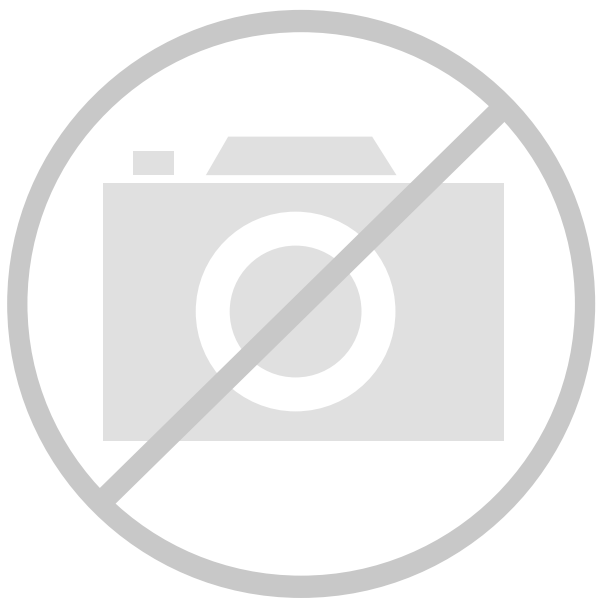




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Understanding [Embedded - FPGAs \(Field Programmable Gate Array\)](#)

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	Obsolete
Number of LABs/CLBs	2016
Number of Logic Elements/Cells	-
Total RAM Bits	18432
Number of I/O	138
Number of Gates	125000
Voltage - Supply	1.425V ~ 1.575V
Mounting Type	Surface Mount
Operating Temperature	-40°C ~ 85°C (TA)
Package / Case	256-LBGA
Supplier Device Package	256-FPBGA (17x17)
Purchase URL	https://www.e-xfl.com/product-detail/microsemi/ax125-1fgg256i

User-Defined Supply Pins

VREF Supply Voltage

Reference voltage for I/O banks. VREF pins are configured by the user from regular I/O pins; VREF pins are not in fixed locations. There can be one or more VREF pins in an I/O bank.

Global Pins

HCLKA/B/C/D Dedicated (Hardwired) Clocks A, B, C and D

These pins are the clock inputs for sequential modules or north PLLs. Input levels are compatible with all supported I/O standards. There is a P/N pin pair for support of differential I/O standards. Single-ended clock I/Os can only be assigned to the P side of a paired I/O. This input is directly wired to each R-cell and offers clock speeds independent of the number of R-cells being driven. When the HCLK pins are unused, it is recommended that they are tied to ground.

CLKE/F/G/H Routed Clocks E, F, G, and H

These pins are clock inputs for clock distribution networks or south PLLs. Input levels are compatible with all supported I/O standards. There is a P/N pin pair for support of differential I/O standards. Single-ended clock I/Os can only be assigned to the P side of a paired I/O. The clock input is buffered prior to clocking the R-cells. When the CLK pins are unused, Microsemi recommends that they are tied to ground.

JTAG/Probe Pins

PRA/B/C/D Probe A, B, C and D

The Probe pins are used to output data from any user-defined design node within the device (controlled with Silicon Explorer II). These independent diagnostic pins can be used to allow real-time diagnostic output of any signal path within the device. The pins' probe capabilities can be permanently disabled to protect programmed design confidentiality. The probe pins are of LVTTTL output levels.

TCK Test Clock

Test clock input for JTAG boundary-scan testing and diagnostic probe (Silicon Explorer II).

TDI Test Data Input

Serial input for JTAG boundary-scan testing and diagnostic probe. TDI is equipped with an internal 10 k Ω pull-up resistor.

TDO Test Data Output

Serial output for JTAG boundary-scan testing.

TMS Test Mode Select

The TMS pin controls the use of the IEEE 1149.1 boundary-scan pins (TCK, TDI, TDO, TRST). TMS is equipped with an internal 10 k Ω pull-up resistor.

TRST Boundary Scan Reset Pin

The TRST pin functions as an active-low input to asynchronously initialize or reset the boundary scan circuit. The TRST pin is equipped with a 10 k Ω pull-up resistor.

Special Functions

LP Low Power Pin

The LP pin controls the low power mode of Axcelerator devices. The device is placed in the low power mode by connecting the LP pin to logic high. To exit the low power mode, the LP pin must be set Low. Additionally, the LP pin must be set Low during chip powering-up or chip powering-down operations. See "Low Power Mode" on page 2-106 for more details.

NC No Connection

This pin is not connected to circuitry within the device. These pins can be driven to any voltage or can be left floating with no effect on the operation of the device.

