



DFPSQRT

Floating Point Pipelined Square Root Unit

ver 2.90

OVERVIEW

The DFPSQRT uses the **pipelined** mathematics algorithm to compute square root function. The input number format is according to IEEE-754 standard. DFPSQRT supports single precision real numbers. SQRT operation can be pipelined up to 9 levels. Input data are fed every clock cycle. The first result appears after 9 clock periods latency and next results are available **each clock** cycle. Precision and accuracy are parameterized.

APPLICATION

- Math coprocessors
- DSP algorithms
- Embedded arithmetic coprocessor
- Data processing & control

KEY FEATURES

- Full IEEE-754 compliance
- Single precision real format support
- Simple interface
- No programming required
- 9 levels pipelining
- 24-bit accuracy, 6 fractional decimal digits
- Results available at every clock
- Fully configurable

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- ◆ Fully synthesizable, static synchronous design with no internal tri-states

DELIVERABLES

- ◆ Source code:
 - ◇ VHDL Source Code or/and
 - ◇ VERILOG Source Code or/and
 - ◇ Encrypted, or plain text EDIF netlist
- ◆ VHDL & VERILOG test bench environment
 - ◇ Active-HDL automatic simulation macros
 - ◇ ModelSim automatic simulation macros
 - ◇ NCSim automatic simulation macros
 - ◇ Tests with reference responses
- ◆ Technical documentation
 - ◇ Installation notes
 - ◇ HDL core specification
 - ◇ Datasheet
- ◆ Synthesis scripts
- ◆ Example application
- ◆ Technical support
 - ◇ IP Core implementation support
 - ◇ 3 months maintenance
 - Delivery the IP Core updates, minor and major versions changes
 - Delivery the documentation updates
 - Phone & email support

LICENSING

Comprehensible and clearly defined licensing methods without royalty fees make using of IP Core easy and simply.

Single Design license allows using IP Core in single FPGA bitstream and ASIC implemen-

<http://www.DigitalCoreDesign.com>
<http://www.dcd.pl>

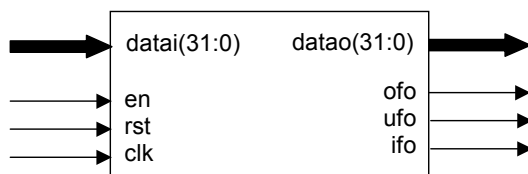
tation. It also permits FPGA prototyping before ASIC production.

Unlimited Designs license allows using IP Core in unlimited number of FPGA bitstreams and ASIC implementations.

In all cases number of IP Core instantiations within a design, and number of manufactured chips are unlimited. There is no time of use limitations.

- Single Design license for
 - VHDL, Verilog source code called HDL Source
 - Encrypted, or plain text EDIF called Netlist
- Unlimited Designs license for
 - HDL Source
 - Netlist
- Upgrade from
 - Netlist to HDL Source
 - Single Design to Unlimited Designs

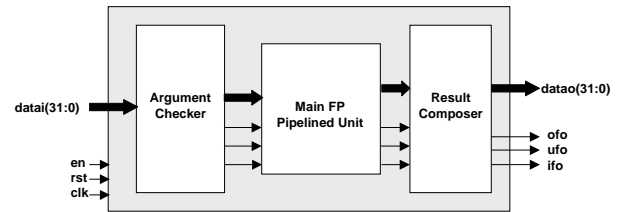
SYMBOL



PINS DESCRIPTION

PIN	TYPE	DESCRIPTION
clk	Input	Global system clock
rst	Input	Global system reset
en	Input	Enable computing
datai[31:0]	Input	Data bus input
datao[31:0]	Output	Data bus output
ofo	Output	Overflow flag
ufo	Output	Underflow flag
ifo	Output	Invalid result flag

BLOCK DIAGRAM



Arguments Checker - performs input data analyze against IEEE-754 number standard compliance. The appropriate numbers and information about the input data classes are given as the results to Main FP Pipelined Unit.

Main FP Pipelined Unit - performs floating point square root function. Gives the complex information about the results to Result Composer module.

Result Composer - performs result rounding function, data alignment to IEEE-754 standard, and the final flags setting.

PERFORMANCE

The following table gives a survey about the Core area and performance in the ALTERA® devices after Place & Route :

Device	Speed grade	Logic Cells	F _{max}
FLEX10KE	-1	1000	48 MHz
ACEX1K	-1	1000	48 MHz
APEX20K	-1	970	50 MHz
APEX20KE	-1	970	53 MHz
APEX20KC	-7	970	62 MHz
APEX-II	-7	970	83 MHz
MERCURY	-5	975	99 MHz
STRATIX	-5	725	96 MHz
CYCLONE	-6	725	94 MHz
STRATIX-II	-3	890	131 MHz
CYCLONE-II	-6	730	99 MHz

Core performance in ALTERA® devices

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