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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	0°C ~ 70°C (TA)
Package / Case	484-BGA
Supplier Device Package	484-FPBGA (23x23)
Purchase URL	https://www.e-xfl.com/product-detail/microchip-technology/ax1000-fgg484

Carry-Chain Logic

The Axcelerator dedicated carry-chain logic offers a very compact solution for implementing arithmetic functions without sacrificing performance.

To implement the carry-chain logic, two C-cells in a Cluster are connected together so the FCO (i.e. carry out) for the two bits is generated in a carry look-ahead scheme to achieve minimum propagation delay from the FCI (i.e. carry in) into the two-bit Cluster. The two-bit carry logic is shown in Figure 2-29.

The FCI of one C-cell pair is driven by the FCO of the C-cell pair immediately above it. Similarly, the FCO of one C-cell pair, drives the FCI input of the C-cell pair immediately below it (Figure 1-4 on page 1-3 and Figure 2-30 on page 2-57).

The carry-chain logic is selected via the CFN input. When carry logic is not required, this signal is deasserted to save power. Again, this configuration is handled automatically for the user through Microsemi's macro library.

The signal propagation delay between two C-cells in the carry-chain sequence is 0.1 ns.

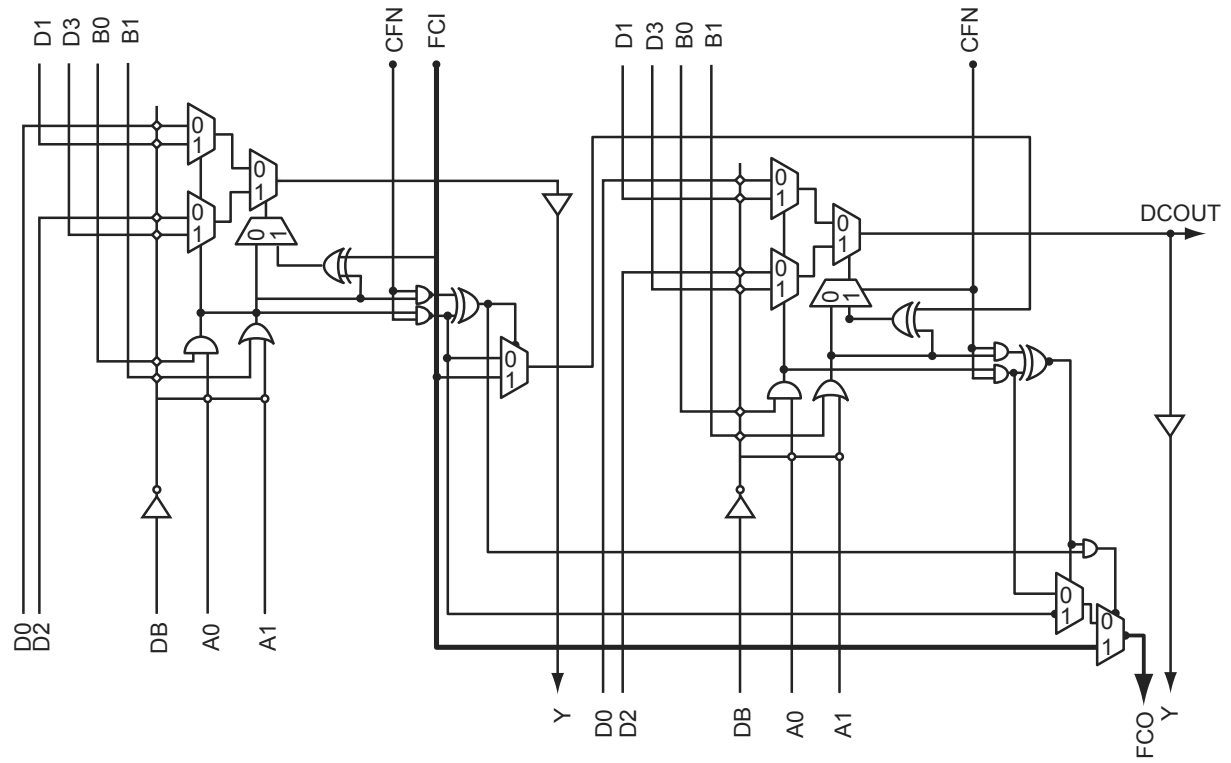


Figure 2-29 • **Axcelerator's Two-Bit Carry Logic**

Vertical and Horizontal Routing

Vertical and Horizontal Tracks provide both local and long distance routing (Figure 2-37 on page 2-62). These tracks are composed of both short-distance, segmented routing and across-chip routing tracks (segmented at core tile boundaries). The short-distance, segmented routing resources can be concatenated through antifuse connections to build longer routing tracks.

These short-distance routing tracks can be used within and between SuperClusters or between modules of non-adjacent SuperClusters. They can be connected to the Output Tracks and to any logic module input (R-cell, C-cell, Buffer, and TX module).

The across-chip horizontal and vertical routing provides long-distance routing resources. These resources interface with the rest of the routing structures through the RX and TX modules (Figure 2-37). The RX module is used to drive signals from the across-chip horizontal and vertical routing to the Output Tracks within the SuperCluster. The TX module is used to drive vertical and horizontal across-chip routing from either short-distance horizontal tracks or from Output Tracks. The TX module can also be used to drive signals from vertical across-chip tracks to horizontal across-chip tracks and vice versa.

