</sub>           | Flip-Flop Enable Input Hold   |          | 0.67 |          | 0.77 |           | 0.90 | ns    |
| t <sub>WASYN</sub>        | Asynchronous Pulse Width      | 0.48     |      | 0.48     |      | 0.48      |      | ns    |
| t <sub>REASYN</sub>       | Asynchronous Recovery Time    |          | 0.23 |          | 0.27 |           | 0.31 | ns    |
| t <sub>HASYN</sub>        | Asynchronous Removal Time     |          | 0.36 |          | 0.36 |           | 0.36 | ns    |
| t <sub>CPWHL</sub>        | Clock Pulse Width High to Low | 0.36     |      | 0.36     |      | 0.36      |      | ns    |
| t <sub>CPWLH</sub>        | Clock Pulse Width Low to High | 0.36     |      | 0.36     |      | 0.36      |      | ns    |

**Table 2-67 • AX500 Predicted Routing Delays**  
Worst-Case Commercial Conditions  $V_{CCA} = 1.425\text{ V}$ ,  $T_J = 70^\circ\text{C}$

|                                 |                                  | -2 Speed | -1 Speed | Std Speed |       |
|---------------------------------|----------------------------------|----------|----------|-----------|-------|
| Parameter                       | Description                      | Typical  | Typical  | Typical   | Units |
| <b>Predicted Routing Delays</b> |                                  |          |          |           |       |
| $t_{DC}$                        | 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 2-68 • AX1000 Predicted Routing Delays**  
Worst-Case Commercial Conditions  $V_{CCA} = 1.425\text{ V}$ ,  $T_J = 70^\circ\text{C}$

|                                 |                                  | -2 Speed | -1 Speed | Std Speed |       |
|---------------------------------|----------------------------------|----------|----------|-----------|-------|
| Parameter                       | Description                      | Typical  | Typical  | Typical   | Units |
| <b>Predicted Routing Delays</b> |                                  |          |          |           |       |
| $t_{DC}$                        | 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            | 0.45     | 0.51     | 0.60      | ns    |
| $t_{RD2}$                       | Routing delay for FO2            | 0.53     | 0.60     | 0.71      | ns    |
| $t_{RD3}$                       | Routing delay for FO3            | 0.56     | 0.63     | 0.74      | ns    |
| $t_{RD4}$                       | Routing delay for FO4            | 0.63     | 0.71     | 0.84      | ns    |
| $t_{RD5}$                       | Routing delay for FO5            | 0.73     | 0.82     | 0.97      | ns    |
| $t_{RD6}$                       | Routing delay for FO6            | 0.99     | 1.13     | 1.32      | ns    |
| $t_{RD7}$                       | Routing delay for FO7            | 1.02     | 1.15     | 1.36      | ns    |
| $t_{RD8}$                       | Routing delay for FO8            | 1.48     | 1.68     | 1.97      | ns    |
| $t_{RD16}$                      | Routing delay for FO16           | 2.57     | 2.91     | 3.42      | ns    |
| $t_{RD32}$                      | Routing delay for FO32           | 4.24     | 4.81     | 5.65      | ns    |

single-ended, or voltage-referenced standard. The [H]CLKxN pad can only be used as a differential pair with [H]CLKxP.

The block marked “i Delay Match” is a fixed delay equal to that of the i divider. The “j Delay Match” block has the same function as its j divider counterpart.

## Functional Description

Figure 2-48 on page 2-75 illustrates a block diagram of the PLL. The PLL contains two dividers, i and j, that allow frequency scaling of the clock signal:

- The i divider in the feedback path allows multiplication of the input clock by integer factors ranging from 1 to 64, and the resultant frequency is available at the output of the PLL block.
- The j divider divides the PLL output by integer factors ranging from 1 to 64, and the divided clock is available at CLK1.
- The two dividers together can implement any combination of multiplication and division up to a maximum frequency of 1 GHz on CLK1. Both the CLK1 and CLK2 outputs have a fixed 50/50 duty cycle.
- The output frequencies of the two clocks are given by the following formulas ( $f_{REF}$  is the reference clock frequency):

$$f_{CLK1} = f_{REF} * (DividerI) / (DividerJ)$$

EQ 4

$$f_{CLK2} = f_{REF} * (DividerI)$$

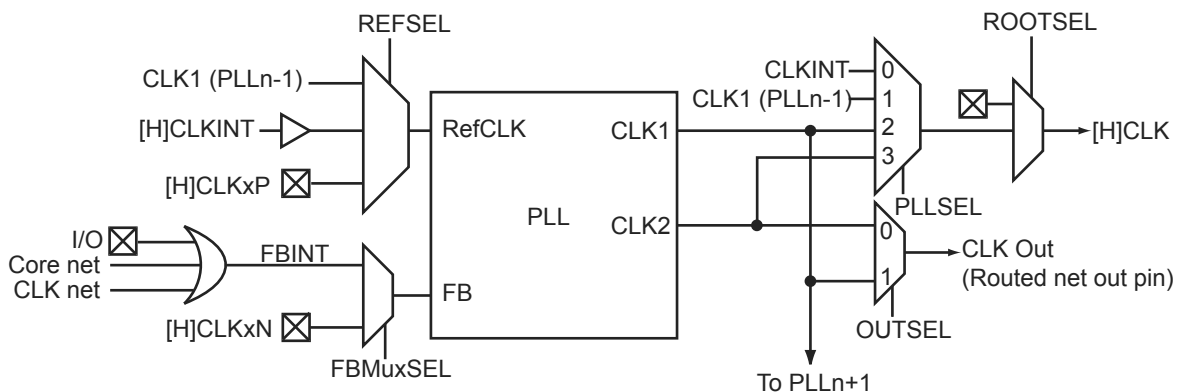
EQ 5

- CLK2 provides the PLL output directly—without division

The input and output frequency ranges are selected by LowFreq and Osc(2:0), respectively. These functions and their possible values are detailed in Table 2-80 on page 2-77.

The delay lines shown in Figure 2-48 on page 2-75 are programmable. The feedback clock path can be delayed (using the five DelayLine bits) relative to the reference clock (or vice versa) by up to 3.75 ns in increments of 250 ps. Table 2-80 on page 2-77 describes the usage of these bits. The delay increments are independent of frequency, so this results in phase changes that vary with frequency. The delay value is highly dependent on  $V_{CC}$  and the speed grade.

