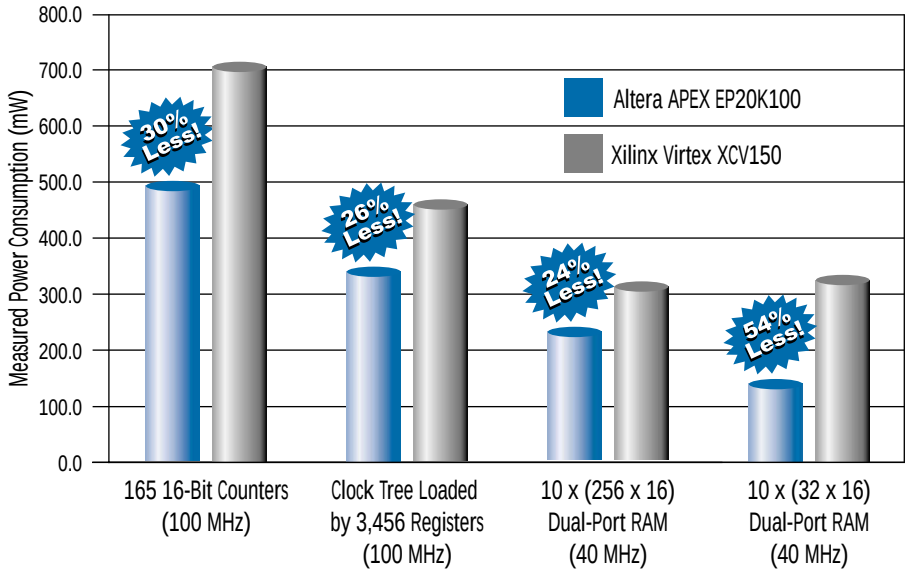


Power Consumption Comparison: APEX EP20K100 vs. Virtex XCV150

Power Comparison

APEX Devices Consume 33% Less Power than Virtex Devices

The Power Comparison

- Recent experiments compared the Altera APEX EP20K100 device (4,160 LEs) to the Xilinx Virtex XCV150 device (3,456 LEs).
- Results showed that Altera APEX devices consume 33% less power than Xilinx Virtex devices.

APEX Power Saving Features

- Smaller die size
- Flexible 2-Kbit embedded system blocks (ESBs)
- Continuous interconnect routing structure

Benefits of Lower Power Consumption

- Lower heat dissipation
- Higher reliability
- Smaller power supply requirements

APEX™

Measuring the Power Savings of APEX Devices

Altera's APEX™ devices deliver the ultimate in design flexibility and efficiency for high-performance System-on-a-Programmable-Chip™ applications. Their small die size and revolutionary MultiCore™ architecture make APEX devices ideal for low-power, high-performance applications. A recent series of power consumption experiments compared the Altera® APEX EP20K100 device to the Xilinx Virtex XCV150. The experiments showed conclusively that the APEX EP20K100 device consumes less power than the Virtex XCV150 device.

Test Designs Utilize Similar Resources

Altera used four designs in tests comparing the power consumption of the devices. The first design used both combinatorial and registered logic to implement 165 16-bit counters in each device; the second used 3,456 registers to load the clock tree; the third implemented 10 x (256 x 16) dual-port RAM in each device; and the fourth implemented 10 x (32 x 16) dual-port RAM in each device. Identical test designs were implemented to test the devices.

APEX EP20K100 Device Consumes 33% Less Power than Virtex XCV150 Device

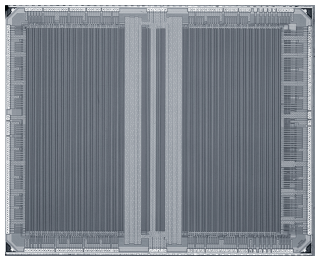
The results of the power consumption experiments demonstrated that the APEX EP20K100 device consumes less power. On average, the APEX EP20K100 device consumed 33% less power than the Virtex XCV150 device:

- The APEX EP20K100 device consumed 30% less power than the Virtex XCV150 device in the 16-bit counter experiments with both combinatorial and registered logic.

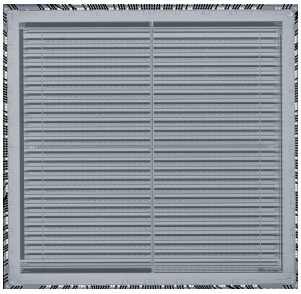
Power Comparison Test Design Resources

Designs	Operating Frequencies (MHz)	APEX EP20K100 Device Utilization	Xilinx XCV150 Device Utilization
165 16-Bit Counters	100	2,640 LEs*	2,640 LEs
Clock Tree (Loaded by 3,456 Registers)	100	3,456 LEs	3,456 LEs
10 x (256 x 16) Dual-Port RAM	40	40 Kbits	40 Kbits
10 x (32 x 16) Dual-Port RAM	40	5 Kbits	5 Kbits

*Logic Elements (LEs)



Altera APEX EP20K100
0.22 µ, 6LM
4,160 LEs
26 ESBs
Relative Die Size = 1.0



Xilinx Virtex XCV150
0.22 µ, 5LM
3,456 LEs
12 RAM Blocks
Relative Die Size = 1.10

Die Size Comparison: Altera APEX EP20K100 has 10% smaller die size and 20% more LEs than Xilinx Virtex XCV150.

- The APEX clock tree consumed 26% less power than the Virtex clock tree in the clock tree experiments.
- Implementing 10 x (256 x 16) dual-port RAM in APEX embedded system blocks (ESBs) consumed 24% less power than implementing RAM in Virtex block RAM.
- Implementing 10 x (32 x 16) dual-port RAM in APEX ESBs consumed 54% less power than implementing RAM in Virtex block RAM.

APEX MultiCore Architecture Efficiency

The efficiency of the revolutionary MultiCore architecture ensures the low power consumption of APEX devices. The APEX EP20K100 device provides 20% more logic elements (LEs) and has a 10% smaller die size than the Virtex XCV150 device. The 2-Kbit APEX ESBs provide more flexibility when implementing RAM than the 4-Kbit Virtex RAM blocks do. Also, the continuous interconnect routing structure of APEX devices offers high performance and predictable delays, and reduces power consumption.

APEX 20KE Devices Further Reduce Power Consumption

Altera offers even further power reduction, with the APEX EP20K100E device, which consumes up to 50% less power than the APEX EP20K100 device. The APEX EP20K100E is on a 0.18-µm process and operates at a core voltage of 1.8 V. This smaller process and lower operating voltage reduces power consumption. Also, the APEX EP20K100E devices offer low-voltage differential signaling (LVDS) I/O interface circuitry. The LVDS I/O pins for high frequency signals consume up to 95% less power than the equivalent number of LVCMOS I/O pins.

Altera Provides the Low-Power, High-Performance Solution

Since many factors affect semiconductor power consumption, the most accurate way to measure power in a complex programmable logic device (CPLD) is to perform laboratory experiments. The power consumption experiments performed by Altera show that APEX EP20K100 devices consume on average 33% less power than Virtex XCV150 devices. Altera APEX devices are the solution for low power, high-performance applications. To determine which APEX device will work best for you, contact your local Altera Sales Representative or visit the Altera web site at http://www.altera.com.

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