

Fit More in Stratix II

Stratix II vs. Virtex-4 Logic Density

The innovative Stratix® II logic structure, combined with the technology leadership of Quartus® II software, allows designers to fit more logic in a Stratix II FPGA than a corresponding Virtex-4 FPGA.

- Stratix II EP2S60 devices have 18 percent more logic than Virtex-4 XC4VLX60, leaving more headroom for future design growth.
- The largest Stratix II FPGA, the EP2S180, has 5 percent more logic than the XC4VLX200.

Stratix II EP2S180 – The Biggest FPGA vs. XC4VLX200

Comparing device sizes involves more than just logic. Altera’s biggest FPGA, Stratix II EP2S180, not only has more logic than the Virtex-4 XC4VLX200, but the EP2S180 also has more memory, digital signal processing (DSP) resources, and I/O pins. In addition, Stratix II EP2S180 devices are production-qualified and available in volume.

Quartus II Settings to Optimize for Area

Quartus II design software makes it easy to get the best area utilization and performance from Stratix II FPGAs. To pack more functions in your Stratix II device, optimize your Quartus II settings for area.

Figure 1. Stratix II vs. Virtex-4 Logic Density

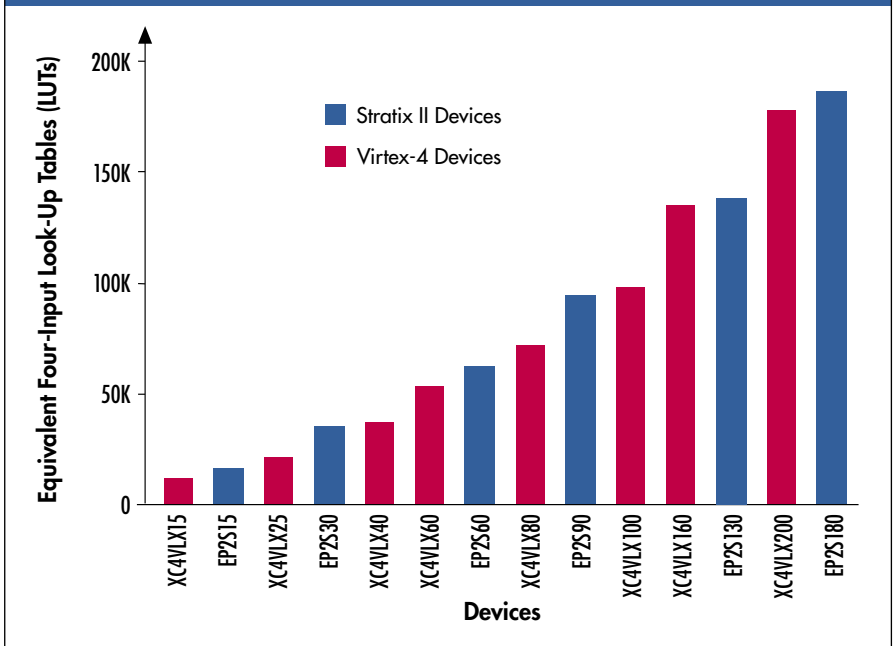


Table 1. Stratix II vs. Virtex-4 Features

Features	Stratix II EP2S180	Virtex-4 XC4VLX200	Stratix II Advantage
Equivalent 4-Input LUTs	186,576	178,176	5% More Logic
Memory	9 Mbits	6 Mbits	50% More Memory
18-Bit x 18-Bit Multipliers	384	96	4x More DSP Resources
Maximum User I/O Pins	1,170	960	21% More User I/O Pins

Table 2. Optimize for Area

Quartus II Options	Quartus II Setting
Perform WYSIWYG Resynthesis	On
Optimization Technique	Area
Restructure Multiplexers	On
Auto Packed Registers	Minimize Area with Chains