Figure 2-49 is a logical diagram of the various control signals to the PLL and shows how the PLL interfaces with the global and routing networks of the FPGA. Note that not all signals are user-accessible. These non-user-accessible signals are used by the place-and-route tool to control the configuration of the PLL. The user gains access to these control signals either based upon the connections built in the user's design or through the special macros (Table 2-84 on page 2-81) inserted into the design. For example, connecting the macro PLLOUT to CLK2 will control the OUTSEL signal.



Note: Not all signals are available to the user.

**Figure 2-49 • PLL Logical Interface**

**Table 2-99 • Two FIFO Blocks Cascaded**  
**Worst-Case Commercial Conditions VCCA = 1.425 V, VCCI = 3.0 V, T<sub>J</sub> = 70°C**

|                      |                              | –2 Speed |       | –1 Speed |       | Std Speed |       | Units |
|----------------------|------------------------------|----------|-------|----------|-------|-----------|-------|-------|
| Parameter            | Description                  | Min.     | Max.  | Min.     | Max.  | Min.      | Max.  |       |
| FIFO Module Timing   |                              |          |       |          |       |           |       |       |
| t <sub>WSU</sub>     | Write Setup                  |          | 13.75 |          | 15.66 |           | 18.41 | ns    |
| t <sub>WHD</sub>     | Write Hold                   |          | 0.00  |          | 0.00  |           | 0.00  | ns    |
| t <sub>WCKH</sub>    | WCLK High                    |          | 0.75  |          | 0.75  |           | 0.75  | ns    |
| t <sub>WCKL</sub>    | WCLK Low                     |          | 1.76  |          | 1.76  |           | 1.76  | ns    |
| t <sub>WCKP</sub>    | Minimum WCLK Period          | 2.51     |       | 2.51     |       | 2.51      |       | ns    |
| t <sub>RSU</sub>     | Read Setup                   |          | 14.33 |          | 16.32 |           | 19.19 | ns    |
| t <sub>RHD</sub>     | Read Hold                    |          | 0.00  |          | 0.00  |           | 0.00  | ns    |
| t <sub>RCKH</sub>    | RCLK High                    |          | 0.73  |          | 0.73  |           | 0.73  | ns    |
| t <sub>RCKL</sub>    | RCLK Low                     |          | 1.89  |          | 1.89  |           | 1.89  | ns    |
| t <sub>RCKP</sub>    | Minimum RCLK period          | 2.62     |       | 2.62     |       | 2.62      |       | ns    |
| t <sub>CLRHF</sub>   | Clear High                   |          | 0.00  |          | 0.00  |           | 0.00  | ns    |
| t <sub>CLR2FF</sub>  | Clear-to-flag (EMPTY/FULL)   |          | 1.92  |          | 2.18  |           | 2.57  | ns    |
| t <sub>CLR2AF</sub>  | Clear-to-flag (AEMPTY/AFULL) |          | 4.39  |          | 5.00  |           | 5.88  | ns    |
| t <sub>CK2FF</sub>   | Clock-to-flag (EMPTY/FULL)   |          | 2.13  |          | 2.42  |           | 2.85  | ns    |
| t <sub>CK2AF</sub>   | Clock-to-flag (AEMPTY/AFULL) |          | 5.04  |          | 5.75  |           | 6.75  | ns    |
| t <sub>RCK2RD1</sub> | RCLK-To-OUT (Pipelined)      |          | 1.43  |          | 1.63  |           | 1.92  | ns    |
| t <sub>RCK2RD2</sub> | RCLK-To-OUT (Nonpipelined)   |          | 2.26  |          | 2.58  |           | 3.03  | ns    |

*Note: Timing data for these two cascaded FIFO blocks uses a depth of 8,192. For all other combinations, use Microsemi's timing software.*

| FG484            |            | FG484          |            | FG484          |            |
|------------------|------------|----------------|------------|----------------|------------|
| AX250 Function   | Pin Number | AX250 Function | Pin Number | AX250 Function | Pin Number |
| <b>Bank 0</b>    |            | IO17NB1F1      | B14        | IO34PB2F2      | D22        |
| IO00NB0F0        | D7         | IO17PB1F1      | B13        | IO35NB2F2      | J18        |
| IO00PB0F0        | D6         | IO18NB1F1      | A14        | IO35PB2F2      | H18        |
| IO01NB0F0        | E7         | IO18PB1F1      | A13        | IO36NB2F2      | G21        |
| IO01PB0F0        | E6         | IO19NB1F1      | A16        | IO36PB2F2      | F21        |
| IO02NB0F0        | C5         | IO19PB1F1      | A15        | IO37NB2F2      | K19        |
| IO02PB0F0        | C4         | IO20NB1F1      | B16        | IO37PB2F2      | J19        |
| IO03NB0F0        | C7         | IO20PB1F1      | B15        | IO38NB2F2      | J20        |
| IO03PB0F0        | C6         | IO21NB1F1      | C17        | IO38PB2F2      | H20        |
| IO04NB0F0        | E9         | IO21PB1F1      | C16        | IO39NB2F2      | L16        |
| IO04PB0F0        | E8         | IO22NB1F1      | F15        | IO39PB2F2      | K16        |
| IO05NB0F0        | D9         | IO22PB1F1      | F14        | IO40NB2F2      | J21        |
| IO05PB0F0        | D8         | IO23NB1F1      | D16        | IO40PB2F2      | H21        |
| IO06NB0F0        | B7         | IO23PB1F1      | D15        | IO41NB2F2      | L17        |
| IO06PB0F0        | B6         | IO24NB1F1      | E16        | IO41PB2F2      | K17        |
| IO07NB0F0        | C9         | IO24PB1F1      | E15        | IO42NB2F2      | J22        |
| IO07PB0F0        | C8         | IO25NB1F1      | F18        | IO42PB2F2      | H22        |
| IO08NB0F0        | A7         | IO25PB1F1      | F17        | IO43NB2F2      | L18        |
| IO08PB0F0        | A6         | IO26NB1F1      | D18        | IO43PB2F2      | K18        |
| IO09NB0F0        | B9         | IO26PB1F1      | E17        | IO44NB2F2      | L20        |
| IO09PB0F0        | B8         | IO27NB1F1      | G16        | IO44PB2F2      | K20        |
| IO10NB0F0        | A9         | IO27PB1F1      | G15        | <b>Bank 3</b>  |            |
| IO10PB0F0        | A8         | <b>Bank 2</b>  |            | IO45NB3F3      | M19        |
| IO11NB0F0        | B10        | IO28NB2F2      | F19        | IO45PB3F3      | L19        |
| IO11PB0F0        | A10        | IO28PB2F2      | E19        | IO46NB3F3      | M21        |
| IO12NB0F0/HCLKAN | E11        | IO29NB2F2      | J16        | IO46PB3F3      | L21        |
| IO12PB0F0/HCLKAP | E10        | IO29PB2F2      | H16        | IO47NB3F3      | N17        |
| IO13NB0F0/HCLKBN | D12        | IO30NB2F2      | E20        | IO47PB3F3      | M17        |
| IO13PB0F0/HCLKBP | D11        | IO30PB2F2      | D20        | IO48NB3F3      | N18        |
| <b>Bank 1</b>    |            | IO31NB2F2      | J17        | IO48PB3F3      | N19        |
| IO14NB1F1/HCLKCN | F13        | IO31PB2F2      | H17        | IO49NB3F3      | N16        |
| IO14PB1F1/HCLKCP | F12        | IO32NB2F2      | G20        | IO49PB3F3      | M16        |
| IO15NB1F1/HCLKDN | E14        | IO32PB2F2      | F20        | IO50NB3F3      | N20        |
| IO15PB1F1/HCLKDP | E13        | IO33NB2F2      | H19        | IO50PB3F3      | M20        |
| IO16NB1F1        | C13        | IO33PB2F2      | G19        | IO51NB3F3      | P21        |
| IO16PB1F1        | C12        | IO34NB2F2      | E22        | IO51PB3F3      | N21        |

