XC4000A
Logic Cell Array Family

Product Specifications

Features

- Third Generation Field-Programmable Gate Arrays
  - Abundant flip-flops
  - Flexible function generators
  - On-chip ultra-fast RAM
  - Dedicated high-speed carry-propagation circuit
  - Wide edge decoders (two per edge)
  - Hierarchy of interconnect lines
  - Internal 3-state bus capability
  - Eight global low-skew clock or signal distribution network
- Flexible Array Architecture
  - Programmable logic blocks and I/O blocks
  - Programmable interconnects and wide decoders
- Sub-micron CMOS Process
  - High-speed logic and Interconnect
  - Low power consumption
- Systems-Oriented Features
  - IEEE 1149.1-compatible boundary-scan logic support
  - Programmable output slew rate (4 modes)
  - Programmable input pull-up or pull-down resistors
  - 24-mA sink current per output (48 per pair)
- Configured by Loading Binary File
  - Unlimited reprogrammability
  - Six programming modes
- XACT Development System runs on '386/'486-type PC, NEC PC, Apollo, Sun-4, and Hewlett-Packard 700 Series
  - Interfaces to popular design environments like Viewlogic, Mentor Graphics and OrCAD
  - Fully automatic partitioning, placement and routing
  - Interactive design editor for design optimization
  - 288 macros, 34 hard macros, RAM/ROM compiler

Description

The XC4000A family of FPGAs offers four devices at the low end of the XC4000 family complexity range. XC4000A differs from XC4000 in four areas: fewer routing resources, fewer wide-edge decoders, higher output sink current, and improved output slew-rate control.

- The XC4000 routing structure is optimized for smaller designs, naturally requiring fewer routing resources. The XC4000A devices have four Longlines and four single-length lines per row and column, while the XC4000 devices have six Longlines and eight single-length lines per row and column. This results in a smaller chip area and lower cost per device.
- XC4000A has two wide-edge decoders on every device edge, while the XC4000 has four. All other wide-decoder features are identical in XC4000 and XC4000A.
- XC4000A outputs are specified at 24 mA, sink current, while XC4000 outputs are specified at 12 mA. The source current is the same 4 mA for both families.
- The XC4000A family offers a more sophisticated output slew-rate control structure with four configurable options for each individual output driver: fast, medium fast, medium slow, and slow. Slew-rate control can alleviate ground-bounce problems when multiple outputs switch simultaneously, and it can reduce or eliminate crosstalk and transmission-line effects on printed circuit boards.

Note that the XC4003 and XC4005 devices are available in both flavors, the lower-priced XC4003A/XC4005A with reduced routing, and the higher-priced XC4003/XC4005 with more abundant routing resources. The XC4000A devices are intended for less demanding and more structured designs, and the XC4000 devices for more random designs requiring additional routing resources.

The equivalent devices are pin-compatible and are available in identical packages, but they are not bitstream compatible. In order to move from a XC4000A to a XC4000, or vice versa, the design must be recompiled.

Table 1. The XC4000A Family of Field-Programmable Gate Arrays

Device	XC4002A	XC4003A	XC4004A	XC4005A
Appr. Gate Count	2,000	3,000	4,000	5,000
CLB Matrix	8 x 8	10 x 10	12 x 12	14 x 14
Number of CLBs	64	100	144	196
Number of Flip-Flops	256	360	480	616
Max Decode Inputs (per side)	24	30	36	42
Max RAM Bits	2,048	3,200	4,608	6,272
Number of IOBs	64	80	96	112

Absolute Maximum Ratings

Symbol	Description		Units
V_{CC}	Supply voltage relative to GND	–0.5 to +7.0	V
V_{IN}	Input voltage with respect to GND	–0.5 to V_{CC} +0.5	V
V_{TS}	Voltage applied to 3-state output	–0.5 to V_{CC} +0.5	V
T_{STG}	Storage temperature (ambient)	–65 to + 150	°C
T_{SOL}	Maximum soldering temperature (10 s @ 1/16 in. = 1.5 mm)	+ 260	°C
T_J	Junction temperature	+ 150	°C

Note: Stresses beyond those listed under Absolute Maximum Ratings may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those listed under Recommended Operating Conditions is not implied. Exposure to Absolute Maximum Ratings conditions for extended periods of time may affect device reliability.

Operating Conditions

Symbol	Description	Min	Max	Units
V_{CC}	Supply voltage relative to GND Commercial 0°C to 85°C junction	4.75	5.25	V
	Supply voltage relative to GND Industrial -40°C to 100°C junction	4.5	5.5	V
	Supply voltage relative to GND Military –55°C to 125°C case	4.5	5.5	V
V_{IH}	High-level input voltage (XC4000 has TTL-like input thresholds)	2.0	V_{CC}	V
V_{IL}	Low-level input voltage (XC4000 has TTL-like input thresholds)	0	0.8	V
T_{IN}	Input signal transition time		250	ns

At junction temperatures above those listed as Operating conditions, all delay parameters increase by 0.35% per °C.

DC Characteristics Over Operating Conditions

Symbol	Description	Min	Max	Units
V_{OH}	High-level output voltage @ I_{OH} = –4.0 mA, V_{CC} min	2.4		V
V_{OL}	Low-level output voltage @ I_{OL} = 24 mA, V_{CC} min (Note 1)		0.4	V
I_{CCO}	Quiescent LCA supply current (Note 2)		10	mA
I_{IL}	Leakage current	–10	+10	µA
C_{IN}	Input capacitance (sample tested)		15	pF
I_{RIN}	Pad pull-up (when selected) @ V_{IN} = 0V (sample tested)	0.02	0.25	mA
I_{RLL}	Horizontal Long Line pull-up (when selected) @ logic Low	0.2	2.5	mA

Note: 1. With 50% of the outputs simultaneously sinking 24 mA.
2. With no output current loads, no active input or longline pull-up resistors, all package pins at V_{CC} or GND, and the LCA configured with a MakeBits tie option.

Wide Decoder Switching Characteristic Guidelines

Testing of the switching parameters is modeled after testing methods specified by MIL-M-38510/605. All devices are 100% functionally tested. Since many internal timing parameters cannot be measured directly, there derived from benchmark timing patterns. The following guidelines relflect worst-case values over the recommended operating conditions. For more detailed, more precise, and more up-to-date timing information, use the values provided by the XACT timing calculator and used in the simulator.

Speed Grade			-6	-5	-4	
Description	**Symbol**	**Device**	**Max**	**Max**	**Max**	**Units**
Full length, both pull-ups, inputs from IOB I-pins	T_{WAF}	XC4002A	8.5	7.5		ns
		XC4003A	9.0	8.0	5.0	ns
		XC4004A	9.5	8.5		ns
		XC4005A	10.0	9.0	6.0	ns
Full length, both pull-ups inputs from internal logic	T_{WAFL}	XC4002A	11.5	10.5		ns
		XC4003A	12.0	11.0	7.0	ns
		XC4004A	12.5	11.5		ns
		XC4005A	13.0	12.0	8.0	ns
Half length, one pull-up inputs from IOB I-pins	T_{WAO}	XC4002A	8.5	7.5		ns
		XC4003A	9.0	8.0	6.0	ns
		XC4004A	9.5	8.5		ns
		XC4005A	10.0	9.0	7.0	ns
Half length, one pull-up inputs from internal logic	T_{WAOL}	XC4002A	11.5	10.5		ns
		XC4003A	12.0	11.0	8.0	ns
		XC4004A	12.5	11.5		ns
		XC4005A	13.0	12.0	9.0	ns

Note: These delays are specified from the decoder input to the decoder output. For pin-to-pin delays, add the input delay (T_{PID}) and output delay (one of 4 modes), as listed on page 2-70.