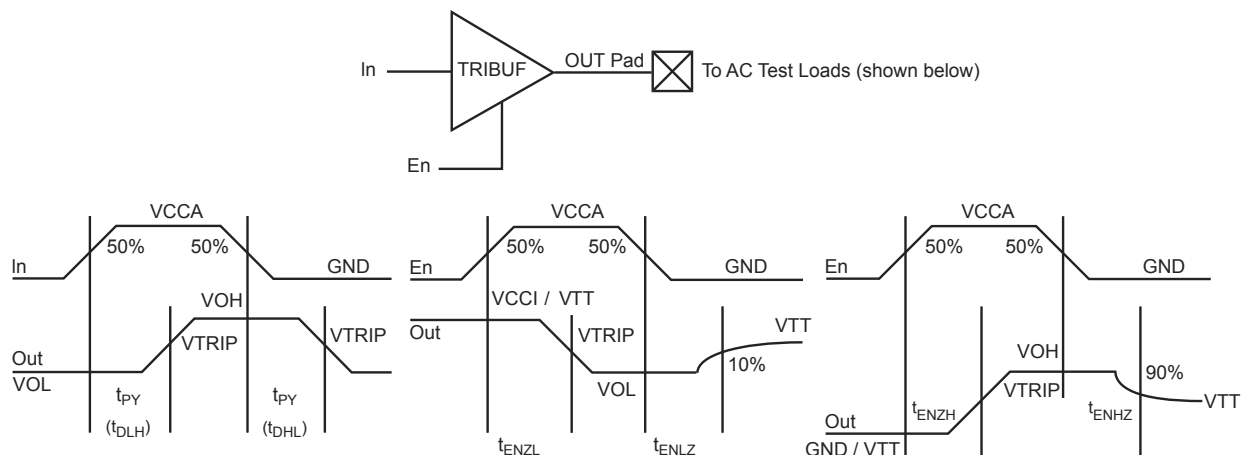


Figure 2-10 • Output Buffer Delays

Table 2-22 • 3.3 V LVTTTL I/O Module

Worst-Case Commercial Conditions VCCA = 1.425 V, VCCI = 3.0 V, T_J = 70°C (continued)

		–2 Speed		–1 Speed		Std Speed		
Parameter	Description	Min.	Max.	Min.	Max.	Min.	Max.	Units
LVTTTL Output Drive Strength = 4 (24mA) / High Slew Rate								
t _{DP}	Input Buffer		1.68		1.92		2.26	ns
t _{PY}	Output Buffer		2.99		3.41		4.01	ns
t _{ENZL}	Enable to Pad Delay through the Output Buffer—Z to Low		2.49		2.51		2.51	ns
t _{ENZH}	Enable to Pad Delay through the Output Buffer—Z to High		2.59		2.95		3.46	ns
t _{ENLZ}	Enable to Pad Delay through the Output Buffer—Low to Z		1.91		1.93		1.93	ns
t _{ENHZ}	Enable to Pad Delay through the Output Buffer—High to Z		3.56		4.06		4.77	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 2-61 • LVPECL I/O Module

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
LVPECL Output Module Timing								
t _{DP}	Input Buffer		1.66		1.89		2.22	ns
t _{PY}	Output Buffer		2.24		2.55		3.00	ns
t _{CLKQ}	Clock-to-Q for the I/O input register		0.67		0.77		0.90	ns
t _{OCLKQ}	Clock-to-Q for the IO 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	Units
Parameter	Description	Typical	Typical	Typical	
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	Units
Parameter	Description	Typical	Typical	Typical	
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

Global Resources

One of the most important aspects of any FPGA architecture is its global resources or clocks. The Axcelerator family provides the user with flexible and easy-to-use global resources, without the limitations normally found in other FPGA architectures.

The AX architecture contains two types of global resources, the HCLK (hardwired clock) and CLK (routed clock). Every Axcelerator device is provided with four HCLKs and four CLKs for a total of eight clocks, regardless of device density.

Hardwired Clocks

The hardwired (HCLK) is a low-skew network that can directly drive the clock inputs of all sequential modules (R-cells, I/O registers, and embedded RAM/FIFOs) in the device with no antifuse in the path. All four HCLKs are available everywhere on the chip.

Timing Characteristics

Table 2-70 • AX125 Dedicated (Hardwired) Array Clock Networks
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.	
Dedicated (Hardwired) Array Clock Networks								
t _{HCKL}	Input Low to High		3.02		3.44		4.05	ns
t _{HCKH}	Input High to Low		3.03		3.46		4.06	ns
t _{HPWH}	Minimum Pulse Width High	0.58		0.65		0.77		ns
t _{HPWL}	Minimum Pulse Width Low	0.52		0.59		0.69		ns
t _{HCKSW}	Maximum Skew		0.06		0.07		0.08	ns
t _{HP}	Minimum Period	1.15		1.31		1.54		ns
t _{HMAX}	Maximum Frequency		870		763		649	MHz

Table 2-71 • AX250 Dedicated (Hardwired) Array Clock Networks
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.	
Dedicated (Hardwired) Array Clock Networks								
t _{HCKL}	Input Low to High		2.57		2.93		3.45	ns
t _{HCKH}	Input High to Low		2.61		2.97		3.50	ns
t _{HPWH}	Minimum Pulse Width High	0.58		0.65		0.77		ns
t _{HPWL}	Minimum Pulse Width Low	0.52		0.59		0.69		ns
t _{HCKSW}	Maximum Skew		0.06		0.07		0.08	ns
t _{HP}	Minimum Period	1.15		1.31		1.54		ns
t _{HMAX}	Maximum Frequency		870		763		649	MHz

