Titanium FPGAs

Enabling the AI-Driven World

You only have a few square millimeters to spare, and you need to pack in as much computing power as you can. Efinix's Titanium FPGAs are fabricated on a 16 nm process and deliver high performance with efficient power in a compact size. They enable AI acceleration, data analysis, real-time decision making, and other compute-intensive workloads for applications such as machine vision, automotive, hand-held medical devices, and next-generation edge applications. They feature the innovative Quantum® compute fabric that, with its enhanced compute capability, makes Titanium FPGAs ideal for embedded hardware acceleration applications. With a wide range of logic element (LE) densities from 35K to 2M, and compatibility with the Efinix RISC-V SoCs, they can help you turn a tiny chip into an accelerated embedded compute system.
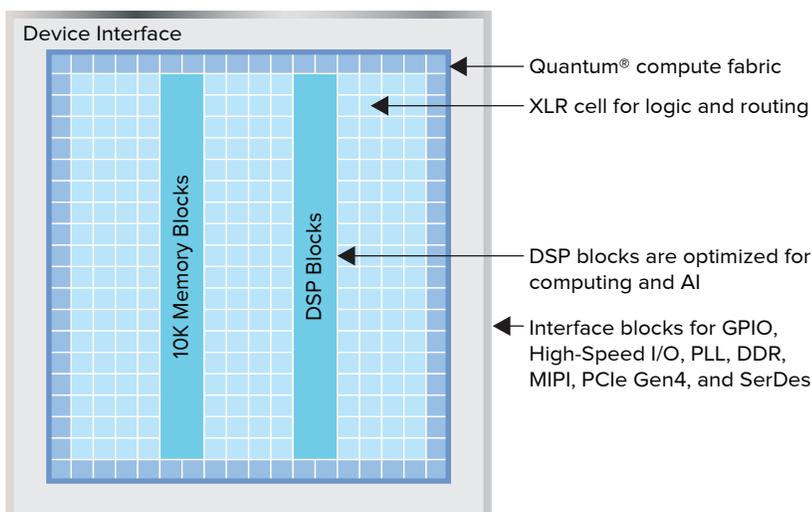
Quantum® Compute Fabric

The Quantum compute fabric is made up of configurable tiles, the eXchangeable logic and routing (XLR) cell, that optimizes routing efficiency and speed while achieving high utilization ratios. The fabric also has highly configurable, 10K embedded memory blocks along with dedicated, high-speed, DSP blocks. Together, these features deliver optimum performance for a wide array of applications from edge compute to industrial automation and video processing.

The 16 nm process node gives Titanium FPGAs a small footprint with low power consumption, making them ideal for highly integrated applications.

Figure 1 Titanium FPGA Block Diagram

Device Interface
- Quantum® compute fabric
- XLR cell for logic and routing
- 10K Memory Blocks
- DSP Blocks
- DSP blocks are optimized for computing and AI
- Interface blocks for GPIO, High-Speed I/O, PLL, DDR, MIPI, PCIe Gen4, and SerDes

- **16 nm process**
- **Energy Efficient**
- **High performance**
- **Small footprint**
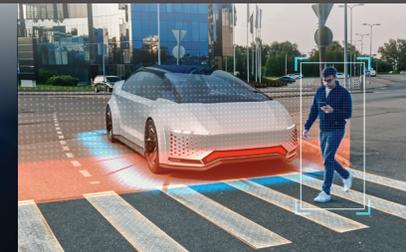- **Quantum® compute fabric**

Machine Vision   Medical Imaging   Industrial Automation   Automotive

Table 1   Titanium FPGAs without Transceivers

Feature	Ti35	Ti60	Ti80	Ti90	Ti120	Ti125	Ti180
Logic Elements (LEs)	36,176	62,016	78,800	92,534	123,379	122,792	176,256
10K RAM blocks (Mb)	1.53	2.62	3.7	6.88	9.18	5.9	13.11
DSP blocks	93	160	182	336	448	288	640
PLLs	4	4	7	8	8	7	8
High-voltage I/O	34	34	35	80	80	35	80
High-speed I/O	146	146	200	232	232	200	232
MIPI D-PHY, support CSI–2/DSI (Gbps)	1.5	1.5	2.5	1.5	1.5	2.5	1.5
LPDDR4/4x	—	—	—	x32	x32	—	x32
MIPI D-PHY 2.5 Gbps (Hard IP)	—	—	—	4 TX 4 RX	4 TX 4 RX	—	4 TX 4 RX