Global Buffer Switching Characteristic Guidelines

Testing of the switching parameters is modeled after testing methods specified by MIL-M-38510/605. All devices are 100% functionally tested. Since many internal timing parameters cannot be measured directly, they are derived from benchmark timing patterns. The following guidelines reflect worst-case values over the recommended operating conditions. For more detailed, more precise, and more up-to-date timing information, use the values provided by the XACT timing calculator and used in the simulator.

Speed Grade			-6	-5	-4	
Description	**Symbol**	**Device**	**Max**	**Max**	**Max**	**Units**
Global Signal Distribution						
From pad through **primary** buffer, to any clock k	T_{PG}	XC4002A	7.7	5.7		ns
		XC4003A	7.8	5.8	5.1	ns
		XC4004A	7.9	5.9		ns
		XC4005A	8.0	6.0	5.5	ns
From pad through **secondary** buffer, to any clock k	T_{SG}	XC4002A	8.7	6.7		ns
		XC4003A	8.8	6.8	6.3	ns
		XC4004A	8.9	6.9		ns
		XC4005A	9.0	7.0	6.7	ns

Horizontal Longline Switching Characteristic Guidelines

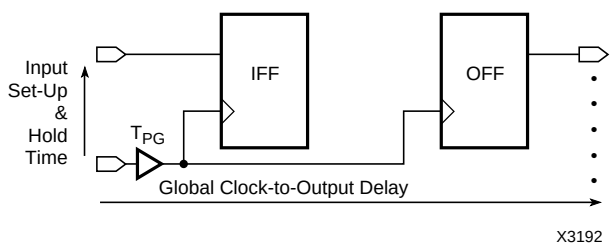
Testing of the switching parameters is modeled after testing methods specified by MIL-M-38510/605. All devices are 100% functionally tested. Since many internal timing parameters cannot be measured directly, they are derived from benchmark timing patterns. The following guidelines reflect worst-case values over the recommended operating conditions. For more detailed, more precise, and more up-to-date timing information, use the values provided by the XACT timing calculator and used in the simulator.

	Speed Grade		-6	-5	-4	
Description	**Symbol**	**Device**	**Max**	**Max**	**Max**	**Units**
TBUF driving a Horizontal Longline (L.L.) I going High or Low to L.L. going High or Low, while T is Low, i.e. buffer is constantly active	T_{IO1}	XC4002A XC4003A XC4004A XC4005A	8.2 8.8 9.4 10.0	6.0 6.2 6.6 7.0	 4.4 5.5	ns ns ns ns
I going Low to L.L. going from resistive pull-up High to active Low, (TBUF configured as open drain)	T_{IO2}	XC4002A XC4003A XC4004A XC4005A	8.7 9.3 9.9 10.5	6.5 6.7 7.1 7.5	 5.0 6.0	ns ns ns ns
T going Low to L.L. going from resistive pull-up or floating High to active Low, (TUBF configured as open drain)	T_{ON}	XC4002A XC4003A XC4004A XC4005A	10.1 10.7 11.4 12.0	8.4 9.0 9.5 10.0	 7.2 8.0	ns ns ns ns
T going High to TBUF going inactive, not driving L.L.	T_{OFF}	All devices	3.0	2.0	1.8	ns
T going High to L.L. going from Low to High, pulled up by a single resistor	T_{PUS}	XC4002A XC4003A XC4004A XC4005A	23.0 24.0 25.0 26.0	19.0 20.0 21.0 22.0	 14.0 16.0	ns ns ns ns
T going High to L.L. going from Low to High, pulled up by two resistors	T_{PUF}	XC4002A XC4003A XC4004A XC4005A	10.5 11.0 11.5 12.0	8.5 9.0 9.5 10.0	 7.0 8.0	ns ns ns ns

Guaranteed Input and Output Parameters (Pin-to-Pin)

All values listed below are tested directly. and guaranteed over the operating conditions. The same parameters can also be derived indirectly from the IOB and Global Buffer specifications. The XACT delay calculator uses this indirect method. When there is a discrepancy between these two methods, the directly tested values listed below should be used, and the derived values should be ignored.

	Speed Grade		-6	-5	-4	
Description	**Symbol**	**Device**				**Units**
Global Clock to Output (fast)	T_{ICKOF}	XC4002A	14.9	12.2		ns
		XC4003A	15.1	12.5	11.6	ns
	(Max)	XC4004A	15.3	12.8		ns
		XC4005A	15.5	13.0	12.0	ns
Global Clock to Output (slew limited)	T_{ICKO}	XC4002A	19.9	15.2		ns
		XC4003A	20.1	15.5	14.6	ns
	(Max)	XC4004A	20.3	15.8		ns
		XC4005A	20.5	16.0	15.0	ns
Input Set-up Time, using IFF (no delay)	T_{PSUF}	XC4002A	2.6	2.3		ns
		XC4003A	2.4	2.0	1.6	ns
	(Min)	XC4004A	2.2	1.7		ns
		XC4005A	2.0	1.5	1.2	ns
Input Hold time, using IFF (no delay)	T_{PHF}	XC4002A	4.9	3.7		ns
		XC4003A	5.1	4.0	4.0	ns
	(Min)	XC4004A	5.3	4.3		ns
		XC4005A	5.5	4.5	4.5	ns
Input Set-up Time, using IFF (with delay)	T_{PSU}	XC4002A	21.8	18.8		ns
		XC4003A	21.5	18.5	12.0	ns
	(Min)	XC4004A	21.2	18.2		ns
		XC4005A	21.0	18.0	12.0	ns
Input Hold Time, using IFF (with delay)	T_{PH}	XC4002A	0	0		ns
		XC4003A	0	0	0	ns
	(Min)	XC4004A	0	0		ns
		XC4005A	0	0	0	ns



Timing is measured at pin threshold, with 50 pF external capacitive loads (incl. test fixture). When testing fast outputs, only one output switches. When testing slew-rate limited outputs, half the number of outputs on one side of the device are switching. These parameter values are tested and guaranteed for worst-case conditions of supply voltage and temperature, and also with the most unfavorable clock polarity choice.

T_{PDLI} for -4 Speed Grade

Pad to I1, I2 via transparent latch, with delay	XC4003A	17.6 ns
	XC4005A	17.9 ns

PRELIMINARY

See page 2-76

T_{PICKD} for -4 Speed Grade

Input set-up time pad to clock (IK) with delay	XC4003A	15.6 ns
	XC4005A	15.9 ns

PRELIMINARY

X6091

IOB Switching Characteristic Guidelines

Testing of the switching parameters is modeled after testing methods specified by MIL-M-38510/605. All devices are 100% functionally tested. Since many internal timing parameters cannot be measured directly, they are derived from benchmark timing patterns. The following guidelines reflect worst-case values over the recommended operating conditions. For more detailed, more precise, and more up-to-date timing information, use the values provided by the XACT timing calculator and used in the simulator.

