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### Understanding [Embedded - CPLDs \(Complex Programmable Logic Devices\)](#)

Embedded - CPLDs, or Complex Programmable Logic Devices, are highly versatile digital logic devices used in electronic systems. These programmable components are designed to perform complex logical operations and can be customized for specific applications. Unlike fixed-function ICs, CPLDs offer the flexibility to reprogram their configuration, making them an ideal choice for various embedded systems. They consist of a set of logic gates and programmable interconnects, allowing designers to implement complex logic circuits without needing custom hardware.

### Applications of Embedded - CPLDs

#### Details

|                                 |                                                                                                                                               |
|---------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|
| Product Status                  | Obsolete                                                                                                                                      |
| Programmable Type               | In System Programmable (min 1K program/erase cycles)                                                                                          |
| Delay Time tpd(1) Max           | 9 ns                                                                                                                                          |
| Voltage Supply - Internal       | 2.7V ~ 3.6V                                                                                                                                   |
| Number of Logic Elements/Blocks | 32                                                                                                                                            |
| Number of Macrocells            | 512                                                                                                                                           |
| Number of Gates                 | 12000                                                                                                                                         |
| Number of I/O                   | 180                                                                                                                                           |
| Operating Temperature           | -40°C ~ 85°C (TA)                                                                                                                             |
| Mounting Type                   | Surface Mount                                                                                                                                 |
| Package / Case                  | 208-BFQFP                                                                                                                                     |
| Supplier Device Package         | 208-PQFP (28x28)                                                                                                                              |
| Purchase URL                    | <a href="https://www.e-xfl.com/product-detail/xilinx/xcr3512xl-10pqg208i">https://www.e-xfl.com/product-detail/xilinx/xcr3512xl-10pqg208i</a> |

## Features

- Low power 3.3V 512 macrocell CPLD
- 7.0 ns pin-to-pin logic delays
- System frequencies up to 135 MHz
- 512 macrocells with 12,000 usable gates
- Available in small footprint packages
  - 208-pin PQFP (180 user I/O)
  - 256-ball FBGA (212 user I/O)
  - 324-ball FBGA (260 user I/O)
- Optimized for 3.3V systems
  - Ultra low power operation
  - Typical Standby Current of 18  $\mu$ A at 25° C
  - 5V tolerant I/O pins with 3.3V core supply
  - Advanced 0.35 micron five layer metal EEPROM process
  - Fast Zero Power™ (FZP) CMOS design technology
  - 3.3V PCI electrical specification compatible outputs (no internal clamp diode on any input or I/O)
- Advanced system features
  - In-system programming
  - Input registers
  - Predictable timing model
  - Up to 23 clocks available per function block
  - Excellent pin retention during design changes
  - Full IEEE Standard 1149.1 boundary-scan (JTAG)
  - Four global clocks
  - Eight product term control terms per function block
- Fast ISP programming times
- Port Enable pin for additional I/O
- 2.7V to 3.6V supply voltage at industrial grade voltage range
- Programmable slew rate control per output
- Security bit prevents unauthorized access
- Refer to the CoolRunner™ XPLA3 family data sheet ([DS012](#)) for architecture description

## Description

The CoolRunner™ XPLA3 XCR3512XL device is a 3.3V, 512 macrocell CPLD targeted at power sensitive designs that require leading edge programmable logic solutions. A total of 32 function blocks provide 12,000 usable gates. Pin-to-pin propagation delays are as fast as 7.0 ns with a maximum system frequency of 135 MHz.

## TotalCMOS Design Technique for Fast Zero Power

CoolRunner XPLA3 CPLDs offer a TotalCMOS™ solution, both in process technology and design technique. This family employs a cascade of CMOS gates to implement its sum of products, instead of the traditional sense amp approach. This CMOS gate implementation allows Xilinx to offer CPLDs that are both high performance and low power, breaking the paradigm that to have low power, you must have low performance. Refer to [Figure 1](#) and [Table 1](#) showing the  $I_{CC}$  vs. Frequency of our XCR3512XL TotalCMOS CPLD (data taken with 32 resettable up/down, 16-bit counters at 3.3V, 25°C).

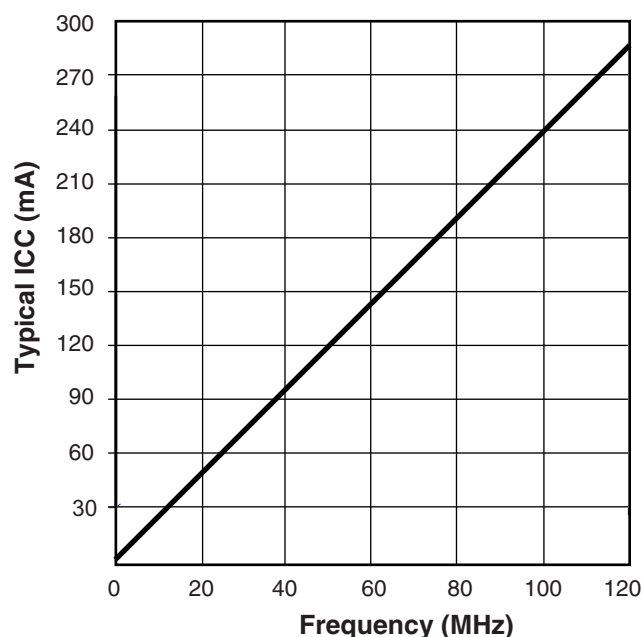


Figure 1: Typical  $I_{CC}$  vs. Frequency at  $V_{CC} = 3.3V$ , 25°C

Table 1: Typical  $I_{CC}$  vs. Frequency at  $V_{CC} = 3.3V$ , 25°C

| Frequency (MHz)       | 0     | 1    | 10   | 20   | 40    | 60    | 80    | 100   | 120   |
|-----------------------|-------|------|------|------|-------|-------|-------|-------|-------|
| Typical $I_{CC}$ (mA) | 0.018 | 2.57 | 25.5 | 50.8 | 100.3 | 147.9 | 193.5 | 237.8 | 281.6 |

## DC Electrical Characteristics Over Recommended Operating Conditions<sup>(1)</sup>

| Symbol           | Parameter                              | Test Conditions                              | Typical | Min.               | Max. | Unit    |
|------------------|----------------------------------------|----------------------------------------------|---------|--------------------|------|---------|
| $V_{OH}^{(2)}$   | Output High voltage                    | $V_{CC} = 3.0V$ to $3.6V$ , $I_{OH} = -8$ mA | -       | 2.4                | -    | V       |
|                  |                                        | $V_{CC} = 2.7V$ to $3.0V$ , $I_{OH} = -8$ mA | -       | 2.0                | -    | V       |
|                  |                                        | $I_{OH} = -500$ $\mu A$                      | -       | 90% $V_{CC}^{(3)}$ | -    | V       |
| $V_{OL}$         | Output Low voltage                     | $I_{OL} = 8$ mA                              | -       | -                  | 0.4  | V       |
| $I_{IL}$         | Input leakage current                  | $V_{IN} = GND$ or $V_{CC}$ to $5.5V$         | -       | -10                | 10   | $\mu A$ |
| $I_{IH}$         | I/O High-Z leakage current             | $V_{IN} = GND$ or $V_{CC}$ to $5.5V$         | -       | -10                | 10   | $\mu A$ |
| $I_{CCSB}^{(7)}$ | Standby current                        | $V_{CC} = 3.6V$                              | 32.5    | -                  | 100  | $\mu A$ |
| $I_{CC}$         | Dynamic current <sup>(4,5)</sup>       | $f = 1$ MHz                                  | -       | -                  | 7    | mA      |
|                  |                                        | $f = 50$ MHz                                 | -       | -                  | 175  | mA      |
| $C_{IN}$         | Input pin capacitance <sup>(6)</sup>   | $f = 1$ MHz                                  | -       | -                  | 8    | pF      |
| $C_{CLK}$        | Clock input capacitance <sup>(6)</sup> | $f = 1$ MHz                                  | -       | -                  | 12   | pF      |
| $C_{I/O}$        | I/O pin capacitance <sup>(6)</sup>     | $f = 1$ MHz                                  | -       | -                  | 10   | pF      |

### Notes:

1. See CoolRunner XPLA3 family data sheet ([DS012](#)) for recommended operating conditions
2. See [Figure 2](#) for output drive characteristics of the CoolRunner XPLA3 family.
3. This parameter guaranteed by design and characterization, not by testing.
4. See [Table 1](#), [Figure 1](#) for typical values.
5. This parameter measured with a 16-bit, resetable up/down counter loaded into every function block, with all outputs disabled and unloaded. Inputs are tied to  $V_{CC}$  or ground. This parameter guaranteed by design and characterization, not testing.
6. Typical values, not tested.
7. Typical value at 70° C.

