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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.

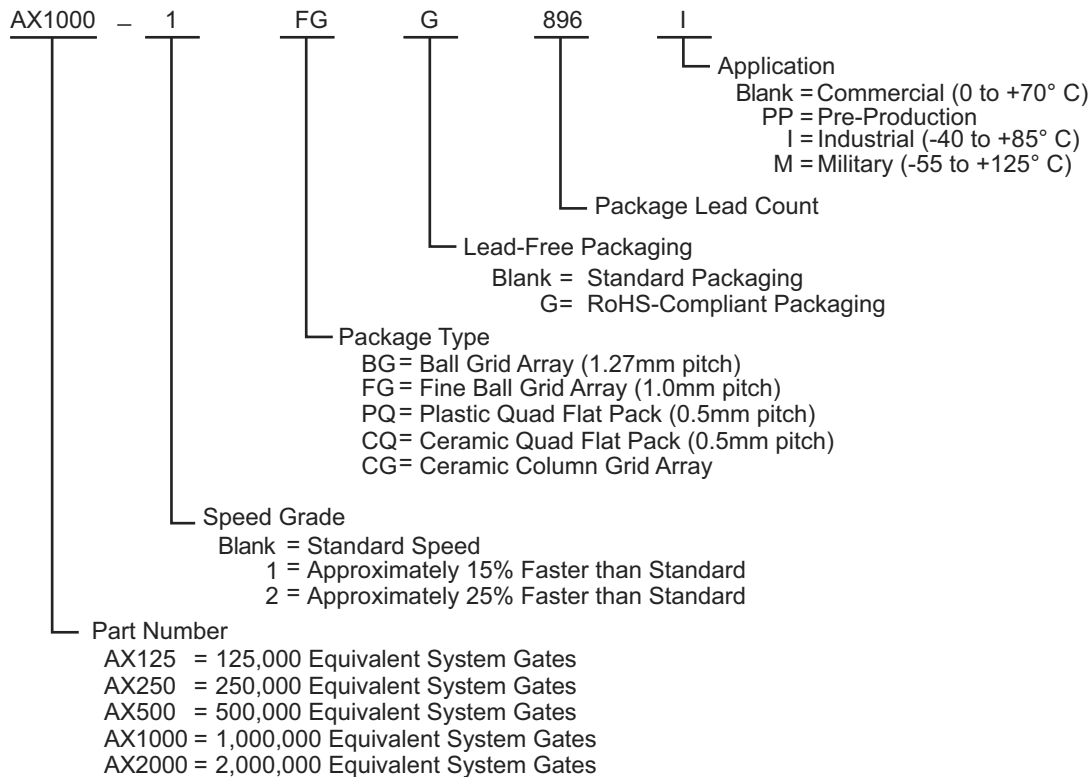
Applications of Embedded - FPGAs

The versatility of Embedded - FPGAs makes them indispensable in numerous fields. In telecommunications.

Details

Product Status	Obsolete
Number of LABs/CLBs	4224
Number of Logic Elements/Cells	-
Total RAM Bits	55296
Number of I/O	115
Number of Gates	250000
Voltage - Supply	1.425V ~ 1.575V
Mounting Type	Surface Mount
Operating Temperature	-40°C ~ 85°C (TA)
Package / Case	208-BFQFP
Supplier Device Package	208-PQFP (28x28)
Purchase URL	https://www.e-xfl.com/product-detail/microsemi/ax250-2pqg208i

Ordering Information



Device Resources

User I/Os (Including Clock Buffers)					
Package	AX125	AX250	AX500	AX1000	AX2000
PQ208	–	115	115	–	–
CQ208	–	115	115	–	–
CQ256	–	–	–	–	136
FG256	138	138	–	–	–
FG324	168	–	–	–	–
CQ352	–	198	198	198	198
FG484	–	248	317	317	–
CG624	–	–	–	418	418
FG676	–	–	336	418	–
BG729	–	–	–	516	–
FG896	–	–	–	516	586
FG1152	–	–	–	–	684

Note: The FG256, FG324, and FG484 are footprint compatible with one another. The FG676, FG896, and FG1152 are also footprint compatible with one another.