		-6		-5		XC4003A XC4005A -4		
Description	**Symbol**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**Units**
INPUT								
Propagation Delays								
Pad to I1, I2	T_{PID}		4.0		3.0		2.8	ns
Pad to I1, I2, via transparent latch (no delay)	T_{PLI}		8.0		7.0		6.0	ns
Pad to I1, I2, via transparent latch (with delay)	T_{PDLI}		26.0		24.0		**	ns
Clock (IK) toI1, I2, (flip-flop)	T_{IKRI}		8.0		7.0		6.0	ns
Clock (IK) to I1, I2 (latch enable, active Low)	T_{IKLI}		8.0		7.0		6.0	ns
Set-up Time (Note 3)								
Pad to Clock (IK), no delay	T_{PICK}	7.0		6.0		4.0		ns
Pad to Clock (IK) with delay	T_{PICKD}	25.0		24 .0		**		ns
Hold Time (Note 3)								
Pad to Clock (IK), no delay	T_{IKPI}	1.0		1.0		1.0		ns
Pad to Clock (IK) with delay	T_{IKPID}	neg		neg		neg		ns
OUTPUT								
Propagation Delays								
Clock (OK) to Pad (fast)	T_{OKPOF}		7.5		7.0		6.5	ns
Output (O) to Pad (fast)	T_{OPF}		9.0		7.0		5.5	ns
3-state to Pad begin hi-Z (slew-rate independent)	T_{TSHZ}		9.0		7.0		6.5	ns
3-state to Pad active and valid (fast)	T_{TSONF}		13.0		10.0		9.5	ns
Additional Delay								
For medium fast outputs			2.0		1.5		1.0	ns
For medium slow outputs			4.0		3.0		2.0	ns
For slow outputs			6.0		4.5		3.0	ns
Set-up and Hold Times								
Output (O) to clock (OK) set-up time	T_{OOK}	8.0		6.0		5.5		ns
Output (O) to clock (OK) hold time	T_{OKO}	0.0		0.0		0		ns
Clock								
Clock High or Low time	T_{CH}/T_{CL}	5.0		4.0		4.0		ns
Global Set/Reset								
Delay from GSR net through Q to I1, I2	T_{RRI}		14.5		13.5		13.5	ns
Delay from GSR net to Pad	T_{RPO}		18.0		17.0		14.6	ns
GSR width*	T_{MRW}	21.0		18.0		18.0		ns

* Timing is based on the XC4005. For other devices see XACT timing calculator.
** See preceding page.

Notes: 1. Timing is measured at pin threshold, with 50 pF external capacitive loads (incl. test fixture).

2. Voltage levels of unused (bonded and unbonded) pads must be valid logic levels. Each can be configured with the internal pull-up or pull-down resistor or alternatively configured as a driven output or be driven from an external source.

3. Input pad setup times and hold times are specified with respect to the internal clock (IK). To calculate system setup time, subtract clock delay (clock pad to IK) from the specified input pad setup time value, but do not subtract below zero. Negative hold time means that the delay in the input data is adequate for the **external system hold time** to be zero, provided the input clock uses the Global signal distribution from pad to IK.

CLB Switching Characteristic Guidelines

Testing of the switching parameters is modeled after testing methods specified by MIL-M-38510/605. All devices are 100% functionally tested. Since many internal timing parameters cannot be measured directly, they are derived from benchmark timing patterns. The following guidelines reflect worst-case values over the recommended operating conditions. For more detailed, more precise, and more up-to-date timing information, use the values provided by the XACT timing calculator and used in the simulator.

Speed Grade		-6		-5		XC4003A XC4005A -4		
Description	**Symbol**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**Units**
Combinatorial Delays								
F/G inputs to X/Y outputs	T_{ILO}		6.0		4.5		4.0	ns
F/G inputs via H' to X/Y outputs	T_{IHO}		8.0		7.0		6.0	ns
C inputs via H' to X/Y outputs	T_{HHO}		7.0		5.0		4.5	ns
CLB Fast Carry Logic								
Operand inputs (F1,F2,G1,G4) to C_{OUT}	T_{OPCY}		7.0		5.5		5.0	ns
Add/Subtract input (F3) to C_{OUT}	T_{ASCY}		8.0		6.0		5.5	ns
Initialization inputs (F1,F3) to C_{OUT}	T_{INCY}		6.0		4.0		3.5	ns
C_{IN} through function generators to X/Y outputs	T_{SUM}		8.0		6.0		5.5	ns
C_{IN} to C_{OUT}, bypass function generators.	T_{BYP}		2.0		1.5		1.5	ns
Sequential Delays								
Clock K to outputs Q	T_{CKO}		5.0		3.0		3.0	ns
Set-up Time before Clock K								
F/G inputs	T_{ICK}	6.0		4.5		4.5		ns
F/G inputs via H'	T_{IHCK}	8.0		6.0		6.0		ns
C inputs via H1	T_{HHCK}	7.0		5.0		5.0		ns
C inputs via DIN	T_{DICK}	4.0		3.0		3.0		ns
C inputs via EC	T_{ECCK}	7.0		4.0		3.0		ns
C inputs via S/R, going Low (inactive)	T_{RCK}	6.0		4.5		4.0		ns
C_{IN} input via F'/G'		8.0		6.0		5.5		ns
C_{IN} input via F'/G' and H'		10.0		7.5		7.3		ns
Hold Time after Clock K								
F/G inputs	T_{CKI}	0		0		0		ns
F/G inputs via H'	T_{CKIH}	0		0		0		ns
C inputs via H1	T_{CKHH}	0		0		0		ns
C inputs via DIN	T_{CKDI}	0		0		0		ns
C inputs via EC	T_{CKEC}	0		0		0		ns
C inputs via S/R, going Low (inactive)	T_{CKR}	0		0		0		ns
Clock								
Clock High time	T_{CH}	5.0		4.0		4.0		ns
Clock Low time	T_{CL}	5.0		4.0		4.0		ns
Set/Reset Direct								
Width (High)	T_{RPW}	5.0		4.0		4.0		ns
Delay from C inputs via S/R, going High to Q	T_{RIO}		9.0		8.0		7.0	ns
Master Set/Reset*								
Width (High or Low)	T_{MRW}	21.0		18.0		18.0		ns
Delay from Global Set/Reset net to Q	T_{MRQ}		33.0		31.0		28.0	ns

* Timing is based on the XC4005. For other devices see XACT timing calculator.

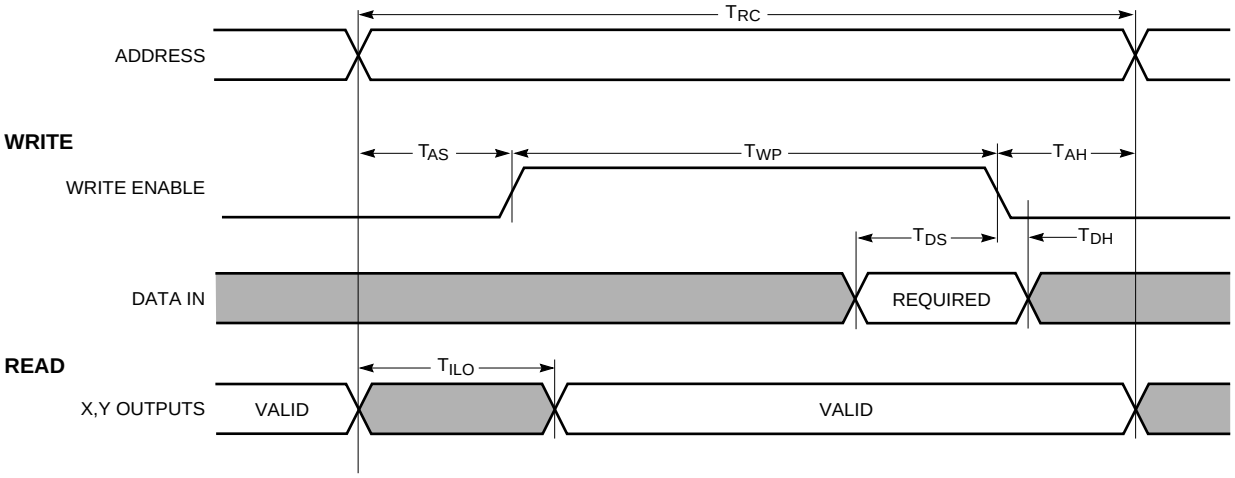
CLB Switching Characteristic Guidelines (continued)

Testing of the switching parameters is modeled after testing methods specified by MIL-M-38510/605. All devices are 100% functionally tested. Since many internal timing parameters cannot be measured directly, they are derived from benchmark timing patterns. The following guidelines reflect worst-case values over the recommended operating conditions. For more detailed, more precise, and more up-to-date timing information, use the values provided by the XACT timing calculator and used in the simulator.