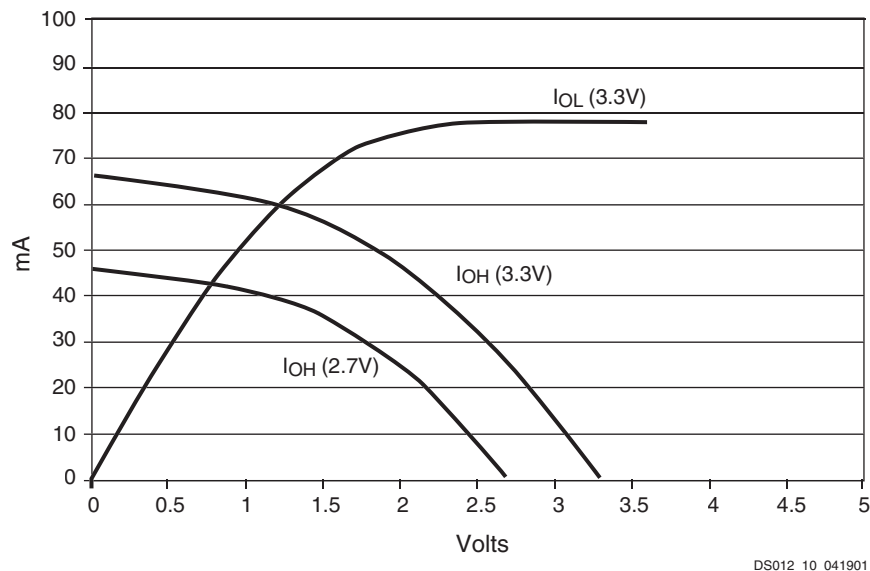


Figure 2: Typical I/V Curve for the CoolRunner XPLA3 Family, 25°C

## AC Electrical Characteristics Over Recommended Operating Conditions<sup>(1,2)</sup>

| Symbol                             | Parameter                                           | -7   |      | -10  |      | -12  |      | Unit |
|------------------------------------|-----------------------------------------------------|------|------|------|------|------|------|------|
|                                    |                                                     | Min. | Max. | Min. | Max. | Min. | Max. |      |
| T <sub>PD1</sub>                   | Propagation delay time (single p-term)              | -    | 7.0  | -    | 9.0  | -    | 10.8 | ns   |
| T <sub>PD2</sub>                   | Propagation delay time (OR array) <sup>(3)</sup>    | -    | 7.5  | -    | 10.0 | -    | 12.0 | ns   |
| T <sub>CO</sub>                    | Clock to output (global synchronous pin clock)      | -    | 5.0  | -    | 5.8  | -    | 6.9  | ns   |
| T <sub>SUF</sub>                   | Setup time (fast input register)                    | 4.0  | -    | 5.0  | -    | 5.0  | -    | ns   |
| T <sub>SU1</sub> <sup>(4)</sup>    | Setup time (single p-term)                          | 3.8  | -    | 5.5  | -    | 6.7  | -    | ns   |
| T <sub>SU2</sub>                   | Setup time (OR array)                               | 4.3  | -    | 6.5  | -    | 7.9  | -    | ns   |
| T <sub>H</sub> <sup>(4)</sup>      | Hold time                                           | 0    | -    | 0    | -    | 0    | -    | ns   |
| T <sub>WLH</sub> <sup>(4)</sup>    | Global Clock pulse width (High or Low)              | 3.0  | -    | 4.0  | -    | 5.0  | -    | ns   |
| T <sub>PLH</sub> <sup>(4)</sup>    | P-term clock pulse width                            | 4.5  | -    | 6.0  | -    | 7.5  | -    | ns   |
| T <sub>APRPW</sub>                 | Asynchronous preset/reset pulse width (High or Low) | 4.5  | -    | 6.0  | -    | 7.5  | -    | ns   |
| T <sub>R</sub> <sup>(4)</sup>      | Input rise time                                     | -    | 20   | -    | 20   | -    | 20   | ns   |
| T <sub>L</sub> <sup>(4)</sup>      | Input fall time                                     | -    | 20   | -    | 20   | -    | 20   | ns   |
| f <sub>SYSTEM</sub> <sup>(4)</sup> | Maximum system frequency                            | -    | 135  | -    | 97   | -    | 77   | MHz  |
| T <sub>CONFIG</sub> <sup>(4)</sup> | Configuration time <sup>(5)</sup>                   | -    | 200  | -    | 200  | -    | 200  | μs   |
| T <sub>INIT</sub> <sup>(4)</sup>   | ISP initialization time                             | -    | 200  | -    | 200  | -    | 200  | μs   |
| T <sub>POE</sub> <sup>(4)</sup>    | P-term OE to output enabled                         | -    | 9.0  | -    | 11.0 | -    | 13.0 | ns   |
| T <sub>POD</sub> <sup>(4)</sup>    | P-term OE to output disabled <sup>(6)</sup>         | -    | 9.0  | -    | 11.0 | -    | 13.0 | ns   |
| T <sub>PCO</sub> <sup>(4)</sup>    | P-term clock to output                              | -    | 8.5  | -    | 10.3 | -    | 12.4 | ns   |
| T <sub>PAO</sub> <sup>(4)</sup>    | P-term set/reset to output valid                    | -    | 9.0  | -    | 11.0 | -    | 13.0 | ns   |

### Notes:

- Specifications measured with one output switching.
- See the CoolRunner XPLA3 family data sheet ([DS012](#)) for recommended operating conditions.
- See [Figure 4](#) for derating.
- These parameters guaranteed by design and/or characterization, not testing.
- Typical current draw during configuration is 17 mA at 3.6V.
- Output C<sub>L</sub> = 5 pF.