Package	Pitch (mm)	Size (mm)	Ti35	Ti60	Ti80	Ti90	Ti120	Ti125	Ti180
64-ball WLCSP	0.4	3.5x3.4		✓					
100-ball FBGA [1]	0.5	5.5x5.5	✓	✓					
225-ball FBGA [2]	0.5	8x8			✓			✓	
225-ball FBGA	0.65	10x10	✓	✓	✓			✓	
256-ball FBGA	0.8	13x13	✓	✓					
324-ball FBGA	0.8	15x15			✓			✓	
361-ball FBGA	0.65	13x13				✓	✓		✓
400-ball FBGA	0.8	16x16				✓	✓		✓
484-ball FBGA [3]	0.65	15x15							✓
484-ball FBGA	0.8	18x18				✓	✓		✓
529-ball FBGA	0.8	19x19				✓	✓		✓

1. The 100 pin package is available as a regular package as well as a SIP that incorporates SPI flash and HyperRAM in addition to the FPGA.
2. The 225 pin package is a SIP that incorporates SPI flash and two HyperRAM in addition to the FPGA.
3. The 484 pin package is a SIP that incorporates LPDDR DRAM in addition to the FPGA.

Table 2   Titanium FPGAs with Transceivers

Feature	Ti85	Ti135	Ti140	Ti165	Ti240	Ti260	Ti375	Ti450	Ti660	Ti800	Ti1250	Ti1600	Ti2000
Logic Elements (LEs)	83,232	132,192	142,300	162,800	236,888	264,384	370,137	447,890	656,916	796,262	1,233,020	1,578,000	1,974,067
10K RAM blocks (Mb)	6.18	9.83	10.6	12.1	17.62	19.7	27.53	26.6	38.9	47.2	73.1	93.6	117
DSP blocks	300	480	510	590	860	960	1,344	862	1,260	1,536	2,380	3,050	3,808
PLLs	9	9	12	12	12	12	12	12	12	12	12	12	12
High-voltage I/O	133	133	150	181	181	150	181	180	180	180	180	180	180
High-speed I/O	139	139	160	235	235	160	235	300	300	300	300	300	300
MIPI D-PHY, support CSI–2/DSI (Gbps)	1.5	1.5	2.5	1.5	1.5	2.5	1.5	2.5	2.5	2.5	2.5	2.5	2.5
LPDDR4/4x	x32	x32	2 x32	2 x32	2 x32	2 x32	2 x32	3 x32	3 x32	3 x32	4 x32	4 x32	4 x32
MIPI D-PHY 2.5 Gbps (Hard IP)	2 TX 2 RX	2 TX 2 RX	—	3 TX 3 RX	3 TX 3 RX	—	3 TX 3 RX	—	—	—	—	—	—
16 Gbps Transceivers	x8	x8	x16	x16	x16	x16	x16	—	—	—	—	—	—
25.8 Gbps Transceivers	—	—	—	—	—	—	—	x24	x24	x24	x40	x40	x40
PCIe® Gen4 (16G)	1 x4	1 x4	2 x4	2 x4	2 x4	2 x4	2 x4	2 x8	2 x8	2 x8	3 x8	3 x8	3 x8
Hardened Quad-Core RISC-V Processor	RV32	RV32	RV64	RV32	RV32	RV64	RV32	RV64	RV64	RV64	RV64	RV64	RV64

Package	Pitch (mm)	Size (mm)	Ti85	Ti135	Ti140	Ti165	Ti240	Ti260	Ti375	Ti450	Ti660	Ti800	Ti1250	Ti1600	Ti2000
441-ball FBGA	0.5	11x11	✓	✓											
484-ball FBGA	0.8	18x18	✓	✓	✓	✓	✓	✓	✓						
529-ball FBGA	0.8	19x19				✓	✓		✓						
576-ball FBGA [4]	0.65	16x16	✓	✓											
676-ball FBGA	0.65	18x18			✓	✓	✓	✓							
676-ball FBGA	0.8	22x22	✓	✓											
900-ball FBGA	0.8	25x25			✓	✓	✓	✓	✓	✓	✓	✓			
1156-ball FBGA	1.0	35x35				✓	✓		✓	✓	✓	✓	✓	✓	✓
1521-ball FBGA	1.0	40x40											✓	✓	✓

4. The Ti135 576-ball FBGA is offered as a standard FPGA package or as a SiP integrating SPI flash and LPDDR4 DRAM.

Refer to the FPGA data sheet or Titanium Selector Guide for details on which resources are available in each package.

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