Figure 2-36 • **FastConnect Routing**

Figure 2-37 • **Horizontal and Vertical Tracks**

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 2-67* • AX500 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 2-68* • AX1000 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	0.45	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

Clock Skew Minimization

Figure 2-56 indicates how feedback from the clock network can be used to create minimal skew between the distributed clock network and the input clock. The input clock is fed to the reference clock input of the PLL. The output clock (CLK2) feeds a routed clock network. The feedback input to the PLL uses a clock input delayed by a routing network. The PLL then adjusts the phase of the input clock to match the delayed clock, thus providing nearly zero effective skew between the two clocks. Refer to the *Axcelerator Family PLL and Clock Management* application note for more information.

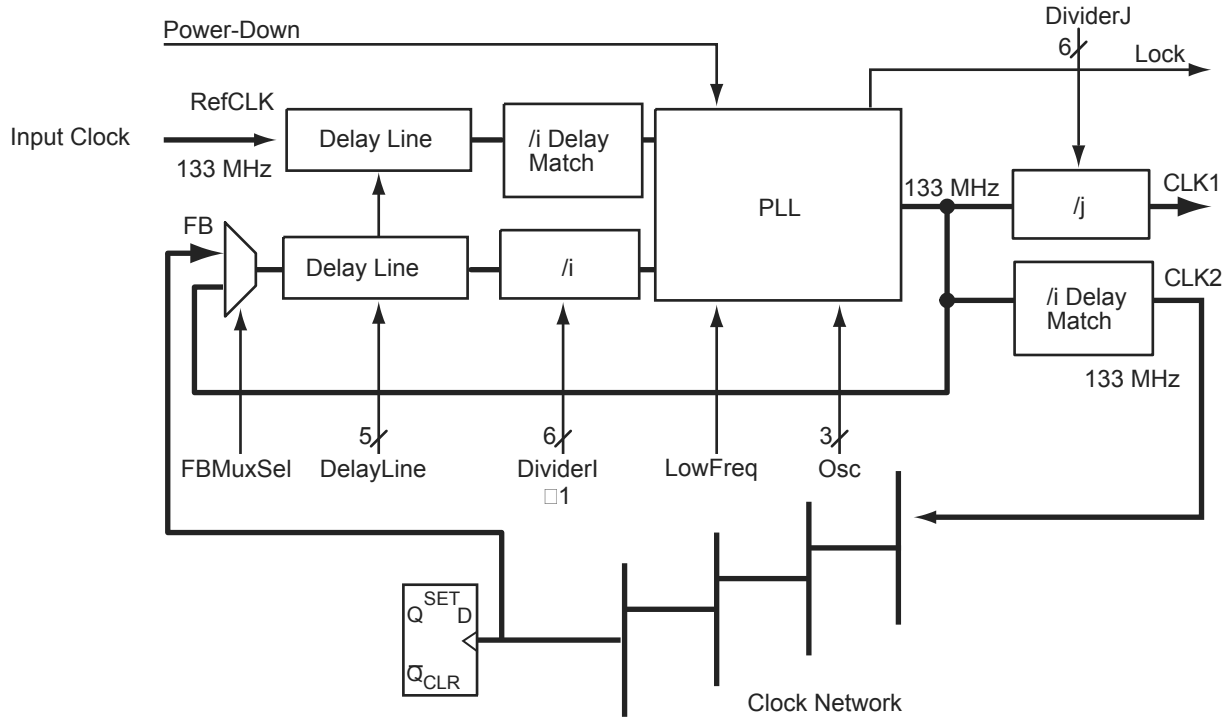


Figure 2-56 • **Using the PLL for Clock Deskewing**

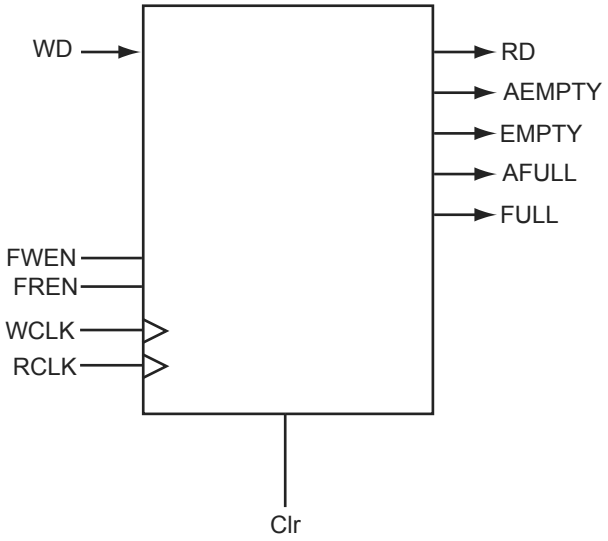


Figure 2-66 • **FIFO Model**

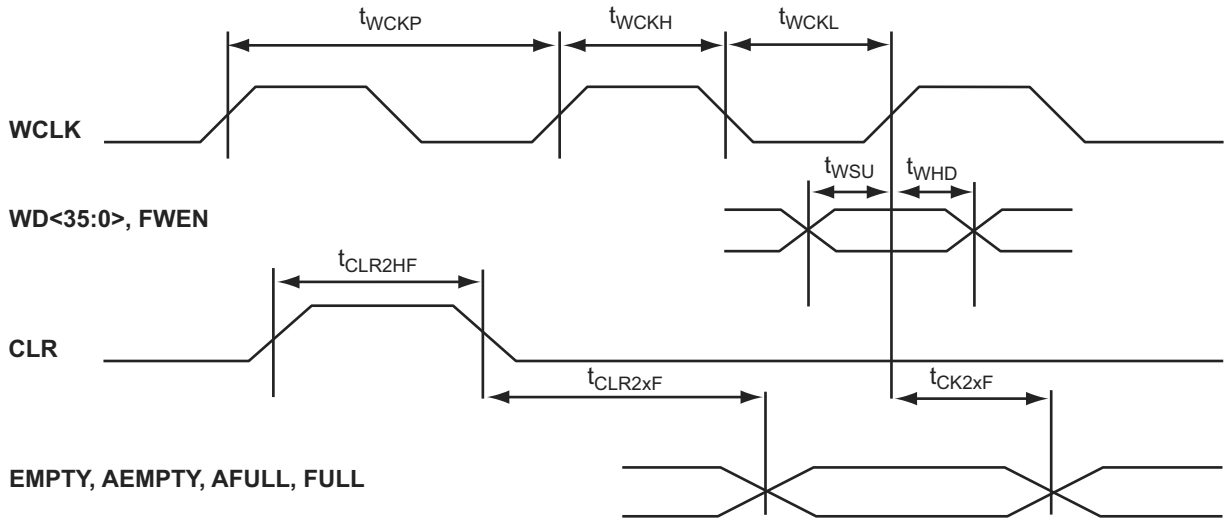


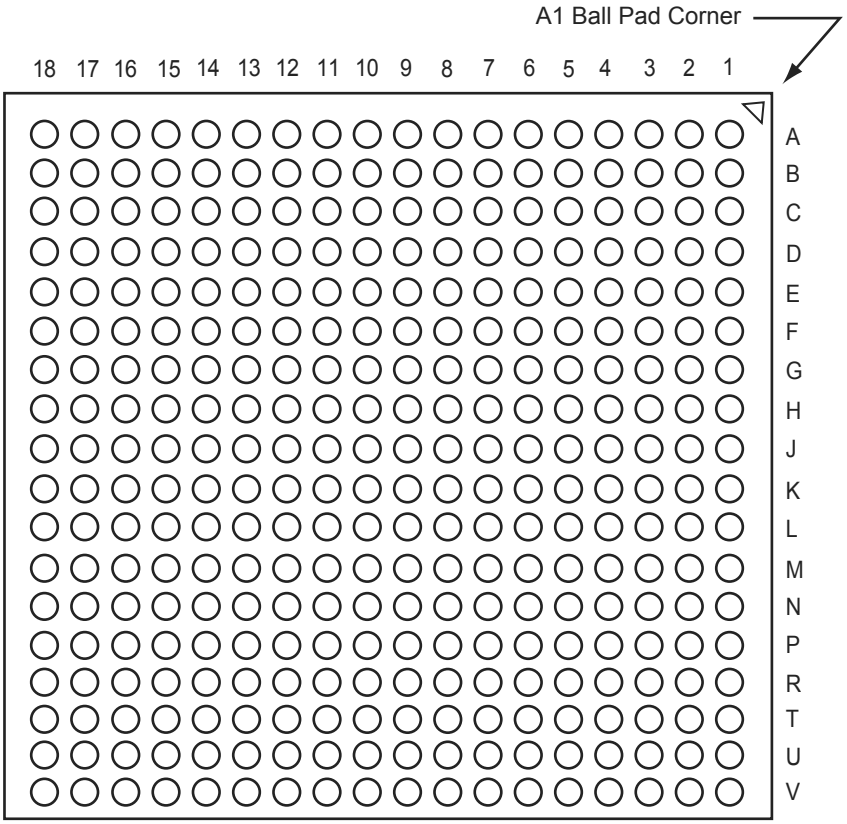
Figure 2-67 • **FIFO Write Timing**

BG729	
AX1000 Function	Pin Number
IO109NB3F10	V24
IO109PB3F10	V25
IO110NB3F10	T20
IO110PB3F10	T21
IO111NB3F10	W26
IO111PB3F10	W27
IO112NB3F10	U22
IO112PB3F10	U23
IO113NB3F10	Y26
IO113PB3F10	Y27
IO114NB3F10	U20
IO114PB3F10	U21
IO115NB3F10	W24
IO115PB3F10	W25
IO116NB3F10	V22
IO116PB3F10	V23
IO117NB3F10	Y24
IO117PB3F10	Y25
IO118NB3F11	V20
IO118PB3F11	V21
IO119NB3F11	AA26
IO119PB3F11	AA27
IO120NB3F11	W22
IO120PB3F11	W23
IO121NB3F11	AA24
IO121PB3F11	AA25
IO122NB3F11	W20
IO122PB3F11	W21
IO123NB3F11	AB26
IO123PB3F11	AB27
IO124NB3F11	Y22
IO124PB3F11	Y23
IO125NB3F11	AB24
IO125PB3F11	AB25
IO126NB3F11	AA22
IO126PB3F11	AA23
IO127NB3F11	AC26