Axcelerator Family Device Status

Axcelerator® Devices	Status
AX125	Production
AX250	Production
AX500	Production
AX1000	Production
AX2000	Production

Temperature Grade Offerings

Package	AX125	AX250	AX500	AX1000	AX2000
PQ208	–	C, I, M	C, I, M	–	–
CQ208	–	M	M	–	–
CQ256	–	–	–	–	M
FG256	C, I	C, I, M	–	–	–
FG324	C, I	–	–	–	–
CQ352	–	M	M	M	M
FG484	–	C, I, M	C, I, M	C, I, M	–
CG624	–	–	–	M	M
FG676	–	–	C, I, M	C, I, M	–
BG729	–	–	–	C, I, M	–
FG896	–	–	–	C, I, M	C, I, M
FG1152	–	–	–	–	C, I, M

C = Commercial

I = Industrial

M = Military

Speed Grade and Temperature Grade Matrix

Temperature Grade	Std	–1	–2
C	✓	✓	✓
I	✓	✓	✓
M	✓	✓	–

C = Commercial

I = Industrial

M = Military

I/O Banks and Compatibility

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

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

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

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

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

VCCI ¹	Compatible Standards	VREF
3.3 V	LVTTL, PCI, PCI-X, LVPECL, GTL+ 3.3 V	1.0
3.3 V	SSTL 3 (Class I and II), LVTTL, PCI, LVPECL	1.5
2.5 V	LVC MOS 2.5 V, GTL+ 2.5 V, LVDS ²	1.0
2.5 V	LVC MOS 2.5 V, SSTL 2 (Classes I and II), LVDS ²	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 $\pm 5\%$

User I/O Naming Conventions

Due to the complex and flexible nature of the Axcelerator family's user I/Os, a naming scheme is used to show the details of the I/O. The naming scheme explains to which bank an I/O belongs, as well as the pairing and pin polarity for differential I/Os (Figure 2-7).

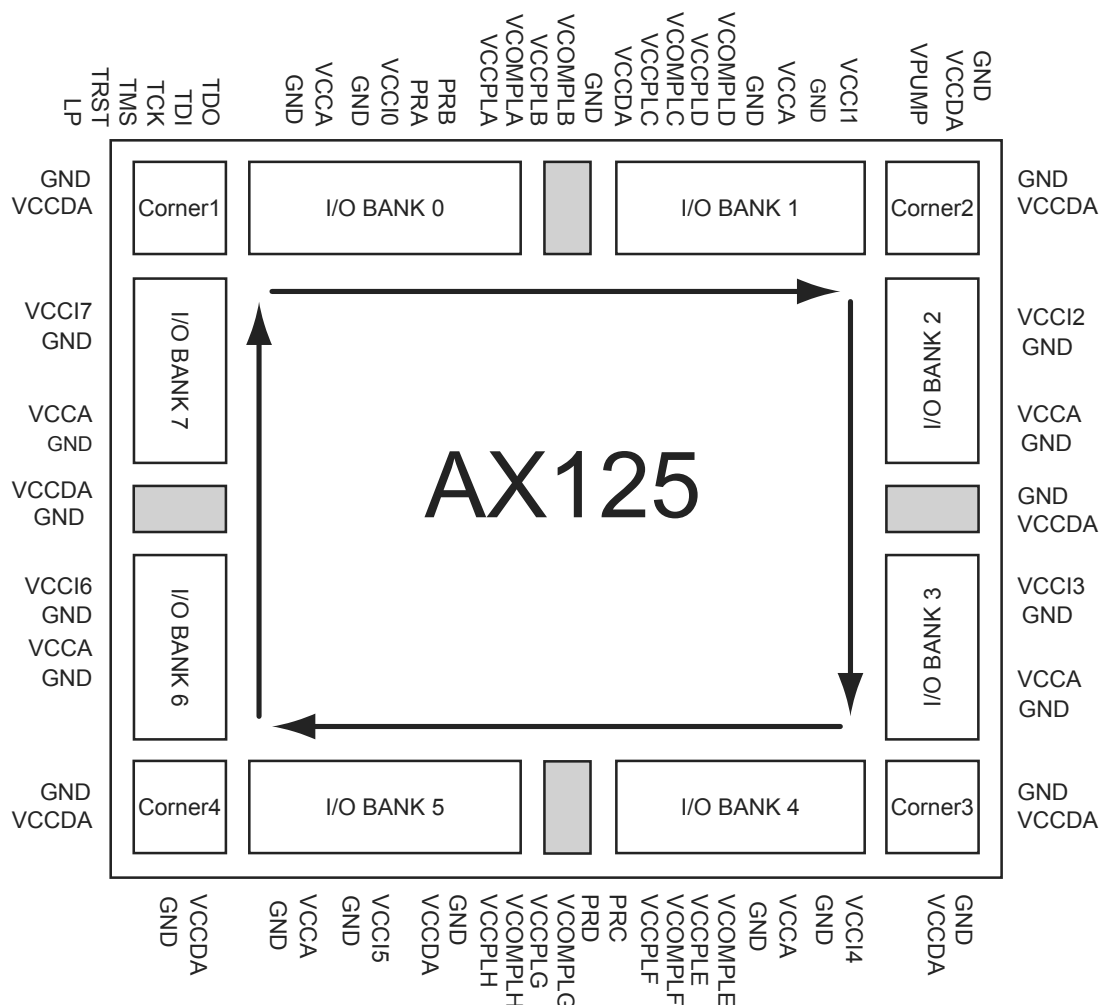
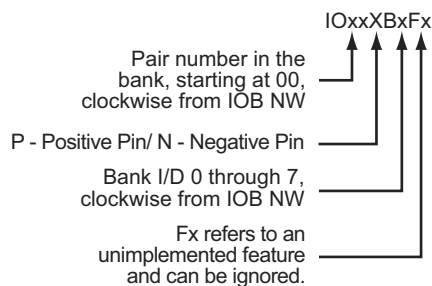