| FG484          |            | FG484          |            |
|----------------|------------|----------------|------------|
| AX250 Function | Pin Number | AX250 Function | Pin Number |
| VCCPLH         | T10        | VCCIB4         | R14        |
| VCCDA          | D14        | VCCIB5         | AA3        |
| VCCDA          | D5         | VCCIB5         | AB3        |
| VCCDA          | F16        | VCCIB5         | R10        |
| VCCDA          | G12        | VCCIB5         | R11        |
| VCCDA          | L4         | VCCIB5         | R9         |
| VCCDA          | M18        | VCCIB6         | M8         |
| VCCDA          | T11        | VCCIB6         | N8         |
| VCCDA          | T17        | VCCIB6         | P8         |
| VCCDA          | U7         | VCCIB6         | Y1         |
| VCCDA          | V14        | VCCIB6         | Y2         |
| VCCDA          | V8         | VCCIB7         | C1         |
| VCCIB0         | A3         | VCCIB7         | C2         |
| VCCIB0         | B3         | VCCIB7         | J8         |
| VCCIB0         | H10        | VCCIB7         | K8         |
| VCCIB0         | H11        | VCCIB7         | L8         |
| VCCIB0         | H9         | VCOMPLA        | D10        |
| VCCIB1         | A20        | VCOMPLB        | G10        |
| VCCIB1         | B20        | VCOMPLC        | E12        |
| VCCIB1         | H12        | VCOMPLD        | G14        |
| VCCIB1         | H13        | VCOMPLE        | W13        |
| VCCIB1         | H14        | VCOMPLF        | T13        |
| VCCIB2         | C21        | VCOMPLG        | V11        |
| VCCIB2         | C22        | VCOMPLH        | T9         |
| VCCIB2         | J15        | VPUMP          | D17        |
| VCCIB2         | K15        |                |            |
| VCCIB2         | L15        |                |            |
| VCCIB3         | M15        |                |            |
| VCCIB3         | N15        |                |            |
| VCCIB3         | P15        |                |            |
| VCCIB3         | Y21        |                |            |
| VCCIB3         | Y22        |                |            |
| VCCIB4         | AA20       |                |            |
| VCCIB4         | AB20       |                |            |
| VCCIB4         | R12        |                |            |
| VCCIB4         | R13        |                |            |

| FG484          |            |
|----------------|------------|
| AX500 Function | Pin Number |
| IO108PB5F10    | AA10       |
| IO110NB5F10    | AB9        |
| IO110PB5F10    | AB10       |
| IO111NB5F10    | Y8         |
| IO111PB5F10    | Y9         |
| IO112NB5F10    | AB7        |
| IO113NB5F10    | W8         |
| IO113PB5F10    | W9         |
| IO114NB5F11    | AA7        |
| IO114PB5F11    | AA8        |
| IO115NB5F11    | AB5        |
| IO115PB5F11    | AB6        |
| IO116NB5F11    | Y6         |
| IO116PB5F11    | Y7         |
| IO117NB5F11    | U8         |
| IO117PB5F11    | U9         |
| IO118NB5F11    | AA5        |
| IO118PB5F11    | AA6        |
| IO119NB5F11    | AA4        |
| IO119PB5F11    | AB4        |
| IO120NB5F11    | Y4         |
| IO120PB5F11    | Y5         |
| IO121NB5F11    | W6         |
| IO121PB5F11    | W7         |
| IO122NB5F11    | V3         |
| IO122PB5F11    | W3         |
| IO123NB5F11    | T7         |
| IO123PB5F11    | T8         |
| IO124NB5F11    | V4         |
| IO124PB5F11    | W5         |
| IO125NB5F11    | V6         |
| IO125PB5F11    | V7         |
| <b>Bank 6</b>  |            |
| IO126NB6F12    | V2         |
| IO126PB6F12    | W2         |

| FG484          |            |
|----------------|------------|
| AX500 Function | Pin Number |
| IO127NB6F12    | P7         |
| IO127PB6F12    | R7         |
| IO128NB6F12    | V1         |
| IO128PB6F12    | W1         |
| IO129NB6F12    | U5         |
| IO129PB6F12    | T5         |
| IO130NB6F12    | T1         |
| IO130PB6F12    | U1         |
| IO131NB6F12    | P6         |
| IO131PB6F12    | R6         |
| IO132NB6F12    | T4         |
| IO132PB6F12    | U4         |
| IO133NB6F12    | U2         |
| IO134NB6F12    | T3         |
| IO134PB6F12    | U3         |
| IO135NB6F12    | P5         |
| IO135PB6F12    | R5         |
| IO136NB6F13    | R2         |
| IO136PB6F13    | T2         |
| IO138NB6F13    | P4         |
| IO138PB6F13    | R4         |
| IO139NB6F13    | N2         |
| IO139PB6F13    | P2         |
| IO140NB6F13    | P3         |
| IO140PB6F13    | R3         |
| IO141NB6F13    | M6         |
| IO141PB6F13    | N6         |
| IO142NB6F13    | P1         |
| IO142PB6F13    | R1         |
| IO143NB6F13    | M5         |
| IO143PB6F13    | N5         |
| IO144NB6F13    | M4         |
| IO144PB6F13    | N4         |
| IO145NB6F13    | M7         |
| IO145PB6F13    | N7         |