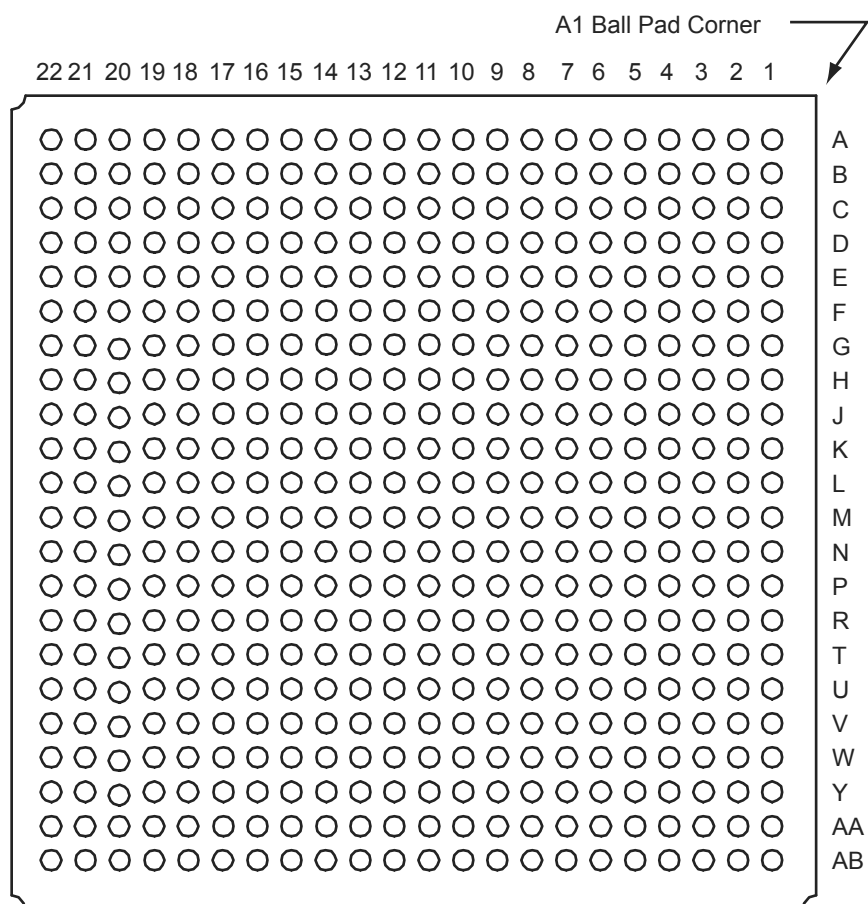
Table 2-99 • Two FIFO Blocks Cascaded
Worst-Case Commercial Conditions VCCA = 1.425 V, VCCI = 3.0 V, T_J = 70°C

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

BG729		BG729		BG729	
AX1000 Function	Pin Number	AX1000 Function	Pin Number	AX1000 Function	Pin Number
IO54PB1F5	E20	IO72PB2F6	J23	IO91NB2F8	N25
IO55NB1F5	E21	IO73NB2F6	H24	IO91PB2F8	N24
IO55PB1F5	D21	IO73PB2F6	H23	IO92NB2F8	N27
IO56NB1F5	H19	IO74NB2F7	L21	IO92PB2F8	N26
IO56PB1F5	G19	IO74PB2F7	K21	IO93NB2F8	P26
IO57NB1F5	D22	IO75NB2F7	G27	IO93PB2F8	P27
IO57PB1F5	C22	IO75PB2F7	F27	IO94NB2F8	N19
IO58NB1F5	B23	IO76NB2F7	K23	IO94PB2F8	N20
IO58PB1F5	A23	IO76PB2F7	K22	IO95NB2F8	P23
IO59NB1F5	D23	IO77NB2F7	H26	IO95PB2F8	P22
IO59PB1F5	C23	IO77PB2F7	H25	Bank 3	
IO60NB1F5	G21	IO78NB2F7	K25	IO96NB3F9	P25
IO60PB1F5	G20	IO78PB2F7	K24	IO96PB3F9	P24
IO61NB1F5	E23	IO79NB2F7	J26	IO97NB3F9	R26
IO61PB1F5	E22	IO79PB2F7	J25	IO97PB3F9	R27
IO62NB1F5	F22	IO80NB2F7	M20	IO98NB3F9	P21
IO62PB1F5	F21	IO80PB2F7	L20	IO98PB3F9	P20
IO63NB1F5	H20	IO81NB2F7	J27	IO99NB3F9	R24
IO63PB1F5	J19	IO81PB2F7	H27	IO99PB3F9	R25
Bank 2		IO82NB2F7	L23	IO100NB3F9	T26
IO64NB2F6	J21	IO82PB2F7	L22	IO100PB3F9	T27
IO64PB2F6	H21	IO83NB2F7	L25	IO101NB3F9	T24
IO65NB2F6	F24	IO83PB2F7	L24	IO101PB3F9	T25
IO65PB2F6	F23	IO84NB2F7	N21	IO102NB3F9	R20
IO66NB2F6	F26	IO84PB2F7	M21	IO102PB3F9	R21
IO66PB2F6	F25	IO85NB2F8	K27	IO103NB3F9	R23
IO67NB2F6	E26	IO85PB2F8	K26	IO103PB3F9	R22
IO67PB2F6	E25	IO86NB2F8	M23	IO104NB3F9	U26
IO68NB2F6	J22	IO86PB2F8	M22	IO104PB3F9	U27
IO68PB2F6	H22	IO87NB2F8	M25	IO105NB3F9	U24
IO69NB2F6	G24	IO87PB2F8	M24	IO105PB3F9	U25
IO69PB2F6	G23	IO88NB2F8	L27	IO106NB3F9	R19
IO70NB2F6	K20	IO88PB2F8	L26	IO106PB3F9	P19
IO70PB2F6	J20	IO89NB2F8	M27	IO107NB3F10	V26
IO71NB2F6	G26	IO89PB2F8	M26	IO107PB3F10	V27
IO71PB2F6	G25	IO90NB2F8	N23	IO108NB3F10	T23
IO72NB2F6	J24	IO90PB2F8	N22	IO108PB3F10	T22

