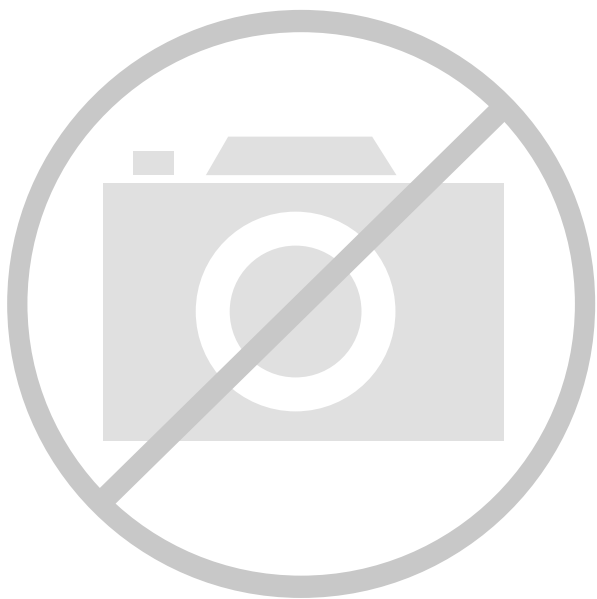




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Understanding [Embedded - FPGAs \(Field Programmable Gate Array\)](#)

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	Discontinued at Digi-Key
Number of LABs/CLBs	32256
Number of Logic Elements/Cells	-
Total RAM Bits	294912
Number of I/O	684
Number of Gates	2000000
Voltage - Supply	1.425V ~ 1.575V
Mounting Type	Surface Mount
Operating Temperature	-40°C ~ 85°C (TA)
Package / Case	1152-BGA
Supplier Device Package	1152-FPBGA (35x35)
Purchase URL	https://www.e-xfl.com/product-detail/microsemi/ax2000-fg1152i

Table 2-22 • 3.3 V LVTTTL I/O Module

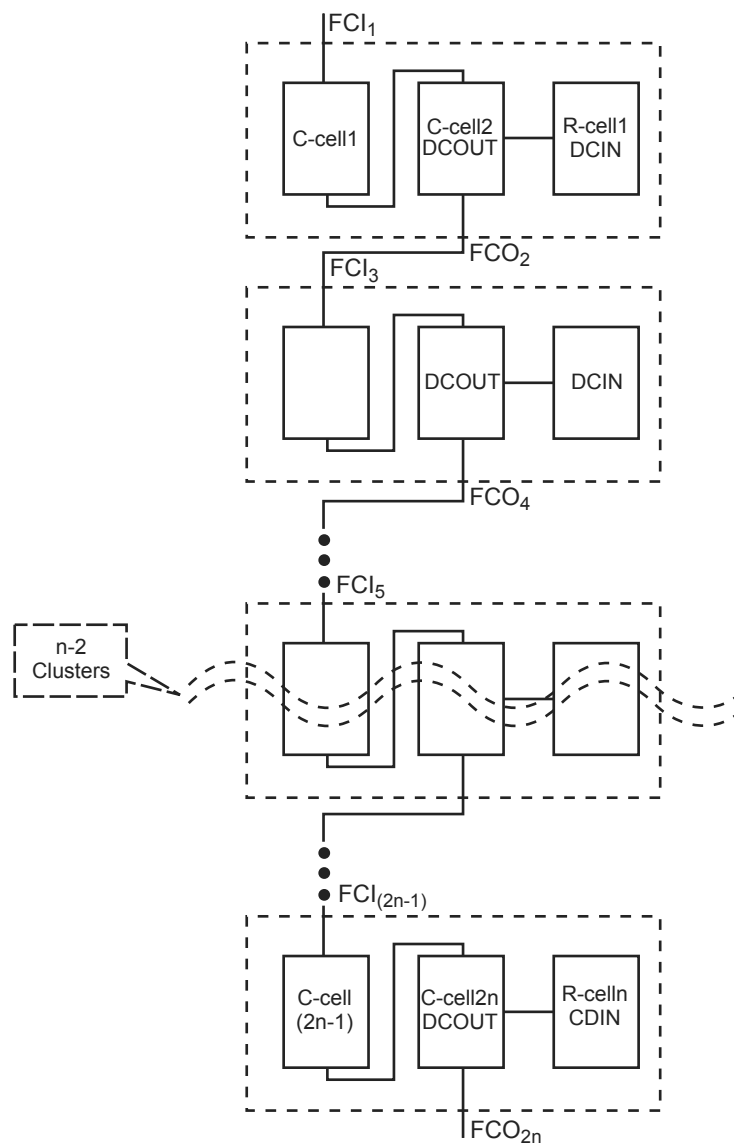
Worst-Case Commercial Conditions VCCA = 1.425 V, VCCI = 3.0 V, T_J = 70°C (continued)