BG729	
AX1000 Function	Pin Number
IO127PB3F11	AC27
IO128NB3F11	Y20
IO128PB3F11	W19
Bank 4	
IO129NB4F12	AA20
IO129PB4F12	Y21
IO130NB4F12	AB22
IO130PB4F12	AB23
IO131NB4F12	AC22
IO131PB4F12	AC23
IO132NB4F12	AD23
IO132PB4F12	AD24
IO133NB4F12	AF23
IO133PB4F12	AE23
IO134NB4F12	AC21
IO134PB4F12	AB21
IO135NB4F12	AC20
IO135PB4F12	AB20
IO136NB4F12	AD21
IO136PB4F12	AD22
IO137NB4F12	Y19
IO137PB4F12	AA19
IO138NB4F12	AE21
IO138PB4F12	AE22
IO139NB4F13	AF21
IO139PB4F13	AF22
IO140NB4F13	AG22
IO140PB4F13	AG23
IO141NB4F13	Y18
IO141PB4F13	AA18
IO142NB4F13	AE20
IO142PB4F13	AD20
IO143NB4F13	AG20
IO143PB4F13	AG21
IO144NB4F13	AC19
IO144PB4F13	AB19
IO145NB4F13	AD18

BG729	
AX1000 Function	Pin Number
IO145PB4F13	AD19
IO146NB4F13	AC18
IO146PB4F13	AB18
IO147NB4F13	Y17
IO147PB4F13	AA17
IO148NB4F13	AF19
IO148PB4F13	AF20
IO149NB4F13	AC17
IO149PB4F13	AB17
IO150NB4F13	AE18
IO150PB4F13	AE19
IO151NB4F13	AA16
IO151PB4F13	Y16
IO152NB4F14	AG18
IO152PB4F14	AG19
IO153NB4F14	AC16
IO153PB4F14	AB16
IO154NB4F14	AF17
IO154PB4F14	AF18
IO155NB4F14	AB15
IO155PB4F14	AC15
IO156NB4F14	AE16
IO156PB4F14	AE17
IO157NB4F14	Y15
IO157PB4F14	AA15
IO158NB4F14	AG16
IO158PB4F14	AG17
IO159NB4F14/CLKEN	AF15
IO159PB4F14/CLKEP	AF16
IO160NB4F14/CLKFN	AD14
IO160PB4F14/CLKFP	AD15
Bank 5	
IO161NB5F15/CLKGN	AE14
IO161PB5F15/CLKGP	AE15
IO162NB5F15/CLKHN	AC13
IO162PB5F15/CLKHP	AD13
IO163NB5F15	Y14

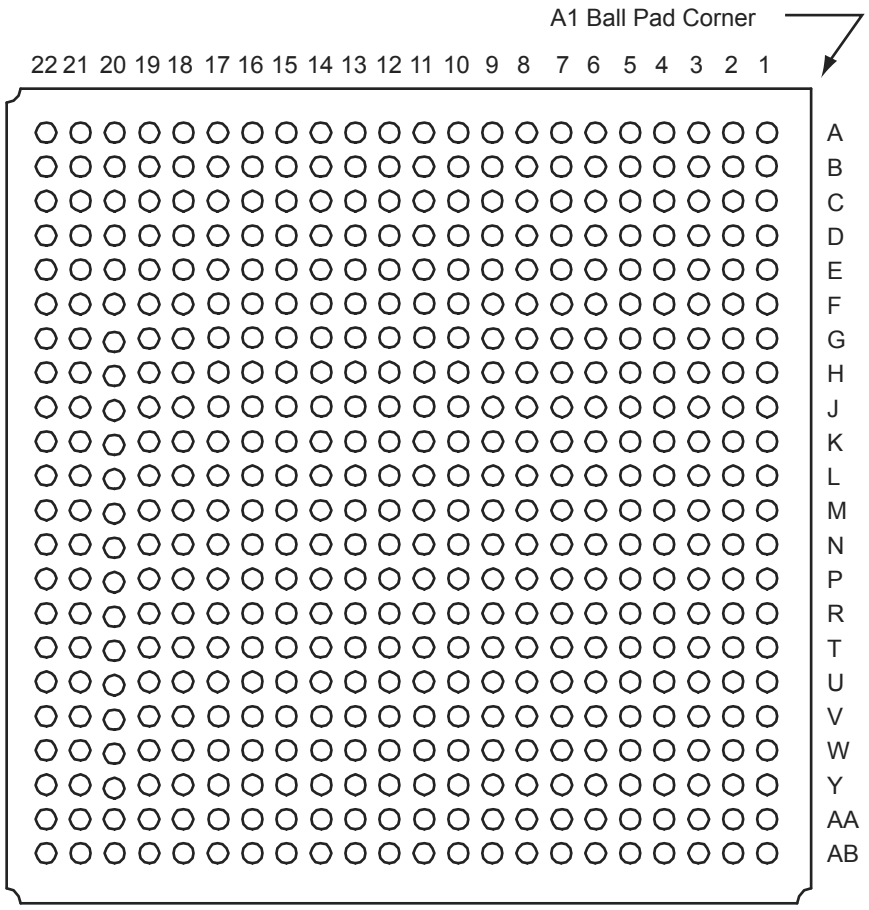
FG324



Note

For Package Manufacturing and Environmental information, visit Resource center at http://www.microsemi.com/soc/products/rescenter/package/index.html.

FG484



Note

For Package Manufacturing and Environmental information, visit Resource center at http://www.microsemi.com/soc/products/rescenter/package/index.html.

