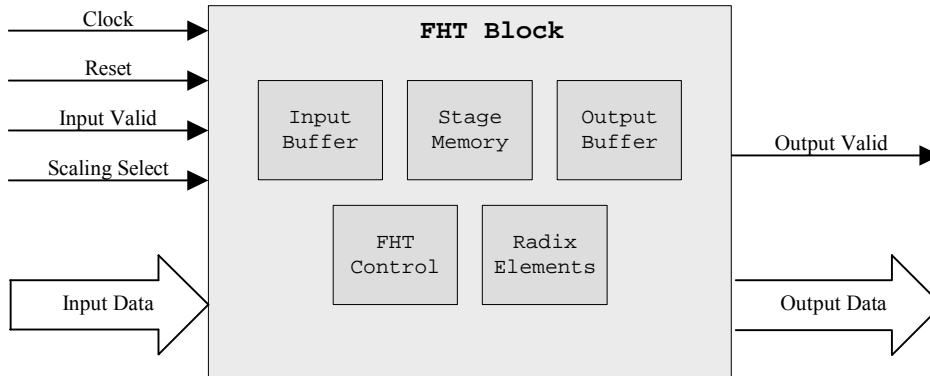


Product Brief

N-Point FHT Core

N-Point Fast Hadamard Transform



IP Core Name

R3FHT – N-point FHT

Features

- Configurable length FHT block
- Programmable input and output wordlengths
- Programmable internal precision
- High throughput
- Area efficient design

Deliverables

- Synthesizable RTL source code in VHDL or Verilog
- Comprehensive verification test bench and vectors in VHDL or Verilog
- C++ bit-correct simulation model and SNR calculator
- Matlab bit-correct simulation model
- Integration documentation and user guide

Overview

The design is targeted for use in ASICs and FPGAs.

The FHT is performed on the N real-valued input samples. The value of N can be any power of two. The input, output, and internal wordlengths are selectable.

Processor core is optimized for minimum area and maximum throughput.

Performance

The FHT core is able to perform a 64 point FHT in 71 clock cycles. The throughput is one real sample per clock cycle. The latency for a 64 point FHT is 7 clock cycles.

Maximum clock speed depends on the application process and pipelining choices (and hence the final design real estate) but over 160 MHz on a Xilinx Virtex-4 and 200 MHz for a 0.13 micron ASIC process have been achieved. In order to achieve higher clock rates the latency of the system may

RAD3 IP Cores Series: N-Point FHT/IFHT

increase as pipelining stages are added in the arithmetic.

Signal scaling is controllable by the Scaling Select input signal and for a 64-point FHT can be chosen to yield any power of 2 scaling between 1 and 64 (i.e. 1, 2, 4, 8, ..., 64). If no scaling is desired this block can be removed to decrease the hardware area for the transform.

The SNR of the block is dependent on the selected internal and output wordlengths.

The equivalent gate count for the logic and memory area (including RAM requirements) of several FHTs is shown in Figure 1. These FHTs range from a 12-bit 64-point to 16-bit 1024-point FHTs.

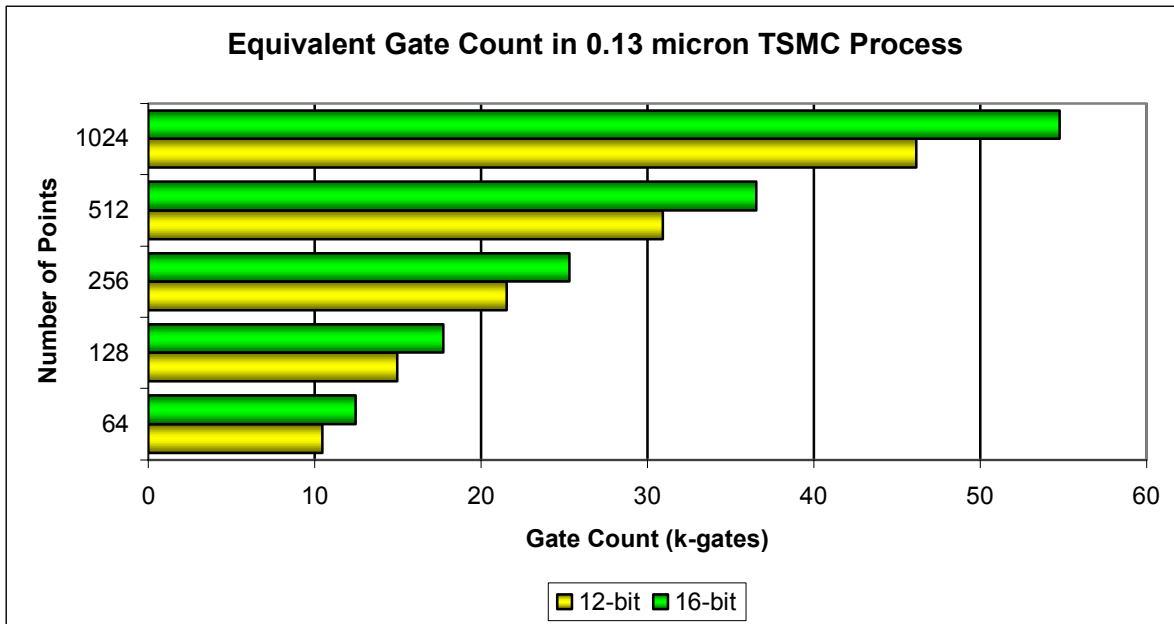


Figure 1: Gate Count for various FHTs in 0.13 μ TSMC Process

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