Figure 2-7 • I/O Bank and Dedicated Pin Layout



Examples:

IO12PB1F1 is the positive pin of the thirteenth pair of the first I/O bank (IOB NE). IO12PB1 combined with IO12NB1 form a differential pair.

For those I/Os that can be employed either as a user I/O or as a special function, the following nomenclature is used:

IOxxXBxFx/special_function_name

IOxxPB1Fx/xCLKx this pin can be configured as a clock input or as a user I/O.

Figure 2-8 • General Naming Schemes

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 =3 (16 mA) / Low Slew Rate								
t _{DP}	Input Buffer		1.68		1.92		2.26	ns
t _{PY}	Output Buffer		11.03		12.56		14.77	ns
t _{ENZL}	Enable to Pad Delay through the Output Buffer—Z to Low		11.42		13.01		15.29	ns
t _{ENZH}	Enable to Pad Delay through the Output Buffer—Z to High		11.04		12.58		14.79	ns
t _{ENLZ}	Enable to Pad Delay through the Output Buffer—Low to Z		1.86		1.88		1.88	ns
t _{ENHZ}	Enable to Pad Delay through the Output Buffer—High to Z		2.50		2.51		2.52	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 =3 (16 mA) / High Slew Rate								
t _{DP}	Input Buffer		1.68		1.92		2.26	ns
t _{PY}	Output Buffer		3.12		3.56		4.18	ns
t _{ENZL}	Enable to Pad Delay through the Output Buffer—Z to Low		3.54		4.04		4.75	ns
t _{ENZH}	Enable to Pad Delay through the Output Buffer—Z to High		2.78		3.17		3.72	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		2.58		2.59		2.60	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

1.8 V LVCMOS

Low-Voltage Complementary Metal-Oxide Semiconductor for 1.8 V is an extension of the LVCMOS standard (JESD8-5) used for general-purpose 1.8 V applications. It uses a 3.3 V tolerant CMOS input buffer and a push-pull output buffer.