		–2 Speed		–1 Speed		Std Speed		
Parameter	Description	Min.	Max.	Min.	Max.	Min.	Max.	Units
LVTTTL Output Drive Strength = 4 (24 mA) / Low Slew Rate								
t _{DP}	Input Buffer		1.68		1.92		2.26	ns
t _{PY}	Output Buffer		10.45		11.90		13.99	ns
t _{ENZL}	Enable to Pad Delay through the Output Buffer—Z to Low		10.61		12.08		14.21	ns
t _{ENZH}	Enable to Pad Delay through the Output Buffer—Z to High		10.47		11.93		14.02	ns
t _{ENLZ}	Enable to Pad Delay through the Output Buffer—Low to Z		1.92		1.94		1.94	ns
t _{ENHZ}	Enable to Pad Delay through the Output Buffer—High to Z		2.57		2.58		2.59	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

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



Note: The carry-chain sequence can end on either C-cell.

Figure 2-30 • Carry-Chain Sequencing of C-Cells

Timing Characteristics

Refer to Table 2-62 on page 2-55 for more information on carry-chain timing.

Timing Characteristics

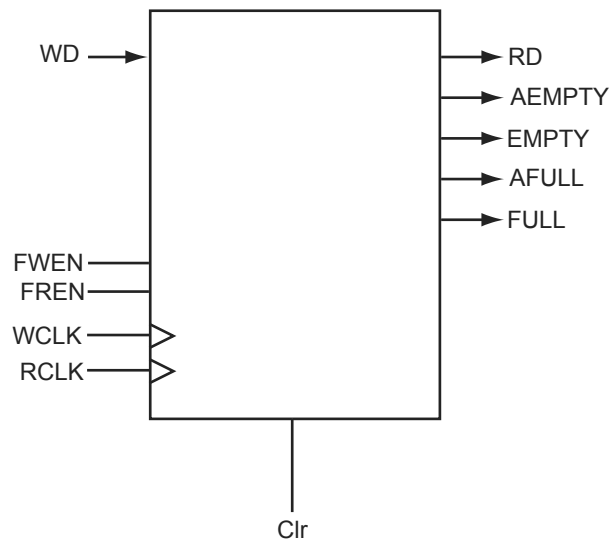


Figure 2-66 • FIFO Model

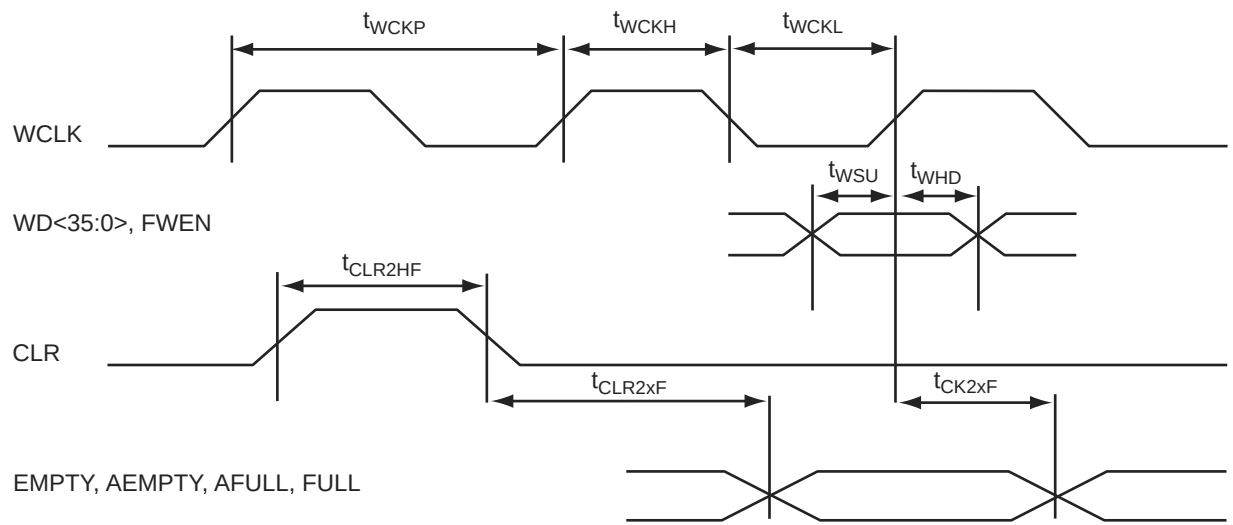


Figure 2-67 • FIFO Write Timing

Table 2-102 • Sixteen 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		16.32		18.60		21.86	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		13.40		13.40		13.40	ns
t _{WCKP}	Minimum WCLK Period	14.15		14.15		14.15		ns
t _{RSU}	Read Setup		17.16		19.54		22.97	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		14.41		14.41		14.41	ns
t _{RCKP}	Minimum RCLK period	15.14		15.14		15.14		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)		12.08		13.76		16.17	ns
t _{RCK2RD2}	RCLK-To-OUT (Nonpipelined)		12.83		14.62		17.18	ns

Note: Timing data for these sixteen cascaded FIFO blocks uses a depth of 65,536. For all other combinations, use Microsemi's timing software.

Building RAM and FIFO Modules

RAM and FIFO modules can be generated and included in a design in two different ways:

- Using the SmartGen Core Generator where the user defines the depth and width of the FIFO/RAM, and then instantiates this block into the design (refer to the *SmartGen*, *FlashROM*, *Analog System Builder*, and *Flash Memory System Builder* User's Guide for more information).
- The alternative is to instantiate the RAM/FIFO blocks manually, using inverters for polarity control and tying all unused data bits to ground.

Other Architectural Features

Low Power Mode

Although designed for high performance, the AX architecture also allows the user to place the device into a low power mode. Each I/O bank in an Axcelerator device can be configured individually, when in low power mode, to tristate all outputs, disable inputs, or both. The low power mode is activated by asserting the LP pin, which is grounded in normal operation.

While in the low power mode, the device is still fully functional and all internal logic states are preserved. This allows a user to disable all but a few signals and operate the part in a low-frequency, watchdog

BG729		BG729		BG729	
AX1000 Function	Pin Number	AX1000 Function	Pin Number	AX1000 Function	Pin Number
GND	B27	GND	R11	VCCA	K11
GND	B3	GND	R12	VCCA	K17
GND	C1	GND	R13	VCCA	K18
GND	C2	GND	R14	VCCA	L10
GND	C25	GND	R15	VCCA	L18
GND	C26	GND	R16	VCCA	U10
GND	C27	GND	R17	VCCA	U18
GND	C3	GND	T11	VCCA	V10
GND	E27	GND	T12	VCCA	V11
GND	L11	GND	T13	VCCA	V17
GND	L12	GND	T14	VCCA	V18
GND	L13	GND	T15	VCCPLA	A13
GND	L14	GND	T16	VCCPLB	J13
GND	L15	GND	T17	VCCPLC	B15
GND	L16	GND	U11	VCCPLD	C15
GND	L17	GND	U12	VCCPLE	AG14
GND	M11	GND	U13	VCCPLF	AF14
GND	M12	GND	U14	VCCPLG	AB13
GND	M13	GND	U15	VCCPLH	AG13
GND	M14	GND	U16	VCCDA	A11
GND	M15	GND	U17	VCCDA	AB12
GND	M16	GND/LP	J8	VCCDA	AC12
GND	M17	NC	U3	VCCDA	AC25
GND	N11	PRA	J14	VCCDA	AD16
GND	N12	PRB	D14	VCCDA	AD17
GND	N13	PRC	V14	VCCDA	E16
GND	N14	PRD	AB14	VCCDA	E2
GND	N15	TCK	E4	VCCDA	E24
GND	N16	TDI	D4	VCCDA	F12
GND	N17	TDO	J9	VCCDA	F16
GND	P11	TMS	H8	VCCDA	F7
GND	P12	TRST	E3	VCCDA	K14
GND	P13	VCCA	AA21	VCCDA	P10
GND	P14	VCCA	AD5	VCCDA	P18
GND	P15	VCCA	E1	VCCDA	W14
GND	P16	VCCA	G22	VCCDA	W9
GND	P17	VCCA	K10	VCCIB0	A4