| FG484          |            |
|----------------|------------|
| AX500 Function | Pin Number |
| IO146NB6F13    | M3         |
| IO146PB6F13    | N3         |
| <b>Bank 7</b>  |            |
| IO147NB7F14    | K7         |
| IO147PB7F14    | L7         |
| IO148NB7F14    | M2         |
| IO148PB7F14    | N1         |
| IO149NB7F14    | K5         |
| IO149PB7F14    | L5         |
| IO150NB7F14    | L3         |
| IO150PB7F14    | L2         |
| IO151NB7F14    | K6         |
| IO151PB7F14    | L6         |
| IO152NB7F14    | K2         |
| IO152PB7F14    | K1         |
| IO153NB7F14    | K4         |
| IO153PB7F14    | K3         |
| IO154NB7F14    | H3         |
| IO154PB7F14    | J3         |
| IO155NB7F14    | H5         |
| IO155PB7F14    | J5         |
| IO156NB7F14    | H4         |
| IO156PB7F14    | J4         |
| IO157NB7F14    | H2         |
| IO157PB7F14    | J2         |
| IO158NB7F15    | H1         |
| IO158PB7F15    | J1         |
| IO159NB7F15    | F1         |
| IO159PB7F15    | G1         |
| IO160NB7F15    | F2         |
| IO160PB7F15    | G2         |
| IO161NB7F15    | H6         |
| IO161PB7F15    | J6         |
| IO162NB7F15    | F3         |
| IO162PB7F15    | G3         |

| FG676          |            |
|----------------|------------|
| AX500 Function | Pin Number |
| VCCIB3         | T19        |
| VCCIB3         | U19        |
| VCCIB3         | U20        |
| VCCIB3         | V19        |
| VCCIB3         | V20        |
| VCCIB3         | W20        |
| VCCIB4         | W14        |
| VCCIB4         | W15        |
| VCCIB4         | W16        |
| VCCIB4         | W17        |
| 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         |

| FG676          |            |
|----------------|------------|
| AX500 Function | Pin Number |
| VCCIB7         | L8         |
| VCCIB7         | M8         |
| VCCIB7         | N8         |
| VCCPLA         | E12        |
| VCCPLB         | F13        |
| VCCPLC         | E15        |
| VCCPLD         | G14        |
| VCCPLE         | AF15       |
| VCCPLF         | AA14       |
| VCCPLG         | AF12       |
| VCCPLH         | AB13       |
| VCOMPLA        | D12        |
| VCOMPLB        | G13        |
| VCOMPLC        | D15        |
| VCOMPLD        | F14        |
| VCOMPLE        | AD15       |
| VCOMPLF        | AB14       |
| VCOMPLG        | AD12       |
| VCOMPLH        | Y13        |
| VPUMP          | E22        |



| FG676           |            |
|-----------------|------------|
| AX1000 Function | Pin Number |
| GND             | A8         |
| GND             | AC23       |
| GND             | AC4        |
| GND             | AD24       |
| GND             | AD3        |
| GND             | AE2        |
| GND             | AE25       |
| GND             | AF1        |
| GND             | AF13       |
| GND             | AF14       |
| GND             | AF19       |
| GND             | AF26       |
| GND             | AF8        |
| GND             | B2         |
| GND             | B25        |
| GND             | B26        |
| GND             | C24        |
| GND             | C3         |
| GND             | G20        |
| GND             | G7         |
| GND             | H1         |
| GND             | H19        |
| GND             | H26        |
| GND             | H8         |
| GND             | J18        |
| GND             | J9         |
| GND             | K10        |
| GND             | K11        |
| GND             | K12        |
| GND             | K13        |
| GND             | K14        |
| GND             | K15        |
| GND             | K16        |
| GND             | K17        |
| GND             | L10        |
| GND             | L11        |

| FG676           |            |
|-----------------|------------|
| AX1000 Function | Pin Number |
| GND             | L12        |
| GND             | L13        |
| GND             | L14        |
| GND             | L15        |
| GND             | L16        |
| GND             | L17        |
| GND             | M10        |
| GND             | M11        |
| GND             | M12        |
| GND             | M13        |
| GND             | M14        |
| GND             | M15        |
| GND             | M16        |
| GND             | M17        |
| GND             | N1         |
| GND             | N10        |
| GND             | N11        |
| GND             | N12        |
| GND             | N13        |
| GND             | N14        |
| GND             | N15        |
| GND             | N16        |
| GND             | N17        |
| GND             | N26        |
| GND             | P1         |
| GND             | P10        |
| GND             | P11        |
| GND             | P12        |
| GND             | P13        |
| GND             | P14        |
| GND             | P15        |
| GND             | P16        |
| GND             | P17        |
| GND             | P26        |
| GND             | R10        |
| GND             | R11        |

| FG676           |            |
|-----------------|------------|
| AX1000 Function | Pin Number |
| GND             | R12        |
| GND             | R13        |
| GND             | R14        |
| GND             | R15        |
| GND             | R16        |
| GND             | R17        |
| GND             | T10        |
| GND             | T11        |
| GND             | T12        |
| GND             | T13        |
| GND             | T14        |
| GND             | T15        |
| GND             | T16        |
| GND             | T17        |
| GND             | U10        |
| GND             | U11        |
| GND             | U12        |
| GND             | U13        |
| GND             | U14        |
| GND             | U15        |
| GND             | U16        |
| GND             | U17        |
| GND             | V18        |
| GND             | V9         |
| GND             | W1         |
| GND             | W19        |
| GND             | W26        |
| GND             | W8         |
| GND             | Y20        |
| GND             | Y7         |
| GND/LP          | C2         |
| NC              | A25        |
| NC              | AC13       |
| NC              | AC14       |
| NC              | AF2        |
| NC              | AF25       |

