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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                                                                                                                    |
| Delay Time tpd(1) Max           | 7.5 ns                                                                                                                                    |
| Voltage Supply - Internal       | 2.37V ~ 2.62V                                                                                                                             |
| Number of Logic Elements/Blocks | 16                                                                                                                                        |
| Number of Macrocells            | 288                                                                                                                                       |
| Number of Gates                 | 6400                                                                                                                                      |
| Number of I/O                   | 192                                                                                                                                       |
| Operating Temperature           | 0°C ~ 70°C (TA)                                                                                                                           |
| Mounting Type                   | Surface Mount                                                                                                                             |
| Package / Case                  | 256-BGA                                                                                                                                   |
| Supplier Device Package         | 256-FBGA (17x17)                                                                                                                          |
| Purchase URL                    | <a href="https://www.e-xfl.com/product-detail/xilinx/xc95288xv-7fg256c">https://www.e-xfl.com/product-detail/xilinx/xc95288xv-7fg256c</a> |



**Note: This product is being discontinued.** You cannot order parts after May 14, 2008. Xilinx recommends replacing XC95288XV devices with equivalent XC95288XL devices in all designs as soon as possible. Recommended replacements are pin compatible, however require a  $V_{CC}$  change to 3.3V, and a recompile of the design file. In addition, there is no 1.8V I/O support, and only one output bank is supported. See [XC907010](#) for details regarding this discontinuation, including device replacement recommendations for the XC95288XV CPLD.

## Features

- 288 macrocells with 6,400 usable gates
- Available in small footprint packages
  - 144-pin TQFP (117 user I/O pins)
  - 208-pin PQFP (168 user I/O pins)
  - 280-pin CSP (192 user I/O pins)
  - 256-pin FBGA (192 user I/O pins)
- Optimized for high-performance 2.5V systems
  - Low power operation
  - Multi-voltage operation
- Advanced system features
  - In-system programmable
  - Four separate output banks
  - Superior pin-locking and routability with Fast CONNECT™ II switch matrix
  - Extra wide 54-input Function Blocks
  - Up to 90 product-terms per macrocell with individual product-term allocation
  - Local clock inversion with three global and one product-term clocks
  - Individual output enable per output pin
  - Input hysteresis on all user and boundary-scan pin inputs
  - Bus-hold circuitry on all user pin inputs
  - Full IEEE Standard 1149.1 boundary-scan (JTAG)
- Fast concurrent programming
- Slew rate control on individual outputs
- Enhanced data security features
- Excellent quality and reliability
  - 20 year data retention
  - ESD protection exceeding 2,000V

## Description

The XC95288XV is a 2.5V CPLD targeted for high-performance, low-voltage applications in leading-edge communications and computing systems. It is comprised of 16 54V18 Function Blocks, providing 6,400 usable gates with propagation delays of 6 ns.

## Power Estimation

Power dissipation in CPLDs can vary substantially depending on the system frequency, design application and output loading. To help reduce power dissipation, each macrocell in a XC9500XV device may be configured for low-power mode (from the default high-performance mode). In addition, unused product-terms and macrocells are automatically deactivated by the software to further conserve power.

For a general estimate of  $I_{CC}$ , the following equation may be used:

$$P_{TOTAL} = P_{INT} + P_{IO} = I_{CCINT} \times V_{CCINT} + P_{IO}$$

Separating internal and I/O power here is convenient because XC9500XV CPLDs also separate the corresponding power pins.  $P_{IO}$  is a strong function of the load capacitance driven, so it is handled by  $I = CVf$ .  $I_{CCINT}$  is another situation that reflects the actual design considered and the internal switching speeds. An estimation expression for  $I_{CCINT}$  (taken from simulation) is:

$$I_{CCINT}(mA) = MC_{HS}(0.122 \times PT_{HS} + 0.238) + MC_{LP}(0.042 \times PT_{LP} + 0.171) + 0.04(MC_{HS} + MC_{LP}) \times f_{MAX} \times MC_{TOG}$$

where:

$MC_{HS}$  = # macrocells used in high speed mode

$MC_{LP}$  = #macrocells used in low power mode

$PT_{HS}$  = average p-terms used per high speed macrocell

$PT_{LP}$  = average p-terms used over low power macrocell

$f_{MAX}$  = max clocking frequency in the device

$MC_{TOG}$  = % macrocells toggling on each clock (12% is frequently a good estimate)

This calculation was derived from laboratory measurements of an XC9500XV part filled with 16-bit counters and allowing a single output (the LSB) to be enabled. The actual  $I_{CC}$  value varies with the design application and should be verified during normal system operation. shows the above estimation in a graphical form. For a more detailed discussion of power consumption in this device, see Xilinx

application note **XAPP361, "Planning for High Speed XC9500XV Designs."**

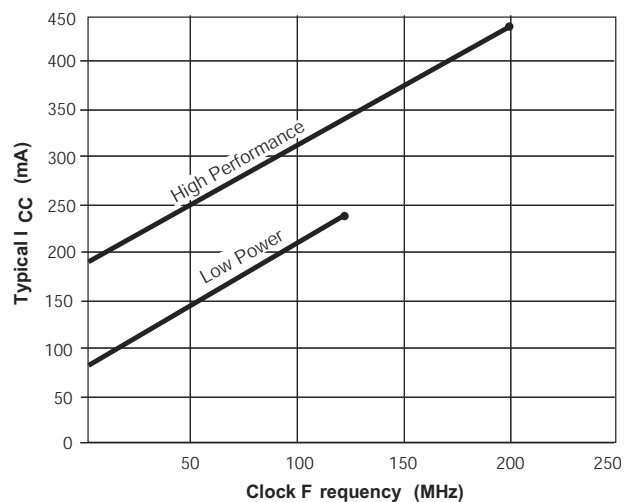
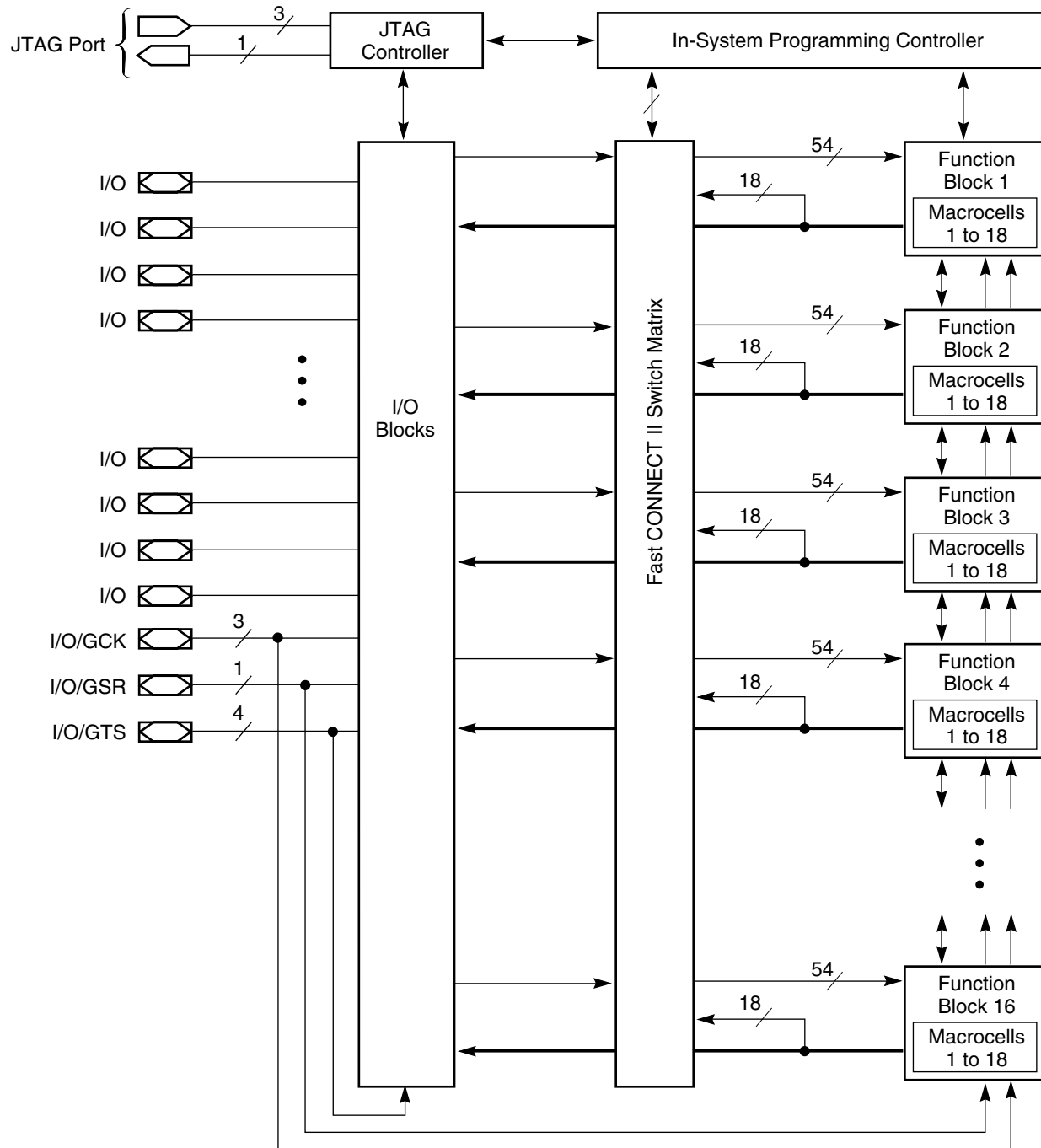


