FLEX 10K vs. FPGA Performance

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The Altera® FLEX® 10K programmable logic device (PLD) family combines the flexibility of programmable logic and the density and efficiency of embedded gate arrays. FLEX 10K devices contain both a logic array and an embedded array that can be used for RAM, ROM, or complex logic functions. With the added capability of the embedded array, the FLEX 10K family offers up to 100,000 gates—a breakthrough in programmable logic—and can satisfy the density requirements of over 80% of gate array design starts (source: Dataquest).

FLEX 10K Provides Faster Performance

Not only does the FLEX 10K family feature the largest device in the programmable logic industry, but FLEX 10K devices also provide faster performance than field-programmable gate arrays (FPGAs). In addition, with the introduction of new -3 speed grade and enhanced -4 speed grade devices, the FLEX 10K family further extends its performance leadership.

The following table compares the performance of FLEX 10K devices and FPGAs. The data is based on industry-standard benchmark performance for Altera, Xilinx, and Lucent devices.

Comparison of FLEX 10K & FPGA Performance

Logic Implementation	PLD	FPGA	
	Altera FLEX 10K *(1)*	**Xilinx XC4000E-2**	**Lucent OR2C15A-4S208** *(2)*
FIR Filter (8-Bit, 16-Tap)	101 MSPS	65 MSPS, *(3)*	*Note (4)*
8 x 8 Multiplier (Pipelined)	125 MHz	52 MHz, *(5)*	89 MHz
8 x 8 Multiplier (Non-Pipelined)	38 MHz	28 MHz, *(5)*	15 MHz
12 x 12 Multiplier (Pipelined)	87 MHz	38 MHz, *(5)*	*Note (4)*
12 x 12 Multiplier (Non-Pipelined)	25 MHz	20 MHz, *(5)*	*Note (4)*
16 x 16 Multiplier (Pipelined)	75 MHz	*Note (4)*	55 MHz
16 x 16 Multiplier (Non-Pipelined)	23 MHz	18 MHz, *(5)*	7 MHz
256 x 8 RAM (Registered Inputs and Outputs)	105 MHz	80 MHz, *(6)*	*Note (4)*

Notes:
(1) Source: Altera Applications. Data is for -3 speed grade FLEX 10K devices.
(2) Source: *Synario App Review*, September 9, 1996, page 11.
(3) Source: *Xilinx XC4000 Series FPGA Product Specification*, ver. 1.02, page 4-3.
(4) No data reported.
(5) Source: *Synario App Review*, September 9, 1996, page 20.
(6) Source: *Xilinx XC4000 Series FPGA Product Specification*, ver. 1.00, page 4-3.

FLEX 10K Performance Migration

FLEX 10K devices provide a high-density logic solution to gate array designs and faster performance than FPGAs. In general, the slowest FLEX 10K device can achieve higher performance than the fastest FPGA. In addition, FLEX 10K devices provide performance migration, which allows designers to migrate to even higher-performance FLEX 10K devices. Therefore, rather than being restricted by the performance limitations of FPGAs, designers can use FLEX 10K devices to satisfy their highest-performance design needs. With higher density and higher performance, the Altera FLEX 10K device family offers a faster and more efficient design solution than FPGAs.

The documents listed below provide more detailed information. Part numbers are in parentheses.

Application Notes

AN 53: Implementing Multipliers in FLEX 10K Devices (A-AN-053-01)

AN 65: Implementing Dual-Port RAM in FLEX 10K Devices (A-AN-065-01)

AN 66: Implementing FIFO Buffers in FLEX 10K Devices (A-AN-066-01)

AN 73: Implementing FIR Filters in FLEX 10K Devices (A-AN-073-01)

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