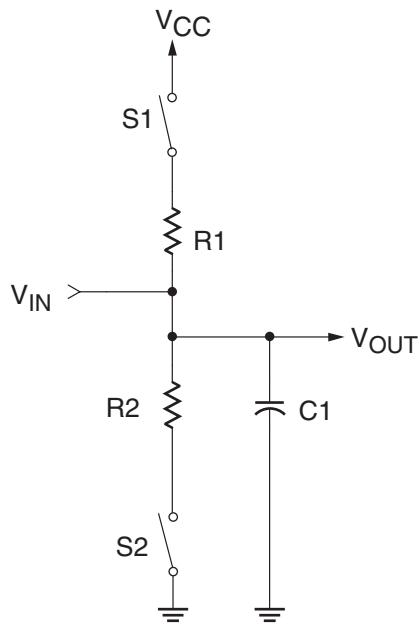
## Internal Timing Parameters<sup>(1,2)</sup>

| Symbol                                     | Parameter                            | -7   |      | -10  |      | -12  |      | Unit |
|--------------------------------------------|--------------------------------------|------|------|------|------|------|------|------|
|                                            |                                      | Min. | Max. | Min. | Max. | Min. | Max. |      |
| Buffer Delays                              |                                      |      |      |      |      |      |      |      |
| T <sub>IN</sub>                            | Input buffer delay                   | -    | 2.5  | -    | 3.3  | -    | 4.0  | ns   |
| T <sub>FIN</sub>                           | Fast input buffer delay              | -    | 4.7  | -    | 4.3  | -    | 4.3  | ns   |
| T <sub>GCK</sub>                           | Global clock buffer delay            | -    | 1.5  | -    | 1.3  | -    | 1.5  | ns   |
| T <sub>OUT</sub>                           | Output buffer delay                  | -    | 2.5  | -    | 3.2  | -    | 3.8  | ns   |
| T <sub>EN</sub>                            | Output buffer enable/disable delay   | -    | 4.5  | -    | 5.2  | -    | 6.0  | ns   |
| Internal Register and Combinatorial Delays |                                      |      |      |      |      |      |      |      |
| T <sub>LDI</sub>                           | Latch transparent delay              | -    | 1.3  | -    | 1.6  | -    | 2.0  | ns   |
| T <sub>SUI</sub>                           | Register setup time                  | 0.8  | -    | 1.0  | -    | 1.2  | -    | ns   |
| T <sub>HI</sub>                            | Register hold time                   | 0.3  | -    | 0.5  | -    | 0.7  | -    | ns   |
| T <sub>ECSU</sub>                          | Register clock enable setup time     | 2.0  | -    | 2.5  | -    | 3.0  | -    | ns   |
| T <sub>ECHO</sub>                          | Register clock enable hold time      | 3.0  | -    | 4.5  | -    | 5.5  | -    | ns   |
| T <sub>COI</sub>                           | Register clock to output delay       | -    | 1.0  | -    | 1.3  | -    | 1.6  | ns   |
| T <sub>AOI</sub>                           | Register async. S/R to output delay  | -    | 2.0  | -    | 2.0  | -    | 2.2  | ns   |
| T <sub>RAI</sub>                           | Register async. recovery             | -    | 5.0  | -    | 7.0  | -    | 8.0  | ns   |
| T <sub>PTCK</sub>                          | Product term clock delay             | -    | 2.5  | -    | 2.5  | -    | 3.0  | ns   |
| T <sub>LOGI1</sub>                         | Internal logic delay (single p-term) | -    | 2.0  | -    | 2.5  | -    | 3.0  | ns   |
| T <sub>LOGI2</sub>                         | Internal logic delay (PLA OR term)   | -    | 2.5  | -    | 3.5  | -    | 4.2  | ns   |
| Feedback Delays                            |                                      |      |      |      |      |      |      |      |
| T <sub>F</sub>                             | ZIA delay                            | -    | 3.1  | -    | 4.5  | -    | 6.0  | ns   |
| Time Adders                                |                                      |      |      |      |      |      |      |      |
| T <sub>LOGI3</sub>                         | Fold-back NAND delay                 | -    | 2.0  | -    | 2.5  | -    | 3.0  | ns   |
| T <sub>UDA</sub>                           | Universal delay                      | -    | 3.5  | -    | 4.0  | -    | 4.0  | ns   |
| T <sub>SLEW</sub>                          | Slew rate limited delay              | -    | 5.0  | -    | 5.0  | -    | 6.0  | ns   |

### Notes:

1. These parameters guaranteed by design and/or characterization, not testing.
2. See the CoolRunner XPLA3 family data sheet ([DS012](#)) for timing model.

## Switching Characteristics



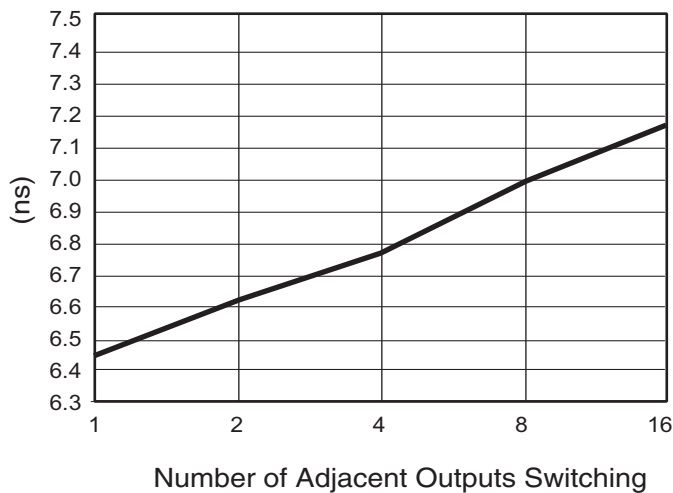
| Component | Values |
|-----------|--------|
| R1        | 390Ω   |
| R2        | 390Ω   |
| C1        | 35 pF  |

| Measurement             | S1     | S2     |
|-------------------------|--------|--------|
| T <sub>POE</sub> (High) | Open   | Closed |
| T <sub>POE</sub> (Low)  | Closed | Open   |
| T <sub>P</sub>          | Closed | Closed |

**Note:** For T<sub>POD</sub>, C1 = 5 pF. Delay measured at output level of V<sub>OL</sub> + 300 mV, V<sub>OH</sub> - 300 mV.

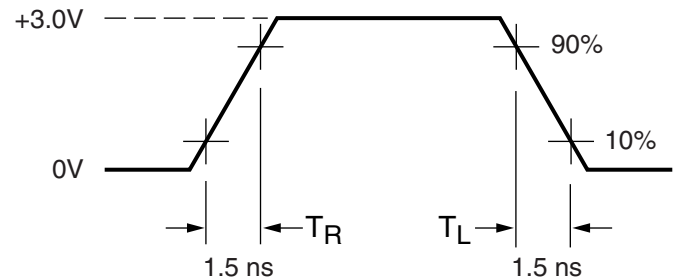
DS023\_03\_102401

Figure 3: AC Load Circuit



DS081\_04\_120902

Figure 4: Derating Curve for T<sub>PD2</sub>



### Measurements:

All circuit delays are measured at the +1.5V level of inputs and outputs, unless otherwise specified.

DS017\_05\_042800

Figure 5: Voltage Waveform

## Pin Descriptions

Table 2: XCR3512XL User I/O Pins

|                     | PQ208 | FT256 | FG324 |
|---------------------|-------|-------|-------|
| Total User I/O Pins | 180   | 212   | 260   |

Table 3: XCR3512XL I/O Pins

| Function Block | Macrocell | PQ208 | FT256 | FG324 |
|----------------|-----------|-------|-------|-------|
| 1              | 1         | 208   | C14   | C21   |
| 1              | 2         | -     | D13   | C20   |
| 1              | 3         | 207   | -     | B22   |
| 1              | 4         | 206   | A15   | B21   |
| 1              | 5         | -     | -     | -     |
| 1              | 6         | -     | -     | -     |
| 1              | 7         | -     | -     | -     |
| 1              | 8         | -     | -     | -     |
| 1              | 9         | -     | -     | -     |
| 1              | 10        | -     | -     | -     |
| 1              | 11        | -     | -     | -     |
| 1              | 12        | -     | -     | -     |
| 1              | 13        | -     | -     | A22   |
| 1              | 14        | 205   | B15   | A21   |
| 1              | 15        | -     | B14   | B20   |
| 1              | 16        | 204   | C13   | C19   |
| 2              | 1         | 1     | E12   | D20   |
| 2              | 2         | -     | -     | C22   |
| 2              | 3         | 2     | A16   | D21   |
| 2              | 4         | -     | C15   | D22   |
| 2              | 5         | -     | -     | -     |
| 2              | 6         | -     | -     | -     |
| 2              | 7         | -     | -     | -     |
| 2              | 8         | -     | -     | -     |
| 2              | 9         | -     | -     | -     |
| 2              | 10        | -     | -     | -     |
| 2              | 11        | -     | -     | -     |
| 2              | 12        | -     | -     | -     |
| 2              | 13        | 3     | B16   | E20   |