Figure 1: Typical I<sub>CC</sub> vs. Frequency for XC95288XV



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**Figure 2: XC95288XV Architecture**  
(Function Block outputs (indicated by the bold line) drive the I/O Blocks directly.)

## Supported I/O Standards

Table 1: IOSTANDARD Options

| IOSTANDARD | V <sub>CCIO</sub> |
|------------|-------------------|
| LVTTL      | 3.3V              |
| LVC MOS2   | 2.5V              |
| X25TO18    | 1.8V              |

The XC95288XV CPLD features both LVC MOS and LVTTL I/O implementations. See [Table 1](#) for I/O standard voltages.

The LVTTL I/O standard is a general purpose EIA/JEDEC standard for 3.3V applications that use an LVTTL input buffer and Push-Pull output buffer. The LVC MOS2 standard is used in 2.5V applications.

XC9500XV CPLDs are also 1.8V I/O compatible. The X25TO18 setting is provided for generating 1.8V compatible outputs from a CPLD normally operating in a 2.5V environment. The ISE software automatically groups outputs with matching IOSTANDARD settings into the same V<sub>CCIO</sub> bank when no location constraints are specified. The default I/O Standard for pads without IOSTANDARD attributes is LVTTL for XC9500XV devices.

## Absolute Maximum Ratings

| Symbol            | Description                                      | Value       | Units |
|-------------------|--------------------------------------------------|-------------|-------|
| V <sub>CC</sub>   | Supply voltage relative to GND                   | –0.5 to 2.7 | V     |
| V <sub>CCIO</sub> | Supply voltage for output drivers                | –0.5 to 3.6 | V     |
| V <sub>IN</sub>   | Input voltage relative to GND <sup>(1)</sup>     | –0.5 to 3.6 | V     |
| V <sub>TS</sub>   | Voltage applied to 3-state output <sup>(1)</sup> | –0.5 to 3.6 | V     |
| T <sub>STG</sub>  | Storage temperature (ambient)                    | –65 to +150 | °C    |
| T <sub>J</sub>    | Junction temperature                             | +150        | °C    |

### Notes:

- Maximum DC undershoot below GND must be limited to either 0.5V or 10 mA, whichever is easier to achieve. During transitions, the device pins may undershoot to –2.0V or overshoot to +3.6V, provided this over- or undershoot lasts less than 10 ns and with the forcing current being limited to 200 mA.
- 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 Operating Conditions is not implied. Exposure to Absolute Maximum Ratings conditions for extended periods of time may affect device reliability.
- For solder specifications, see [Xilinx Packaging](#).

## Recommended Operation Conditions

| Symbol             | Parameter                                            |                                            | Min  | Max               | Units |
|--------------------|------------------------------------------------------|--------------------------------------------|------|-------------------|-------|
| V <sub>CCINT</sub> | Supply voltage for internal logic and input buffers  | Commercial T <sub>A</sub> = 0°C to +70°C   | 2.37 | 2.62              | V     |
|                    |                                                      | Industrial T <sub>A</sub> = –40°C to +85°C | 2.37 | 2.62              |       |
| V <sub>CCIO</sub>  | Supply voltage for output drivers for 3.3V operation |                                            | 3.0  | 3.6               | V     |
|                    | Supply voltage for output drivers for 2.5V operation |                                            | 2.37 | 2.62              | V     |
|                    | Supply voltage for output drivers for 1.8V operation |                                            | 1.71 | 1.89              | V     |
| V <sub>IL</sub>    | Low-level input voltage                              |                                            | 0    | 0.8               | V     |
| V <sub>IH</sub>    | High-level input voltage                             |                                            | 1.7  | 3.6               | V     |
| V <sub>O</sub>     | Output voltage                                       |                                            | 0    | V <sub>CCIO</sub> | V     |

## Quality and Reliability Characteristics

| Symbol    | Parameter                        | Min   | Max | Units  |
|-----------|----------------------------------|-------|-----|--------|
| $T_{DR}$  | Data retention                   | 20    | -   | Years  |
| $N_{PE}$  | Program/Erase cycles (endurance) | 1,000 | -   | Cycles |
| $V_{ESD}$ | Electrostatic Discharge (ESD)    | 2,000 | -   | Volts  |

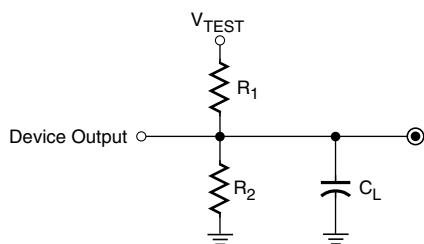
## DC Characteristics Over Recommended Operating Conditions