FG484	
AX250 Function	**Pin Number**
VCCPLH	T10
VCCDA	D14
VCCDA	D5
VCCDA	F16
VCCDA	G12
VCCDA	L4
VCCDA	M18
VCCDA	T11
VCCDA	T17
VCCDA	U7
VCCDA	V14
VCCDA	V8
VCCIB0	A3
VCCIB0	B3
VCCIB0	H10
VCCIB0	H11
VCCIB0	H9
VCCIB1	A20
VCCIB1	B20
VCCIB1	H12
VCCIB1	H13
VCCIB1	H14
VCCIB2	C21
VCCIB2	C22
VCCIB2	J15
VCCIB2	K15
VCCIB2	L15
VCCIB3	M15
VCCIB3	N15
VCCIB3	P15
VCCIB3	Y21
VCCIB3	Y22
VCCIB4	AA20
VCCIB4	AB20
VCCIB4	R12
VCCIB4	R13

FG484	
AX250 Function	**Pin Number**
VCCIB4	R14
VCCIB5	AA3
VCCIB5	AB3
VCCIB5	R10
VCCIB5	R11
VCCIB5	R9
VCCIB6	M8
VCCIB6	N8
VCCIB6	P8
VCCIB6	Y1
VCCIB6	Y2
VCCIB7	C1
VCCIB7	C2
VCCIB7	J8
VCCIB7	K8
VCCIB7	L8
VCOMPLA	D10
VCOMPLB	G10
VCOMPLC	E12
VCOMPLD	G14
VCOMPLE	W13
VCOMPLF	T13
VCOMPLG	V11
VCOMPLH	T9
VPUMP	D17

FG676	
AX1000 Function	**Pin Number**
IO129PB4F12	AA21
IO131NB4F12	AD22
IO131PB4F12	AD23
IO132NB4F12	AE23
IO132PB4F12	AE24
IO133NB4F12	AB20
IO133PB4F12	AA20
IO134NB4F12	AC21
IO134PB4F12	AC22
IO135NB4F12	AF22
IO135PB4F12	AF23
IO137NB4F12	AB19
IO137PB4F12	AA19
IO139NB4F13	AC19
IO139PB4F13	AC20
IO140NB4F13	AE21
IO140PB4F13	AE22
IO141NB4F13	AD20
IO141PB4F13	AD21
IO143NB4F13	AB17
IO143PB4F13	AB18
IO144NB4F13	AE19
IO144PB4F13	AE20
IO145NB4F13	AC17
IO145PB4F13	AC18
IO146NB4F13	AD18
IO146PB4F13	AD19
IO147NB4F13	AA17
IO147PB4F13	AA18
IO148NB4F13	AF20
IO148PB4F13	AF21
IO149NB4F13	AA16
IO149PB4F13	Y16
IO151NB4F13	AC16
IO151PB4F13	AB16
IO153NB4F14	AE17

FG676	
AX1000 Function	**Pin Number**
IO153PB4F14	AE18
IO154NB4F14	AF17
IO154PB4F14	AF18
IO155NB4F14	AA15
IO155PB4F14	Y15
IO157NB4F14	AC15
IO157PB4F14	AB15
IO159NB4F14/CLKEN	AE16
IO159PB4F14/CLKEP	AF16
IO160NB4F14/CLKFN	AE14
IO160PB4F14/CLKFP	AE15
Bank 5	
IO161NB5F15/CLKGN	AE12
IO161PB5F15/CLKGP	AE13
IO162NB5F15/CLKHN	AE11
IO162PB5F15/CLKHP	AF11
IO163NB5F15	AC12
IO163PB5F15	AB12
IO165NB5F15	Y12
IO165PB5F15	AA13
IO167NB5F15	Y11
IO167PB5F15	AA12
IO168NB5F15	AF9
IO168PB5F15	AF10
IO169NB5F15	AB11
IO169PB5F15	AA11
IO171NB5F16	AE9
IO171PB5F16	AE10
IO173NB5F16	AC10
IO173PB5F16	AC11
IO174NB5F16	AE7
IO174PB5F16	AE8
IO175NB5F16	AC9
IO175PB5F16	AD9
IO176NB5F16	AF6
IO176PB5F16	AF7

FG676	
AX1000 Function	**Pin Number**
IO177NB5F16	AA10
IO177PB5F16	AB10
IO179NB5F16	AD7
IO179PB5F16	AD8
IO180NB5F16	AC7
IO180PB5F16	AC8
IO181NB5F17	AA9
IO181PB5F17	AB9
IO183NB5F17	AD6
IO183PB5F17	AE6
IO184NB5F17	AE5
IO184PB5F17	AF5
IO185NB5F17	AA8
IO185PB5F17	AB8
IO187NB5F17	AC5
IO187PB5F17	AC6
IO188NB5F17	AD4
IO188PB5F17	AD5
IO189NB5F17	AB6
IO189PB5F17	AB7
IO190NB5F17	AF4
IO190PB5F17	AE4
IO191NB5F17	AE3
IO191PB5F17	AF3
IO192NB5F17	AA6
IO192PB5F17	AA7
Bank 6	
IO193NB6F18	Y5
IO193PB6F18	AA5
IO194NB6F18	AB3
IO194PB6F18	AC3
IO195NB6F18	Y4
IO195PB6F18	AA4
IO196NB6F18	AC2
IO196PB6F18	AD2
IO197NB6F18	W6