| FG896           |            | FG896            |            | FG896           |            |
|-----------------|------------|------------------|------------|-----------------|------------|
| AX1000 Function | Pin Number | AX1000 Function  | Pin Number | AX1000 Function | Pin Number |
| <b>Bank 0</b>   |            | IO17NB0F1        | B11        | IO34NB1F3       | A17        |
| IO00NB0F0       | D6         | IO17PB0F1        | B10        | IO34PB1F3       | B17        |
| IO00PB0F0       | E6         | IO18NB0F1        | D11        | IO35NB1F3       | D18        |
| IO01NB0F0       | A5         | IO18PB0F1        | E11        | IO35PB1F3       | C18        |
| IO01PB0F0       | B5         | IO19NB0F1        | C12        | IO36NB1F3       | H17        |
| IO02NB0F0       | G9         | IO19PB0F1        | C11        | IO36PB1F3       | J17        |
| IO02PB0F0       | G8         | IO20NB0F1        | F12        | IO37NB1F3       | B19        |
| IO03NB0F0       | F8         | IO20PB0F1        | G12        | IO37PB1F3       | A19        |
| IO03PB0F0       | F7         | IO21NB0F1        | D12        | IO38NB1F3       | H18        |
| IO04NB0F0       | D7         | IO21PB0F1        | E12        | IO38PB1F3       | J18        |
| IO04PB0F0       | E7         | IO22NB0F2        | H13        | IO39NB1F3       | B20        |
| IO05NB0F0       | C7         | IO22PB0F2        | J13        | IO39PB1F3       | A20        |
| IO05PB0F0       | C6         | IO23NB0F2        | A12        | IO40NB1F3       | C20        |
| IO06NB0F0       | H9         | IO23PB0F2        | A11        | IO40PB1F3       | C19        |
| IO06PB0F0       | H8         | IO24NB0F2        | F13        | IO41NB1F4       | E20        |
| IO07NB0F0       | D8         | IO24PB0F2        | G13        | IO41PB1F4       | E19        |
| IO07PB0F0       | E8         | IO25NB0F2        | B13        | IO42NB1F4       | F18        |
| IO08NB0F0       | E9         | IO25PB0F2        | B12        | IO42PB1F4       | G18        |
| IO08PB0F0       | F9         | IO26NB0F2        | E14        | IO43NB1F4       | A22        |
| IO09NB0F0       | A7         | IO26PB0F2        | E13        | IO43PB1F4       | A21        |
| IO09PB0F0       | B7         | IO27NB0F2        | B14        | IO44NB1F4       | F20        |
| IO10NB0F0       | H10        | IO27PB0F2        | A14        | IO44PB1F4       | F19        |
| IO10PB0F0       | G10        | IO28NB0F2        | H14        | IO45NB1F4       | D21        |
| IO11NB0F0       | C9         | IO28PB0F2        | J14        | IO45PB1F4       | D20        |
| IO11PB0F0       | C8         | IO29NB0F2        | B15        | IO46NB1F4       | D22        |
| IO12NB0F1       | E10        | IO29PB0F2        | A15        | IO46PB1F4       | C22        |
| IO12PB0F1       | F10        | IO30NB0F2/HCLKAN | C14        | IO47NB1F4       | A25        |
| IO13NB0F1       | D10        | IO30PB0F2/HCLKAP | D14        | IO47PB1F4       | A24        |
| IO13PB0F1       | D9         | IO31NB0F2/HCLKBN | E15        | IO48NB1F4       | H19        |
| IO14NB0F1       | F11        | IO31PB0F2/HCLKBP | D15        | IO48PB1F4       | G19        |
| IO14PB0F1       | G11        | <b>Bank 1</b>    |            | IO49NB1F4       | C24        |
| IO15NB0F1       | A10        | IO32NB1F3/HCLKCN | E17        | IO49PB1F4       | C23        |
| IO15PB0F1       | A9         | IO32PB1F3/HCLKCP | E16        | IO50NB1F4       | G20        |
| IO16NB0F1       | H12        | IO33NB1F3/HCLKDN | C17        | IO50PB1F4       | H20        |
| IO16PB0F1       | H11        | IO33PB1F3/HCLKDP | D17        | IO51NB1F4       | F21        |

| FG896             |            |
|-------------------|------------|
| AX1000 Function   | Pin Number |
| IO155NB4F14       | AC17       |
| IO155PB4F14       | AB17       |
| IO156NB4F14       | AK19       |
| IO156PB4F14       | AJ19       |
| IO157NB4F14       | AE17       |
| IO157PB4F14       | AD17       |
| IO158NB4F14       | AJ17       |
| IO158PB4F14       | AJ18       |
| IO159NB4F14/CLKEN | AG18       |
| IO159PB4F14/CLKEP | AH18       |
| IO160NB4F14/CLKFN | AG16       |
| IO160PB4F14/CLKFP | AG17       |
| Bank 5            |            |
| IO161NB5F15/CLKGN | AG14       |
| IO161PB5F15/CLKGP | AG15       |
| IO162NB5F15/CLKHN | AG13       |
| IO162PB5F15/CLKHP | AH13       |
| IO163NB5F15       | AE14       |
| IO163PB5F15       | AD14       |
| IO164NB5F15       | AJ12       |
| IO164PB5F15       | AJ13       |
| IO165NB5F15       | AB14       |
| IO165PB5F15       | AC15       |
| IO166NB5F15       | AK11       |
| IO166PB5F15       | AK12       |
| IO167NB5F15       | AB13       |
| IO167PB5F15       | AC14       |
| IO168NB5F15       | AH11       |
| IO168PB5F15       | AH12       |
| IO169NB5F15       | AD13       |
| IO169PB5F15       | AC13       |
| IO170NB5F15       | AJ10       |
| IO170PB5F15       | AJ11       |
| IO171NB5F16       | AG11       |
| IO171PB5F16       | AG12       |