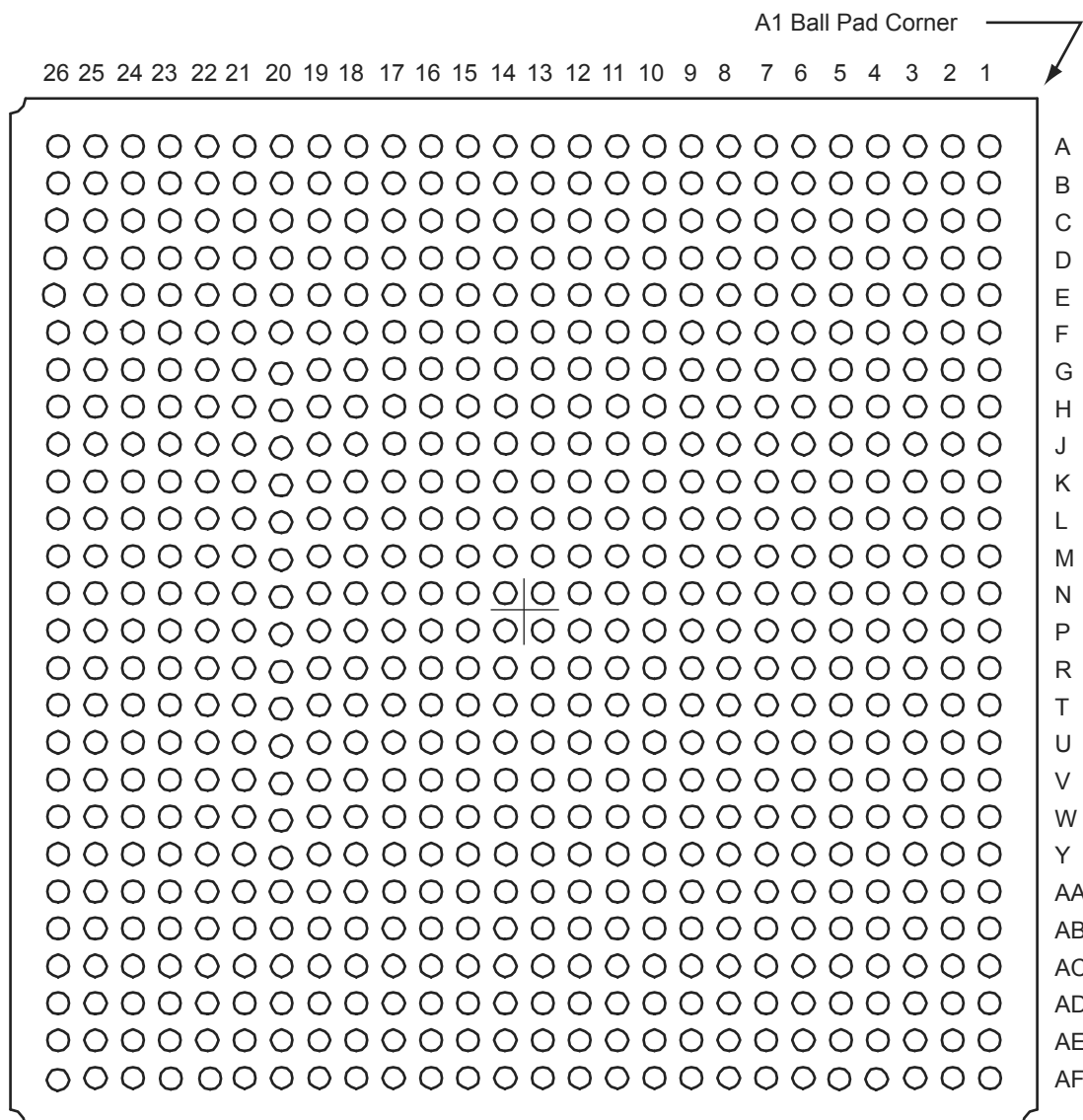
FG484



Note

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

FG676



Note

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

FG676	
AX1000 Function	Pin Number
IO67PB2F6	E23
IO68NB2F6	H23
IO68PB2F6	H22
IO69NB2F6	D25
IO69PB2F6	C25
IO70NB2F6	G24
IO70PB2F6	G23
IO71NB2F6	F25
IO71PB2F6	E25
IO72NB2F6	G26
IO72PB2F6	F26
IO73NB2F6	E26
IO73PB2F6	D26
IO74NB2F7	J21
IO74PB2F7	J22
IO75NB2F7	J24
IO75PB2F7	H24
IO76NB2F7	K23
IO76PB2F7	J23
IO77NB2F7	H25
IO77PB2F7	G25
IO78NB2F7	K25
IO78PB2F7	J25
IO80NB2F7	K21
IO80PB2F7	K22
IO81NB2F7	K26
IO81PB2F7	J26
IO82NB2F7	L24
IO82PB2F7	K24
IO83NB2F7	L23
IO83PB2F7	L22
IO84NB2F7	L20
IO84PB2F7	L21
IO86NB2F8	L26
IO86PB2F8	L25
IO88NB2F8	M23