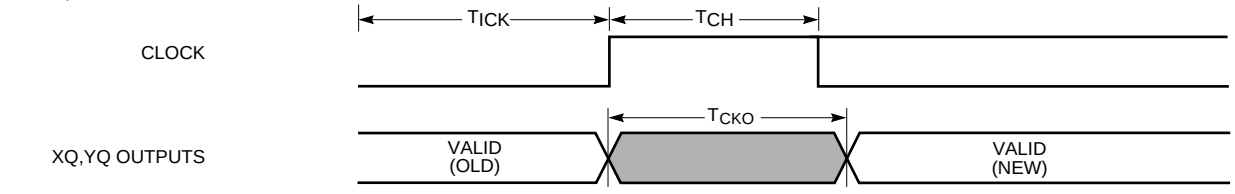
CLB RAM OPTION	Speed Grade		-6		-5		XC4003A XC4005A -4		
Description	**Symbol**		**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**Units**
Write Operation									
Address write cycle time	16 x 2	T_{WC}	9.0		8.0		8.0		ns
	32 x 1	T_{WCT}	9.0		8.0		8.0		ns
Write Enable pulse width (High)	16 x 2	T_{WP}	5.0		4.0		4.0		ns
	32 x 1	T_{WPT}	5.0		4.0		4.0		ns
Address set-up time before beginning of WE	16 x 2	T_{AS}	2.0		2.0		2.0		ns
	32 x 1	T_{AST}	2.0		2.0		2.0		ns
Address hold time after end of WE	16 x 2	T_{AH}	2.0		2.0		2.0		ns
	32 x 1	T_{AHT}	2.0		2.0		2.0		ns
DIN set-up time before end of WE	16 x 2	T_{DS}	4.0		4.0		4.0		ns
	32 x 1	T_{DST}	5.0		5.0		5.0		ns
DIN hold time after end of WE	both	T_{DHT}	2.0		2.0		2.0		ns
Read Operation									
Address read cycle time	16 x 2	T_{RC}	7.0		5.5		5.0		ns
	32 x 1	T_{RCT}	10.0		7.5		7.0		ns
Data valid after address change	16 x 2	T_{ILO}		6.0		4.5		4.0	ns
(no Write Enable)	32 x 1	T_{IHO}		8.0		7.0		6.0	ns
Read Operation, Clocking Data into Flip-Flop									
Address setup time before clock K	16 x 2	T_{ICK}	6.0		4.5		4.5		ns
	32 x 1	T_{IHCK}	8.0		6.0		6.0		ns
Read During Write									
Data valid after WE going active	16 x 2	T_{WO}		12.0		10.0		9.0	ns
(DIN stable before WE)	32 x 1	T_{WOT}		15.0		12.0		11.0	ns
Data valid after DIN	16 x 2	T_{DO}		11.0		9.0		8.5	ns
(DIN change during WE)	32 x 1	T_{DOT}		14.0		11.0		11.0	ns
Read During Write, Clocking Data into Flip-Flop									
WE setup time before clock K	16 x 2	T_{WCK}	12.0		10.0		9.5		ns
	32 x 1	T_{WCKT}	15.0		12.0		11.5		ns
Data setup time before clock K	16 x 2	T_{DCK}	11.0		9.0		9.0		ns
	32 x 1	T_{DCKT}	14.0		11.0		11.0		ns