Table 3: XCR3512XL I/O Pins (Continued)

| Function Block | Macrocell | PQ208 | FT256 | FG324 |
|----------------|-----------|-------|-------|-------|
| 2              | 14        | 4     | D14   | F19   |
| 2              | 15        | -     | -     | E21   |
| 2              | 16        | 6     | D15   | E22   |
| 3              | 1         | 203   | A14   | B19   |
| 3              | 2         | -     | E11   | A20   |
| 3              | 3         | 202   | -     | C18   |
| 3              | 4         | 201   | A13   | B18   |
| 3              | 5         | -     | -     | -     |
| 3              | 6         | -     | -     | -     |
| 3              | 7         | -     | -     | -     |
| 3              | 8         | -     | -     | -     |
| 3              | 9         | -     | -     | -     |
| 3              | 10        | -     | -     | -     |
| 3              | 11        | -     | -     | -     |
| 3              | 12        | -     | -     | -     |
| 3              | 13        | -     | D12   | A19   |
| 3              | 14        | -     | -     | D17   |
| 3              | 15        | 199   | B13   | A18   |
| 3              | 16        | 198   | C12   | C17   |
| 4              | 1         | 7     | E13   | F20   |
| 4              | 2         | -     | -     | F21   |
| 4              | 3         | 8     | C16   | F22   |
| 4              | 4         | 9     | F12   | G19   |
| 4              | 5         | -     | -     | -     |
| 4              | 6         | -     | -     | -     |
| 4              | 7         | -     | -     | -     |
| 4              | 8         | -     | -     | -     |
| 4              | 9         | -     | -     | -     |
| 4              | 10        | -     | -     | -     |
| 4              | 11        | -     | -     | -     |
| 4              | 12        | -     | -     | -     |
| 4              | 13        | -     | -     | G20   |
| 4              | 14        | 10    | D16   | G21   |
| 4              | 15        | -     | E14   | G22   |
| 4              | 16        | 11    | E15   | H20   |

Table 3: XCR3512XL I/O Pins (Continued)

| Function Block | Macrocell | PQ208 | FT256 | FG324 |
|----------------|-----------|-------|-------|-------|
| 5              | 1         | 197   | A12   | B17   |
| 5              | 2         | -     | -     | A17   |
| 5              | 3         | 196   | D11   | D16   |
| 5              | 4         | -     | -     | C16   |
| 5              | 5         | -     | -     | -     |
| 5              | 6         | -     | -     | -     |
| 5              | 7         | -     | -     | -     |
| 5              | 8         | -     | -     | -     |
| 5              | 9         | -     | -     | -     |
| 5              | 10        | -     | -     | -     |
| 5              | 11        | -     | -     | -     |
| 5              | 12        | -     | -     | -     |
| 5              | 13        | 195   | A11   | B16   |
| 5              | 14        | -     | E10   | A16   |
| 5              | 15        | 194   | B12   | C15   |
| 5              | 16        | 193   | C11   | B15   |
| 6              | 1         | 12    | F13   | H21   |
| 6              | 2         | -     | -     | H22   |
| 6              | 3         | 13    | E16   | J19   |
| 6              | 4         | -     | -     | J20   |
| 6              | 5         | -     | -     | -     |
| 6              | 6         | -     | -     | -     |
| 6              | 7         | -     | -     | -     |
| 6              | 8         | -     | -     | -     |
| 6              | 9         | -     | -     | -     |
| 6              | 10        | -     | -     | -     |
| 6              | 11        | -     | -     | -     |
| 6              | 12        | -     | -     | -     |
| 6              | 13        | 15    | F15   | J21   |
| 6              | 14        | 16    | G12   | J22   |
| 6              | 15        | -     | F14   | K19   |
| 6              | 16        | 17    | G15   | K20   |
| 7              | 1         | 192   | B11   | A15   |
| 7              | 2         | -     | D10   | D14   |
| 7              | 3         | 190   | A10   | C14   |

Table 3: XCR3512XL I/O Pins (Continued)

| Function Block | Macrocell | PQ208              | FT256              | FG324              |
|----------------|-----------|--------------------|--------------------|--------------------|
| 7              | 4         | 189 <sup>(1)</sup> | C10 <sup>(1)</sup> | B14 <sup>(1)</sup> |
| 7              | 5         | -                  | -                  | -                  |
| 7              | 6         | -                  | -                  | -                  |
| 7              | 7         | -                  | -                  | -                  |
| 7              | 8         | -                  | -                  | -                  |
| 7              | 9         | -                  | -                  | -                  |
| 7              | 10        | -                  | -                  | -                  |
| 7              | 11        | -                  | -                  | -                  |
| 7              | 12        | -                  | -                  | -                  |
| 7              | 13        | 188                | -                  | A14                |
| 7              | 14        | -                  | -                  | D13                |
| 7              | 15        | -                  | A9                 | C13                |
| 7              | 16        | 187                | D9                 | B13                |
| 8              | 1         | 18                 | G13                | K21                |
| 8              | 2         | -                  | -                  | K22                |
| 8              | 3         | 19                 | F16                | L19                |
| 8              | 4         | -                  | -                  | L20                |
| 8              | 5         | -                  | -                  | -                  |
| 8              | 6         | -                  | -                  | -                  |
| 8              | 7         | -                  | -                  | -                  |
| 8              | 8         | -                  | -                  | -                  |
| 8              | 9         | -                  | -                  | -                  |
| 8              | 10        | -                  | -                  | -                  |
| 8              | 11        | -                  | -                  | -                  |
| 8              | 12        | -                  | -                  | -                  |
| 8              | 13        | 20                 | G14                | L21                |
| 8              | 14        | 21                 | G16                | L22                |
| 8              | 15        | 22                 | H13                | M21                |
| 8              | 16        | 24                 | H12                | M20                |
| 9              | 1         | 51                 | P16                | AA21               |
| 9              | 2         | -                  | N14                | AB22               |
| 9              | 3         | 49                 | R16                | AA22               |
| 9              | 4         | -                  | -                  | Y20                |
| 9              | 5         | -                  | -                  | -                  |
| 9              | 6         | -                  | -                  | -                  |

Table 3: XCR3512XL I/O Pins (Continued)

| Function Block | Macrocell | PQ208 | FT256 | FG324 |
|----------------|-----------|-------|-------|-------|
| 9              | 7         | -     | -     | -     |
| 9              | 8         | -     | -     | -     |
| 9              | 9         | -     | -     | -     |
| 9              | 10        | -     | -     | -     |
| 9              | 11        | -     | -     | -     |
| 9              | 12        | -     | -     | -     |
| 9              | 13        | 48    | M13   | Y21   |
| 9              | 14        | 47    | P15   | W20   |
| 9              | 15        | 46    | L12   | W21   |
| 9              | 16        | 45    | N16   | Y22   |
| 10             | 1         | 52    | N13   | AB21  |
| 10             | 2         | 53    | R15   | Y19   |
| 10             | 3         | 54    | M12   | AA20  |
| 10             | 4         | -     | -     | AB20  |
| 10             | 5         | -     | -     | -     |
| 10             | 6         | -     | -     | -     |
| 10             | 7         | -     | -     | -     |
| 10             | 8         | -     | -     | -     |
| 10             | 9         | -     | -     | -     |
| 10             | 10        | -     | -     | -     |
| 10             | 11        | -     | -     | -     |
| 10             | 12        | -     | -     | -     |
| 10             | 13        | 55    | T16   | Y18   |
| 10             | 14        | 56    | P14   | AA19  |
| 10             | 15        | -     | T15   | AB19  |
| 10             | 16        | 57    | P13   | W17   |
| 11             | 1         | 44    | M14   | W22   |
| 11             | 2         | 43    | M16   | V20   |
| 11             | 3         | 42    | L13   | V21   |
| 11             | 4         | -     | N15   | U19   |
| 11             | 5         | -     | -     | -     |
| 11             | 6         | -     | -     | -     |
| 11             | 7         | -     | -     | -     |
| 11             | 8         | -     | -     | -     |
| 11             | 9         | -     | -     | -     |