FG676	
AX1000 Function	Pin Number
IO88PB2F8	M22
IO89NB2F8	M26
IO89PB2F8	M25
IO90NB2F8	M20
IO90PB2F8	M21
IO91NB2F8	N24
IO91PB2F8	M24
IO92NB2F8	N22
IO92PB2F8	N23
IO94NB2F8	N20
IO94PB2F8	N21
IO95NB2F8	P25
IO95PB2F8	N25
Bank 3	
IO98NB3F9	P20
IO98PB3F9	P21
IO99NB3F9	R24
IO99PB3F9	P24
IO100NB3F9	R22
IO100PB3F9	P22
IO101NB3F9	T26
IO101PB3F9	R26
IO102NB3F9	R21
IO102PB3F9	R20
IO103NB3F9	T25
IO103PB3F9	R25
IO105NB3F9	V26
IO105PB3F9	U26
IO106NB3F9	T23
IO106PB3F9	R23
IO107NB3F10	U24
IO107PB3F10	T24
IO108NB3F10	U22
IO108PB3F10	T22
IO109NB3F10	V25
IO109PB3F10	U25

FG676	
AX1000 Function	Pin Number
IO110NB3F10	T21
IO110PB3F10	T20
IO112NB3F10	V23
IO112PB3F10	U23
IO113NB3F10	Y25
IO113PB3F10	W25
IO114NB3F10	V21
IO114PB3F10	U21
IO115NB3F10	W24
IO115PB3F10	V24
IO116NB3F10	AA26
IO116PB3F10	Y26
IO118NB3F11	AC26
IO118PB3F11	AB26
IO119NB3F11	AB25
IO119PB3F11	AA25
IO120NB3F11	W22
IO120PB3F11	V22
IO121NB3F11	Y23
IO121PB3F11	W23
IO122NB3F11	AA24
IO122PB3F11	Y24
IO123NB3F11	AE26
IO123PB3F11	AD26
IO124NB3F11	Y21
IO124PB3F11	W21
IO125NB3F11	AD25
IO125PB3F11	AC25
IO126NB3F11	AB23
IO126PB3F11	AA23
IO127NB3F11	AC24
IO127PB3F11	AB24
IO128NB3F11	AA22
IO128PB3F11	Y22
Bank 4	
IO129NB4F12	AB21

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
IO103NB3F9	V27
IO103PB3F9	U27
IO104NB3F9	W29
IO104PB3F9	V29
IO105NB3F9	Y28
IO105PB3F9	W28
IO106NB3F9	V25
IO106PB3F9	U25
IO107NB3F10	W26
IO107PB3F10	V26
IO108NB3F10	W24
IO108PB3F10	V24
IO109NB3F10	Y27
IO109PB3F10	W27
IO110NB3F10	V23
IO110PB3F10	V22
IO111NB3F10	AA29
IO111PB3F10	Y29
IO112NB3F10	Y25
IO112PB3F10	W25
IO113NB3F10	AB27
IO113PB3F10	AA27
IO114NB3F10	Y23
IO114PB3F10	W23
IO115NB3F10	AA26
IO115PB3F10	Y26
IO116NB3F10	AC28
IO116PB3F10	AB28
IO117NB3F10	AE29
IO117PB3F10	AD29
IO118NB3F11	AE28
IO118PB3F11	AD28
IO119NB3F11	AD27
IO119PB3F11	AC27
IO120NB3F11	AA24

FG896	
AX1000 Function	Pin Number
IO120PB3F11	Y24
IO121NB3F11	AB25
IO121PB3F11	AA25
IO122NB3F11	AC26
IO122PB3F11	AB26
IO123NB3F11	AG28
IO123PB3F11	AF28
IO124NB3F11	AB23
IO124PB3F11	AA23
IO125NB3F11	AF27
IO125PB3F11	AE27
IO126NB3F11	AD25
IO126PB3F11	AC25
IO127NB3F11	AE26
IO127PB3F11	AD26
IO128NB3F11	AC24
IO128PB3F11	AB24
Bank 4	
IO129NB4F12	AD23
IO129PB4F12	AC23
IO130NB4F12	AK26
IO130PB4F12	AK27
IO131NB4F12	AF24
IO131PB4F12	AF25
IO132NB4F12	AG25
IO132PB4F12	AG26
IO133NB4F12	AD22
IO133PB4F12	AC22
IO134NB4F12	AE23
IO134PB4F12	AE24
IO135NB4F12	AH24
IO135PB4F12	AH25
IO136NB4F12	AJ25
IO136PB4F12	AJ26
IO137NB4F12	AD21

FG896	
AX1000 Function	Pin Number
IO137PB4F12	AC21
IO138NB4F12	AK24
IO138PB4F12	AK25
IO139NB4F13	AE21
IO139PB4F13	AE22
IO140NB4F13	AG23
IO140PB4F13	AG24
IO141NB4F13	AF22
IO141PB4F13	AF23
IO142NB4F13	AJ23
IO142PB4F13	AJ24
IO143NB4F13	AD19
IO143PB4F13	AD20
IO144NB4F13	AG21
IO144PB4F13	AG22
IO145NB4F13	AE19
IO145PB4F13	AE20
IO146NB4F13	AF20
IO146PB4F13	AF21
IO147NB4F13	AC19
IO147PB4F13	AC20
IO148NB4F13	AH22
IO148PB4F13	AH23
IO149NB4F13	AC18
IO149PB4F13	AB18
IO150NB4F13	AK21
IO150PB4F13	AJ21
IO151NB4F13	AE18
IO151PB4F13	AD18
IO152NB4F14	AJ20
IO152PB4F14	AK20
IO153NB4F14	AG19
IO153PB4F14	AG20
IO154NB4F14	AH19
IO154PB4F14	AH20