Density Benchmarks

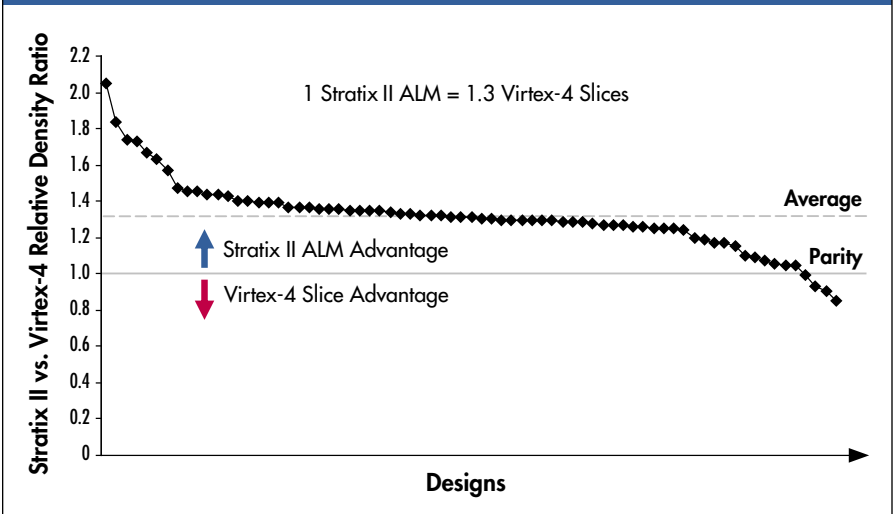
Benchmark analysis was conducted on over 70 customer designs using Synplify software version 8.0, Quartus II software version 5.0, and ISE software version 7.1i service pack 1. The method used fixed performance and was optimized for area.

The benchmark results show that the basic logic structure in Stratix II FPGAs—the adaptive logic module (ALM)—is equivalent to 1.3 slices, the basic Virtex-4 logic structure.

The Stratix II density advantage comes from two main factors:

- Stratix II ALMs are more efficient than Virtex-4 slices
- Quartus II software is better at area optimization than ISE

Figure 2. Stratix II ALM vs. Virtex-4 Slice Benchmarks



Stratix II Architectural Advantage

The ALM's wide-input LUT and flexible LUT size support make the Stratix II family more efficient for area utilization.

Table 3. Architecture Comparison

Function								
Stratix II	1 ALM	1 ALM	1 ALM	1 ALM	1 ALM	1 ALM	1 ALM	1 ALM
Virtex-4	1 Slice	1.5 Slices	1.5 Slices	1.5-2 Slices	2 Slices	2-4 Slices	1-2 Slices	2 Slices

Compare Stratix II & Virtex-4

Use the competitive product matrix when comparing Stratix II and Virtex-4 devices.

Table 4. Competitive Product Matrix

Stratix II							Virtex-4					
Device	ALMs	Equivalent Slices	Equivalent 4-Input LUTs	Memory (Kbits)	18x18 Multipliers	Maximum User I/O Pins	Device	Slices	Equivalent 4-Input LUTs	Memory (Kbits)	18x18 Multipliers	Maximum User I/O Pins
EP2S15	6,240	8,112	16,224	409	48	366	XC4VLX15	6,144	12,288	864	32	320
							XC4VLX25	10,752	21,504	1,296	48	448
EP2S30	13,552	17,617	35,235	1,337	64	500	XC4VLX40	18,432	36,864	1,728	64	640
							XC4VLX60	26,624	53,248	2,880	64	640
EP2S60	24,176	31,429	62,858	2,484	144	718	XC4VLX80	35,840	71,680	3,600	80	768
							XC4VLX100	49,152	98,304	4,320	96	960
EP2S90	36,384	47,299	94,598	4,414	192	902	XC4VLX160	67,584	135,168	5,184	96	960
							XC4VLX200	89,088	178,176	6,048	96	960
EP2S130	53,016	68,921	137,842	6,589	252	1,126						
EP2S180	71,760	93,288	186,576	9,163	384	1,170						