Table 3: XCR3512XL I/O Pins (Continued)

| Function Block | Macrocell | PQ208 | FT256 | FG324 |
|----------------|-----------|-------|-------|-------|
| 11             | 10        | -     | -     | -     |
| 11             | 11        | -     | -     | -     |
| 11             | 12        | -     | -     | -     |
| 11             | 13        | -     | -     | V22   |
| 11             | 14        | 40    | M15   | U20   |
| 11             | 15        | 39    | L16   | U21   |
| 11             | 16        | 38    | K12   | U22   |
| 12             | 1         | 58    | R14   | Y17   |
| 12             | 2         | -     | N12   | AA18  |
| 12             | 3         | 59    | T14   | AB18  |
| 12             | 4         | -     | -     | AA17  |
| 12             | 5         | -     | -     | -     |
| 12             | 6         | -     | -     | -     |
| 12             | 7         | -     | -     | -     |
| 12             | 8         | -     | -     | -     |
| 12             | 9         | -     | -     | -     |
| 12             | 10        | -     | -     | -     |
| 12             | 11        | -     | -     | -     |
| 12             | 12        | -     | -     | -     |
| 12             | 13        | 60    | M11   | AB17  |
| 12             | 14        | -     | R13   | W16   |
| 12             | 15        | 61    | P12   | Y16   |
| 12             | 16        | 62    | T13   | AA16  |
| 13             | 1         | 37    | L15   | T19   |
| 13             | 2         | -     | -     | T20   |
| 13             | 3         | 36    | K13   | T21   |
| 13             | 4         | 35    | K16   | T22   |
| 13             | 5         | -     | -     | -     |
| 13             | 6         | -     | -     | -     |
| 13             | 7         | -     | -     | -     |
| 13             | 8         | -     | -     | -     |
| 13             | 9         | -     | -     | -     |
| 13             | 10        | -     | -     | -     |
| 13             | 11        | -     | -     | -     |
| 13             | 12        | -     | -     | -     |

Table 3: XCR3512XL I/O Pins (Continued)

| Function Block | Macrocell | PQ208             | FT256              | FG324              |
|----------------|-----------|-------------------|--------------------|--------------------|
| 13             | 13        | -                 | K14                | R20                |
| 13             | 14        | 34                | K15                | R21                |
| 13             | 15        | 33                | L14                | R22                |
| 13             | 16        | 31                | J16                | P19                |
| 14             | 1         | 64                | N11                | AB16               |
| 14             | 2         | -                 | R12                | Y15                |
| 14             | 3         | 65                | T12                | AA15               |
| 14             | 4         | 66                | R11                | AB15               |
| 14             | 5         | -                 | -                  | -                  |
| 14             | 6         | -                 | -                  | -                  |
| 14             | 7         | -                 | -                  | -                  |
| 14             | 8         | -                 | -                  | -                  |
| 14             | 9         | -                 | -                  | -                  |
| 14             | 10        | -                 | -                  | -                  |
| 14             | 11        | -                 | -                  | -                  |
| 14             | 12        | -                 | -                  | -                  |
| 14             | 13        | 67                | M10                | W14                |
| 14             | 14        | 68                | P11                | Y14                |
| 14             | 15        | -                 | -                  | AA14               |
| 14             | 16        | 69                | N10                | AB14               |
| 15             | 1         | 30 <sup>(1)</sup> | J13 <sup>(1)</sup> | P20 <sup>(1)</sup> |
| 15             | 2         | 29                | J15                | P21                |
| 15             | 3         | 28                | J14                | P22                |
| 15             | 4         | -                 | -                  | N19                |
| 15             | 5         | -                 | -                  | -                  |
| 15             | 6         | -                 | -                  | -                  |
| 15             | 7         | -                 | -                  | -                  |
| 15             | 8         | -                 | -                  | -                  |
| 15             | 9         | -                 | -                  | -                  |
| 15             | 10        | -                 | -                  | -                  |
| 15             | 11        | -                 | -                  | -                  |
| 15             | 12        | -                 | -                  | -                  |
| 15             | 13        | 27                | H16                | N21                |
| 15             | 14        | -                 | -                  | N22                |
| 15             | 15        | 26                | H14                | M22                |

Table 3: XCR3512XL I/O Pins (Continued)

| Function Block | Macrocell | PQ208 | FT256 | FG324 |
|----------------|-----------|-------|-------|-------|
| 15             | 16        | 25    | H15   | M19   |
| 16             | 1         | 70    | T11   | W13   |
| 16             | 2         | 71    | R10   | Y13   |
| 16             | 3         | 73    | P10   | AA13  |
| 16             | 4         | -     | T10   | AB13  |
| 16             | 5         | -     | -     | -     |
| 16             | 6         | -     | -     | -     |
| 16             | 7         | -     | -     | -     |
| 16             | 8         | -     | -     | -     |
| 16             | 9         | -     | -     | -     |
| 16             | 10        | -     | -     | -     |
| 16             | 11        | -     | -     | -     |
| 16             | 12        | -     | -     | -     |
| 16             | 13        | -     | -     | W12   |
| 16             | 14        | 76    | N9    | AA12  |
| 16             | 15        | 77    | R9    | AB12  |
| 16             | 16        | 78    | P9    | Y11   |
| 17             | 1         | 157   | B1    | C3    |
| 17             | 2         | -     | B2    | A2    |
| 17             | 3         | 158   | C3    | B3    |
| 17             | 4         | -     | -     | C4    |
| 17             | 5         | -     | -     | -     |
| 17             | 6         | -     | -     | -     |
| 17             | 7         | -     | -     | -     |
| 17             | 8         | -     | -     | -     |
| 17             | 9         | -     | -     | -     |
| 17             | 10        | -     | -     | -     |
| 17             | 11        | -     | -     | -     |
| 17             | 12        | -     | -     | -     |
| 17             | 13        | 159   | D4    | B4    |
| 17             | 14        | -     | A2    | C5    |
| 17             | 15        | 160   | A1    | B5    |
| 17             | 16        | 161   | B3    | A3    |
| 18             | 1         | 156   | C1    | D3    |
| 18             | 2         | 155   | D3    | B2    |