Table 2-26 • DC Input and Output Levels

VIL		VIH		VOL	VOH	IOL	IOH
Min., V	Max., V	Min., V	Max., V	Max., V	Min., V	mA	mA
-0.3	0.2 VCCI	0.7 VCCI	3.6	0.2	VCCI - 0.2	8 mA	-8 mA

AC Loadings

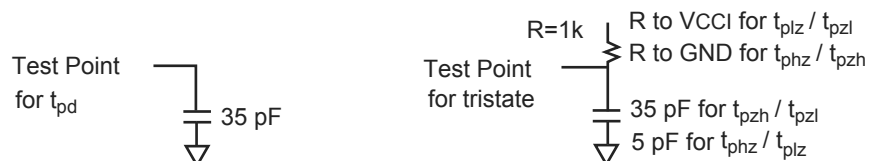


Figure 2-17 • AC Test Loads

Table 2-27 • AC Waveforms, Measuring Points, and Capacitive Loads

Input Low (V)	Input High (V)	Measuring Point* (V)	VREF (typ) (V)	Cload (pF)
0	1.8	0.5 VCCI	N/A	35

Note: * Measuring Point = VTRIP

Table 2-36 • 3.3 V PCI-X 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		Units
Parameter	Description	Min.	Max.	Min.	Max.	Min.	Max.	
3.3 V PCI-X Output Module Timing								
t _{DP}	Input Buffer	1.57		1.79		2.10		ns
t _{PY}	Output Buffer	2.10		2.40		2.82		ns
t _{ENZL}	Enable to Pad Delay through the Output Buffer—Z to Low	1.61		1.62		1.63		ns
t _{ENZH}	Enable to Pad Delay through the Output Buffer—Z to High	1.59		1.60		1.61		ns
t _{ENLZ}	Enable to Pad Delay through the Output Buffer—Low to Z	2.65		3.02		3.55		ns
t _{ENHZ}	Enable to Pad Delay through the Output Buffer—High to Z	3.11		3.55		4.17		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

Class II

Table 2-47 • DC Input and Output Levels

VIL		VIH		VOL	VOH	IOL	IOH
Min., V	Max., V	Min., V	Max., V	Max., V	Min., V	mA	mA
-0.3	VREF – 0.2	VREF + 0.2	3.6	VREF – 0.8	VREF + 0.8	15.2	-15.2

AC Loadings

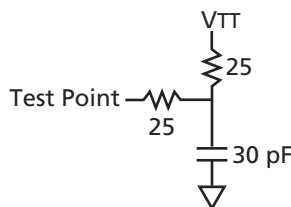


Figure 2-22 • AC Test Loads

Table 2-48 • AC Waveforms, Measuring Points, and Capacitive Loads

Input Low (V)	Input High (V)	Measuring Point* (V)	VREF (typ) (V)	C _{load} (pF)
VREF – 0.75	VREF + 0.75	VREF	1.25	30

Note: * Measuring Point = V_{trip}

Timing Characteristics

Table 2-49 • 2.5 V SSTL2 Class II I/O Module

Worst-Case Commercial Conditions VCCA = 1.425 V, VCCI = 2.3 V, T_J = 70°C

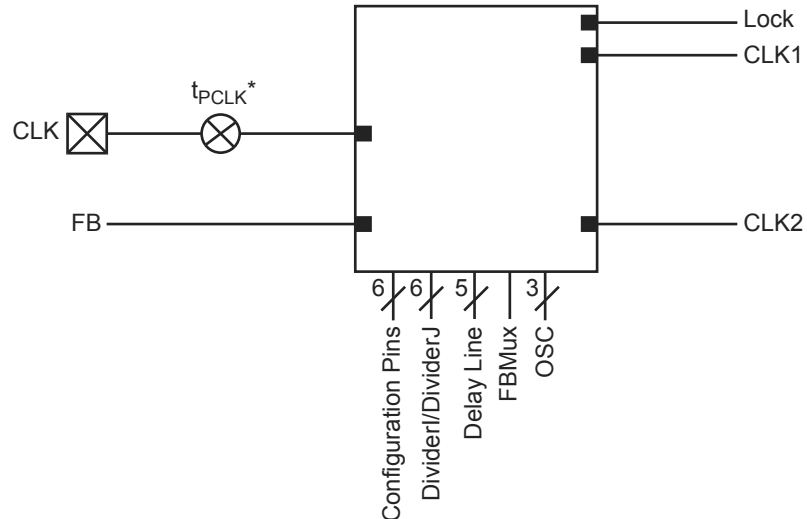
		–2 Speed		–1 Speed		Std Speed		Units
Parameter	Description	Min.	Max.	Min.	Max.	Min.	Max.	
2.5 V SSTL2 Class II I/O Module Timing								
t _{DP}	Input Buffer		1.89		2.16		2.53	ns
t _{PY}	Output Buffer		2.39		2.72		3.20	ns
t _{ICLKQ}	Clock-to-Q for the I/O input register		0.67		0.77		0.90	ns
t _{OCLKQ}	Clock-to-Q 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