FG896	
AX2000 Function	Pin Number
IO180PB4F16	AG24
IO181NB4F17	AK24
IO181PB4F17	AK25
IO182NB4F17	AD22
IO182PB4F17	AC22
IO183NB4F17	AF22
IO183PB4F17	AF23
IO184NB4F17	AE21
IO184PB4F17	AE22
IO185NB4F17	AJ23
IO185PB4F17	AJ24
IO187NB4F17	AH22
IO187PB4F17	AH23
IO188NB4F17	AD21
IO188PB4F17	AC21
IO189PB4F17	AK22
IO190NB4F17	AF20
IO190PB4F17	AF21
IO191NB4F17	AG21
IO191PB4F17	AG22
IO192NB4F17	AE19
IO192PB4F17	AE20
IO195NB4F18	AK21
IO195PB4F18	AJ21
IO196NB4F18	AD19
IO196PB4F18	AD20
IO197NB4F18	AJ20
IO197PB4F18	AK20
IO198NB4F18	AC19
IO198PB4F18	AC20
IO199NB4F18	AG19
IO199PB4F18	AG20
IO200NB4F18	AH19
IO200PB4F18	AH20
IO201NB4F18	AK19

FG896	
AX2000 Function	Pin Number
IO201PB4F18	AJ19
IO202NB4F18	AC18
IO202PB4F18	AB18
IO206NB4F19	AE18
IO206PB4F19	AD18
IO207NB4F19	AJ17
IO207PB4F19	AJ18
IO208NB4F19	AE17
IO208PB4F19	AD17
IO209NB4F19	AK17
IO210NB4F19	AC17
IO210PB4F19	AB17
IO211NB4F19	AJ16
IO211PB4F19	AK16
IO212NB4F19/CLKEN	AG18
IO212PB4F19/CLKEP	AH18
IO213NB4F19/CLKFN	AG16
IO213PB4F19/CLKFP	AG17
Bank 5	
IO214NB5F20/CLKGN	AG14
IO214PB5F20/CLKGP	AG15
IO215NB5F20/CLKHN	AG13
IO215PB5F20/CLKHP	AH13
IO216NB5F20	AB14
IO216PB5F20	AC15
IO217NB5F20	AK15
IO217PB5F20	AJ15
IO218NB5F20	AE14
IO218PB5F20	AD14
IO219NB5F20	AK14
IO219PB5F20	AJ14
IO222NB5F20	AB13
IO222PB5F20	AC14
IO223NB5F21	AJ12
IO223PB5F21	AJ13

FG896	
AX2000 Function	Pin Number
IO225NB5F21	AH11
IO225PB5F21	AH12
IO226NB5F21	AC13
IO226PB5F21	AD13
IO227NB5F21	AE12
IO227PB5F21	AE13
IO228NB5F21	AG11
IO228PB5F21	AG12
IO229NB5F21	AK11
IO229PB5F21	AK12
IO230NB5F21	AC12
IO230PB5F21	AD12
IO232NB5F21	AE11
IO232PB5F21	AF11
IO233NB5F21	AJ10
IO233PB5F21	AJ11
IO234NB5F21	AC11
IO234PB5F21	AD11
IO236NB5F22	AK9
IO236PB5F22	AK10
IO237NB5F22	AG9
IO237PB5F22	AG10
IO238NB5F22	AF9
IO238PB5F22	AF10
IO239NB5F22	AH8
IO239PB5F22	AH9
IO240NB5F22	AC10
IO240PB5F22	AD10
IO242NB5F22	AE9
IO242PB5F22	AE10
IO243NB5F22	AJ7
IO243PB5F22	AJ8
IO244NB5F22	AK6
IO244PB5F22	AK7
IO245NB5F23	AF8

FG1152		FG1152		FG1152	
AX2000 Function	Pin Number	AX2000 Function	Pin Number	AX2000 Function	Pin Number
IO311NB7F29	N3	IO328PB7F30	N9	GND	A33
IO311PB7F29	P3	IO329NB7F30	J4	GND	A4
IO312NB7F29	P7	IO329PB7F30	K4	GND	A8
IO312PB7F29	R7	IO330NB7F30	J5	GND	AA14
IO313NB7F29	P6	IO330PB7F30	K5	GND	AA15
IO313PB7F29	R6	IO331NB7F30	M10	GND	AA16
IO314NB7F29	M2	IO331PB7F30	M9	GND	AA17
IO314PB7F29	N2	IO332NB7F31	L8	GND	AA18
IO315NB7F29	N4	IO332PB7F31	M8	GND	AA19
IO315PB7F29	P4	IO333NB7F31	F2	GND	AA20
IO316NB7F29	R9	IO333PB7F31	F1	GND	AA21
IO316PB7F29	R8	IO334NB7F31	J6	GND	AB1
IO317NB7F29	N5	IO334PB7F31	K6	GND	AB13
IO317PB7F29	P5	IO335NB7F31	H4	GND	AB22
IO318NB7F29	R10	IO335PB7F31	H3	GND	AB34
IO318PB7F29	R11	IO336NB7F31	K7	GND	AC12
IO319NB7F29	L2	IO336PB7F31	L7	GND	AC23
IO319PB7F29	L1	IO337NB7F31	G4	GND	AC30
IO320NB7F29	N8	IO337PB7F31	G3	GND	AC5
IO320PB7F29	P8	IO338NB7F31	K9	GND	AD11
IO321NB7F30	M6	IO338PB7F31	L9	GND	AD24
IO321PB7F30	N6	IO339NB7F31	H6	GND	AD31
IO322NB7F30	P10	IO339PB7F31	H5	GND	AD4
IO322PB7F30	P9	IO340NB7F31	H7	GND	AE3
IO323NB7F30	L3	IO340PB7F31	J7	GND	AE32
IO323PB7F30	M3	IO341NB7F31	J8	GND	AF2
IO324NB7F30	M7	IO341PB7F31	K8	GND	AF33
IO324PB7F30	N7	Dedicated I/O		GND	AG1
IO325NB7F30	K2	GND	A13	GND	AG27
IO325PB7F30	K1	GND	A2	GND	AG34
IO326NB7F30	G2	GND	A22	GND	AG8
IO326PB7F30	H2	GND	A27	GND	AH28
IO327NB7F30	L6	GND	A3	GND	AH7
IO327PB7F30	L5	GND	A31	GND	AJ29
IO328NB7F30	N10	GND	A32	GND	AJ6