FG324	
AX125 Function	Pin Number
Bank 0	
IO00NB0F0	C5
IO00PB0F0	C4
IO01NB0F0	A3
IO01PB0F0	A2
IO02NB0F0	C7
IO02PB0F0	C6
IO03NB0F0	B5
IO03PB0F0	B4
IO04NB0F0	A5
IO04PB0F0	A4
IO05NB0F0	A7
IO05PB0F0	A6
IO06NB0F0	B7
IO06PB0F0	B6
IO07NB0F0/HCLKAN	C9
IO07PB0F0/HCLKAP	C8
IO08NB0F0/HCLKBN	B10
IO08PB0F0/HCLKBP	B9
Bank 1	
IO09NB1F1/HCLKCN	D11
IO09PB1F1/HCLKCP	D10
IO10NB1F1/HCLKDN	C12
IO10PB1F1/HCLKDP	C11
IO11NB1F1	A15
IO11PB1F1	A14
IO12NB1F1	B14
IO12PB1F1	B13
IO13NB1F1	A17
IO13PB1F1	A16
IO14NB1F1	D13
IO14PB1F1	D12
IO15NB1F1	C14
IO15PB1F1	C13
IO16NB1F1	B16

FG324	
AX125 Function	Pin Number
IO16PB1F1	C15
IO17NB1F1	E14
IO17PB1F1	E13
Bank 2	
IO18NB2F2	G14
IO18PB2F2	F14
IO19NB2F2	D16
IO19PB2F2	D15
IO20NB2F2	C18
IO20PB2F2	B18
IO21NB2F2	D17
IO21PB2F2	C17
IO22NB2F2	F17
IO22PB2F2	E17
IO23NB2F2	G16
IO23PB2F2	F16
IO24NB2F2	E18
IO24PB2F2	D18
IO25NB2F2	G18
IO25PB2F2	F18
IO26NB2F2	H17
IO26PB2F2	G17
IO27NB2F2	J16
IO27PB2F2	H16
IO28NB2F2	J18
IO28PB2F2	H18
IO29NB2F2	K17
IO29PB2F2	J17
Bank 3	
IO30NB3F3	N18
IO30PB3F3	M18
IO31NB3F3	L18
IO31PB3F3	K18
IO32NB3F3	L16
IO32PB3F3	L17

FG324	
AX125 Function	Pin Number
IO33NB3F3	R18
IO33PB3F3	P18
IO34NB3F3	N15
IO34PB3F3	M15
IO35NB3F3	M16
IO35PB3F3	M17
IO36NB3F3	P16
IO36PB3F3	N16
IO37NB3F3	R17
IO37PB3F3	P17
IO38NB3F3	N14
IO38PB3F3	M14
IO39NB3F3	U18
IO39PB3F3	T18
IO40NB3F3	R16
IO40PB3F3	T17
IO41NB3F3	P13
IO41PB3F3	P14
Bank 4	
IO42NB4F4	T13
IO42PB4F4	T14
IO43NB4F4	U15
IO43PB4F4	T15
IO44NB4F4	U13
IO44PB4F4	U14
IO45NB4F4	V15
IO45PB4F4	V16
IO46NB4F4	V13
IO46PB4F4	V14
IO47NB4F4	V12
IO47PB4F4	U12
IO48NB4F4	V10
IO48PB4F4	V11
IO49NB4F4/CLKEN	T10
IO49PB4F4/CLKEP	T11

FG324	
AX125 Function	Pin Number
VCCIB5	N7
VCCIB5	N8
VCCIB5	N9
VCCIB6	K6
VCCIB6	L6
VCCIB6	M6
VCCIB7	G6
VCCIB7	H6
VCCIB7	J6
VCOMPLA	B8
VCOMPLB	E8
VCOMPLC	C10
VCOMPLD	E12
VCOMPLE	U11
VCOMPLF	P11
VCOMPLG	T9
VCOMPLH	P7
VPUMP	B15

FG484	
AX500 Function	Pin Number
IO163NB7F15	G5
IO163PB7F15	G6
IO164NB7F15	D1
IO164PB7F15	E1
IO165NB7F15	F4
IO165PB7F15	G4
IO166NB7F15	D2
IO166PB7F15	E2
IO167NB7F15	F5
IO167PB7F15	E4
Dedicated I/O	
VCCDA	H7
GND	A1
GND	A11
GND	A12
GND	A2
GND	A21
GND	A22
GND	AA1
GND	AA2
GND	AA21
GND	AA22
GND	AB1
GND	AB11
GND	AB12
GND	AB2
GND	AB21
GND	AB22
GND	B1
GND	B2
GND	B21
GND	B22
GND	C20
GND	C3
GND	D19