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

FG676	
AX1000 Function	**Pin Number**
NC	D13
NC	D14
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
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

FG676	
AX1000 Function	**Pin Number**
VCCA	T9
VCCA	U18
VCCA	U9
VCCA	V10
VCCA	V11
VCCA	V12
VCCA	V13
VCCA	V14
VCCA	V15
VCCA	V16
VCCA	V17
VCCPLA	E12
VCCPLB	F13
VCCPLC	E15
VCCPLD	G14
VCCPLE	AF15
VCCPLF	AA14
VCCPLG	AF12
VCCPLH	AB13
VCCDA	A11
VCCDA	A3
VCCDA	AB22
VCCDA	AB5
VCCDA	AD10
VCCDA	AD11
VCCDA	AD13
VCCDA	AD16
VCCDA	AD17
VCCDA	B1
VCCDA	B11
VCCDA	B17
VCCDA	C16
VCCDA	D24
VCCDA	E14
VCCDA	P2
VCCDA	P23

FG676	
AX1000 Function	**Pin Number**
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
VCCIB3	T19
VCCIB3	U19
VCCIB3	U20
VCCIB3	V19
VCCIB3	V20
VCCIB3	W20
VCCIB4	W14
VCCIB4	W15
VCCIB4	W16
VCCIB4	W17

FG896	
AX1000 Function	Pin Number
GND	A13
GND	A18
GND	A2
GND	A23
GND	A29
GND	A8
GND	AA10
GND	AA21
GND	AA28
GND	AA3
GND	AB2
GND	AB22
GND	AB29
GND	AB9
GND	AC1
GND	AC30
GND	AE25
GND	AE6
GND	AF26
GND	AF5
GND	AG27
GND	AG4
GND	AH10
GND	AH15
GND	AH16
GND	AH21
GND	AH28
GND	AH3
GND	AJ1
GND	AJ2
GND	AJ22
GND	AJ29
GND	AJ30
GND	AJ9
GND	AK13

FG896	
AX1000 Function	Pin Number
GND	AK18
GND	AK2
GND	AK23
GND	AK29
GND	AK8
GND	B1
GND	B2
GND	B22
GND	B29
GND	B30
GND	B9
GND	C10
GND	C15
GND	C16
GND	C21
GND	C28
GND	C3
GND	D27
GND	D28
GND	D4
GND	E26
GND	E5
GND	H1
GND	H30
GND	J2
GND	J22
GND	J29
GND	J9
GND	K10
GND	K21
GND	K28
GND	K3
GND	L11
GND	L20
GND	M12

FG896	
AX1000 Function	Pin Number
GND	M13
GND	M14
GND	M15
GND	M16
GND	M17
GND	M18
GND	M19
GND	N1
GND	N12
GND	N13
GND	N14
GND	N15
GND	N16
GND	N17
GND	N18
GND	N19
GND	N30
GND	P12
GND	P13
GND	P14
GND	P15
GND	P16
GND	P17
GND	P18
GND	P19
GND	R12
GND	R13
GND	R14
GND	R15
GND	R16
GND	R17
GND	R18
GND	R19
GND	R28
GND	R3

FG896	
AX1000 Function	Pin Number
GND	T12
GND	T13
GND	T14
GND	T15
GND	T16
GND	T17
GND	T18
GND	T19
GND	T28
GND	T3
GND	U12
GND	U13
GND	U14
GND	U15
GND	U16
GND	U17
GND	U18
GND	U19
GND	V1
GND	V12
GND	V13
GND	V14
GND	V15
GND	V16
GND	V17
GND	V18
GND	V19
GND	V30
GND	W12
GND	W13
GND	W14
GND	W15
GND	W16
GND	W17
GND	W18

FG896	
AX1000 Function	Pin Number
GND	W19
GND	Y11
GND	Y20
GND/LP	E4
NC	A16
NC	A26
NC	A4
NC	A6
NC	AA30
NC	AB1
NC	AB30
NC	AC2
NC	AC29
NC	AD1
NC	AD2
NC	AD30
NC	AE1
NC	AE15
NC	AE16
NC	AE2
NC	AE30
NC	AF1
NC	AF2
NC	AF29
NC	AF30
NC	AG1
NC	AG2
NC	AG29
NC	AG30
NC	AH27
NC	AH4
NC	AJ14
NC	AJ15
NC	AJ16
NC	AJ27

FG896	
AX1000 Function	Pin Number
NC	AJ4
NC	AK14
NC	AK15
NC	AK16
NC	AK17
NC	AK22
NC	AK4
NC	AK5
NC	B16
NC	B18
NC	B21
NC	B23
NC	B26
NC	B4
NC	B6
NC	B8
NC	C27
NC	D1
NC	D2
NC	D29
NC	D30
NC	E1
NC	E2
NC	E29
NC	E30
NC	F15
NC	F16
NC	F29
NC	F30
NC	G1
NC	G29
NC	G30
NC	H29
NC	J1
NC	J30