CQ352	
AX250 Function	Pin Number
IO64PB4F4	167
IO65NB4F4	170
IO65PB4F4	171
IO66NB4F4	164
IO66PB4F4	165
IO67NB4F4	160
IO67PB4F4	161
IO68NB4F4	158
IO68PB4F4	159
IO70NB4F4	154
IO70PB4F4	155
IO72NB4F4	152
IO72PB4F4	153
IO73NB4F4	146
IO73PB4F4	147
IO74NB4F4/CLKEN	142
IO74PB4F4/CLKEP	143
IO75NB4F4/CLKFN	136
IO75PB4F4/CLKFP	137
Bank 5	
IO76NB5F5/CLKGN	128
IO76PB5F5/CLKGP	129
IO77NB5F5/CLKHN	122
IO77PB5F5/CLKHP	123
IO78NB5F5	112
IO78PB5F5	113
IO79NB5F5	118
IO79PB5F5	119
IO80NB5F5	110
IO80PB5F5	111
IO82NB5F5	106
IO82PB5F5	107
IO84NB5F5	100
IO84PB5F5	101
IO85NB5F5	104

CQ352	
AX250 Function	Pin Number
IO85PB5F5	105
IO86NB5F5	98
IO86PB5F5	99
IO87NB5F5	94
IO87PB5F5	95
IO89NB5F5	92
IO89PB5F5	93
Bank 6	
IO90PB6F6	86
IO91NB6F6	84
IO91PB6F6	85
IO92NB6F6	78
IO92PB6F6	79
IO93NB6F6	82
IO93PB6F6	83
IO95NB6F6	76
IO95PB6F6	77
IO96NB6F6	72
IO96PB6F6	73
IO97NB6F6	70
IO97PB6F6	71
IO98NB6F6	66
IO98PB6F6	67
IO99NB6F6	64
IO99PB6F6	65
IO100NB6F6	60
IO100PB6F6	61
IO101NB6F6	58
IO101PB6F6	59
IO103NB6F6	54
IO103PB6F6	55
IO104NB6F6	52
IO104PB6F6	53
IO105NB6F6	48
IO105PB6F6	49

CQ352	
AX250 Function	Pin Number
IO106NB6F6	46
IO106PB6F6	47
Bank 7	
IO107NB7F7	40
IO107PB7F7	41
IO108NB7F7	42
IO108PB7F7	43
IO109NB7F7	36
IO109PB7F7	37
IO110NB7F7	34
IO110PB7F7	35
IO111NB7F7	30
IO111PB7F7	31
IO113NB7F7	28
IO113PB7F7	29
IO114NB7F7	24
IO114PB7F7	25
IO115NB7F7	22
IO115PB7F7	23
IO116NB7F7	18
IO116PB7F7	19
IO117NB7F7	16
IO117PB7F7	17
IO118NB7F7	12
IO118PB7F7	13
IO119NB7F7	10
IO119PB7F7	11
IO121NB7F7	6
IO121PB7F7	7
IO123NB7F7	4
IO123PB7F7	5
Dedicated I/O	
GND	1
GND	9
GND	15

CQ352	
AX250 Function	Pin Number
VCCDA	346
VCCIB0	321
VCCIB0	333
VCCIB0	344
VCCIB1	273
VCCIB1	285
VCCIB1	297
VCCIB2	227
VCCIB2	239
VCCIB2	245
VCCIB2	257
VCCIB3	185
VCCIB3	197
VCCIB3	203
VCCIB3	215
VCCIB4	144
VCCIB4	156
VCCIB4	168
VCCIB5	96
VCCIB5	108
VCCIB5	120
VCCIB6	50
VCCIB6	62
VCCIB6	68
VCCIB6	80
VCCIB7	8
VCCIB7	20
VCCIB7	26
VCCIB7	38
VCCPLA	317
VCCPLB	315
VCCPLC	303
VCCPLD	301
VCCPLE	140
VCCPLF	138

CQ352	
AX250 Function	Pin Number
VCCPLG	126
VCCPLH	124
VCOMPLA	318
VCOMPLB	316
VCOMPLC	304
VCOMPLD	302
VCOMPLE	141
VCOMPLF	139
VCOMPLG	127
VCOMPLH	125
VPUMP	267