FG484	
AX500 Function	Pin Number
GND	D4
GND	E18
GND	E5
GND	G18
GND	H15
GND	H8
GND	J14
GND	J9
GND	K10
GND	K11
GND	K12
GND	K13
GND	L1
GND	L10
GND	L11
GND	L12
GND	L13
GND	L22
GND	M1
GND	M10
GND	M11
GND	M12
GND	M13
GND	M22
GND	N10
GND	N11
GND	N12
GND	N13
GND	P14
GND	P9
GND	R15
GND	R8
GND	U16
GND	U6
GND	V18

FG484	
AX500 Function	Pin Number
GND	V5
GND	W19
GND	W4
GND	Y20
GND	Y3
GND/LP	G7
NC	AB8
NC	AB16
NC	C10
NC	C11
NC	C14
PRA	G11
PRB	F11
PRC	T12
PRD	U12
TCK	G8
TDI	F9
TDO	F7
TMS	F6
TRST	F8
VCCA	G17
VCCA	J10
VCCA	J11
VCCA	J12
VCCA	J13
VCCA	J7
VCCA	K14
VCCA	K9
VCCA	L14
VCCA	L9
VCCA	M14
VCCA	M9
VCCA	N14
VCCA	N9
VCCA	P10

FG484		FG484		FG484	
AX1000 Function	Pin Number	AX1000 Function	Pin Number	AX1000 Function	Pin Number
IO87PB2F8	H20	IO106PB3F9	P17	IO142PB4F13	V20
IO88NB2F8	L18	IO107NB3F10	T21	IO143NB4F13	W15
IO88PB2F8	K18	IO107PB3F10	R21	IO143PB4F13	W16
IO89NB2F8	K19	IO110NB3F10	V22	IO144NB4F13	AA18
IO89PB2F8	J19	IO110PB3F10	U22	IO144PB4F13	AA19
IO90NB2F8	J21	IO113NB3F10	V21	IO145NB4F13	U14
IO90PB2F8	H21	IO113PB3F10	U21	IO145PB4F13	U15
IO91NB2F8	J22	IO114NB3F10	P18	IO146NB4F13	Y15
IO91PB2F8	H22	IO114PB3F10	P19	IO146PB4F13	Y16
IO93NB2F8	K21	IO116PB3F10	R19	IO147NB4F13	AB18
IO93PB2F8	K22	IO117NB3F10	U20	IO147PB4F13	AB19
IO94NB2F8	L20	IO117PB3F10	T20	IO149NB4F13	Y14
IO94PB2F8	K20	IO118NB3F11	T18	IO149PB4F13	W14
IO95NB2F8	M21	IO118PB3F11	R18	IO150NB4F13	AA16
IO95PB2F8	L21	IO121NB3F11	U19	IO150PB4F13	AA17
Bank 3		IO121PB3F11	T19	IO152NB4F14	AA14
IO96NB3F9	N16	IO124NB3F11	R16	IO152PB4F14	AA15
IO96PB3F9	M16	IO124PB3F11	P16	IO154NB4F14	AB14
IO97NB3F9	M19	IO127NB3F11	W21	IO154PB4F14	AB15
IO97PB3F9	L19	IO127PB3F11	W22	IO155NB4F14	AA13
IO98NB3F9	P22	Bank 4		IO155PB4F14	AB13
IO98PB3F9	N22	IO129PB4F12	AB17	IO158NB4F14	Y12
IO99NB3F9	N20	IO132NB4F12	Y19	IO158PB4F14	Y13
IO99PB3F9	M20	IO132PB4F12	W18	IO159NB4F14/CLKEN	V12
IO100NB3F9	N17	IO133NB4F12	W17	IO159PB4F14/CLKEP	V13
IO100PB3F9	M17	IO133PB4F12	V17	IO160NB4F14/CLKFN	W11
IO101NB3F9	P21	IO135NB4F12	T15	IO160PB4F14/CLKFP	W12
IO101PB3F9	N21	IO135PB4F12	T16	Bank 5	
IO103NB3F9	R20	IO138NB4F12	Y17	IO161NB5F15/CLKGN	U10
IO103PB3F9	P20	IO138PB4F12	Y18	IO161PB5F15/CLKGP	U11
IO104NB3F9	N18	IO139NB4F13	V15	IO162NB5F15/CLKHN	V9
IO104PB3F9	N19	IO139PB4F13	V16	IO162PB5F15/CLKHP	V10
IO105NB3F9	T22	IO140NB4F13	U18	IO163NB5F15	Y10
IO105PB3F9	R22	IO140PB4F13	V19	IO163PB5F15	Y11
IO106NB3F9	R17	IO142NB4F13	W20	IO167NB5F15	AA11