User Flow

There are two methods of including a PLL in a design:

- The recommended method of using a PLL is to create custom PLL blocks using Microsemi's macro generator, SmartGen, that can be instantiated in a design.
- The alternative method is to instantiate one of the generic library primitives (PLL or PLLFB) into either a schematic or HDL netlist, using inverters for polarity control and tying all unused address and data bits to ground.

Timing Model



Note: t_{PCLK} is the delay in the clock signal

Figure 2-52 • PLL Model

FG484	
AX1000 Function	Pin Number
IO167PB5F15	AA12
IO169NB5F15	AA9
IO169PB5F15	AA10
IO170NB5F15	AB9
IO170PB5F15	AB10
IO171NB5F16	W8
IO171PB5F16	W9
IO172NB5F16	Y8
IO172PB5F16	Y9
IO173NB5F16	U8
IO173PB5F16	U9
IO174NB5F16	AA7
IO174PB5F16	AA8
IO175NB5F16	AB5
IO175PB5F16	AB6
IO176NB5F16	AA5
IO176PB5F16	AA6
IO177NB5F16	AA4
IO177PB5F16	AB4
IO178NB5F16	Y6
IO178PB5F16	Y7
IO179NB5F16	T7
IO179PB5F16	T8
IO180NB5F16	W6
IO180PB5F16	W7
IO181NB5F17	Y4
IO181PB5F17	Y5
IO184NB5F17	AB7
IO187NB5F17	V3
IO187PB5F17	W3
IO188NB5F17	V4
IO188PB5F17	W5
IO192NB5F17	V6
IO192PB5F17	V7
Bank 6	

FG484	
AX1000 Function	Pin Number
IO194NB6F18	V2
IO194PB6F18	W2
IO195NB6F18	U5
IO195PB6F18	T5
IO200NB6F18	T4
IO200PB6F18	U4
IO201NB6F18	P6
IO201PB6F18	R6
IO203NB6F19	U2
IO204NB6F19	T3
IO204PB6F19	U3
IO205NB6F19	P5
IO205PB6F19	R5
IO208NB6F19	V1
IO208PB6F19	W1
IO209NB6F19	P7
IO209PB6F19	R7
IO212NB6F19	P4
IO212PB6F19	R4
IO214NB6F20	P3
IO214PB6F20	R3
IO215NB6F20	M6
IO215PB6F20	N6
IO216NB6F20	R2
IO216PB6F20	T2
IO217NB6F20	T1
IO217PB6F20	U1
IO219NB6F20	M5
IO219PB6F20	N5
IO220NB6F20	P1
IO220PB6F20	R1
IO221NB6F20	N2
IO221PB6F20	P2
IO222NB6F20	M3
IO222PB6F20	N3