| Symbol   | Parameter                                            | Test Conditions                                                                              | Min            | Max       | Units         |
|----------|------------------------------------------------------|----------------------------------------------------------------------------------------------|----------------|-----------|---------------|
| $V_{OH}$ | Output high voltage for 3.3V outputs                 | $I_{OH} = -4.0 \text{ mA}$                                                                   | 2.4            | -         | V             |
|          | Output high voltage for 2.5V outputs                 | $I_{OH} = -1.0 \text{ mA}$                                                                   | 2.0            | -         | V             |
|          | Output high voltage for 1.8V outputs                 | $I_{OH} = -100 \mu\text{A}$                                                                  | 90% $V_{CCIO}$ | -         | V             |
| $V_{OL}$ | Output low voltage for 3.3V outputs                  | $I_{OL} = 8.0 \text{ mA}$                                                                    | -              | 0.4       | V             |
|          | Output low voltage for 2.5V outputs                  | $I_{OL} = 1.0 \text{ mA}$                                                                    | -              | 0.4       | V             |
|          | Output low voltage for 1.8V outputs                  | $I_{OL} = 100 \mu\text{A}$                                                                   | -              | 0.4       | V             |
| $I_{IL}$ | Input leakage current                                | $V_{CC} = 2.62\text{V}$<br>$V_{CCIO} = 3.6\text{V}$<br>$V_{IN} = \text{GND or } 3.6\text{V}$ | -              | $\pm 10$  | $\mu\text{A}$ |
| $I_{IH}$ | Input high-Z leakage current                         | $V_{CC} = 2.62\text{V}$<br>$V_{CCIO} = 3.6\text{V}$<br>$V_{IN} = \text{GND or } 3.6\text{V}$ | -              | $\pm 10$  | $\mu\text{A}$ |
|          |                                                      | $V_{CC} \text{ min} < V_{IN} < 3.6\text{V}$                                                  | -              | $\pm 150$ | $\mu\text{A}$ |
| $C_{IN}$ | I/O capacitance                                      | $V_{IN} = \text{GND}$<br>$f = 1.0 \text{ MHz}$                                               | -              | 10        | pF            |
| $I_{CC}$ | Operating supply current<br>(low power mode, active) | $V_I = \text{GND, No load}$<br>$f = 1.0 \text{ MHz}$                                         | 59             |           | mA            |

## AC Characteristics

| Symbol       | Parameter                                | XC95288XV-6 |     | XC95288XV-7 |       | XC95288XV-10 |       | Units |
|--------------|------------------------------------------|-------------|-----|-------------|-------|--------------|-------|-------|
|              |                                          | Min         | Max | Min         | Max   | Min          | Max   |       |
| $T_{PD}$     | I/O to output valid                      | -           | 6.0 | -           | 7.5   | -            | 10    | ns    |
| $T_{SU}$     | I/O setup time before GCK                | 4.0         | -   | 4.8         | -     | 6.5          | -     | ns    |
| $T_H$        | I/O hold time after GCK                  | 0           | -   | 0           | -     | 0            | -     | ns    |
| $T_{CO}$     | GCK to output valid                      | -           | 3.8 | -           | 4.5   | -            | 5.8   | ns    |
| $f_{SYSTEM}$ | Multiple FB internal operating frequency | -           | 208 | -           | 125.0 | -            | 100.0 | MHz   |
| $T_{PSU}$    | I/O setup time before p-term clock input | 1.0         | -   | 1.6         | -     | 2.1          | -     | ns    |
| $T_{PH}$     | I/O hold time after p-term clock input   | 2.6         | -   | 3.2         | -     | 4.4          | -     | ns    |
| $T_{PCO}$    | P-term clock output valid                | -           | 6.8 | -           | 7.7   | -            | 10.2  | ns    |
| $T_{OE}$     | GTS to output valid                      | -           | 4.5 | -           | 5.0   | -            | 7.0   | ns    |
| $T_{OD}$     | GTS to output disable                    | -           | 4.5 | -           | 5.0   | -            | 7.0   | ns    |
| $T_{POE}$    | Product term OE to output enabled        | -           | 8.4 | -           | 9.5   | -            | 11.0  | ns    |
| $T_{POD}$    | Product term OE to output disabled       | -           | 8.4 | -           | 9.5   | -            | 11.0  | ns    |

| Symbol             | Parameter                                           | XC95288XV-6 |      | XC95288XV-7 |      | XC95288XV-10 |      | Units |
|--------------------|-----------------------------------------------------|-------------|------|-------------|------|--------------|------|-------|
|                    |                                                     | Min         | Max  | Min         | Max  | Min          | Max  |       |
| T <sub>AO</sub>    | GSR to output valid                                 | -           | 10.8 | -           | 12.0 | -            | 14.5 | ns    |
| T <sub>PAO</sub>   | P-term S/R to output valid                          | -           | 11.8 | -           | 12.6 | -            | 15.3 | ns    |
| T <sub>WLH</sub>   | GCK pulse width (High or Low)                       | 2.4         | -    | 4.0         | -    | 5.0          | -    | ns    |
| T <sub>PLH</sub>   | P-term clock pulse width (High or Low)              | 6.0         | -    | 6.5         | -    | 7.0          | -    | ns    |
| T <sub>APRPW</sub> | Asynchronous preset/reset pulse width (High or Low) | 6.0         | -    | 6.5         | -    | 7.0          | -    | ns    |



| Output Type | V <sub>CCIO</sub> | V <sub>TEST</sub> | R <sub>1</sub> | R <sub>2</sub> | C <sub>L</sub> |
|-------------|-------------------|-------------------|----------------|----------------|----------------|
|             | 3.3V              | 3.3V              | 320Ω           | 360Ω           | 35 pF          |
|             | 2.5V              | 2.5V              | 250Ω           | 660Ω           | 35 pF          |
|             | 1.8V              | 1.8V              | 10KΩ           | 14KΩ           | 35 pF          |

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Figure 3: AC Load Circuit

## Internal Timing Parameters

| Symbol                                     | Parameter                                 | XC95288XV-6 |     | XC95288XV-7 |     | XC95288XV-10 |     | Units |
|--------------------------------------------|-------------------------------------------|-------------|-----|-------------|-----|--------------|-----|-------|
|                                            |                                           | Min         | Max | Min         | Max | Min          | Max |       |
| Buffer Delays                              |                                           |             |     |             |     |              |     |       |
| T <sub>IN</sub>                            | Input buffer delay                        | -           | 2.2 | -           | 2.3 | -            | 3.5 | ns    |
| T <sub>GCK</sub>                           | GCK buffer delay                          | -           | 1.2 | -           | 1.5 | -            | 1.8 | ns    |
| T <sub>GSR</sub>                           | GSR buffer delay                          | -           | 2.2 | -           | 3.1 | -            | 4.5 | ns    |
| T <sub>GTS</sub>                           | GTS buffer delay                          | -           | 4.5 | -           | 5.0 | -            | 7.0 | ns    |
| T <sub>OUT</sub>                           | Output buffer delay                       | -           | 2.4 | -           | 2.5 | -            | 3.0 | ns    |
| T <sub>EN</sub>                            | Output buffer enable/disable delay        | -           | 0   | -           | 0   | -            | 0   | ns    |
| Product Term Control Delays                |                                           |             |     |             |     |              |     |       |
| T <sub>PTCK</sub>                          | Product term clock delay                  | -           | 2.0 | -           | 2.4 | -            | 2.7 | ns    |
| T <sub>PTSR</sub>                          | Product term set/reset delay              | -           | 1.0 | -           | 1.4 | -            | 1.8 | ns    |
| T <sub>PTTS</sub>                          | Product term 3-state delay                | -           | 6.2 | -           | 7.2 | -            | 7.5 | ns    |
| Internal Register and Combinatorial Delays |                                           |             |     |             |     |              |     |       |
| T <sub>PDI</sub>                           | Combinatorial logic propagation delay     | -           | 0.4 | -           | 1.3 | -            | 1.7 | ns    |
| T <sub>SUI</sub>                           | Register setup time                       | 2.0         | -   | 2.6         | -   | 3.0          | -   | ns    |
| T <sub>HI</sub>                            | Register hold time                        | 1.6         | -   | 2.2         | -   | 3.5          | -   | ns    |
| T <sub>ECSU</sub>                          | Register clock enable setup time          | 2.0         | -   | 2.6         | -   | 3.0          | -   | ns    |
| T <sub>ECHO</sub>                          | Register clock enable hold time           | 1.6         | -   | 2.2         | -   | 3.5          | -   | ns    |
| T <sub>COI</sub>                           | Register clock to output valid time       | -           | 0.2 | -           | 0.5 | -            | 1.0 | ns    |
| T <sub>AOI</sub>                           | Register async. S/R to output delay       | -           | 6.2 | -           | 6.4 | -            | 7.0 | ns    |
| T <sub>RAI</sub>                           | Register async. S/R recover before clock  | 6.0         | -   | 7.5         |     | 10.0         | -   | ns    |
| T <sub>LOGI</sub>                          | Internal logic delay                      | -           | 1.0 | -           | 1.4 | -            | 1.8 | ns    |
| T <sub>LOGILP</sub>                        | Internal low power logic delay            | -           | 5.5 | -           | 6.4 | -            | 7.3 | ns    |
| Feedback Delays                            |                                           |             |     |             |     |              |     |       |
| T <sub>F</sub>                             | Fast CONNECT II feedback delay            | -           | 1.6 | -           | 3.5 | -            | 4.2 | ns    |
| Time Adders                                |                                           |             |     |             |     |              |     |       |
| T <sub>PTA</sub>                           | Incremental product term allocator delay  | -           | 0.8 | -           | 0.8 | -            | 1.0 | ns    |
| T <sub>PTA2</sub>                          | Adjacent macrocell p-term allocator delay | -           | 0.3 | -           | 0.3 | -            | 0.4 | ns    |
| T <sub>SLEW</sub>                          | Slew-rate limited delay                   | -           | 3.5 | -           | 4.0 | -            | 4.5 | ns    |