Table 3: XCR3512XL I/O Pins (Continued)

| Function Block | Macrocell | PQ208 | FT256 | FG324 |
|----------------|-----------|-------|-------|-------|
| 18             | 3         | 154   | C2    | B1    |
| 18             | 4         | 153   | F5    | C2    |
| 18             | 5         | -     | -     | -     |
| 18             | 6         | -     | -     | -     |
| 18             | 7         | -     | -     | -     |
| 18             | 8         | -     | -     | -     |
| 18             | 9         | -     | -     | -     |
| 18             | 10        | -     | -     | -     |
| 18             | 11        | -     | -     | -     |
| 18             | 12        | -     | -     | -     |
| 18             | 13        | -     | -     | C1    |
| 18             | 14        | 151   | D1    | E3    |
| 18             | 15        | -     | -     | D2    |
| 18             | 16        | 150   | E4    | D1    |
| 19             | 1         | 162   | C4    | A4    |
| 19             | 2         | -     | -     | D6    |
| 19             | 3         | 163   | A3    | A5    |
| 19             | 4         | -     | D5    | C6    |
| 19             | 5         | -     | -     | -     |
| 19             | 6         | -     | -     | -     |
| 19             | 7         | -     | -     | -     |
| 19             | 8         | -     | -     | -     |
| 19             | 9         | -     | -     | -     |
| 19             | 10        | -     | -     | -     |
| 19             | 11        | -     | -     | -     |
| 19             | 12        | -     | -     | -     |
| 19             | 13        | 164   | B4    | B6    |
| 19             | 14        | -     | E6    | A6    |
| 19             | 15        | 166   | A4    | D7    |
| 19             | 16        | 167   | C5    | C7    |
| 20             | 1         | 149   | D2    | F4    |
| 20             | 2         | 148   | E3    | F3    |
| 20             | 3         | -     | -     | E2    |
| 20             | 4         | 147   | E1    | E1    |
| 20             | 5         | -     | -     | -     |

Table 3: XCR3512XL I/O Pins (Continued)

| Function Block | Macrocell | PQ208 | FT256 | FG324 |
|----------------|-----------|-------|-------|-------|
| 20             | 6         | -     | -     | -     |
| 20             | 7         | -     | -     | -     |
| 20             | 8         | -     | -     | -     |
| 20             | 9         | -     | -     | -     |
| 20             | 10        | -     | -     | -     |
| 20             | 11        | -     | -     | -     |
| 20             | 12        | -     | -     | -     |
| 20             | 13        | -     | -     | F2    |
| 20             | 14        | 146   | F4    | F1    |
| 20             | 15        | 145   | F1    | G4    |
| 20             | 16        | 144   | G5    | G3    |
| 21             | 1         | 168   | B5    | B7    |
| 21             | 2         | -     | D6    | A7    |
| 21             | 3         | 169   | A5    | C8    |
| 21             | 4         | -     | -     | B8    |
| 21             | 5         | -     | -     | -     |
| 21             | 6         | -     | -     | -     |
| 21             | 7         | -     | -     | -     |
| 21             | 8         | -     | -     | -     |
| 21             | 9         | -     | -     | -     |
| 21             | 10        | -     | -     | -     |
| 21             | 11        | -     | -     | -     |
| 21             | 12        | -     | -     | -     |
| 21             | 13        | 170   | C6    | A8    |
| 21             | 14        | 171   | B6    | D9    |
| 21             | 15        | -     | E7    | C9    |
| 21             | 16        | 172   | A6    | B9    |
| 22             | 1         | 142   | E2    | G2    |
| 22             | 2         | 141   | F3    | G1    |
| 22             | 3         | -     | -     | H3    |
| 22             | 4         | 140   | F2    | H2    |
| 22             | 5         | -     | -     | -     |
| 22             | 6         | -     | -     | -     |
| 22             | 7         | -     | -     | -     |
| 22             | 8         | -     | -     | -     |

Table 3: XCR3512XL I/O Pins (Continued)

| Function Block | Macrocell | PQ208              | FT256             | FG324              |
|----------------|-----------|--------------------|-------------------|--------------------|
| 22             | 9         | -                  | -                 | -                  |
| 22             | 10        | -                  | -                 | -                  |
| 22             | 11        | -                  | -                 | -                  |
| 22             | 12        | -                  | -                 | -                  |
| 22             | 13        | -                  | -                 | H1                 |
| 22             | 14        | 139                | G4                | J4                 |
| 22             | 15        | -                  | G1                | J3                 |
| 22             | 16        | 138                | G3                | J2                 |
| 23             | 1         | 173                | D7                | A9                 |
| 23             | 2         | -                  | B7                | D10                |
| 23             | 3         | 175                | C7                | C10                |
| 23             | 4         | -                  | C8                | B10                |
| 23             | 5         | -                  | -                 | -                  |
| 23             | 6         | -                  | -                 | -                  |
| 23             | 7         | -                  | -                 | -                  |
| 23             | 8         | -                  | -                 | -                  |
| 23             | 9         | -                  | -                 | -                  |
| 23             | 10        | -                  | -                 | -                  |
| 23             | 11        | -                  | -                 | -                  |
| 23             | 12        | -                  | -                 | -                  |
| 23             | 13        | -                  | -                 | A10                |
| 23             | 14        | 176 <sup>(1)</sup> | A7 <sup>(1)</sup> | D11 <sup>(1)</sup> |
| 23             | 15        | 177                | D8                | C11                |
| 23             | 16        | 178                | B8                | B11                |
| 24             | 1         | 137                | H1                | J1                 |
| 24             | 2         | 136                | H4                | K4                 |
| 24             | 3         | 135                | G2                | K3                 |
| 24             | 4         | -                  | H3                | K2                 |
| 24             | 5         | -                  | -                 | -                  |
| 24             | 6         | -                  | -                 | -                  |
| 24             | 7         | -                  | -                 | -                  |
| 24             | 8         | -                  | -                 | -                  |
| 24             | 9         | -                  | -                 | -                  |
| 24             | 10        | -                  | -                 | -                  |
| 24             | 11        | -                  | -                 | -                  |

Table 3: XCR3512XL I/O Pins (Continued)

| Function Block | Macrocell | PQ208 | FT256 | FG324 |
|----------------|-----------|-------|-------|-------|
| 24             | 12        | -     | -     | -     |
| 24             | 13        | 133   | J1    | K1    |
| 24             | 14        | -     | -     | L1    |
| 24             | 15        | -     | -     | L4    |
| 24             | 16        | 132   | J3    | L3    |
| 25             | 1         | 105   | P2    | AA1   |
| 25             | 2         | 106   | P3    | Y3    |
| 25             | 3         | -     | -     | Y2    |
| 25             | 4         | 108   | T1    | W3    |
| 25             | 5         | -     | -     | -     |
| 25             | 6         | -     | -     | -     |
| 25             | 7         | -     | -     | -     |
| 25             | 8         | -     | -     | -     |
| 25             | 9         | -     | -     | -     |
| 25             | 10        | -     | -     | -     |
| 25             | 11        | -     | -     | -     |
| 25             | 12        | -     | -     | -     |
| 25             | 13        | -     | -     | Y1    |
| 25             | 14        | 109   | N3    | W2    |
| 25             | 15        | 110   | R1    | W1    |
| 25             | 16        | 111   | M4    | V3    |
| 26             | 1         | 104   | M5    | AB1   |
| 26             | 2         | -     | N4    | AA2   |
| 26             | 3         | 103   | R2    | AB2   |
| 26             | 4         | -     | T2    | AA3   |
| 26             | 5         | -     | -     | -     |
| 26             | 6         | -     | -     | -     |
| 26             | 7         | -     | -     | -     |
| 26             | 8         | -     | -     | -     |
| 26             | 9         | -     | -     | -     |
| 26             | 10        | -     | -     | -     |
| 26             | 11        | -     | -     | -     |
| 26             | 12        | -     | -     | -     |
| 26             | 13        | 102   | P4    | Y4    |
| 26             | 14        | -     | -     | AB3   |