FG1152	
AX2000 Function	Pin Number
IO259NB6F24	AF7
IO259PB6F24	AG7
IO260NB6F24	AH3
IO260PB6F24	AH4
IO261NB6F24	AH5
IO261PB6F24	AJ5
IO262NB6F24	AE6
IO262PB6F24	AF6
IO263NB6F24	AF5
IO263PB6F24	AG5
IO264NB6F24	AD8
IO264PB6F24	AE8
IO265NB6F24	AF3
IO265PB6F24	AG3
IO266NB6F24	AC10
IO266PB6F24	AD10
IO267NB6F25	AD7
IO267PB6F25	AE7
IO268NB6F25	AD5
IO268PB6F25	AE5
IO269NB6F25	AE4
IO269PB6F25	AF4
IO270NB6F25	AB9
IO270PB6F25	AC9
IO271NB6F25	AC6
IO271PB6F25	AD6
IO272NB6F25	AB8
IO272PB6F25	AC8
IO273NB6F25	AE1
IO273PB6F25	AE2
IO274NB6F25	AA10
IO274PB6F25	AB10
IO275NB6F25	AB7
IO275PB6F25	AC7
IO276NB6F25	AD1

FG1152	
AX2000 Function	Pin Number
IO276PB6F25	AD2
IO277NB6F25	AC4
IO277PB6F25	AC3
IO278NB6F26	AA8
IO278PB6F26	AA9
IO279NB6F26	AB5
IO279PB6F26	AB6
IO280NB6F26	Y10
IO280PB6F26	Y11
IO281NB6F26	AB3
IO281PB6F26	AB4
IO282NB6F26	Y7
IO282PB6F26	AA7
IO283NB6F26	AC2
IO283PB6F26	AC1
IO284NB6F26	Y9
IO284PB6F26	Y8
IO285NB6F26	AA5
IO285PB6F26	AA6
IO286NB6F26	W10
IO286PB6F26	W11
IO287NB6F26	AA3
IO287PB6F26	AA4
IO288NB6F26	W9
IO288PB6F26	W8
IO289NB6F27	AA1
IO289PB6F27	AA2
IO290NB6F27	W6
IO290PB6F27	Y6
IO291NB6F27	W5
IO291PB6F27	Y5
IO292NB6F27	V7
IO292PB6F27	W7
IO293NB6F27	W4
IO293PB6F27	Y4

FG1152	
AX2000 Function	Pin Number
IO294NB6F27	V10
IO294PB6F27	V11
IO295NB6F27	Y1
IO295PB6F27	Y2
IO296NB6F27	W1
IO296PB6F27	W2
IO297NB6F27	V1
IO297PB6F27	V2
IO298NB6F27	V9
IO298PB6F27	V8
IO299NB6F27	U4
IO299PB6F27	V4
Bank 7	
IO300NB7F28	U10
IO300PB7F28	U11
IO301NB7F28	U2
IO301PB7F28	U1
IO302NB7F28	U6
IO302PB7F28	U7
IO303NB7F28	T3
IO303PB7F28	U3
IO304NB7F28	U9
IO304PB7F28	U8
IO305NB7F28	R2
IO305PB7F28	R1
IO306NB7F28	R4
IO306PB7F28	T4
IO307NB7F28	R5
IO307PB7F28	T5
IO308NB7F28	T11
IO308PB7F28	T10
IO309NB7F28	T6
IO309PB7F28	T7
IO310NB7F29	T9
IO310PB7F29	T8

FG1152	
AX2000 Function	Pin Number
NC	AP9
NC	B17
NC	B22
NC	B27
NC	B8
NC	D10
NC	D20
NC	D23
NC	D25
NC	F3
NC	F32
NC	F33
NC	F34
NC	F4
NC	G1
NC	G32
NC	G33
NC	G34
NC	H31
NC	H33
NC	J1
NC	J3
NC	J34
NC	M1
NC	M4
NC	P1
NC	P2
NC	R31
NC	T1
NC	T2
NC	V3
NC	V34
NC	W3
NC	W34
PRA	J17

FG1152	
AX2000 Function	Pin Number
PRB	F18
PRC	AD18
PRD	AH18
TCK	J9
TDI	F7
TDO	L10
TMS	H8
TRST	E6
VCCA	AA13
VCCA	AA22
VCCA	AB14
VCCA	AB15
VCCA	AB16
VCCA	AB17
VCCA	AB18
VCCA	AB19
VCCA	AB20
VCCA	AB21
VCCA	AF8
VCCA	AK28
VCCA	G30
VCCA	G5
VCCA	N14
VCCA	N15
VCCA	N16
VCCA	N17
VCCA	N18
VCCA	N19
VCCA	N20
VCCA	N21
VCCA	P13
VCCA	P22
VCCA	R13
VCCA	R22
VCCA	T13

FG1152	
AX2000 Function	Pin Number
VCCA	T22
VCCA	U13
VCCA	U22
VCCA	V13
VCCA	V22
VCCA	W13
VCCA	W22
VCCA	Y13
VCCA	Y22
VCCDA	AF26
VCCDA	AF9
VCCDA	AG17
VCCDA	AG18
VCCDA	AH14
VCCDA	AH15
VCCDA	AH17
VCCDA	AH20
VCCDA	AH21
VCCDA	AK29
VCCDA	AK6
VCCDA	E15
VCCDA	E29
VCCDA	E7
VCCDA	F15
VCCDA	F21
VCCDA	F5
VCCDA	G20
VCCDA	H17
VCCDA	H18
VCCDA	H28
VCCDA	J18
VCCDA	V27
VCCDA	V6
VCCIB0	A5
VCCIB0	B5

