Parallel Multipliers – Performance Optimized

XILINX ®

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Features

- High performance compact implementation
- Drop-in modules for the XC4000E, EX, and XL families
- Two variable operands, 2's complement arithmetic
- Signed data, full precision outputs
- Registered inputs and outputs
- Pre-designed modules with relative placement gives predictable timing
- Fast place and route times
- Supported in Viewlogic and Foundation schematic entry and simulation tools
- VHDL and Verilog instantiation code supplied for HDL designs
- High performance and density guaranteed through Relational Placed Macro (RPM) mapping and placement technology
- Available in Xilinx CORE Generator

General Description

Xilinx LogiCORE™ high-speed parallel multipliers are pre-defined drop-in modules ideal for fast, real-time DSP applications or any application where multiplication speed, area efficiency, and design time are important. The multipliers use highly efficient algorithms, tuned and optimally implemented in the Xilinx XC4000E, EX, and XL series of FPGAs.

Two parallel operands can be input to the multiplier core every clock cycle. A new double precision output will be available every clock cycle after an initial latency period. For example, a 12 by 12 multiplier can produce a result every 11 nsec. in a 4000E-1.

Two pre-defined modules are available: an 8x8 multiplier and a 12x12 multiplier. Table 1 gives the implementation statistics for these modules.

Pinout

Signal names for the schematic symbol are shown in Figure 1 and described in Table 2.
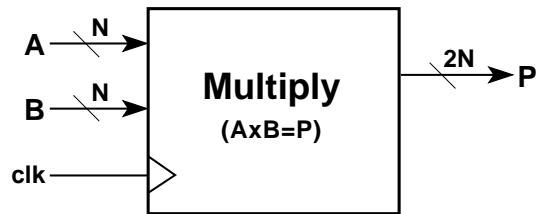
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Figure 1: Core Schematic Symbol

Table 2: Core Signal Pinout

Signal	Signal Direction	Description
A[n:0]	Input	PARALLEL DATA IN, N-bits wide
B[n:0]	Input	PARALLEL DATA IN, N-bits wide
clk	Input	CLOCK, processes data on the low to high transition
P[2n+1:0]	Output	PARALLEL DATA OUT, 2N-bits wide

Table 1: Parallel Multiplier Implementation Statistics

Design Name	Input Data	Output Data	Pin to Pin Performance[1] XC4000XL-08	Latency	CLBs Used	CLB Array Size	Smallest Device
M8x8	8 x 8 Signed	16 bit	130 MHz	4 clks	70	10 rows x 8 cols	4003E
M12x12	12 x 12 Signed	24 bit	111 MHz	5 clks	156	14 rows x 13 cols	4005E

Note 1: Based on XC4000XL-08 advanced speed files.

Multiplier Trade-offs

Two different implementations of parallel multipliers trade area for speed. The area efficient designs consume about one-fourth less CLB resources than the high speed designs in the 4000E family.

The additional routing resources in the 4000EX and 4000XL families will increase the performance for the area efficient designs. In addition, both structures will benefit from the overall performance increase derived from the 4000XL .35 micron process technology.

Ordering Information

This macro comes free with the Xilinx CORE Generator. For additional information contact your local Xilinx sales representative, or e-mail requests to dsp@xilinx.com.
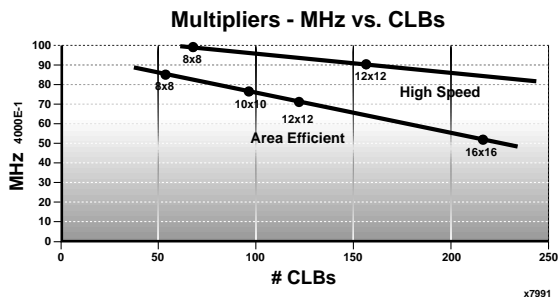
Multipliers - MHz vs. CLBs

Figure 2: Trade-offs of Area Versus Speed Optimization for Multipliers

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