Table 3: XCR3512XL I/O Pins (Continued)

| Function Block | Macrocell | PQ208 | FT256 | FG324 |
|----------------|-----------|-------|-------|-------|
| 26             | 15        | 101   | R3    | AA4   |
| 26             | 16        | 100   | N5    | Y5    |
| 27             | 1         | 112   | P1    | U4    |
| 27             | 2         | -     | -     | V2    |
| 27             | 3         | 113   | L5    | V1    |
| 27             | 4         | 114   | N2    | U3    |
| 27             | 5         | -     | -     | -     |
| 27             | 6         | -     | -     | -     |
| 27             | 7         | -     | -     | -     |
| 27             | 8         | -     | -     | -     |
| 27             | 9         | -     | -     | -     |
| 27             | 10        | -     | -     | -     |
| 27             | 11        | -     | -     | -     |
| 27             | 12        | -     | -     | -     |
| 27             | 13        | -     | -     | U2    |
| 27             | 14        | 115   | M3    | U1    |
| 27             | 15        | 117   | L4    | T3    |
| 27             | 16        | 118   | M2    | T2    |
| 28             | 1         | 99    | T3    | AA5   |
| 28             | 2         | 98    | M6    | AB4   |
| 28             | 3         | -     | R4    | W6    |
| 28             | 4         | 97    | P5    | AB5   |
| 28             | 5         | -     | -     | -     |
| 28             | 6         | -     | -     | -     |
| 28             | 7         | -     | -     | -     |
| 28             | 8         | -     | -     | -     |
| 28             | 9         | -     | -     | -     |
| 28             | 10        | -     | -     | -     |
| 28             | 11        | -     | -     | -     |
| 28             | 12        | -     | -     | -     |
| 28             | 13        | -     | -     | Y6    |
| 28             | 14        | 96    | T4    | AA6   |
| 28             | 15        | 95    | N6    | AB6   |
| 28             | 16        | 93    | R5    | W7    |
| 29             | 1         | 119   | L2    | T1    |

Table 3: XCR3512XL I/O Pins (Continued)

| Function Block | Macrocell | PQ208              | FT256             | FG324             |
|----------------|-----------|--------------------|-------------------|-------------------|
| 29             | 2         | -                  | -                 | R3                |
| 29             | 3         | 120                | M1                | R2                |
| 29             | 4         | 121                | K5                | R1                |
| 29             | 5         | -                  | -                 | -                 |
| 29             | 6         | -                  | -                 | -                 |
| 29             | 7         | -                  | -                 | -                 |
| 29             | 8         | -                  | -                 | -                 |
| 29             | 9         | -                  | -                 | -                 |
| 29             | 10        | -                  | -                 | -                 |
| 29             | 11        | -                  | -                 | -                 |
| 29             | 12        | -                  | -                 | -                 |
| 29             | 13        | 122                | L3                | P4                |
| 29             | 14        | 123                | K4                | P3                |
| 29             | 15        | -                  | -                 | P2                |
| 29             | 16        | 124                | L1                | P1                |
| 30             | 1         | 92                 | T6                | Y7                |
| 30             | 2         | -                  | T5                | AA7               |
| 30             | 3         | 91                 | M7                | AB7               |
| 30             | 4         | -                  | -                 | Y8                |
| 30             | 5         | -                  | -                 | -                 |
| 30             | 6         | -                  | -                 | -                 |
| 30             | 7         | -                  | -                 | -                 |
| 30             | 8         | -                  | -                 | -                 |
| 30             | 9         | -                  | -                 | -                 |
| 30             | 10        | -                  | -                 | -                 |
| 30             | 11        | -                  | -                 | -                 |
| 30             | 12        | -                  | -                 | -                 |
| 30             | 13        | 90                 | R6                | AA8               |
| 30             | 14        | 89                 | N7                | AB8               |
| 30             | 15        | 88                 | T7                | W9                |
| 30             | 16        | 87                 | P6                | Y9                |
| 31             | 1         | 126                | K2                | N4                |
| 31             | 2         | -                  | K3                | N3                |
| 31             | 3         | 127 <sup>(1)</sup> | K1 <sup>(1)</sup> | N2 <sup>(1)</sup> |
| 31             | 4         | 128                | J4                | N1                |

Table 3: XCR3512XL I/O Pins (Continued)

| Function Block | Macrocell | PQ208 | FT256 | FG324 |
|----------------|-----------|-------|-------|-------|
| 31             | 5         | -     | -     | -     |
| 31             | 6         | -     | -     | -     |
| 31             | 7         | -     | -     | -     |
| 31             | 8         | -     | -     | -     |
| 31             | 9         | -     | -     | -     |
| 31             | 10        | -     | -     | -     |
| 31             | 11        | -     | -     | -     |
| 31             | 12        | -     | -     | -     |
| 31             | 13        | -     | -     | M4    |
| 31             | 14        | 129   | J2    | M3    |
| 31             | 15        | 130   | J5    | M2    |
| 31             | 16        | 131   | H2    | L2    |
| 32             | 1         | 86    | R7    | AA9   |
| 32             | 2         | -     | P7    | AB9   |
| 32             | 3         | 84    | T8    | W10   |
| 32             | 4         | -     | N8    | Y10   |
| 32             | 5         | -     | -     | -     |
| 32             | 6         | -     | -     | -     |
| 32             | 7         | -     | -     | -     |
| 32             | 8         | -     | -     | -     |
| 32             | 9         | -     | -     | -     |
| 32             | 10        | -     | -     | -     |
| 32             | 11        | -     | -     | -     |
| 32             | 12        | -     | -     | -     |
| 32             | 13        | -     | -     | AA10  |
| 32             | 14        | 81    | R8    | AB11  |
| 32             | 15        | 80    | P8    | W11   |
| 32             | 16        | 79    | T9    | AA11  |

**Notes:**

1. JTAG pins.

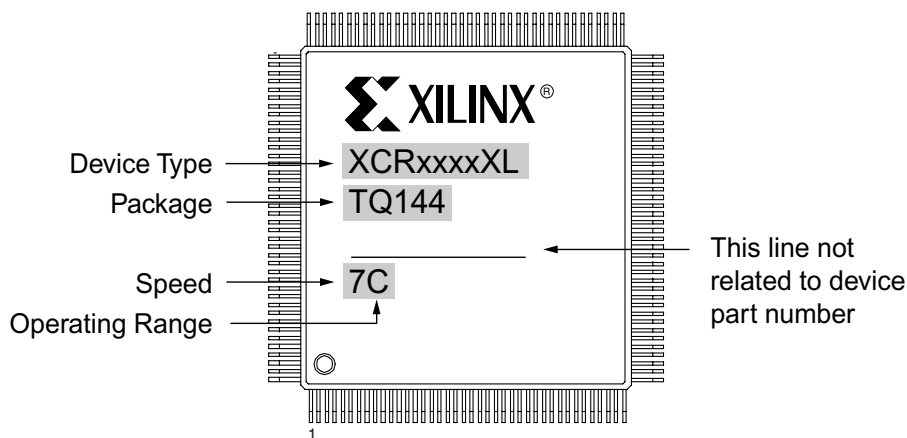
Table 4: XCR3512XL Global, JTAG, Port Enable, Power, and No Connect Pins