| FG896           |            |
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| AX1000 Function | Pin Number |
| IO172NB5F16     | AK9        |
| IO172PB5F16     | AK10       |
| IO173NB5F16     | AE12       |
| IO173PB5F16     | AE13       |
| IO174NB5F16     | AG9        |
| IO174PB5F16     | AG10       |
| IO175NB5F16     | AE11       |
| IO175PB5F16     | AF11       |
| IO176NB5F16     | AH8        |
| IO176PB5F16     | AH9        |
| IO177NB5F16     | AC12       |
| IO177PB5F16     | AD12       |
| IO178NB5F16     | AJ7        |
| IO178PB5F16     | AJ8        |
| IO179NB5F16     | AF9        |
| IO179PB5F16     | AF10       |
| IO180NB5F16     | AE9        |
| IO180PB5F16     | AE10       |
| IO181NB5F17     | AC11       |
| IO181PB5F17     | AD11       |
| IO182NB5F17     | AK6        |
| IO182PB5F17     | AK7        |
| IO183NB5F17     | AF8        |
| IO183PB5F17     | AG8        |
| IO184NB5F17     | AG7        |
| IO184PB5F17     | AH7        |
| IO185NB5F17     | AC10       |
| IO185PB5F17     | AD10       |
| IO186NB5F17     | AJ5        |
| IO186PB5F17     | AJ6        |
| IO187NB5F17     | AE7        |
| IO187PB5F17     | AE8        |
| IO188NB5F17     | AF6        |
| IO188PB5F17     | AF7        |
| IO189NB5F17     | AD8        |

| FG896           |            |
|-----------------|------------|
| AX1000 Function | Pin Number |
| IO189PB5F17     | AD9        |
| IO190NB5F17     | AH6        |
| IO190PB5F17     | AG6        |
| IO191NB5F17     | AG5        |
| IO191PB5F17     | AH5        |
| IO192NB5F17     | AC8        |
| IO192PB5F17     | AC9        |
| Bank 6          |            |
| IO193NB6F18     | AB7        |
| IO193PB6F18     | AC7        |
| IO194NB6F18     | AD5        |
| IO194PB6F18     | AE5        |
| IO195NB6F18     | AB6        |
| IO195PB6F18     | AC6        |
| IO196NB6F18     | AE4        |
| IO196PB6F18     | AF4        |
| IO197NB6F18     | AA8        |
| IO197PB6F18     | AB8        |
| IO198NB6F18     | AF3        |
| IO198PB6F18     | AG3        |
| IO199NB6F18     | AC4        |
| IO199PB6F18     | AD4        |
| IO200NB6F18     | AB5        |
| IO200PB6F18     | AC5        |
| IO201NB6F18     | Y7         |
| IO201PB6F18     | AA7        |
| IO202NB6F18     | AD3        |
| IO202PB6F18     | AE3        |
| IO203NB6F19     | Y6         |
| IO203PB6F19     | AA6        |
| IO204NB6F19     | Y5         |
| IO204PB6F19     | AA5        |
| IO205NB6F19     | W8         |
| IO205PB6F19     | Y8         |
| IO206NB6F19     | AA4        |

| FG896           |            | FG896           |            | FG896           |            |
|-----------------|------------|-----------------|------------|-----------------|------------|
| AX1000 Function | Pin Number | AX1000 Function | Pin Number | AX1000 Function | Pin Number |
| GND             | T12        | GND             | W19        | NC              | AJ4        |
| GND             | T13        | GND             | Y11        | NC              | AK14       |
| GND             | T14        | GND             | Y20        | NC              | AK15       |
| GND             | T15        | GND/LP          | E4         | NC              | AK16       |
| GND             | T16        | NC              | A16        | NC              | AK17       |
| GND             | T17        | NC              | A26        | NC              | AK22       |
| GND             | T18        | NC              | A4         | NC              | AK4        |
| GND             | T19        | NC              | A6         | NC              | AK5        |
| GND             | T28        | NC              | AA30       | NC              | B16        |
| GND             | T3         | NC              | AB1        | NC              | B18        |
| GND             | U12        | NC              | AB30       | NC              | B21        |
| GND             | U13        | NC              | AC2        | NC              | B23        |
| GND             | U14        | NC              | AC29       | NC              | B26        |
| GND             | U15        | NC              | AD1        | NC              | B4         |
| GND             | U16        | NC              | AD2        | NC              | B6         |
| GND             | U17        | NC              | AD30       | NC              | B8         |
| GND             | U18        | NC              | AE1        | NC              | C27        |
| GND             | U19        | NC              | AE15       | NC              | D1         |
| GND             | V1         | NC              | AE16       | NC              | D2         |
| GND             | V12        | NC              | AE2        | NC              | D29        |
| GND             | V13        | NC              | AE30       | NC              | D30        |
| GND             | V14        | NC              | AF1        | NC              | E1         |
| GND             | V15        | NC              | AF2        | NC              | E2         |
| GND             | V16        | NC              | AF29       | NC              | E29        |
| GND             | V17        | NC              | AF30       | NC              | E30        |
| GND             | V18        | NC              | AG1        | NC              | F15        |
| GND             | V19        | NC              | AG2        | NC              | F16        |
| GND             | V30        | NC              | AG29       | NC              | F29        |
| GND             | W12        | NC              | AG30       | NC              | F30        |
| GND             | W13        | NC              | AH27       | NC              | G1         |
| GND             | W14        | NC              | AH4        | NC              | G29        |
| GND             | W15        | NC              | AJ14       | NC              | G30        |
| GND             | W16        | NC              | AJ15       | NC              | H29        |
| GND             | W17        | NC              | AJ16       | NC              | J1         |
| GND             | W18        | NC              | AJ27       | NC              | J30        |