Note: Timing for the 16 x 1 RAM option is identical to 16 x 2 RAM timing

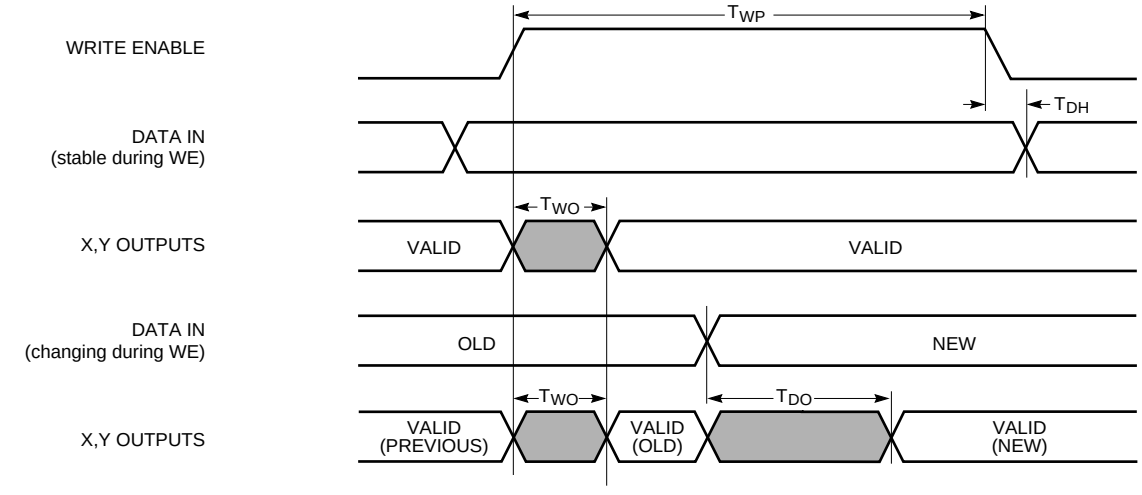
CLB RAM Timing Characteristics



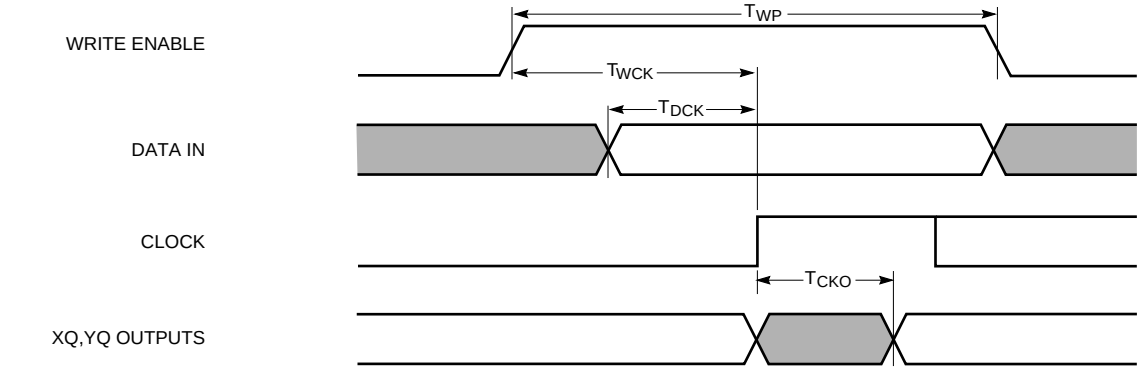
READ, CLOCKING DATA INTO FLIP-FLOP



READ DURING WRITE



READ DURING WRITE, CLOCKING DATA INTO FLIP-FLOP



X2640

XC4002A Pinouts

Pin Description	PC84	PQ100	VQ100	PG120	Bound Scan
VCC	2	92	89	G3	–
I/O (A8)	3	93	90	G1	26
I/O (A9)	4	94	91	F1	29
–	–	95*	92*	E1*	–
–	–	96*	93*	F2*	–
I/O (A10)	5	97	94	F3	32
I/O (A11)	6	98	95	D1	35
–	–	–	–	E2*	–
I/O (A12)	7	99	96	C1	38
I/O (A13)	8	100	97	D2	41
–	–	–	–	E3*	–
–	–	–	–	B1*	–
I/O (A14)	9	1	98	C2	44
SGCK1 (A15, I/O)	10	2	99	D3	47
VCC	11	3	100	C3	–
GND	12	4	1	C4	–
PGCK1 (A16, I/O)	13	5	2	B2	50
I/O (A17)	14	6	3	B3	53
–	–	–	–	A1*	–
–	–	–	–	A2*	–
I/O (TDI)	15	7	4	C5	56
I/O (TCK)	16	8	5	B4	59
–	–	–	–	A3*	–
I/O (TMS)	17	9	6	B5	62
I/O	18	10	7	A4	65
–	–	–	–	C6*	–
–	–	11*	8*	A5*	–
I/O	19	12	9	B6	68
I/O	20	13	10	A6	71
GND	21	14	11	B7	–
VCC	22	15	12	C7	–
I/O	23	16	13	A7	74
I/O	24	17	14	A8	77
–	–	18*	15*	A9*	–
–	–	–	–	B8*	–
I/O	25	19	16	C8	80
I/O	26	20	17	A10	83
I/O	27	21	18	B9	86
I/O	–	22	19	A11	89
–	–	–	–	B10*	–

Pin Description	PC84	PQ100	VQ100	PG120	Bound Scan
I/O	28	23	20	C9	92
SGCK2 (I/O)	29	24	21	A12	95
O (M1)	30	25	22	B11	98
GND	31	26	23	C10	–
I (M0)	32	27	24	C11	101†
VCC	33	28	25	D11	–
I (M2)	34	29	26	B12	102†
PGCK2 (I/O)	35	30	27	C12	103
I/O (HDC)	36	31	28	A13	106
–	–	–	–	B13*	–
–	–	–	–	E11*	–
I/O	–	32	29	D12	109
I/O (LDC)	37	33	30	C13	112
I/O	38	34	31	E12	115
I/O	39	35	32	D13	118
–	–	36*	33*	F11*	–
–	–	37*	34*	E13*	–
I/O	40	38	35	F12	121
I/O (ERR, INIT)	41	39	36	F13	124
VCC	42	40	37	G12	–
GND	43	41	38	G11	–
I/O	44	42	39	G13	127
I/O	45	43	40	H13	130
–	–	44*	41*	J13*	–
–	–	45*	42*	H12*	–
I/O	46	46	43	H11	133
I/O	47	47	44	K13	136
I/O	48	48	45	J12	139
I/O	49	49	46	L13	142
–	–	–	–	K12*	–
–	–	–	–	J11*	–
I/O	50	50	47	M13	145
SGCK3 (I/O)	51	51	48	L12	148
GND	52	52	49	K11	–
DONE	53	53	50	L11	–
VCC	54	54	51	L10	–
PROG	55	55	52	M12	–
I/O (D7)	56	56	53	M11	151
PGCK3 (I/O)	57	57	54	N13	154
–	–	–	–	N12*	–

Pin Description	PC84	PQ100	VQ100	PG120	Bound Scan
–	–	–	–	L9	–
I/O (D6)	58	58	55	M10	157
I/O	–	59	56	N11	160
I/O (D5)	59	60	57	M9	163
I/O (CSO)	60	61	58	N10	166
–	–	62*	59*	L8*	–
–	–	63*	60*	N9*	–
I/O (D4)	61	64	61	M8	169
I/O	62	65	62	N8	172
VCC	63	66	63	M7	–
GND	64	67	64	L7	–
I/O (D3)	65	68	65	N7	175
I/O (RS)	66	69	66	N6	178
–	–	70*	67*	N5*	–
–	–	–	–	M6*	–
I/O (D2)	67	71	68	L6	181
I/O	68	72	69	N4	184
I/O (D1)	69	73	70	M5	187
I/O (RCLK-BUSY/RDY)	70	74	71	N3	190
–	–	–	–	M4*	–
–	–	–	–	L5*	–
I/O (D0, DIN)	71	75	72	N2	193
SGCK4 (DOUT, I/O)	72	76	73	M3	196
CCLK	73	77	74	L4	–
VCC	74	78	75	L3	–
O (TDO)	75	79	76	M2	–
GND	76	80	77	K3	–
I/O (A0, WS)	77	81	78	L2	2
PGCK4 (I/O,A1)	78	82	79	N1	5
–	–	–	–	M1*	–
–	–	–	–	J3*	–
I/O (CS1, A2)	79	83	80	K2	8
I/O (A3)	80	84	81	L1	11
I/O (A4)	81	85	82	J2	14
I/O (A5)	82	86	83	K1	17
–	–	87*	84*	H3*	–
–	–	88*	85*	J1*	–
I/O (A6)	83	89	86	H2	20
I/O (A7)	84	90	87	H1	23
GND	1	91	88	G2	–

* Indicates unconnected package pins.
† Contributes only one bit (.i) to the boundary scan register.
Boundary Scan Bit 0 = TDO.T
Boundary Scan Bit 1 = TDO.O
Boundary Scan Bit 199 = BSCANT.UPD

XC4003A Pinouts

Pin Description	PC84	VQ100	PQ100	PG120	Bound Scan
VCC	2	89	92	G3	–
I/O (A8)	3	90	93	G1	32
I/O (A9)	4	91	94	F1	35
I/O	–	92	95	E1	38
I/O	–	93	96	F2	41
I/O (A10)	5	94	97	F3	44
I/O (A11)	6	95	98	D1	47
–	–	–	–	E2*	–
I/O (A12)	7	96	99	C1	50
I/O (A13)	8	97	100	D2	53
–	–	–	–	E3*	–
–	–	–	–	B1*	–
I/O (A14)	9	98	1	C2	56
SGCK1 (A15,I/O)	10	99	2	D3	59
VCC	11	100	3	C3	–
GND	12	1	4	C4	–
PGCK1 (A16, I/O)	13	2	5	B2	62
I/O (A17)	14	3	6	B3	65
–	–	–	–	A1*	–
–	–	–	–	A2*	–
I/O (TDI)	15	4	7	C5	68
I/O (TCK)	16	5	8	B4	71
–	–	–	–	A3*	–
I/O (TMS)	17	6	9	B5	74
I/O	18	7	10	A4	77
I/O	–	–	–	C6	80
I/O	–	8	11	A5	83
I/O	19	9	12	B6	86
I/O	20	10	13	A6	89
GND	21	11	14	B7	–
VCC	22	12	15	C7	–
I/O	23	13	16	A7	92
I/O	24	14	17	A8	95
I/O	–	15	18	A9	98
I/O	–	–	–	B8	101
I/O	25	16	19	C8	104
I/O	26	17	20	A10	107
I/O	27	18	21	B9	110
I/O	–	19	22	A11	113
–	–	–	–	B10*	–
I/O	28	20	23	C9	116
SGCK2 (I/O)	29	21	24	A12	119
O (M1)	30	22	25	B11	122
GND	31	23	26	C10	–
I (M0)	32	24	27	C11	125†
VCC	33	25	28	D11	–
I (M2)	34	26	29	B12	126†
PGCK2 (I/O)	35	27	30	C12	127
I/O (HDC)	36	28	31	A13	130
–	–	–	–	B13*	–
–	–	–	–	E11*	–
I/O	–	29	32	D12	133
I/O (LDC)	37	30	33	C13	136
I/O	38	31	34	E12	139
I/O	39	32	35	D13	142
I/O	–	33	36	F11	145
I/O	–	34	37	E13	148
I/O	40	35	38	F12	151
I/O (ERR, INIT)	41	36	39	F13	154
VCC	42	37	40	G12	–