| Pin Type    | PQ208                                                        | FT256                                                                                         | FG324                                                                                                                                                  |
|-------------|--------------------------------------------------------------|-----------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|
| IN0 / CLK0  | 181                                                          | B9                                                                                            | C12                                                                                                                                                    |
| IN1 / CLK1  | 182                                                          | A8                                                                                            | B12                                                                                                                                                    |
| IN2 / CLK2  | 183                                                          | C9                                                                                            | D12                                                                                                                                                    |
| IN3 / CLK3  | 184                                                          | B10                                                                                           | A12                                                                                                                                                    |
| TCK         | 30                                                           | J13                                                                                           | P20                                                                                                                                                    |
| TDI         | 176                                                          | A7                                                                                            | D11                                                                                                                                                    |
| TDO         | 189                                                          | C10                                                                                           | B14                                                                                                                                                    |
| TMS         | 127                                                          | K1                                                                                            | N2                                                                                                                                                     |
| PORT_EN     | 116 <sup>(1)</sup>                                           | N1 <sup>(1)</sup>                                                                             | T4 <sup>(1)</sup>                                                                                                                                      |
| Vcc         | 5, 23, 41, 63, 74, 83, 85, 107, 125, 143, 165, 179, 186, 191 | E8, E9, F7, F8, F9, F10, G6, G11, H5, H6, H11, J6, J11, J12, K6, K11, L7, L8, L9, L10, M8, M9 | A11, A13, D8, D15, H4, H19, J10, J11, J12, J13, K9, K14, L9, L14, M1, M9, M14, N9, N14, N20, P10, P11, P12, P13, R4, R19, W8, W15, Y12, AB10           |
| GND         | 14, 32, 50, 72, 75, 82, 94, 134, 152, 174, 180, 185, 200     | E5, F6, F11, G7, G8, G9, G10, H7, H8, H9, H10, J7, J8, J9, J10, K7, K8, K9, K10, L6, L11      | D4, D5, D18, D19, E4, E19, J9, J14, K10, K11, K12, K13, L10, L11, L12, L13, M10, M11, M12, M13, N10, N11, N12, N13, P9, P14, V4, V19, W4, W5, W18, W19 |
| No Connects | -                                                            | -                                                                                             | A1                                                                                                                                                     |

**Notes:**

1. Port Enable is brought High to enable JTAG pins when JTAG pins are used as I/O. See family data sheet ([DS012](#)) for full explanation.

## Device Part Marking and Ordering Combination Information



Sample package with part marking.

| Device Ordering and Part Marking Number | Speed (pin-to-pin delay) | Pkg. Symbol | No. of Pins | Package Type                           | Operating Range <sup>(1)</sup> |
|-----------------------------------------|--------------------------|-------------|-------------|----------------------------------------|--------------------------------|
| XCR3512XL-7PQ208C                       | 7.5 ns                   | PQ208       | 208-pin     | Plastic Quad Flat Pack (PQFP)          | C                              |
| XCR3512XL-7PQG208C                      | 7.5 ns                   | PQG208      | 208-pin     | Plastic Quad Flat Pack (PQFP); Pb-Free | C                              |
| XCR3512XL-7FT256C                       | 7.5 ns                   | FT256       | 256-ball    | Fine-Pitch BGA (FT)                    | C                              |
| XCR3512XL-7FG324C                       | 7.5 ns                   | FG324       | 324-ball    | Fineline BGA Package (FG)              | C                              |
| XCR3512XL-10PQ208C                      | 10 ns                    | PQ208       | 208-pin     | Plastic Quad Flat Pack (PQFP)          | C                              |
| XCR3512XL-10PQG208C                     | 10 ns                    | PQG208      | 208-pin     | Plastic Quad Flat Pack (PQFP); Pb-Free | C                              |
| XCR3512XL-10FT256C                      | 10 ns                    | FT256       | 256-ball    | Fine-Pitch BGA (FT)                    | C                              |
| XCR3512XL-10FG324C                      | 10 ns                    | FG324       | 324-ball    | Fineline BGA Package (FG)              | C                              |
| XCR3512XL-10PQ208I                      | 10 ns                    | PQ208       | 208-pin     | Plastic Quad Flat Pack (PQFP)          | I                              |
| XCR3512XL-10PQG208I                     | 10 ns                    | PQG208      | 208-pin     | Plastic Quad Flat Pack (PQFP); Pb-Free | I                              |
| XCR3512XL-10FT256I                      | 10 ns                    | FT256       | 256-ball    | Fine-Pitch BGA (FT)                    | I                              |
| XCR3512XL-10FG324I                      | 10 ns                    | FG324       | 324-ball    | Fineline BGA Package (FG)              | I                              |
| XCR3512XL-12PQ208C                      | 12 ns                    | PQ208       | 208-pin     | Plastic Quad Flat Pack (PQFP)          | C                              |
| XCR3512XL-12PQG208C                     | 12 ns                    | PQG208      | 208-pin     | Plastic Quad Flat Pack (PQFP); Pb-Free | C                              |
| XCR3512XL-12FT256C                      | 12 ns                    | FT256       | 256-ball    | Fine-Pitch BGA (FT)                    | C                              |
| XCR3512XL-12FG324C                      | 12 ns                    | FG324       | 324-ball    | Fineline BGA Package (FG)              | C                              |
| XCR3512XL-12PQ208I                      | 12 ns                    | PQ208       | 208-pin     | Plastic Quad Flat Pack (PQFP)          | I                              |
| XCR3512XL-12PQG208I                     | 12 ns                    | PQG208      | 208-pin     | Plastic Quad Flat Pack (PQFP); Pb-Free | I                              |
| XCR3512XL-12FT256I                      | 12 ns                    | FT256       | 256-ball    | Fine-Pitch BGA (FT)                    | I                              |
| XCR3512XL-12FG324I                      | 12 ns                    | FG324       | 324-ball    | Fineline BGA Package (FG)              | I                              |

### Notes:

1. C = Commercial:  $T_A = 0^\circ$  to  $+70^\circ\text{C}$ ; I = Industrial:  $T_A = -40^\circ$  to  $+85^\circ\text{C}$

## Warranty Disclaimer

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## Additional Information

[CoolRunner XPLA3 Data Sheets and Application Notes](#)    [Device Package User Guide](#)

[Device Packages](#)

## Revision History

The following table shows the revision history for this document

| Date     | Version | Revision                                                                                                                                                                                                                                                                                                                                                                                        |
|----------|---------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 04/11/01 | 1.0     | Initial Xilinx release.                                                                                                                                                                                                                                                                                                                                                                         |
| 04/19/01 | 1.1     | Updated Typical I/V curve, <b>Figure 2</b> : added voltage levels.                                                                                                                                                                                                                                                                                                                              |
| 09/04/01 | 1.2     | Updated AC Electrical: added T <sub>INIT</sub> spec.; Internal Timing Parameters; added -12 industrial temperature.                                                                                                                                                                                                                                                                             |
| 01/08/02 | 1.3     | Updated T <sub>INIT</sub> spec and T <sub>CONFIG</sub> spec. Added single p-term setup time (T <sub>SU1</sub> ) to AC Table, renamed T <sub>SU</sub> to T <sub>SU2</sub> for setup time through the OR array. Updated T <sub>HI</sub> spec to correct a typo. Updated AC Load Circuit diagram to more closely resemble true test conditions, added note for T <sub>POD</sub> delay measurement. |
| 01/06/03 | 1.4     | Updated all AC and DC parameters based on product characterization. Released to Preliminary. Updated T <sub>PCO</sub> (added T <sub>PTCK</sub> ). Updated Ordering Information format.                                                                                                                                                                                                          |
| 07/15/03 | 1.5     | Updated test conditions for I <sub>IL</sub> and I <sub>IH</sub> .                                                                                                                                                                                                                                                                                                                               |
| 09/23/03 | 1.6     | Updated Package Device Marking Pin 1 orientation. Removed Preliminary.                                                                                                                                                                                                                                                                                                                          |
| 02/13/04 | 1.7     | Add solder temperature specification. Add links to data sheets, application notes, and packages.                                                                                                                                                                                                                                                                                                |
| 01/05/05 | 1.8     | Fixed broken links.                                                                                                                                                                                                                                                                                                                                                                             |
| 04/08/05 | 1.9     | Added I <sub>CCSB</sub> Typical and T <sub>APRPW</sub> specifications. Removed T <sub>SOL</sub> specification.                                                                                                                                                                                                                                                                                  |
| 03/31/06 | 2.0     | Added Warranty Disclaimer; Added Pb-Free package ordering information.                                                                                                                                                                                                                                                                                                                          |