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		FG896		FG896	
AX1000 Function	Pin Number	AX1000 Function	Pin Number	AX1000 Function	Pin Number
Bank 0		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	Bank 1		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
IO51PB1F4	E21
IO52NB1F4	F22
IO52PB1F4	E22
IO53NB1F4	B25
IO53PB1F4	B24
IO54NB1F5	D24
IO54PB1F5	D23
IO55NB1F5	F23
IO55PB1F5	E23
IO56NB1F5	H21
IO56PB1F5	G21
IO57NB1F5	D25
IO57PB1F5	C25
IO58NB1F5	F24
IO58PB1F5	E24
IO59NB1F5	D26
IO59PB1F5	C26
IO60NB1F5	G23
IO60PB1F5	G22
IO61NB1F5	B27
IO61PB1F5	A27
IO62NB1F5	F25
IO62PB1F5	E25
IO63NB1F5	H23
IO63PB1F5	H22
Bank 2	
IO64NB2F6	K23
IO64PB2F6	J23
IO65NB2F6	J24
IO65PB2F6	H24
IO66NB2F6	H26
IO66PB2F6	H25
IO67NB2F6	G26
IO67PB2F6	G25
IO68NB2F6	K25

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

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

FG896	
AX1000 Function	Pin Number
VCCIB2	L22
VCCIB2	M21
VCCIB2	M22
VCCIB2	N21
VCCIB2	P21
VCCIB2	R21
VCCIB3	AA22
VCCIB3	AH29
VCCIB3	AH30
VCCIB3	T21
VCCIB3	U21
VCCIB3	V21
VCCIB3	W21
VCCIB3	W22
VCCIB3	Y21
VCCIB3	Y22
VCCIB4	AA16
VCCIB4	AA17
VCCIB4	AA18
VCCIB4	AA19
VCCIB4	AA20
VCCIB4	AB19
VCCIB4	AB20
VCCIB4	AB21
VCCIB4	AJ28
VCCIB4	AK28
VCCIB5	AA11
VCCIB5	AA12
VCCIB5	AA13
VCCIB5	AA14
VCCIB5	AA15
VCCIB5	AB10
VCCIB5	AB11
VCCIB5	AB12
VCCIB5	AJ3

FG896	
AX1000 Function	Pin Number
VCCIB5	AK3
VCCIB6	AA9
VCCIB6	AH1
VCCIB6	AH2
VCCIB6	T10
VCCIB6	U10
VCCIB6	V10
VCCIB6	W10
VCCIB6	W9
VCCIB6	Y10
VCCIB6	Y9
VCCIB7	C1
VCCIB7	C2
VCCIB7	K9
VCCIB7	L10
VCCIB7	L9
VCCIB7	M10
VCCIB7	M9
VCCIB7	N10
VCCIB7	P10
VCCIB7	R10
VCOMPLA	F14
VCOMPLB	J15
VCOMPLC	F17
VCOMPLD	H16
VCOMPLE	AF17
VCOMPLF	AD16
VCOMPLG	AF14
VCOMPLH	AB15
VPUMP	G24