Pin Description	PC84	VQ100	PQ100	PG120	Bound Scan
GND	43	38	41	G11	–
I/O	44	39	42	G13	157
I/O	45	40	43	H13	160
I/O	–	41	44	J13	163
I/O	–	42	45	H12	166
I/O	46	43	46	H11	169
I/O	47	44	47	K13	172
I/O	48	45	48	J12	175
I/O	49	46	49	L13	178
–	–	–	–	K12*	–
–	–	–	–	J11*	–
I/O	50	47	50	M13	181
SGCK3 (I/O)	51	48	51	L12	184
GND	52	49	52	K11	–
DONE	53	50	53	L11	–
VCC	54	51	54	L10	–
PROG	55	52	55	M12	–
I/O (D7)	56	53	56	M11	187
PGCK3 (I/O)	57	54	57	N13	190
–	–	–	–	N12*	–
–	–	–	–	L9*	–
I/O (D6)	58	55	58	M10	193
I/O	–	56	59	N11	196
I/O (D5)	59	57	60	M9	199
I/O (CS0)	60	58	61	N10	202
I/O	–	59	62	L8	205
I/O	–	60	63	N9	208
I/O (D4)	61	61	64	M8	211
I/O	62	62	65	N8	214
VCC	63	63	66	M7	–
GND	64	64	67	L7	–
I/O (D3)	65	65	68	N7	217
I/O (RS)	66	66	69	N6	220
I/O	–	67	70	N5	223
I/O	–	–	–	M6	226
I/O (D2)	67	68	71	L6	229
I/O	68	69	72	N4	232
I/O (D1)	69	70	73	M5	235
I/O (RCLK-BUSY/RDY)	70	71	74	N3	238
–	–	–	–	M4*	–
–	–	–	–	L5*	–
I/O (D0, DIN)	71	72	75	N2	241
SGCK4 (DOUT, I/O)	72	73	76	M3	244
CCLK	73	74	77	L4	–
VCC	74	75	78	L3	–
O (TDO)	75	76	79	M2	–
GND	76	77	80	K3	–
I/O (A0, WS)	77	78	81	L2	2
PGCK4 (A1, I/O)	78	79	82	N1	5
–	–	–	–	M1*	–
–	–	–	–	J3*	–
I/O (CS1, A2)	79	80	83	K2	8
I/O (A3)	80	81	84	L1	11
I/O (A4)	81	82	85	J2	14
I/O (A5)	82	83	86	K1	17
I/O	–	84	87	H3	20
I/O	–	85	88	J1	23
I/O (A6)	83	86	89	H2	26
I/O (A7)	84	87	90	H1	29
GND	1	88	91	G2	–

* Indicates unconnected package pins.
† Contributes only one bit (.i) to the boundary scan register.
Boundary Scan Bit 0 = TDO.T
Boundary Scan Bit 1 = TDO.O
Boundary Scan Bit 247 = BSCANT.UPD

XC4004A Pinouts

Pin Description	PC84	TQ144	PQ160	PG120	Bound Scan
VCC	2	128	142	G3	–
I/O (A8)	3	129	143	G1	38
I/O (A9)	4	130	144	F1	41
I/O	–	131	145	E1	44
I/O	–	132	146	F2	47
I/O (A10)	5	133	147	F3	50
I/O (A11)	6	134	148	D1	53
–	–	135*	149*	–	–
–	–	136*	150*	–	–
GND	–	137	151	E2	–
–	–	–	152*	–	–
–	–	–	153*	–	–
I/O (A12)	7	138	154	C1	56
I/O (A13)	8	139	155	D2	59
I/O	–	140	156	E3	62
I/O	–	141	157	B1	65
I/O (A14)	9	142	158	C2	68
SGCK1 (A15, I/O)	10	143	159	D3	71
VCC	11	144	160	C3	–
GND	12	1	1	C4	–
PGCK1 (A16, I/O)	13	2	2	B2	74
I/O (A17)	14	3	3	B3	77
I/O	–	4	4	A1	80
I/O	–	5	5	A2	83
I/O (TDI)	15	6	6	C5	86
I/O (TCK)	16	7	7	B4	89
–	–	–	8*	–	–
–	–	–	9*	–	–
GND	–	8	10	A3	–
–	–	9*	11*	–	–
–	–	10*	12*	–	–
I/O (TMS)	17	11	13	B5	92
I/O	18	12	14	A4	95
I/O	–	13	15	C6	98
I/O	–	14	16	A5	101
I/O	19	15	17	B6	104
I/O	20	16	18	A6	107
GND	21	17	19	B7	–
VCC	22	18	20	C7	–
I/O	23	19	21	A7	110
I/O	24	20	22	A8	113
I/O	–	21	23	A9	116
I/O	–	22	24	B8	119
I/O	25	23	25	C8	122
I/O	26	24	26	A10	125
–	–	25*	27*	–	–
–	–	26*	28*	–	–
GND	–	27	29	–	–
–	–	–	30*	–	–
–	–	–	31*	–	–
I/O	27	28	32	B9	128
I/O	–	29	33	A11	131
I/O	–	30	34	B10	134
I/O	–	31	35	–	137

Pin Description	PC84	TQ144	PQ160	PG120	Bound Scan
I/O	28	32	36	C9	140
SGCK2 (I/O)	29	33	37	A12	143
O (M1)	30	34	38	B11	146
GND	31	35	39	C10	–
I (M0)	32	36	40	C11	149†
VCC	33	37	41	D11	–
I (M2)	34	38	42	B12	150†
PGCK2 (I/O)	35	39	43	C12	151
I/O (HDC)	36	40	44	A13	154
I/O	–	41	45	B13	157
I/O	–	42	46	E11	160
I/O	–	43	47	D12	163
I/O (LDC)	37	44	48	C13	166
–	–	–	49*	–	–
–	–	–	50*	–	–
GND	–	45	51	–	–
–	–	46*	52*	–	–
–	–	47*	53*	–	–
I/O	38	48	54	E12	169
I/O	39	49	55	D13	172
I/O	–	50	56	F11	175
I/O	–	51	57	E13	178
I/O	40	52	58	F12	181
I/O (ERR, INIT)	41	53	59	F13	184
VCC	42	54	60	G12	–
GND	43	55	61	G11	–
I/O	44	56	62	G13	187
I/O	45	57	63	H13	190
I/O	–	58	64	J13	193
I/O	–	59	65	H12	196
I/O	46	60	66	H11	199
I/O	47	61	67	K13	202
–	–	62*	68*	–	–
–	–	63*	69*	–	–
GND	–	64	70	–	–
–	–	–	71*	–	–
–	–	–	72*	–	
I/O	48	65	73	J12	205
I/O	49	66	74	L13	201
I/O	–	67	75	K12	211
I/O	–	68	76	J11	214
I/O	50	69	77	M13	217
SGCK3 (I/O)	51	70	78	L12	220
GND	52	71	79	K11	–
DONE	53	72	80	L11	–
VCC	54	73	81	L10	–
PROG	55	74	82	M12	–
I/O (D7)	56	75	83	M11	223
PGCK3 (I/O)	57	76	84	N13	226
I/O	-	77	85	N12	229
I/O	-	78	86	L9	232
I/O (D6)	58	79	87	M10	235
I/O	-	80	88	N11	238
-	-	-	89*	-	–