PQ208	
AX250 Function	**Pin Number**
IO110PB7F7	19
IO112NB7F7	16
IO112PB7F7	17
IO117NB7F7	12
IO117PB7F7	13
IO119NB7F7	10
IO119PB7F7	11
IO121PB7F7	7
IO122NB7F7	5
IO122PB7F7	6
IO123NB7F7	3
IO123PB7F7	4
Dedicated I/O	
VCCDA	1
VCCDA	26
VCCDA	53
VCCDA	63
VCCDA	78
VCCDA	95
VCCDA	105
VCCDA	130
VCCDA	157
VCCDA	167
VCCDA	182
VCCDA	202
GND	104
GND	9
GND	15
GND	21
GND	32
GND	39
GND	46
GND	51
GND	59
GND	65
GND	69
GND	90

PQ208	
AX250 Function	**Pin Number**
GND	94
GND	99
GND	113
GND	119
GND	125
GND	136
GND	143
GND	150
GND	155
GND	164
GND	169
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	52
VCCA	156
VCCA	14
VCCA	38
VCCA	64
VCCA	93
VCCA	118
VCCA	142
VCCA	168
VCCA	195
VCCPLA	189

PQ208	
AX250 Function	**Pin Number**
VCCPLB	187
VCCPLC	178
VCCPLD	176
VCCPLE	85
VCCPLF	83
VCCPLG	74
VCCPLH	72
VCCIB0	193
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
VCOMPLA	190
VCOMPLB	188
VCOMPLC	179
VCOMPLD	177
VCOMPLE	86
VCOMPLF	84
VCOMPLG	75
VCOMPLH	73
VPUMP	158

CQ352	
AX2000 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	
AX2000 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	352
PRA	312
PRB	311
PRC	135
PRD	134
TCK	349
TDI	348
TDO	347
TMS	350
TRST	351
VCCA	3
VCCA	14
VCCA	32
VCCA	56
VCCA	74
VCCA	87
VCCA	102
VCCA	114

CQ352	
AX2000 Function	Pin Number
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	91
VCCDA	116
VCCDA	117
VCCDA	130
VCCDA	131
VCCDA	132
VCCDA	148
VCCDA	149
VCCDA	174
VCCDA	178
VCCDA	221
VCCDA	266
VCCDA	268
VCCDA	293
VCCDA	294
VCCDA	307
VCCDA	308
VCCDA	309
VCCDA	327
VCCDA	328

CG624	
AX2000 Function	**Pin Number**
Bank 0	
IO00NB0F0	D7*
IO00PB0F0	E7*
IO01NB0F0	G7
IO01PB0F0	G6
IO02NB0F0	B5
IO02PB0F0	B4
IO04PB0F0	C7
IO05NB0F0	F8
IO05PB0F0	F7
IO06NB0F0	H8
IO06PB0F0	H7
IO11NB0F0	J8
IO11PB0F0	J7
IO12PB0F1	B6
IO13NB0F1	E9*
IO13PB0F1	D8*
IO15NB0F1	C9
IO15PB0F1	C8
IO16NB0F1	A5
IO16PB0F1	A4
IO17NB0F1	D10
IO17PB0F1	D9
IO18NB0F1	A7
IO18PB0F1	A6
IO19NB0F1	G9
IO19PB0F1	G8
IO20PB0F1	B7
IO23NB0F2	F10
IO23PB0F2	F9
IO26NB0F2	C11*
IO26PB0F2	B8*

*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**
IO27NB0F2	H10
IO27PB0F2	H9
IO28NB0F2	A9
IO28PB0F2	B9
IO30NB0F2	B11
IO30PB0F2	B10
IO31NB0F2	E11
IO31PB0F2	F11
IO33NB0F2	D12
IO33PB0F2	D11
IO34NB0F3	A11
IO34PB0F3	A10
IO37NB0F3	J13
IO37PB0F3	K13
IO38NB0F3	H11
IO38PB0F3	G11
IO40PB0F3	B12
IO41NB0F3/HCLKAN	G13
IO41PB0F3/HCLKAP	G12
IO42NB0F3/HCLKBN	C13
IO42PB0F3/HCLKBP	C12
Bank 1	
IO43NB1F4/HCLKCN	G15
IO43PB1F4/HCLKCP	G14
IO44NB1F4/HCLKDN	B14
IO44PB1F4/HCLKDP	B13
IO45NB1F4	H13
IO47NB1F4	D14
IO47PB1F4	C14
IO48NB1F4	A16
IO48PB1F4	A15
IO49PB1F4	H15

*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**
IO51NB1F4	E15
IO51PB1F4	F15
IO52NB1F4	A17
IO55NB1F5	G16
IO55PB1F5	H16
IO56NB1F5	A20
IO56PB1F5	A19
IO57NB1F5	D16
IO57PB1F5	D15
IO58NB1F5	A22
IO58PB1F5	A21
IO59NB1F5	F16
IO61NB1F5	G17
IO61PB1F5	H17
IO62NB1F5	B17
IO62PB1F5	B16
IO63NB1F5	H18
IO65NB1F6	C17
IO66PB1F6	B18
IO67NB1F6	J18
IO67PB1F6	J19
IO68NB1F6	B20
IO68PB1F6	B19
IO69NB1F6	E17
IO69PB1F6	F17
IO70NB1F6	B22
IO70PB1F6	B21
IO71PB1F6	G18
IO73NB1F6	G19
IO74NB1F6	C19
IO74PB1F6	C18
IO75NB1F6	D18

*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.*