PQ208	
AX500 Function	Pin Number
Bank 0	
IO03NB0F0	198
IO03PB0F0	199
IO04NB0F0	197
IO19NB0F1/HCLKAN	191
IO19PB0F1/HCLKAP	192
IO20NB0F1/HCLKBN	185
IO20PB0F1/HCLKBP	186
Bank 1	
IO21NB1F2/HCLKCN	180
IO21PB1F2/HCLKCP	181
IO22NB1F2/HCLKDN	174
IO22PB1F2/HCLKDP	175
IO23NB1F2	170
IO23PB1F2	171
IO37NB1F3	165
IO37PB1F3	166
IO39NB1F3	161
IO39PB1F3	162
IO41NB1F3	159
IO41PB1F3	160
Bank 2	
IO43NB2F4	151
IO43PB2F4	153
IO44NB2F4	152
IO44PB2F4	154
IO45PB2F4	148
IO46NB2F4	146
IO46PB2F4	147
IO48NB2F4	144
IO48PB2F4	145
IO57NB2F5	139
IO57PB2F5	140
IO58PB2F5	141
IO59NB2F5	137
IO59PB2F5	138
IO61NB2F5	132

PQ208	
AX500 Function	Pin Number
IO61PB2F5	134
IO62NB2F5	131
IO62PB2F5	133
Bank 3	
IO63NB3F6	127
IO63PB3F6	129
IO64NB3F6	126
IO64PB3F6	128
IO66NB3F6	122
IO66PB3F6	123
IO68NB3F6	120
IO68PB3F6	121
IO77NB3F7	116
IO77PB3F7	117
IO79NB3F7	114
IO79PB3F7	115
IO81NB3F7	110
IO81PB3F7	111
IO82NB3F7	108
IO82PB3F7	109
IO83NB3F7	106
IO83PB3F7	107
Bank 4	
IO84PB4F8	103
IO85NB4F8	100
IO86NB4F8	101
IO86PB4F8	102
IO87NB4F8	96
IO87PB4F8	97
IO101NB4F9	91
IO101PB4F9	92
IO103NB4F9/CLKEN	87
IO103PB4F9/CLKEP	88
IO104NB4F9/CLKFN	81
IO104PB4F9/CLKFP	82
Bank 5	
IO105NB5F10/CLKGN	76

PQ208	
AX500 Function	Pin Number
IO105PB5F10/CLKGP	77
IO106NB5F10/CLKHN	70
IO106PB5F10/CLKHP	71
IO107NB5F10	66
IO107PB5F10	67
IO119NB5F11	62
IO121NB5F11	60
IO121PB5F11	61
IO123NB5F11	56
IO123PB5F11	57
IO125NB5F11	54
IO125PB5F11	55
Bank 6	
IO127NB6F12	47
IO127PB6F12	49
IO128NB6F12	48
IO128PB6F12	50
IO129NB6F12	42
IO129PB6F12	43
IO130PB6F12	44
IO132NB6F12	40
IO132PB6F12	41
IO141NB6F13	35
IO141PB6F13	36
IO142PB6F13	37
IO143NB6F13	33
IO143PB6F13	34
IO145NB6F13	28
IO145PB6F13	30
IO146NB6F13	27
IO146PB6F13	29
Bank 7	
IO147NB7F14	23
IO147PB7F14	25
IO148NB7F14	22
IO148PB7F14	24
IO150NB7F14	18

CQ208	
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	
GND	9
GND	15
GND	21
GND	32
GND	39
GND	46
GND	51
GND	59
GND	65
GND	69
GND	90
GND	94
GND	99
GND	104
GND	113
GND	119
GND	125
GND	136
GND	143
GND	150
GND	155
GND	164
GND	169
GND	173

CQ208	
AX250 Function	Pin Number
GND	194
GND	196
GND	201
GND/LP	208
PRA	184
PRB	183
PRC	80
PRD	79
TCK	205
TDI	204
TDO	203
TMS	206
TRST	207
VCCA	2
VCCA	14
VCCA	38
VCCA	52
VCCA	64
VCCA	93
VCCA	118
VCCA	142
VCCA	156
VCCA	168
VCCA	195
VCCDA	1
VCCDA	26
VCCDA	53
VCCDA	63
VCCDA	78
VCCDA	95
VCCDA	105
VCCDA	130
VCCDA	157
VCCDA	167
VCCDA	182
VCCDA	202
VCCIB0	193

CQ208	
AX250 Function	Pin Number
VCCIB0	200
VCCIB1	163
VCCIB1	172
VCCIB2	135
VCCIB2	149
VCCIB3	112
VCCIB3	124
VCCIB4	89
VCCIB4	98
VCCIB5	58
VCCIB5	68
VCCIB6	31
VCCIB6	45
VCCIB7	8
VCCIB7	20
VCCPLA	189
VCCPLB	187
VCCPLC	178
VCCPLD	176
VCCPLE	85
VCCPLF	83
VCCPLG	74
VCCPLH	72
VCOMPLA	190
VCOMPLB	188
VCOMPLC	179
VCOMPLD	177
VCOMPLE	86
VCOMPLF	84
VCOMPLG	75
VCOMPLH	73
VPUMP	158