Pin Description	PC84	TQ144	PQ160	PG120	Bound Scan
–	–	–	90*	–	–
GND	–	81	91	–	–
–	–	82*	92*	–	–
–	–	83*	93*	–	–
I/O (D5)	59	84	94	M9	241
I/O (CSO)	60	85	95	N10	244
I/O	–	86	96	L8	247
I/O	–	87	97	N9	250
I/O (D4)	61	88	98	M8	253
I/O	62	89	99	N8	256
VCC	63	90	100	M7	–
GND	64	91	101	L7	–
I/O (D3)	65	92	102	N7	259
I/O (RS)	66	93	103	N6	262
I/O	–	94	104	N5	265
I/O	–	95	105	M6	268
I/O (D2)	67	96	106	L6	271
I/O	68	97	107	N4	274
–	–	98*	108*	–	–
–	–	99*	109*	–	–
GND	–	100	110	–	–
–	–	–	111*	–	–
–	–	–	112*	–	–
I/O (D1)	69	101	113	M5	277
I/O (**RCLK-BUSY/RDY**)	70	102	114	N3	280
I/O	–	103	115	M4	283
I/O	–	104	116	L5	286
I/O (D0, DIN)	71	105	117	N2	289
SGCK4 (DOUT, I/O)	72	106	118	M3	292
CCLK	73	107	119	L4	–
VCC	74	108	120	L3	–
O (TDO)	75	109	121	M2	–
GND	76	110	122	K3	–
I/O (A0, WS)	77	111	123	L2	2
PGCK4 (I/O,A1)	78	112	124	N1	5
I/O	–	113	125	M1	8
I/O	–	114	126	J3	11
I/O (CS1, A2)	79	115	127	K2	14
I/O (A3)	80	116	128	L1	17
–	–	117*	129*	–	–
–	–	–	130*	–	–
GND	–	118	131	–	–
–	–	119*	132*	–	–
–	–	120*	133*	–	–
I/O (A4)	81	121	134	J2	20
I/O (A5)	82	122	135	K1	23
–	–	–	136*	–	–
I/O	–	123	137	H3	26
I/O	–	124	138	J1	29
I/O (A6)	83	125	139	H2	32
I/O (A7)	84	126	140	H1	35
GND	1	127	141	G2	–

* Indicates unconnected package pins.
† Contributes only one bit (.i) to the boundary scan register.
Boundary Scan Bit 0 = TDO.T
Boundary Scan Bit 1 = TDO.O
Boundary Scan Bit 295 = BSCANT.UPD

XC4005A Pinouts

Pin Description	PC84	TQ144	PQ160	PQ208	PG156	Bound Scan
VCC	2	128	142	183	H3	–
I/O (A8)	3	129	143	184	H1	44
I/O (A9)	4	130	144	185	G1	47
I/O	–	131	145	186	G2	50
I/O	–	132	146	187	G3	53
–	–	–	–	188*	–	–
–	–	–	–	189*	–	–
I/O (A10)	5	133	147	190	F1	56
I/O (A11)	6	134	148	191	F2	59
I/O	–	135	149	192	E1	62
I/O	–	136	150	193	E2	65
GND	–	137	151	194	F3	–
–	–	–	–	195*	–	–
–	–	–	–	196*	–	–
–	–	–	152*	197*	D1*	–
–	–	–	153*	198*	D2*	–
I/O (A12)	7	138	154	199	E3	68
I/O (A13)	8	139	155	200	C1	71
–	–	–	–	–	–	–
I/O	–	140	156	201	C2	74
I/O	–	141	157	202	D3	77
I/O (A14)	9	142	158	203	B1	80
SGCK1 (A15, I/O)	10	143	159	204	B2	83
VCC	11	144	160	205	C3	–
–	–	–	–	206*	–	–
–	–	–	–	207*	–	–
–	–	–	–	208*	–	–
–	–	–	–	1*	–	–
GND	12	1	1	2	C4	–
–	–	–	–	3*	–	–
PGCK1 (A16, I/O)	13	2	2	4	B3	86
I/O (A17)	14	3	3	5	A1	89
I/O	–	4	4	6	A2	92
I/O	–	5	5	7	C5	95
–	–	–	–	–	–	–
I/O (TDI)	15	6	6	8	B4	98
I/O (TCK)	16	7	7	9	A3	101
–	–	–	8*	10*	A4*	–
–	–	–	9*	11*	–	–
–	–	–	–	12*	–	–
–	–	–	–	13*	–	–
GND	–	8	10	14	C6	–
I/O	–	9	11	15	B5	104
I/O	–	10	12	16	B6	107
I/O (TMS)	17	11	13	17	A5	110
I/O	18	12	14	18	C7	113
–	–	–	–	19*	–	–
–	–	–	–	20*	–	–
I/O	–	13	15	21	B7	116
I/O	–	14	16	22	A6	119
I/O	19	15	17	23	A7	122
I/O	20	16	18	24	A8	125
GND	21	17	19	25	C8	–
VCC	22	18	20	26	B8	–
I/O	23	19	21	27	C9	128
I/O	24	20	22	28	B9	131
I/O	–	21	23	29	A9	134
I/O	–	22	24	30	B10	137
–	–	–	–	31*	–	–
–	–	–	–	32*	–	–
I/O	25	23	25	33	C10	140
I/O	26	24	26	34	A10	143
I/O	–	25	27	35	A11	146
I/O	–	26	28	36	B11	149
GND	–	27	29	37	C11	–
–	–	–	–	38*	–	–
–	–	–	–	39*	–	–
–	–	–	30*	40*	A12*	–
–	–	–	31*	41*	–	–
I/O	27	28	32	42	B12	152
I/O	–	29	33	43	A13	155
I/O	–	30	34	44	A14	158