CQ352		CQ352		CQ352	
AX500 Function	Pin Number	AX500 Function	Pin Number	AX500 Function	Pin Number
Bank 0		IO35NB1F3	275	Bank 3	
IO00PB0F0	343	IO35PB1F3	276	IO63NB3F6	217
IO03NB0F0	341	IO37NB1F3	271	IO63PB3F6	218
IO03PB0F0	342	IO37PB1F3	272	IO64NB3F6	219
IO05NB0F0	337	IO41NB1F3	269	IO64PB3F6	220
IO05PB0F0	338	IO41PB1F3	270	IO65NB3F6	213
IO07NB0F0	335	Bank 2		IO65PB3F6	214
IO07PB0F0	336	IO43NB2F4	261	IO67NB3F6	207
IO09NB0F0	331	IO43PB2F4	262	IO67PB3F6	208
IO09PB0F0	332	IO45NB2F4	259	IO68NB3F6	211
IO15NB0F1	325	IO45PB2F4	260	IO68PB3F6	212
IO15PB0F1	326	IO47NB2F4	255	IO69NB3F6	205
IO17NB0F1	323	IO47PB2F4	256	IO69PB3F6	206
IO17PB0F1	324	IO49NB2F4	253	IO71NB3F6	201
IO19NB0F1/HCLKAN	319	IO49PB2F4	254	IO71PB3F6	202
IO19PB0F1/HCLKAP	320	IO50NB2F4	247	IO73NB3F6	199
IO20NB0F1/HCLKBN	313	IO50PB2F4	248	IO73PB3F6	200
IO20PB0F1/HCLKBP	314	IO51NB2F4	249	IO75NB3F7	193
Bank 1		IO51PB2F4	250	IO75PB3F7	194
IO21NB1F2/HCLKCN	305	IO53NB2F5	243	IO76NB3F7	195
IO21PB1F2/HCLKCP	306	IO53PB2F5	244	IO76PB3F7	196
IO22NB1F2/HCLKDN	299	IO54NB2F5	241	IO77NB3F7	189
IO22PB1F2/HCLKDP	300	IO54PB2F5	242	IO77PB3F7	190
IO23NB1F2	289	IO55NB2F5	237	IO79NB3F7	187
IO23PB1F2	290	IO55PB2F5	238	IO79PB3F7	188
IO24NB1F2	295	IO57NB2F5	235	IO80NB3F7	183
IO24PB1F2	296	IO57PB2F5	236	IO80PB3F7	184
IO25NB1F2	287	IO58NB2F5	231	IO81NB3F7	181
IO25PB1F2	288	IO58PB2F5	232	IO81PB3F7	182
IO27NB1F2	283	IO59NB2F5	229	IO83NB3F7	179
IO27PB1F2	284	IO59PB2F5	230	IO83PB3F7	180
IO29NB1F2	281	IO61NB2F5	225	Bank 4	
IO29PB1F2	282	IO61PB2F5	226	IO85NB4F8	172
IO31NB1F2	277	IO62NB2F5	223	IO85PB4F8	173
IO31PB1F2	278	IO62PB2F5	224	IO87NB4F8	170

CG624	
AX2000 Function	Pin Number
IO75PB1F6	D17
IO76NB1F7	C21
IO76PB1F7	C20
IO79NB1F7	H20
IO79PB1F7	H19
IO80NB1F7	E18
IO80PB1F7	F18
IO81NB1F7	G21
IO81PB1F7	G20
IO82NB1F7	F20
IO82PB1F7	F19
IO85NB1F7	D20*
IO85PB1F7	D19*
Bank 2	
IO86NB2F8	F23
IO86PB2F8	E23
IO87NB2F8	H23
IO87PB2F8	G23
IO88NB2F8	E24
IO88PB2F8	D24
IO89NB2F8	M17*
IO89PB2F8	G22*
IO91NB2F8	J22
IO91PB2F8	H22
IO92NB2F8	L18
IO92PB2F8	K18
IO96NB2F9	G24
IO96PB2F9	F24
IO97NB2F9	J21
IO97PB2F9	J20
IO98PB2F9	J23
IO99NB2F9	L19

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
IO99PB2F9	K19
IO100NB2F9	E25
IO100PB2F9	D25
IO103PB2F9	K20
IO105NB2F9	M19
IO105PB2F9	M18
IO106NB2F9	J24
IO106PB2F9	H24
IO107NB2F10	L23*
IO107PB2F10	N16*
IO109NB2F10	L22
IO109PB2F10	K22
IO110NB2F10	G25
IO110PB2F10	F25
IO111NB2F10	L21
IO111PB2F10	L20
IO112NB2F10	L24
IO112PB2F10	K24
IO113NB2F10	N17
IO115NB2F10	M20
IO115PB2F10	M21
IO117NB2F10	N19
IO117PB2F10	N18
IO118NB2F11	J25
IO121NB2F11	N24
IO121PB2F11	M24
IO122NB2F11	L25
IO122PB2F11	K25
IO123NB2F11	N22
IO123PB2F11	M22
IO124NB2F11	N23
IO124PB2F11	M23

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
IO127NB2F11	P18
IO127PB2F11	P17
IO128NB2F11	N25
IO128PB2F11	M25
Bank 3	
IO129NB3F12	N20
IO130PB3F12	P24
IO131NB3F12	P21
IO133NB3F12	P20
IO133PB3F12	P19
IO138NB3F12	R23
IO138PB3F12	P23
IO139NB3F13	R22
IO139PB3F13	P22
IO141NB3F13	R19
IO142NB3F13	R25
IO142PB3F13	P25
IO143PB3F13	R21
IO145NB3F13	T18
IO145PB3F13	R18
IO146NB3F13	T24
IO146PB3F13	R24
IO147NB3F13	T20
IO147PB3F13	R20
IO148NB3F13	U25
IO148PB3F13	T25
IO149NB3F13	T22
IO153NB3F14	U19
IO153PB3F14	T19
IO154NB3F14	Y25
IO154PB3F14	W25
IO157NB3F14	V20

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.