FG484	
AX1000 Function	Pin Number
IO223NB6F20	M7
IO223PB6F20	N7
IO224NB6F20	M4
IO224PB6F20	N4
Bank 7	
IO225NB7F21	M2
IO225PB7F21	N1
IO226NB7F21	K2
IO226PB7F21	K1
IO228NB7F21	L3
IO228PB7F21	L2
IO229NB7F21	K5
IO229PB7F21	L5
IO230NB7F21	H1
IO230PB7F21	J1
IO231NB7F21	H2
IO231PB7F21	J2
IO232NB7F21	K4
IO232PB7F21	K3
IO233NB7F21	K6
IO233PB7F21	L6
IO234NB7F21	F1
IO234PB7F21	G1
IO235NB7F21	F2
IO235PB7F21	G2
IO236NB7F22	H3
IO236PB7F22	J3
IO237NB7F22	K7
IO237PB7F22	L7
IO241NB7F22	H6
IO241PB7F22	J6
IO242NB7F22	H4
IO242PB7F22	J4
IO243NB7F22	H5
IO243PB7F22	J5

FG676	
AX500 Function	Pin Number
IO51NB2F4	L20
IO51PB2F4	L21
IO52NB2F5	K26
IO52PB2F5	J26
IO53NB2F5	L23
IO53PB2F5	L22
IO54NB2F5	L24
IO54PB2F5	K24
IO55NB2F5	M20
IO55PB2F5	M21
IO56NB2F5	L26
IO56PB2F5	L25
IO57NB2F5	M23
IO57PB2F5	M22
IO58NB2F5	M26
IO58PB2F5	M25
IO59NB2F5	N22
IO59PB2F5	N23
IO60NB2F5	N24
IO60PB2F5	M24
IO61NB2F5	N20
IO61PB2F5	N21
IO62NB2F5	P25
IO62PB2F5	N25
Bank 3	
IO63NB3F6	T26
IO63PB3F6	R26
IO64NB3F6	R24
IO64PB3F6	P24
IO65NB3F6	P20
IO65PB3F6	P21
IO66NB3F6	T25
IO66PB3F6	R25
IO67NB3F6	T23
IO67PB3F6	R23

FG676	
AX500 Function	Pin Number
IO68NB3F6	V26
IO68PB3F6	U26
IO69NB3F6	V25
IO69PB3F6	U25
IO70NB3F6	Y25
IO70PB3F6	W25
IO71NB3F6	W24
IO71PB3F6	V24
IO72NB3F6	V23
IO72PB3F6	U23
IO73NB3F6	T21
IO73PB3F6	T20
IO74NB3F7	AA26
IO74PB3F7	Y26
IO75NB3F7	AA24
IO75PB3F7	Y24
IO76NB3F7	Y23
IO76PB3F7	W23
IO77NB3F7	V21
IO77PB3F7	U21
IO78NB3F7	AB25
IO78PB3F7	AA25
IO79NB3F7	AC26
IO79PB3F7	AB26
IO80NB3F7	AC24
IO80PB3F7	AB24
IO81NB3F7	AB23
IO81PB3F7	AA23
IO82NB3F7	AA22
IO82PB3F7	Y22
IO83NB3F7	AE26
IO83PB3F7	AD26
Bank 4	
IO84NB4F8	AB21
IO84PB4F8	AA21

FG676	
AX500 Function	Pin Number
IO85NB4F8	AE23
IO85PB4F8	AE24
IO86NB4F8	AC21
IO86PB4F8	AC22
IO87NB4F8	AF22
IO87PB4F8	AF23
IO88NB4F8	AD22
IO88PB4F8	AD23
IO89NB4F8	AC19
IO89PB4F8	AC20
IO90NB4F8	AE21
IO90PB4F8	AE22
IO91NB4F8	AA17
IO91PB4F8	AA18
IO92NB4F8	AD20
IO92PB4F8	AD21
IO93NB4F8	AF20
IO93PB4F8	AF21
IO94NB4F9	AE19
IO94PB4F9	AE20
IO95NB4F9	AC17
IO95PB4F9	AC18
IO96NB4F9	AD18
IO96PB4F9	AD19
IO97NB4F9	AA16
IO97PB4F9	Y16
IO98NB4F9	AE17
IO98PB4F9	AE18
IO99NB4F9	AC16
IO99PB4F9	AB16
IO100NB4F9	AF17
IO100PB4F9	AF18
IO101NB4F9	AA15
IO101PB4F9	Y15
IO102NB4F9	AC15