## XC95288XV I/O Pins

| Function Block | Macro-cell | TQ144 | PQ208 | FG256 | CS280 | BScan Order | Bank | Function Block | Macro-cell | TQ144             | PQ208             | FG256             | CS280             | BScan Order | Bank |
|----------------|------------|-------|-------|-------|-------|-------------|------|----------------|------------|-------------------|-------------------|-------------------|-------------------|-------------|------|
| 1              | 1          | -     | -     | -     | -     | 861         | -    | 3              | 1          | -                 | -                 | -                 | -                 | 753         | -    |
| 1              | 2          | -     | 28    | H1    | K2    | 858         | 1    | 3              | 2          | 28                | 38                | L2                | N2                | 750         | 1    |
| 1              | 3          | -     | 29    | H5    | K3    | 855         | 1    | 3              | 3          | -                 | 39                | L5                | P1                | 747         | 1    |
| 1              | 4          | -     | -     | -     | -     | 852         | -    | 3              | 4          | -                 | -                 | -                 | -                 | 744         | -    |
| 1              | 5          | 20    | 30    | J1    | K4    | 849         | 1    | 3              | 5          | -                 | 40                | M1                | P2                | 741         | 1    |
| 1              | 6          | 21    | 31    | J5    | L1    | 846         | 1    | 3              | 6          | -                 | 41                | L4                | P3                | 738         | 1    |
| 1              | 7          | -     | -     | -     | -     | 843         | -    | 3              | 7          | -                 | -                 | -                 | -                 | 735         | -    |
| 1              | 8          | 22    | 32    | J2    | L2    | 840         | 1    | 3              | 8          | -                 | 43                | N1                | P4                | 732         | 1    |
| 1              | 9          | -     | -     | J3    | L3    | 837         | 1    | 3              | 9          | -                 | -                 | L3                | R1                | 729         | 1    |
| 1              | 10         | 23    | 33    | K1    | L4    | 834         | 1    | 3              | 10         | 30 <sup>(1)</sup> | 44 <sup>(1)</sup> | M2 <sup>(1)</sup> | R3 <sup>(1)</sup> | 726         | 1    |
| 1              | 11         | -     | -     | J4    | M1    | 831         | 1    | 3              | 11         | -                 | -                 | M4                | R2                | 723         | 1    |
| 1              | 12         | 24    | 34    | K2    | M2    | 828         | 1    | 3              | 12         | 31                | 45                | P1                | R4                | 720         | 1    |
| 1              | 13         | -     | -     | -     | -     | 825         | -    | 3              | 13         | -                 | -                 | -                 | -                 | 717         | -    |
| 1              | 14         | 25    | 35    | K5    | M3    | 822         | 1    | 3              | 14         | 32 <sup>(1)</sup> | 46 <sup>(1)</sup> | M3 <sup>(1)</sup> | T1 <sup>(1)</sup> | 714         | 1    |
| 1              | 15         | 26    | 36    | L1    | M4    | 819         | 1    | 3              | 15         | 33                | 47                | N2                | T2                | 711         | 1    |
| 1              | 16         | -     | -     | -     | -     | 816         | -    | 3              | 16         | -                 | -                 | -                 | -                 | 708         | -    |
| 1              | 17         | 27    | 37    | K3    | N1    | 813         | 1    | 3              | 17         | -                 | 48                | N4                | T3                | 705         | 1    |
| 1              | 18         | -     | -     | -     | -     | 810         | -    | 3              | 18         | -                 | -                 | -                 | -                 | 702         | -    |
| 2              | 1          | -     | -     | -     | -     | 807         | -    | 4              | 1          | -                 | -                 | -                 | -                 | 699         | -    |
| 2              | 2          | 9     | 15    | D1    | G3    | 804         | 2    | 4              | 2          | 2 <sup>(1)</sup>  | 3 <sup>(1)</sup>  | D3 <sup>(1)</sup> | C2 <sup>(1)</sup> | 696         | 2    |
| 2              | 3          | 10    | 16    | G4    | G2    | 801         | 2    | 4              | 3          | -                 | 4                 | D2                | B1                | 693         | 2    |
| 2              | 4          | -     | -     | -     | -     | 798         | -    | 4              | 4          | -                 | -                 | -                 | -                 | 690         | -    |
| 2              | 5          | 11    | 17    | E1    | G1    | 795         | 2    | 4              | 5          | 3 <sup>(1)</sup>  | 5 <sup>(1)</sup>  | E3 <sup>(1)</sup> | C1 <sup>(1)</sup> | 687         | 2    |
| 2              | 6          | 12    | 18    | G3    | G4    | 792         | 2    | 4              | 6          | 4                 | 6                 | C2                | D4                | 684         | 2    |
| 2              | 7          | -     | -     | -     | -     | 789         | -    | 4              | 7          | -                 | -                 | -                 | -                 | 681         | -    |
| 2              | 8          | 13    | 19    | G2    | H1    | 786         | 2    | 4              | 8          | 5 <sup>(1)</sup>  | 7 <sup>(1)</sup>  | D4 <sup>(1)</sup> | D3 <sup>(1)</sup> | 678         | 2    |
| 2              | 9          | -     | -     | F5    | H3    | 783         | 2    | 4              | 9          | -                 | -                 | B1                | D2                | 675         | 2    |
| 2              | 10         | 14    | 20    | F1    | H2    | 780         | 2    | 4              | 10         | -                 | 8                 | E4                | D1                | 672         | 2    |
| 2              | 11         | -     | -     | G5    | H4    | 777         | 2    | 4              | 11         | -                 | -                 | C1                | E3                | 669         | 2    |
| 2              | 12         | 15    | 21    | H2    | J1    | 774         | 2    | 4              | 12         | 6 <sup>(1)</sup>  | 9 <sup>(1)</sup>  | E5 <sup>(1)</sup> | E2 <sup>(1)</sup> | 666         | 2    |
| 2              | 13         | -     | -     | -     | -     | 771         | -    | 4              | 13         | -                 | -                 | -                 | -                 | 663         | -    |
| 2              | 14         | 16    | 22    | H4    | J2    | 768         | 2    | 4              | 14         | 7                 | 10                | E2                | E4                | 660         | 2    |
| 2              | 15         | 17    | 23    | G1    | J3    | 765         | 2    | 4              | 15         | -                 | 12                | F2                | F3                | 657         | 2    |
| 2              | 16         | -     | -     | -     | -     | 762         | -    | 4              | 16         | -                 | -                 | -                 | -                 | 654         | -    |
| 2              | 17         | 19    | 25    | H3    | J4    | 759         | 2    | 4              | 17         | -                 | 14                | E6                | F4                | 651         | 2    |
| 2              | 18         | -     | -     | -     | -     | 756         | -    | 4              | 18         | -                 | -                 | -                 | -                 | 648         | -    |