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

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

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

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		CG624		CG624	
AX1000 Function	Pin Number	AX1000 Function	Pin Number	AX1000 Function	Pin Number
IO131NB4F12	V19	IO153NB4F14	Y15	IO173PB5F16	Y11
IO131PB4F12	W19	IO153PB4F14	Y16	IO174NB5F16	AB10
IO133NB4F12	Y18	IO155NB4F14	V15	IO174PB5F16	AB11
IO133PB4F12	Y19	IO155PB4F14	V16	IO175NB5F16	AC9
IO135NB4F12	W18	IO156NB4F14	AB14	IO175PB5F16	AE9
IO135PB4F12	V18	IO156PB4F14	AB15	IO177NB5F16	AA8
IO137NB4F12	Y17	IO157NB4F14	AE14	IO177PB5F16	Y8
IO137PB4F12	AA17	IO157PB4F14	AC18	IO178NB5F16	Y6
IO138NB4F12	AB19	IO158NB4F14	AC15	IO178PB5F16	W6
IO138PB4F12	AB18	IO158PB4F14	AC19	IO179NB5F16	Y10
IO139NB4F13	AA19	IO159NB4F14/CLKEN	W14	IO179PB5F16	W10
IO139PB4F13	U18	IO159PB4F14/CLKEP	W15	IO180NB5F16	Y7
IO140NB4F13	AC20	IO160NB4F14/CLKFN	AC13	IO180PB5F16	W7
IO140PB4F13	AC21	IO160PB4F14/CLKFP	AD13	IO181NB5F17	AD9
IO141NB4F13	AD17	Bank 5		IO181PB5F17	AD10
IO141PB4F13	AD18	IO161NB5F15/CLKGN	W13	IO182NB5F17	AE10
IO142NB4F13	AD21	IO161PB5F15/CLKGP	Y13	IO182PB5F17	AE11
IO142PB4F13	AD22	IO162NB5F15/CLKHN	AC12	IO183NB5F17	AD7
IO143NB4F13	AB17	IO162PB5F15/CLKHP	AD12	IO183PB5F17	AD8
IO143PB4F13	AC17	IO163NB5F15	V9	IO184NB5F17	AB9
IO144PB4F13	AE22	IO163PB5F15	V10	IO185NB5F17	AE6
IO145NB4F13	AE15	IO164NB5F15	V11	IO185PB5F17	AE7
IO145PB4F13	AE16	IO164PB5F15	T13	IO186NB5F17	AE4
IO146NB4F13	AD19	IO165NB5F15	U13	IO186PB5F17	AE5
IO146PB4F13	AD20	IO165PB5F15	V13	IO187NB5F17	AA9
IO147NB4F13	AD15	IO167NB5F15	W11	IO187PB5F17	Y9
IO147PB4F13	AD16	IO167PB5F15	W12	IO188NB5F17	U8
IO148PB4F13	AE21	IO168NB5F15	AB6	IO189NB5F17	AD5
IO149NB4F13	AD14	IO168PB5F15	AA6	IO189PB5F17	AD6
IO149PB4F13	AC14	IO169NB5F15	V8	IO191NB5F17	AC5
IO150NB4F13	AE19	IO169PB5F15	V7	IO191PB5F17	AC6
IO150PB4F13	AE20	IO171NB5F16	W8	IO192NB5F17	AB7
IO151NB4F13	V17	IO171PB5F16	W9	IO192PB5F17	AC7
IO151PB4F13	W17	IO172NB5F16	AB8	Bank 6	
IO152NB4F14	AB16	IO172PB5F16	AC8	IO193NB6F18	U6
IO152PB4F14	W16	IO173NB5F16	AA11	IO193PB6F18	U5

Revision	Changes	Page
Revision 3 (continued)	The timing characteristics tables from pages 2-26 to 2-60 were updated.	2-26 to 2-60
	The "Global Resources" section was updated.	2-66
	The timing characteristics tables from pages 2-102 to 2-103 were updated.	2-102 to 2-103
	The "PQ208", "FG256", and "FG324" tables are new.	3-9,3-16, 3-84