| FG1152          |            | FG1152          |            | FG1152          |            |
|-----------------|------------|-----------------|------------|-----------------|------------|
| AX2000 Function | Pin Number | AX2000 Function | Pin Number | AX2000 Function | Pin Number |
| GND             | AK12       | GND             | AN34       | GND             | D1         |
| GND             | AK17       | GND             | AN4        | GND             | D11        |
| GND             | AK18       | GND             | AN9        | GND             | D2         |
| GND             | AK23       | GND             | AP13       | GND             | D24        |
| GND             | AK30       | GND             | AP2        | GND             | D3         |
| GND             | AK5        | GND             | AP22       | GND             | D31        |
| GND             | AL1        | GND             | AP27       | GND             | D32        |
| GND             | AL11       | GND             | AP3        | GND             | D33        |
| GND             | AL2        | GND             | AP31       | GND             | D34        |
| GND             | AL24       | GND             | AP32       | GND             | D4         |
| GND             | AL3        | GND             | AP33       | GND             | E12        |
| GND             | AL31       | GND             | AP4        | GND             | E17        |
| GND             | AL32       | GND             | AP8        | GND             | E18        |
| GND             | AL33       | GND             | B1         | GND             | E23        |
| GND             | AL34       | GND             | B2         | GND             | E30        |
| GND             | AL4        | GND             | B26        | GND             | E5         |
| GND             | AM1        | GND             | B3         | GND             | F29        |
| GND             | AM10       | GND             | B31        | GND             | F30        |
| GND             | AM15       | GND             | B32        | GND             | F6         |
| GND             | AM2        | GND             | B33        | GND             | G28        |
| GND             | AM20       | GND             | B34        | GND             | G7         |
| GND             | AM25       | GND             | B4         | GND             | H1         |
| GND             | AM3        | GND             | B9         | GND             | H34        |
| GND             | AM31       | GND             | C1         | GND             | J2         |
| GND             | AM32       | GND             | C10        | GND             | J33        |
| GND             | AM33       | GND             | C15        | GND             | K3         |
| GND             | AM34       | GND             | C2         | GND             | K32        |
| GND             | AM4        | GND             | C20        | GND             | L11        |
| GND             | AN1        | GND             | C25        | GND             | L24        |
| GND             | AN2        | GND             | C3         | GND             | L31        |
| GND             | AN26       | GND             | C31        | GND             | L4         |
| GND             | AN3        | GND             | C32        | GND             | M12        |
| GND             | AN31       | GND             | C33        | GND             | M23        |
| GND             | AN32       | GND             | C34        | GND             | M30        |
| GND             | AN33       | GND             | C4         | GND             | M5         |

| CQ352             |            | CQ352           |            | CQ352                |            |
|-------------------|------------|-----------------|------------|----------------------|------------|
| AX1000 Function   | Pin Number | AX1000 Function | Pin Number | AX1000 Function      | Pin Number |
| IO131PB4F12       | 171        | IO187PB5F17     | 99         | IO224NB6F20          | 46         |
| IO132NB4F12       | 166        | IO188NB5F17     | 100        | IO224PB6F20          | 47         |
| IO132PB4F12       | 167        | IO188PB5F17     | 101        | <b>Bank 7</b>        |            |
| IO133NB4F12       | 164        | IO190NB5F17     | 94         | IO225NB7F21          | 40         |
| IO133PB4F12       | 165        | IO190PB5F17     | 95         | IO225PB7F21          | 41         |
| IO134NB4F12       | 160        | IO192NB5F17     | 92         | IO226NB7F21          | 42         |
| IO134PB4F12       | 161        | IO192PB5F17     | 93         | IO226PB7F21          | 43         |
| IO136NB4F12       | 158        | <b>Bank 6</b>   |            | IO237NB7F22          | 34         |
| IO136PB4F12       | 159        | IO193PB6F18     | 86         | IO237PB7F22          | 35         |
| IO137NB4F12       | 154        | IO194NB6F18     | 84         | IO238NB7F22          | 36         |
| IO137PB4F12       | 155        | IO194PB6F18     | 85         | IO238PB7F22          | 37         |
| IO138NB4F12       | 152        | IO196NB6F18     | 78         | IO240NB7F22          | 30         |
| IO138PB4F12       | 153        | IO196PB6F18     | 79         | IO240PB7F22          | 31         |
| IO153NB4F14       | 146        | IO197NB6F18     | 82         | IO241NB7F22          | 28         |
| IO153PB4F14       | 147        | IO197PB6F18     | 83         | IO241PB7F22          | 29         |
| IO159NB4F14/CLKEN | 142        | IO198NB6F18     | 76         | IO242NB7F22          | 24         |
| IO159PB4F14/CLKEP | 143        | IO198PB6F18     | 77         | IO242PB7F22          | 25         |
| IO160NB4F14/CLKFN | 136        | IO203NB6F19     | 72         | IO244NB7F22          | 22         |
| IO160PB4F14/CLKFP | 137        | IO203PB6F19     | 73         | IO244PB7F22          | 23         |
| <b>Bank 5</b>     |            | IO204NB6F19     | 70         | IO245NB7F22          | 18         |
| IO161NB5F15/CLKGN | 128        | IO204PB6F19     | 71         | IO245PB7F22          | 19         |
| IO161PB5F15/CLKGP | 129        | IO205NB6F19     | 66         | IO246NB7F22          | 16         |
| IO162NB5F15/CLKHN | 122        | IO205PB6F19     | 67         | IO246PB7F22          | 17         |
| IO162PB5F15/CLKHP | 123        | IO206NB6F19     | 64         | IO249NB7F23          | 12         |
| IO167NB5F15       | 118        | IO206PB6F19     | 65         | IO249PB7F23          | 13         |
| IO167PB5F15       | 119        | IO207NB6F19     | 60         | IO250NB7F23          | 10         |
| IO183NB5F17       | 110        | IO207PB6F19     | 61         | IO250PB7F23          | 11         |
| IO183PB5F17       | 111        | IO208NB6F19     | 58         | IO256NB7F23          | 4          |
| IO184NB5F17       | 112        | IO208PB6F19     | 59         | IO256PB7F23          | 5          |
| IO184PB5F17       | 113        | IO211NB6F19     | 54         | IO257NB7F23          | 6          |
| IO185NB5F17       | 104        | IO211PB6F19     | 55         | IO257PB7F23          | 7          |
| IO185PB5F17       | 105        | IO212NB6F19     | 52         | <b>Dedicated I/O</b> |            |
| IO186NB5F17       | 106        | IO212PB6F19     | 53         | GND                  | 1          |
| IO186PB5F17       | 107        | IO223NB6F20     | 48         | GND                  | 9          |
| IO187NB5F17       | 98         | IO223PB6F20     | 49         | GND                  | 15         |