**Notes:**

1. Global control pin

## XC95288XV I/O Pins (continued)

| Function Block | Macro-cell | TQ144              | PQ208              | FG256             | CS280             | BScan Order | Bank | Function Block | Macro-cell | TQ144 | PQ208 | FG256 | CS280 | BScan Order | Bank |
|----------------|------------|--------------------|--------------------|-------------------|-------------------|-------------|------|----------------|------------|-------|-------|-------|-------|-------------|------|
| 5              | 1          | -                  | -                  | -                 | -                 | 645         | -    | 7              | 1          | -     | -     | -     | -     | 537         | -    |
| 5              | 2          | 34                 | 49                 | R1                | U1                | 642         | 1    | 7              | 2          | -     | 62    | R3    | W5    | 534         | 1    |
| 5              | 3          | -                  | 50                 | N3                | V1                | 639         | 1    | 7              | 3          | 45    | 63    | M6    | U6    | 531         | 1    |
| 5              | 4          | -                  | -                  | -                 | -                 | 636         | -    | 7              | 4          | -     | -     | -     | -     | 528         | -    |
| 5              | 5          | 35                 | 51                 | P2                | U2                | 633         | 1    | 7              | 5          | 46    | 64    | T3    | V6    | 525         | 1    |
| 5              | 6          | -                  | 54                 | P4                | V3                | 630         | 1    | 7              | 6          | -     | 66    | T4    | W6    | 522         | 1    |
| 5              | 7          | -                  | -                  | -                 | -                 | 627         | -    | 7              | 7          | -     | -     | -     | -     | 519         | -    |
| 5              | 8          | 38 <sup>(1)</sup>  | 55 <sup>(1)</sup>  | P5 <sup>(1)</sup> | W2 <sup>(1)</sup> | 624         | 1    | 7              | 8          | -     | 67    | P7    | U7    | 516         | 1    |
| 5              | 9          | -                  | -                  | T2                | W3                | 621         | 1    | 7              | 9          | -     | -     | T5    | V7    | 513         | 1    |
| 5              | 10         | 39                 | 56                 | N5                | T4                | 618         | 1    | 7              | 10         | -     | 69    | N7    | W7    | 510         | 1    |
| 5              | 11         | -                  | -                  | R4                | U4                | 615         | 1    | 7              | 11         | -     | -     | R7    | T7    | 507         | 1    |
| 5              | 12         | 40                 | 57                 | M5                | V4                | 612         | 1    | 7              | 12         | 48    | 70    | M7    | W8    | 504         | 1    |
| 5              | 13         | -                  | -                  | -                 | -                 | 609         | -    | 7              | 13         | -     | -     | -     | -     | 501         | -    |
| 5              | 14         | 41                 | 58                 | R5                | W4                | 606         | 1    | 7              | 14         | -     | 71    | T6    | U8    | 498         | 1    |
| 5              | 15         | 43                 | 60                 | R6                | V5                | 603         | 1    | 7              | 15         | 49    | 72    | N8    | V8    | 495         | 1    |
| 5              | 16         | -                  | -                  | -                 | -                 | 600         | -    | 7              | 16         | -     | -     | -     | -     | 492         | -    |
| 5              | 17         | 44                 | 61                 | N6                | T5                | 597         | 1    | 7              | 17         | -     | 73    | T7    | T8    | 489         | 1    |
| 5              | 18         | -                  | -                  | -                 | -                 | 594         | -    | 7              | 18         | -     | -     | -     | -     | 486         | -    |
| 6              | 1          | -                  | -                  | -                 | -                 | 591         | -    | 8              | 1          | -     | -     | -     | -     | 483         | -    |
| 6              | 2          | 135                | 197                | A5                | D7                | 588         | 2    | 8              | 2          | 130   | 186   | E11   | B10   | 480         | 2    |
| 6              | 3          | 136                | 198                | D6                | A6                | 585         | 2    | 8              | 3          | 131   | 187   | A8    | C10   | 477         | 2    |
| 6              | 4          | -                  | -                  | -                 | -                 | 582         | -    | 8              | 4          | -     | -     | -     | -     | 474         | -    |
| 6              | 5          | 137                | 199                | B5                | B6                | 579         | 2    | 8              | 5          | 132   | 188   | C8    | D10   | 471         | 2    |
| 6              | 6          | 138                | 200                | C6                | C6                | 576         | 2    | 8              | 6          | -     | 189   | B8    | A9    | 468         | 2    |
| 6              | 7          | -                  | -                  | -                 | -                 | 573         | -    | 8              | 7          | -     | -     | -     | -     | 465         | -    |
| 6              | 8          | 139                | 201                | A4                | D6                | 570         | 2    | 8              | 8          | 133   | 191   | D8    | B9    | 462         | 2    |
| 6              | 9          | -                  | -                  | E7                | A5                | 567         | 2    | 8              | 9          | -     | -     | A7    | C9    | 459         | 2    |
| 6              | 10         | 140                | 202                | A3                | C5                | 564         | 2    | 8              | 10         | 134   | 192   | E9    | D9    | 456         | 2    |
| 6              | 11         | -                  | -                  | C5                | B5                | 561         | 2    | 8              | 11         | -     | -     | B7    | A8    | 453         | 2    |
| 6              | 12         | -                  | 203                | A2                | D5                | 558         | 2    | 8              | 12         | -     | 193   | D7    | B8    | 450         | 2    |
| 6              | 13         | -                  | -                  | -                 | -                 | 555         | -    | 8              | 13         | -     | -     | -     | -     | 447         | -    |
| 6              | 14         | 142                | 205                | B4                | B4                | 552         | 2    | 8              | 14         | -     | 194   | A6    | C8    | 444         | 2    |
| 6              | 15         | 143 <sup>(1)</sup> | 206 <sup>(1)</sup> | C4 <sup>(1)</sup> | C4 <sup>(1)</sup> | 549         | 2    | 8              | 15         | -     | 195   | B6    | B7    | 441         | 2    |
| 6              | 16         | -                  | -                  | -                 | -                 | 546         | -    | 8              | 16         | -     | -     | -     | -     | 438         | -    |
| 6              | 17         | -                  | 208                | B3                | A3                | 543         | 2    | 8              | 17         | -     | 196   | E8    | C7    | 435         | 2    |
| 6              | 18         | -                  | -                  | -                 | -                 | 540         | -    | 8              | 18         | -     | -     | -     | -     | 432         | -    |