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

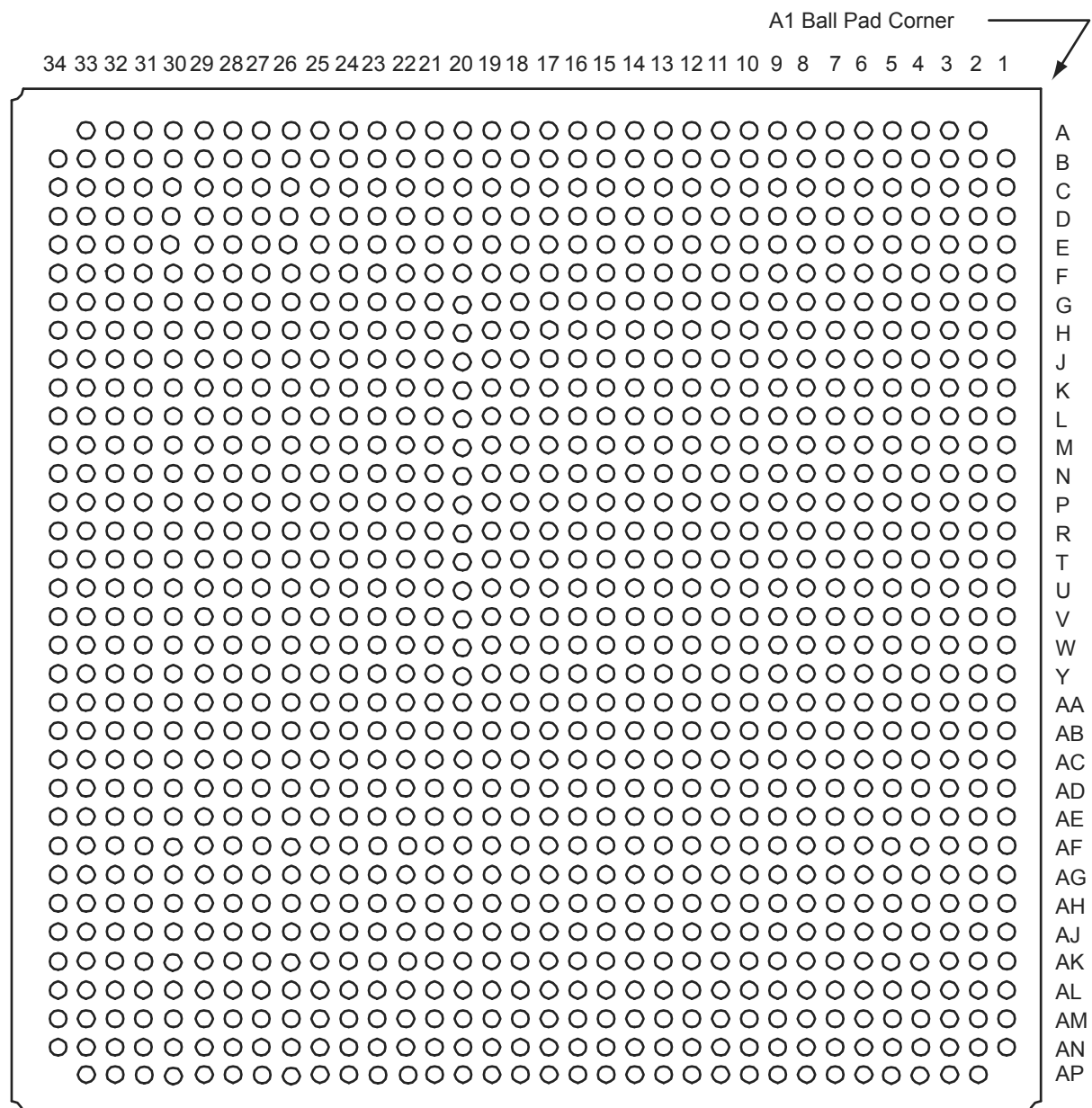
FG676	
AX500 Function	Pin Number
VCCIB7	L8
VCCIB7	M8
VCCIB7	N8
VCCPLA	E12
VCCPLB	F13
VCCPLC	E15
VCCPLD	G14
VCCPLE	AF15
VCCPLF	AA14
VCCPLG	AF12
VCCPLH	AB13
VCOMPLA	D12
VCOMPLB	G13
VCOMPLC	D15
VCOMPLD	F14
VCOMPLE	AD15
VCOMPLF	AB14
VCOMPLG	AD12
VCOMPLH	Y13
VPUMP	E22