| CQ352             |            |
|-------------------|------------|
| AX2000 Function   | Pin Number |
| IO182PB4F17       | 171        |
| IO183NB4F17       | 166        |
| IO183PB4F17       | 167        |
| IO184NB4F17       | 164        |
| IO184PB4F17       | 165        |
| IO185NB4F17       | 160        |
| IO185PB4F17       | 161        |
| IO190NB4F17       | 158        |
| IO190PB4F17       | 159        |
| IO191NB4F17       | 154        |
| IO191PB4F17       | 155        |
| IO192NB4F17       | 152        |
| IO192PB4F17       | 153        |
| IO207NB4F19       | 146        |
| IO207PB4F19       | 147        |
| IO212NB4F19/CLKEN | 142        |
| IO212PB4F19/CLKEP | 143        |
| IO213NB4F19/CLKFN | 136        |
| IO213PB4F19/CLKFP | 137        |
| <b>Bank 5</b>     |            |
| IO214NB5F20/CLKGN | 128        |
| IO214PB5F20/CLKGP | 129        |
| IO215NB5F20/CLKHN | 122        |
| IO215PB5F20/CLKHP | 123        |
| IO217NB5F20       | 118        |
| IO217PB5F20       | 119        |
| IO236NB5F22       | 110        |
| IO236PB5F22       | 111        |
| IO237NB5F22       | 112        |
| IO237PB5F22       | 113        |
| IO238NB5F22       | 104        |
| IO238PB5F22       | 105        |
| IO239NB5F22       | 106        |
| IO239PB5F22       | 107        |
| IO240NB5F22       | 100        |

| CQ352           |            |
|-----------------|------------|
| AX2000 Function | Pin Number |
| IO240PB5F22     | 101        |
| IO242NB5F22     | 94         |
| IO242PB5F22     | 95         |
| IO243NB5F22     | 98         |
| IO243PB5F22     | 99         |
| IO244NB5F22     | 92         |
| IO244PB5F22     | 93         |
| <b>Bank 6</b>   |            |
| IO257PB6F24     | 86         |
| IO258NB6F24     | 84         |
| IO258PB6F24     | 85         |
| IO261NB6F24     | 82         |
| IO261PB6F24     | 83         |
| IO262NB6F24     | 78         |
| IO262PB6F24     | 79         |
| IO265NB6F24     | 76         |
| IO265PB6F24     | 77         |
| IO279NB6F26     | 72         |
| IO279PB6F26     | 73         |
| IO280NB6F26     | 70         |
| IO280PB6F26     | 71         |
| IO281NB6F26     | 66         |
| IO281PB6F26     | 67         |
| IO282NB6F26     | 64         |
| IO282PB6F26     | 65         |
| IO284NB6F26     | 60         |
| IO284PB6F26     | 61         |
| IO285NB6F26     | 58         |
| IO285PB6F26     | 59         |
| IO286NB6F26     | 54         |
| IO286PB6F26     | 55         |
| IO287NB6F26     | 52         |
| IO287PB6F26     | 53         |
| IO294NB6F27     | 48         |
| IO294PB6F27     | 49         |

| CQ352                |            |
|----------------------|------------|
| AX2000 Function      | Pin Number |
| IO296NB6F27          | 46         |
| IO296PB6F27          | 47         |
| <b>Bank 7</b>        |            |
| IO300NB7F28          | 42         |
| IO300PB7F28          | 43         |
| IO303NB7F28          | 40         |
| IO303PB7F28          | 41         |
| IO310NB7F29          | 34         |
| IO310PB7F29          | 35         |
| IO311NB7F29          | 36         |
| IO311PB7F29          | 37         |
| IO312NB7F29          | 28         |
| IO312PB7F29          | 29         |
| IO315NB7F29          | 30         |
| IO315PB7F29          | 31         |
| IO316NB7F29          | 22         |
| IO316PB7F29          | 23         |
| IO317NB7F29          | 24         |
| IO317PB7F29          | 25         |
| IO318NB7F29          | 18         |
| IO318PB7F29          | 19         |
| IO320NB7F29          | 16         |
| IO320PB7F29          | 17         |
| IO334NB7F31          | 10         |
| IO334PB7F31          | 11         |
| IO335NB7F31          | 12         |
| IO335PB7F31          | 13         |
| IO338NB7F31          | 6          |
| IO338PB7F31          | 7          |
| IO341NB7F31          | 4          |
| IO341PB7F31          | 5          |
| <b>Dedicated I/O</b> |            |
| GND                  | 1          |
| GND                  | 9          |
| GND                  | 15         |

| 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        |
| <b>Bank 4</b>   |            |
| 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       |
| <b>Bank 5</b>     |            |
| 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.



| CG624           |            |
|-----------------|------------|
| AX2000 Function | Pin Number |
| VCCIB2          | D23        |
| VCCIB2          | E22        |
| VCCIB2          | K17        |
| VCCIB2          | L17        |
| VCCIB2          | M16        |
| VCCIB3          | AA22       |
| VCCIB3          | AB23       |
| VCCIB3          | AC24       |
| VCCIB3          | AC25       |
| VCCIB3          | P16        |
| VCCIB3          | R17        |
| VCCIB3          | T17        |
| VCCIB4          | AB21       |
| VCCIB4          | AC22       |
| VCCIB4          | AD23       |
| VCCIB4          | AE23       |
| VCCIB4          | T14        |
| VCCIB4          | U15        |
| VCCIB4          | U16        |
| VCCIB5          | AB5        |
| VCCIB5          | AC4        |
| VCCIB5          | AD3        |
| VCCIB5          | AE3        |
| VCCIB5          | T12        |
| VCCIB5          | U10        |
| VCCIB5          | U11        |
| VCCIB6          | AA4        |
| VCCIB6          | AB3        |
| VCCIB6          | AC1        |
| VCCIB6          | AC2        |
| VCCIB6          | P10        |
| VCCIB6          | R9         |

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 |
| VCCIB6          | T9         |
| VCCIB7          | C1         |
| VCCIB7          | C2         |
| VCCIB7          | D3         |
| VCCIB7          | E4         |
| VCCIB7          | K9         |
| VCCIB7          | L9         |
| VCCIB7          | M10        |
| VCCPLA          | E12        |
| VCCPLB          | J12        |
| VCCPLC          | E14        |
| VCCPLD          | H14        |
| VCCPLE          | Y14        |
| VCCPLF          | U14        |
| VCCPLG          | Y12        |
| VCCPLH          | U12        |
| VCOMPLA         | F12        |
| VCOMPLB         | H12        |
| VCOMPLC         | F14        |
| VCOMPLD         | J14        |
| VCOMPLE         | AA14       |
| VCOMPLF         | V14        |
| VCOMPLG         | AA12       |
| VCOMPLH         | V12        |
| VPUMP           | E20        |

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.*