### Notes:

1. Global control pin

## XC95288XV I/O Pins (continued)

| Function Block | Macro-cell | TQ144 | PQ208 | FG256 | CS280 | BScan Order | Bank | Function Block | Macro-cell | TQ144 | PQ208 | FG256 | CS280 | BScan Order | Bank |
|----------------|------------|-------|-------|-------|-------|-------------|------|----------------|------------|-------|-------|-------|-------|-------------|------|
| 9              | 1          | -     | -     | -     | -     | 429         | -    | 11             | 1          | -     | -     | -     | -     | 321         | -    |
| 9              | 2          | 50    | 74    | R8    | U9    | 426         | 3    | 11             | 2          | -     | 87    | P10   | W13   | 318         | 3    |
| 9              | 3          | 51    | 75    | P8    | T9    | 423         | 3    | 11             | 3          | 60    | 88    | T12   | V13   | 315         | 3    |
| 9              | 4          | -     | -     | -     | -     | 420         | -    | 11             | 4          | -     | -     | -     | -     | 312         | -    |
| 9              | 5          | 52    | 76    | T8    | W10   | 417         | 3    | 11             | 5          | 61    | 89    | N10   | U13   | 309         | 3    |
| 9              | 6          | 53    | 77    | M8    | V10   | 414         | 3    | 11             | 6          | -     | 90    | T13   | T13   | 306         | 3    |
| 9              | 7          | -     | -     | -     | -     | 411         | -    | 11             | 7          | -     | -     | -     | -     | 303         | -    |
| 9              | 8          | 54    | 78    | T9    | U10   | 408         | 3    | 11             | 8          | -     | 91    | M11   | W14   | 300         | 3    |
| 9              | 9          | -     | -     | P9    | W11   | 405         | 3    | 11             | 9          | -     | -     | N11   | T14   | 297         | 3    |
| 9              | 10         | -     | 80    | R9    | V11   | 402         | 3    | 11             | 10         | 64    | 95    | T14   | W15   | 294         | 3    |
| 9              | 11         | 56    | 82    | M9    | U11   | 399         | 3    | 11             | 11         | 66    | 97    | R12   | V15   | 291         | 3    |
| 9              | 12         | 57    | 83    | T10   | T11   | 396         | 3    | 11             | 12         | 68    | 99    | T15   | W16   | 288         | 3    |
| 9              | 13         | -     | -     | -     | -     | 393         | -    | 11             | 13         | -     | -     | -     | -     | 285         | -    |
| 9              | 14         | 58    | 84    | M10   | W12   | 390         | 3    | 11             | 14         | 69    | 100   | R14   | U16   | 282         | 3    |
| 9              | 15         | -     | 85    | R10   | V12   | 387         | 3    | 11             | 15         | -     | 101   | N13   | W17   | 279         | 3    |
| 9              | 16         | -     | -     | -     | -     | 384         | -    | 11             | 16         | -     | -     | -     | -     | 276         | -    |
| 9              | 17         | 59    | 86    | T11   | T12   | 381         | 3    | 11             | 17         | 70    | 102   | R13   | W18   | 273         | 3    |
| 9              | 18         | -     | -     | -     | -     | 378         | -    | 11             | 18         | -     | -     | -     | -     | 270         | -    |
| 10             | 1          | -     | -     | -     | -     | 375         | -    | 12             | 1          | -     | -     | -     | -     | 267         | -    |
| 10             | 2          | 117   | 170   | B11   | C14   | 372         | 4    | 12             | 2          | 110   | 158   | B13   | B19   | 264         | 4    |
| 10             | 3          | 118   | 171   | D11   | B14   | 369         | 4    | 12             | 3          | 111   | 159   | B14   | B18   | 261         | 4    |
| 10             | 4          | -     | -     | -     | -     | 366         | -    | 12             | 4          | -     | -     | -     | -     | 258         | -    |
| 10             | 5          | 119   | 173   | A11   | A14   | 363         | 4    | 12             | 5          | 112   | 160   | C13   | B17   | 255         | 4    |
| 10             | 6          | 120   | 174   | D10   | C13   | 360         | 4    | 12             | 6          | -     | 161   | A15   | A18   | 252         | 4    |
| 10             | 7          | -     | -     | -     | -     | 357         | -    | 12             | 7          | -     | -     | -     | -     | 249         | -    |
| 10             | 8          | 121   | 175   | B10   | B13   | 354         | 4    | 12             | 8          | 113   | 162   | C12   | A17   | 246         | 4    |
| 10             | 9          | -     | -     | E12   | A13   | 351         | 4    | 12             | 9          | -     | -     | B12   | D16   | 243         | 4    |
| 10             | 10         | 124   | 178   | F12   | A12   | 348         | 4    | 12             | 10         | 115   | 164   | D13   | C16   | 240         | 4    |
| 10             | 11         | 125   | 179   | B9    | C12   | 345         | 4    | 12             | 11         | -     | 165   | A14   | B16   | 237         | 4    |
| 10             | 12         | 126   | 180   | C9    | B12   | 342         | 4    | 12             | 12         | 116   | 166   | E13   | A16   | 234         | 4    |
| 10             | 13         | -     | -     | -     | -     | 339         | -    | 12             | 13         | -     | -     | -     | -     | 231         | -    |
| 10             | 14         | 128   | 182   | A9    | B11   | 336         | 4    | 12             | 14         | -     | 167   | A13   | C15   | 228         | 4    |
| 10             | 15         | -     | 183   | D9    | C11   | 333         | 4    | 12             | 15         | -     | 168   | C11   | B15   | 225         | 4    |
| 10             | 16         | -     | -     | -     | -     | 330         | -    | 12             | 16         | -     | -     | -     | -     | 222         | -    |
| 10             | 17         | 129   | 185   | E10   | A10   | 327         | 4    | 12             | 17         | -     | 169   | A12   | D15   | 219         | 4    |
| 10             | 18         | -     | -     | -     | -     | 324         | -    | 12             | 18         | -     | -     | -     | -     | 216         | -    |

