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## Understanding Embedded - FPGAs (Field Programmable Gate Array)

Embedded - FPGAs, or Field Programmable Gate Arrays, are advanced integrated circuits that offer unparalleled flexibility and performance for digital systems. Unlike traditional fixed-function logic devices, FPGAs can be programmed and reprogrammed to execute a wide array of logical operations, enabling customized functionality tailored to specific applications. This reprogrammability allows developers to iterate designs quickly and implement complex functions without the need for custom hardware.

## Applications of Embedded - FPGAs

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

| Details | |
|---|---|
| Product Status | Active |
| Number of LABs/CLBs | 3491 |
| Number of Logic Elements/Cells | 55856 |
| Total RAM Bits | 2396160 |
| Number of I/O | 324 |
| Number of Gates | - |
| Voltage - Supply | 1.15V ~ 1.25V |
| Mounting Type | Surface Mount |
| Operating Temperature | 0°C ~ 85°C (TJ) |
| Package / Case | 484-BGA |
| Supplier Device Package | 484-FBGA (23x23) |
| Purchase URL | https://www.e-xfl.com/product-detail/intel/ep4ce55f23c7 |

Table 1–3. Recommended Operating Conditions for Cyclone IV E Devices (1), (2) (Part 2 of 2)

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| $I_{Diode}$ | Magnitude of DC current across PCI-clamp diode when enable | — | — | — | 10 | mA |

Notes to Table 1–3:

(1) Cyclone IV E 1.0 V core voltage devices support C8L, C9L, and I8L speed grades. Cyclone IV E 1.2 V core voltage devices support C6, C7, C8, I7, and A7 speed grades.

(2) $V_{CCIO}$ for all I/O banks must be powered up during device operation. All $V_{CCA}$ pins must be powered to 2.5 V (even when PLLs are not used) and must be powered up and down at the same time.

(3) $V_{CC}$ must rise monotonically.

(4) $V_{CCIO}$ powers all input buffers.

(5) The POR time for Standard POR ranges between 50 and 200 ms. Each individual power supply must reach the recommended operating range within 50 ms.

(6) The POR time for Fast POR ranges between 3 and 9 ms. Each individual power supply must reach the recommended operating range within 3 ms.

Table 1–4. Recommended Operating Conditions for Cyclone IV GX Devices (Part 1 of 2)

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| $V_{CCINT}$ (3) | Core voltage, PCIe hard IP block, and transceiver PCS power supply | — | 1.16 | 1.2 | 1.24 | V |
| $V_{CCA}$ (1), (3) | PLL analog power supply | — | 2.375 | 2.5 | 2.625 | V |
| $V_{CCD\_PLL}$ (2) | PLL digital power supply | — | 1.16 | 1.2 | 1.24 | V |
| $V_{CCIO}$ (3), (4) | I/O banks power supply for 3.3 V operation | — | 3.135 | 3.3 | 3.465 | V |
| | I/O banks power supply for 3.0 V operation | — | 2.85 | 3 | 3.15 | V |
| | I/O banks power supply for 2.5 V operation | — | 2.375 | 2.5 | 2.625 | V |
| | I/O banks power supply for 1.8 V operation | — | 1.71 | 1.8 | 1.89 | V |
| | I/O banks power supply for 1.5 V operation | — | 1.425 | 1.5 | 1.575 | V |
| | I/O banks power supply for 1.2 V operation | — | 1.14 | 1.2 | 1.26 | V |
| $V_{CC\_CLKIN}$ (3), (5), (6) | Differential clock input pins power supply for 3.3 V operation | — | 3.135 | 3.3 | 3.465 | V |
| | Differential clock input pins power supply for 3.0 V operation | — | 2.85 | 3 | 3.15 | V |
| | Differential clock input pins power supply for 2.5 V operation | — | 2.375 | 2.5 | 2.625 | V |
| | Differential clock input pins power supply for 1.8 V operation | — | 1.71 | 1.8 | 1.89 | V |
| | Differential clock input pins power supply for 1.5 V operation | — | 1.425 | 1.5 | 1.575 | V |
| | Differential clock input pins power supply for 1.2 V operation | — | 1.14 | 1.2 | 1.26 | V |
| $V_{CCH\_GXB}$ | Transceiver output buffer power supply | — | 2.375 | 2.5 | 2.625 | V |