FG896	
AX2000 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	
AX2000 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	
AX2000 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

FG1152



Note

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

FG1152		FG1152		FG1152	
AX2000 Function	Pin Number	AX2000 Function	Pin Number	AX2000 Function	Pin Number
IO51PB1F4	J20	IO69NB1F6	C27	IO86NB2F8	J28
IO52NB1F4	B20	IO69PB1F6	C26	IO86PB2F8	J27
IO52PB1F4	A20	IO70NB1F6	H24	IO87NB2F8	M25
IO53NB1F4	F20	IO70PB1F6	G24	IO87PB2F8	L25
IO53PB1F4	E20	IO71NB1F6	H23	IO88NB2F8	L26
IO54NB1F5	B21	IO71PB1F6	G23	IO88PB2F8	K26
IO54PB1F5	A21	IO72NB1F6	B28	IO89NB2F8	G31
IO55NB1F5	K21	IO72PB1F6	A28	IO89PB2F8	F31
IO55PB1F5	J21	IO73NB1F6	E26	IO90NB2F8	H29
IO56NB1F5	D21	IO73PB1F6	E25	IO90PB2F8	G29
IO56PB1F5	C21	IO74NB1F6	F26	IO91NB2F8	K28
IO57NB1F5	G22	IO74PB1F6	F25	IO91PB2F8	K27
IO57PB1F5	G21	IO75NB1F6	K25	IO92NB2F8	J30
IO58NB1F5	E22	IO75PB1F6	K24	IO92PB2F8	H30
IO58PB1F5	E21	IO76NB1F7	D27	IO93NB2F8	L28
IO59NB1F5	D22	IO76PB1F7	D26	IO93PB2F8	L27
IO59PB1F5	C22	IO77NB1F7	B29	IO94NB2F8	K29
IO60NB1F5	B23	IO77PB1F7	A29	IO94PB2F8	J29
IO60PB1F5	A23	IO78NB1F7	D28	IO95NB2F8	K31
IO61NB1F5	H22	IO78PB1F7	C28	IO95PB2F8	J31
IO61PB1F5	H21	IO79NB1F7	H25	IO96NB2F9	J32
IO62NB1F5	C24	IO79PB1F7	G25	IO96PB2F9	H32
IO62PB1F5	C23	IO80NB1F7	F27	IO97NB2F9	M27
IO63NB1F5	F23	IO80PB1F7	E27	IO97PB2F9	M26
IO63PB1F5	F22	IO81NB1F7	J25	IO98NB2F9	L30
IO64NB1F6	B24	IO81PB1F7	J24	IO98PB2F9	K30
IO64PB1F6	A24	IO82NB1F7	D29	IO99NB2F9	N25
IO65NB1F6	J22	IO82PB1F7	C29	IO99PB2F9	N26
IO65PB1F6	K22	IO83NB1F7	H26	IO100NB2F9	M29
IO66NB1F6	B25	IO83PB1F7	G26	IO100PB2F9	L29
IO66PB1F6	A25	IO84NB1F7	F28	IO101NB2F9	L33
IO67NB1F6	K23	IO84PB1F7	E28	IO101PB2F9	L32
IO67PB1F6	J23	IO85NB1F7	H27	IO102NB2F9	K34
IO68NB1F6	F24	IO85PB1F7	G27	IO102PB2F9	K33
IO68PB1F6	E24	Bank 2		IO103NB2F9	N28

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	
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
Bank 5	
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
Bank 6	
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
Bank 7	
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
Dedicated I/O	
GND	1
GND	9
GND	15

CQ352	
AX2000 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	
AX2000 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

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