## XC95288XV I/O Pins (continued)

| Function Block | Macro-cell | TQ144 | PQ208 | FG256 | CS280 | BScan Order | Bank | Function Block | Macro-cell | TQ144 | PQ208 | FG256 | CS280 | BScan Order | Bank |
|----------------|------------|-------|-------|-------|-------|-------------|------|----------------|------------|-------|-------|-------|-------|-------------|------|
| 13             | 1          | -     | -     | -     | -     | 213         | -    | 15             | 1          | -     | -     | -     | -     | 105         | -    |
| 13             | 2          | 71    | 103   | P13   | V17   | 210         | 3    | 15             | 2          | 79    | 117   | M12   | P16   | 102         | 3    |
| 13             | 3          | -     | 106   | P15   | U18   | 207         | 3    | 15             | 3          | 80    | 118   | M16   | P19   | 99          | 3    |
| 13             | 4          | -     | -     | -     | -     | 204         | -    | 15             | 4          | -     | -     | -     | -     | 96          | -    |
| 13             | 5          | -     | 107   | N14   | V19   | 201         | 3    | 15             | 5          | -     | 119   | K14   | N17   | 93          | 3    |
| 13             | 6          | -     | 109   | R16   | U19   | 198         | 3    | 15             | 6          | -     | 120   | L16   | N18   | 90          | 3    |
| 13             | 7          | -     | -     | -     | -     | 195         | -    | 15             | 7          | -     | -     | -     | -     | 87          | -    |
| 13             | 8          | 74    | 110   | N15   | T16   | 192         | 3    | 15             | 8          | 81    | 121   | K13   | N19   | 84          | 3    |
| 13             | 9          | -     | -     | M15   | T17   | 189         | 3    | 15             | 9          | -     | -     | K15   | N16   | 81          | 3    |
| 13             | 10         | -     | 111   | M13   | T18   | 186         | 3    | 15             | 10         | 82    | 122   | L12   | M19   | 78          | 3    |
| 13             | 11         | 75    | 112   | P16   | T19   | 183         | 3    | 15             | 11         | 83    | 123   | K16   | M17   | 75          | 3    |
| 13             | 12         | -     | 113   | N16   | R18   | 180         | 3    | 15             | 12         | 85    | 125   | J14   | M16   | 72          | 3    |
| 13             | 13         | -     | -     | -     | -     | 177         | -    | 15             | 13         | -     | -     | -     | -     | 69          | -    |
| 13             | 14         | 76    | 114   | M14   | R16   | 174         | 3    | 15             | 14         | 86    | 126   | J15   | L19   | 66          | 3    |
| 13             | 15         | 77    | 115   | L15   | R19   | 171         | 3    | 15             | 15         | 87    | 127   | J13   | L18   | 63          | 3    |
| 13             | 16         | -     | -     | -     | -     | 168         | -    | 15             | 16         | -     | -     | -     | -     | 60          | -    |
| 13             | 17         | 78    | 116   | L13   | P17   | 165         | 3    | 15             | 17         | 88    | 128   | J16   | L17   | 57          | 3    |
| 13             | 18         | -     | -     | -     | -     | 162         | -    | 15             | 18         | -     | -     | -     | -     | 54          | -    |
| 14             | 1          | -     | -     | -     | -     | 159         | -    | 16             | 1          | -     | -     | -     | -     | 51          | -    |
| 14             | 2          | -     | 144   | F15   | G19   | 156         | 4    | 16             | 2          | 91    | 131   | K12   | L16   | 48          | 4    |
| 14             | 3          | 100   | 145   | E15   | G16   | 153         | 4    | 16             | 3          | 92    | 133   | J12   | K18   | 45          | 4    |
| 14             | 4          | -     | -     | -     | -     | 150         | -    | 16             | 4          | -     | -     | -     | -     | 42          | -    |
| 14             | 5          | 101   | 146   | F13   | F19   | 147         | 4    | 16             | 5          | 93    | 134   | H15   | K17   | 39          | 4    |
| 14             | 6          | 102   | 147   | D16   | F18   | 144         | 4    | 16             | 6          | 94    | 135   | H14   | K16   | 36          | 4    |
| 14             | 7          | -     | -     | -     | -     | 141         | -    | 16             | 7          | -     | -     | -     | -     | 33          | -    |
| 14             | 8          | 103   | 148   | F14   | F17   | 138         | 4    | 16             | 8          | 95    | 136   | G16   | J19   | 30          | 4    |
| 14             | 9          | -     | -     | C16   | F16   | 135         | 4    | 16             | 9          | -     | -     | H13   | J18   | 27          | 4    |
| 14             | 10         | 104   | 149   | E14   | E19   | 132         | 4    | 16             | 10         | 96    | 137   | G15   | J17   | 24          | 4    |
| 14             | 11         | 105   | 150   | D15   | E17   | 129         | 4    | 16             | 11         | 97    | 138   | H16   | J16   | 21          | 4    |
| 14             | 12         | -     | 151   | G12   | E18   | 126         | 4    | 16             | 12         | 98    | 139   | F16   | H19   | 18          | 4    |
| 14             | 13         | -     | -     | -     | -     | 123         | -    | 16             | 13         | -     | -     | -     | -     | 15          | -    |
| 14             | 14         | 106   | 152   | C15   | E16   | 120         | 4    | 16             | 14         | -     | 140   | H12   | H18   | 12          | 4    |
| 14             | 15         | 107   | 154   | D14   | D18   | 117         | 4    | 16             | 15         | -     | 142   | E16   | H17   | 9           | 4    |
| 14             | 16         | -     | -     | -     | -     | 114         | -    | 16             | 16         | -     | -     | -     | -     | 6           | -    |
| 14             | 17         | -     | 155   | B16   | D17   | 111         | 4    | 16             | 17         | -     | 143   | G14   | H16   | 3           | 4    |
| 14             | 18         | -     | -     | -     | -     | 108         | -    | 16             | 18         | -     | -     | -     | -     | 0           | -    |

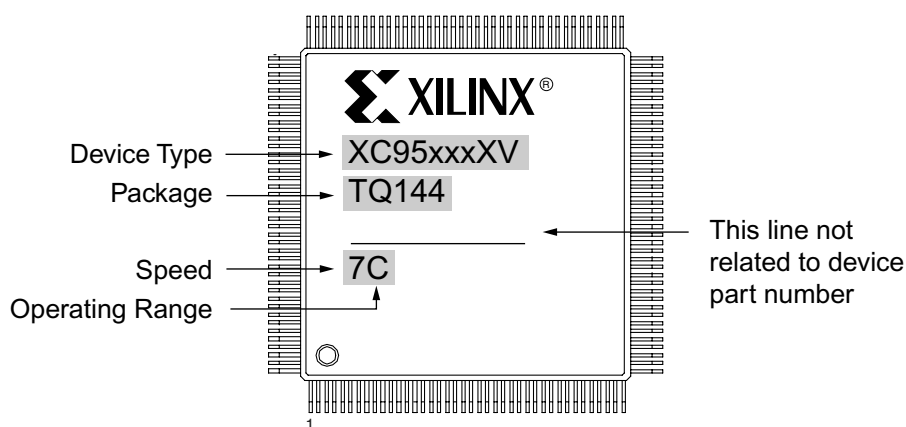
## XC95288XV Global, JTAG and Power Pins

| Pin Type                | TQ144                                                  | PQ208                                                                               | FG256                                                                                                                    | CS280                                                                                                                                                                               |
|-------------------------|--------------------------------------------------------|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| I/O/GCK1                | 30                                                     | 44                                                                                  | M2                                                                                                                       | R3                                                                                                                                                                                  |
| I/O/GCK2                | 32                                                     | 46                                                                                  | M3                                                                                                                       | T1                                                                                                                                                                                  |
| I/O/GCK3                | 38                                                     | 55                                                                                  | P5                                                                                                                       | W2                                                                                                                                                                                  |
| I/O/GTS1                | 5                                                      | 7                                                                                   | D4                                                                                                                       | D3                                                                                                                                                                                  |
| I/O/GTS2                | 6                                                      | 9                                                                                   | E5                                                                                                                       | E2                                                                                                                                                                                  |
| I/O/GTS3                | 2                                                      | 3                                                                                   | D3                                                                                                                       | C2                                                                                                                                                                                  |
| I/O/GTS4                | 3                                                      | 5                                                                                   | E3                                                                                                                       | C1                                                                                                                                                                                  |
| I/O/GSR                 | 143                                                    | 206                                                                                 | C4                                                                                                                       | C4                                                                                                                                                                                  |
| TCK                     | 67                                                     | 98                                                                                  | P12                                                                                                                      | T15                                                                                                                                                                                 |
| TDI                     | 63                                                     | 94                                                                                  | R11                                                                                                                      | U14                                                                                                                                                                                 |
| TDO <sup>(1)</sup>      | 122                                                    | 176                                                                                 | A10                                                                                                                      | D13                                                                                                                                                                                 |
| TMS                     | 65                                                     | 96                                                                                  | N12                                                                                                                      | U15                                                                                                                                                                                 |
| V <sub>CCINT</sub> 2.5V | 8, 42, 84, 141                                         | 11, 59, 124, 153, 204                                                               | F4, G6, H6, J6, K6, F7, L7, F8., L8, F9, L9, F10, L10, G11, H11, J11, K11                                                | E1, F2, N3, U5, W9, V9, U12, V16, R17, M18, G18, D19, C18, A15, A11, D8, A4                                                                                                         |
| V <sub>CCIO1</sub>      | 37                                                     | 53, 65                                                                              | K4, L6, P6                                                                                                               | N4, V2, T6                                                                                                                                                                          |
| V <sub>CCIO2</sub>      | 1                                                      | 1, 26                                                                               | C7, D5, F3, F6                                                                                                           | A7, C3, F1, K1                                                                                                                                                                      |
| V <sub>CCIO3</sub>      | 55, 73                                                 | 79, 92, 105                                                                         | L11, L14, N9, P11                                                                                                        | T10, V14, V18, P18                                                                                                                                                                  |
| V <sub>CCIO4</sub>      | 109, 127                                               | 132, 157, 172, 181, 184                                                             | C10, F11, D12, G13                                                                                                       | K19, G17, C19, D14, D12, D11                                                                                                                                                        |
| GND                     | 18, 29, 36, 47, 62, 72, 89, 90, 99, 108, 114, 123, 144 | 2, 13, 24, 27, 42, 52, 68, 81, 93, 104, 108, 129, 130, 141, 156, 163, 177, 190, 207 | A1, T1, B2, R2, C3, P3, G7, H7, J7, K7, G8, H8, J8, K8, G9, H9, J9, K9, G10, H10, J10, K10, C14, P14, B15, R15, A16, T16 | E5, F5, G5, H5, J5, K5, L5, M5, N5, P5, R5, R6, R7, R8, R9, R10, R11, R12, R13, R14, R15, P15, N15, M15, L15, K15, J15, H15, G15, F15, E15, E14, E13, E12, E11, E10, E9, E8, E7, E6 |
| No Connects             | -                                                      | -                                                                                   | -                                                                                                                        | A1, W1, U3, W19, U17, A19, C17, A2, B3, B2                                                                                                                                          |