Pin Description	PC84	TQ144	PQ160	PQ208	PG156	Bound Scan
I/O	–	31	35	45	C12	161
–	–	–	–	–	–	–
I/O	28	32	36	46	B13	164
SGCK2 (I/O)	29	33	37	47	B14	167
O (M1)	30	34	38	48	A15	170
GND	31	35	39	49	C13	–
I (M0)	32	36	40	50	A16	173†
–	–	–	–	51*	–	–
–	–	–	–	52*	–	–
–	–	–	–	53*	–	–
–	–	–	–	54*	–	–
VCC	33	37	41	55	C14	–
I (M2)	34	38	42	56	B15	174†
PGCK2 (I/O)	35	39	43	57	B16	175
I/O (HDC)	36	40	44	58	D14	178
I/O	–	41	45	59	C15	181
–	–	–	–	–	–	–
I/O	–	42	46	60	D15	184
I/O	–	43	47	61	E14	187
I/O (LDC)	37	44	48	62	C16	190
–	–	–	49*	63*	E15*	–
–	–	–	50*	64*	D16*	–
–	–	–	–	65*	–	–
–	–	–	–	66*	–	–
GND	–	45	51	67	F14	–
I/O	–	46	52	68	F15	193
I/O	–	47	53	69	E16	196
I/O	38	48	54	70	F16	199
I/O	39	49	55	71	G14	202
–	–	–	–	72*	–	–
–	–	–	–	73*	–	–
I/O	–	50	56	74	G15	205
I/O	–	51	57	75	G16	208
I/O	40	52	58	76	H16	211
I/O (ERR, INIT)	41	53	59	77	H15	214
VCC	42	54	60	78	H14	–
GND	43	55	61	79	J14	–
I/O	44	56	62	80	J15	217
I/O	45	57	63	81	J16	220
I/O	–	58	64	82	K16	223
I/O	–	59	65	83	K15	226
–	–	–	–	84*	–	–
–	–	–	–	85*	–	–
I/O	46	60	66	86	K14	229
I/O	47	61	67	87	L16	232
I/O	–	62	68	88	M16	235
I/O	–	63	69	89	L15	238
GND	–	64	70	90	L14	–
–	–	–	–	91*	–	–
–	–	–	–	92*	–	–
–	–	–	71*	93*	N16*	–
–	–	–	72*	94*	M15*	–
I/O	48	65	73	95	P16	241
I/O	49	66	74	96	M14	244
I/O	–	67	75	97	N15	247
I/O	–	68	76	98	P15	250
I/O	50	69	77	99	N14	253
SGCK3 (I/O)	51	70	78	100	R16	256
GND	52	71	79	101	P14	–
–	–	–	–	102*	–	–
DONE	53	72	80	103	R15	–
–	–	–	–	104*	–	–
–	–	–	–	105*	–	–
VCC	54	73	81	106	P13	–
–	–	–	–	107*	–	–
PROG	55	74	82	108	R14	–
I/O (D7)	56	75	83	109	T16	259
PGCK3 (I/O)	57	76	84	110	T15	262
I/O	–	77	85	111	R13	265
–	–	–	–	–	–	–
I/O	–	78	86	112	P12	268
I/O(D6)	58	79	87	113	T14	271

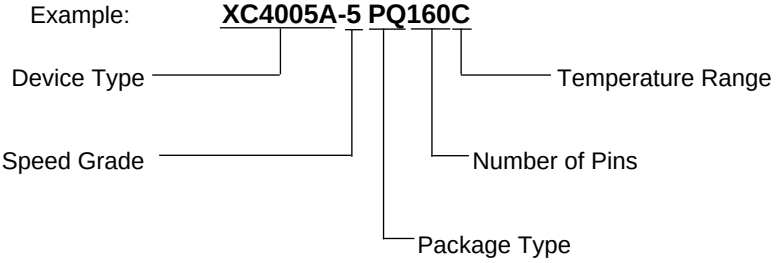
* Indicates unconnected package pins.
† Contributes only one bit (.i) to the boundary scan register.

XC4005A Pinouts (continued)

Pin Descriptions	PC84	TQ144	PQ160	PQ208	PG156	Bound Scan
I/O	–	80	88	114	T13	274
–	–	–	89*	115*	R12*	–
–	–	–	90*	116*	T12*	–
–	–	–	–	117*	–	–
–	–	–	–	118*	–	–
GND	–	81	91	119	P11	–
I/O	–	82	92	120	R11	277
I/O	–	83	93	121	T11	280
I/O (D5)	59	84	94	122	T10	283
I/O ($\overline{CS0}$)	60	85	95	123	P10	286
–	–	–	–	124*	–	–
–	–	–	–	125*	–	–
I/O	–	86	96	126	R10	289
I/O	–	87	97	127	T9	292
I/O (D4)	61	88	98	128	R9	295
I/O	62	89	99	129	P9	298
VCC	63	90	100	130	R8	–
GND	64	91	101	131	P8	–
I/O (D3)	65	92	102	132	T8	301
I/O ($\overline{RS}$)	66	93	103	133	T7	304
I/O	–	94	104	134	T6	307
I/O	–	95	105	135	R7	310
–	–	–	–	136*	–	–
–	–	–	–	137*	–	–
I/O (D2)	67	96	106	138	P7	313
I/O	68	97	107	139	T5	316
I/O	–	98	108	140	R6	319
I/O	–	99	109	141	T4	322
GND	–	100	110	142	P6	–
–	–	–	–	143*	–	–
–	–	–	–	144*	–	–
–	–	–	111*	145*	R5*	–
–	–	–	112*	146*	–	–
I/O (D1)	69	101	113	147	T3	325
I/O (RCLK-$\overline{BUSY}$/RDY)	70	102	114	148	P5	328
I/O	–	103	115	149	R4	331
–	–	–	–	–	–	–
I/O	–	104	116	150	R3	334
I/O (D0, DIN)	71	105	117	151	P4	337
SGCK4 (DOUT, I/O)	72	106	118	152	T2	340
CCLK	73	107	119	153	R2	–
VCC	74	108	120	154	P3	–
–	–	–	–	155*	–	–
–	–	–	–	156*	–	–
–	–	–	–	157*	–	–
–	–	–	–	158*	–	–
O (TDO)	75	109	121	159	T1	–
GND	76	110	122	160	N3	–
I/O (A0,$\overline{WS}$)	77	111	123	161	R1	2
PGCK4 (A1,I/O)	78	112	124	162	P2	5
I/O	–	113	125	163	N2	8
–	–	–	–	–	–	–
I/O	–	114	126	164	M3	11
I/O (CS1,A2)	79	115	127	165	P1	14
I/O (A3)	80	116	128	166	N1	17
–	–	117*	129*	167*	M2*	–
–	–	–	130*	168*	M1*	–
–	–	–	–	169*	–	–
–	–	–	–	170*	–	–
GND	–	118	131	171	L3	–
I/O	–	119	132	172	L2	20
I/O	–	120	133	173	L1	23
I/O (A4)	81	121	134	174	K3	26
I/O (A5)	82	122	135	175	K2	29
–	–	–	–	176*	–	–
–	–	–	136*	177*	–	–
I/O	–	123	137	178	K1	32
I/O	–	124	138	179	J1	35
I/O (A6)	83	125	139	180	J2	38
I/O (A7)	84	126	140	181	J3	41
GND	1	127	141	182	H2	–

* Indicates unconnected package pins.
Boundary Scan Bit 0 = TDO.T
Boundary Scan Bit 1 = TDO.O
Boundary Scan Bit 343 = BSCANT.UPD

Ordering Information



Component Availability

PINS		84	100			120	144	156	160	164	191	196	208		223	225	240		299
TYPE		PLAST. PLCC	PLAST. PQFP	PLAST. VQFP	TOP BRAZED CQFP	CERAM. PGA	PLAST. TQFP	CERAM PGA	PLAST. PQFP	TOP BRAZED CQFP	CERAM. PGA	TOP BRAZED CQFP	PLAST. PQFP	METAL PQFP	CERAM. PGA	PLAST. BGA	PLAST. PQFP	METAL PQFP	METAL PQFP
CODE		PC84	PQ100	VQ100	CB100	PG120	TQ144	PG156	PQ160	CB164	PG191	CB196	PQ208	MQ208	PG223	BG225	PQ240	MQ240	PG299
XC4002A	-6	C I	C I	C I		C I													
	-5	C	C	C		C													
	-4																		
XC4003A	-10				M B	M B													
	-6	C I	C I	C I	M B	C I M B													
	-5	C	C	C		C													
	-4	C	C	C		C													
XC4004A	-6	C I				C I	C I		C I										
	-5	C				C	C		C										
	-4																		
XC4005A	-6	C I					C I	C I	C I				C I						
	-5	C I					C I	C I	C I				C I						
	-4	C					C	C	C				C						

C = Commercial = 0° to +85° C I = Industrial = -40° to +100° C M = Mil Temp = -55° to +125° C
B = MIL-STD-883C Class B Parentheses indicate future product plans