### Notes:

1. TDO voltage is controlled by V<sub>CCIO4</sub>.

## 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> |
|-----------------------------------------|--------------------------|-------------|-------------|----------------------------------|--------------------------------|
| XC95288XV-6TQ144C                       | 6 ns                     | TQ144       | 144-pin     | Thin Quad Flat Pack              | C                              |
| XC95288XV-6PQ208C                       | 6 ns                     | PQ208       | 208-pin     | Plastic Quad Flat Package        | C                              |
| XC95288XV-6FG256C                       | 6 ns                     | FG256       | 256-ball    | Plastic Fineline Ball Grid Array | C                              |
| XC95288XV-6CS280C                       | 6 ns                     | CS280       | 280-ball    | Chipscale Package                | C                              |
| XC95288XV-7TQ144C                       | 7.5 ns                   | TQ144       | 144-pin     | Thin Quad Flat Pack              | C                              |
| XC95288XV-7PQ208C                       | 7.5 ns                   | PQ208       | 208-pin     | Plastic Quad Flat Package        | C                              |
| XC95288XV-7FG256C                       | 7.5 ns                   | FG256       | 256-ball    | Plastic Fineline Ball Grid Array | C                              |
| XC95288XV-7CS280C                       | 7.5 ns                   | CS280       | 280-pin     | Chipscale Package                | C                              |
| XC95288XV-7TQ144I                       | 7.5 ns                   | TQ144       | 144-pin     | Thin Quad Flat Pack              | I                              |
| XC95288XV-7PQ208I                       | 7.5 ns                   | PQ208       | 208-pin     | Plastic Quad Flat Package        | I                              |
| XC95288XV-7FG256I                       | 7.5 ns                   | FG256       | 256-ball    | Plastic Fineline Ball Grid Array | I                              |
| XC95288XV-7CS280I                       | 7.5 ns                   | CS280       | 280-pin     | Chipscale Package                | I                              |
| XC95288XV-10TQ144C                      | 10 ns                    | TQ144       | 144-pin     | Thin Quad Flat Pack              | C                              |
| XC95288XV-10PQ208C                      | 10 ns                    | PQ208       | 208-pin     | Plastic Quad Flat Package        | C                              |
| XC95288XV-10FG256C                      | 10 ns                    | FG256       | 256-ball    | Plastic Fineline Ball Grid Array | C                              |
| XC95288XV-10CS280C                      | 10 ns                    | CS280       | 280-ball    | Chipscale Package                | C                              |
| XC95288XV-10TQ144I                      | 10 ns                    | TQ144       | 144-pin     | Thin Quad Flat Pack              | I                              |
| XC95288XV-10PQ208I                      | 10 ns                    | PQ208       | 208-pin     | Plastic Quad Flat Package        | I                              |
| XC95288XV-10FG256I                      | 10 ns                    | FG256       | 256-ball    | Plastic Fineline Ball Grid Array | I                              |
| XC95288XV-10CS280I                      | 10 ns                    | CS280       | 280-ball    | Chipscale Package                | I                              |

### Notes:

1. C = Commercial:  $T_A = 0^\circ$  to  $+70^\circ\text{C}$ ; I = Industrial:  $T_A = -40^\circ$  to  $+85^\circ\text{C}$
2. Some packages available in Pb-free option. See [Xilinx Packaging](#) for more information.

## Revision History

| Date     | Version | Revision                                                                                                                                                                                                                                                                                           |
|----------|---------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 09/28/98 | 1.0     | Original creation of data sheet.                                                                                                                                                                                                                                                                   |
| 12/10/98 | 1.1     | Revision of tables.                                                                                                                                                                                                                                                                                |
| 2/5/99   | 1.2     | Updated pinouts to reflect BG256 (replaces BG352).                                                                                                                                                                                                                                                 |
| 6/7/99   | 1.3     | Add -7 speed and CS280 package.                                                                                                                                                                                                                                                                    |
| 4/11/00  | 1.4     | Updated AC specifications, added bank information to pinout tables.                                                                                                                                                                                                                                |
| 01/29/01 | 2.0     | Added -5 performance specification, deleted -6; changed BG256 package to FG256 package. Updated $I_{CC}$ vs. Frequency.                                                                                                                                                                            |
| 05/15/01 | 2.1     | Updated $I_{CC}$ formula, Recommended Operation Conditions, -5 AC Characteristics and Internal Timing Parameters                                                                                                                                                                                   |
| 08/27/01 | 2.2     | Changed $V_{CCIO}$ 3.3V from 3.13 to 3.0 (min), 3.46 to 3.60 (max); DC characteristics: $I_{IL}$ - added "low" current, $I_{IH}$ - changed to "Input leakage high current"; Internal Timing: -5 $T_{AOI}$ from 6.5 to 5.9.                                                                         |
| 06/24/02 | 2.3     | Updated $I_{CC}$ equation on page 1. Updated : AC Load Circuit 1.8V parameters. Added second test condition and max measurement to $I_{IH}$ DC Characteristics. Added Part Marking Information to Ordering Information. Changed to Preliminary. Changed -5 speed to -6 speed; added -7 Industrial. |
| 05/27/03 | 2.4     | Updated $T_{SOL}$ from 260 to 220°C. Updated Device Part Marking.                                                                                                                                                                                                                                  |
| 08/21/03 | 2.5     | Updated Package Device Marking Pin 1 orientation.                                                                                                                                                                                                                                                  |
| 04/15/05 | 2.6     | Added $T_{APRPW}$ specification to AC Characteristics. Added IOSTANDARD information.                                                                                                                                                                                                               |
| 06/25/07 | 3.0     | Notice of discontinuance.                                                                                                                                                                                                                                                                          |