

# IP-CORE

## Cosine/Sine Generator

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### Features:

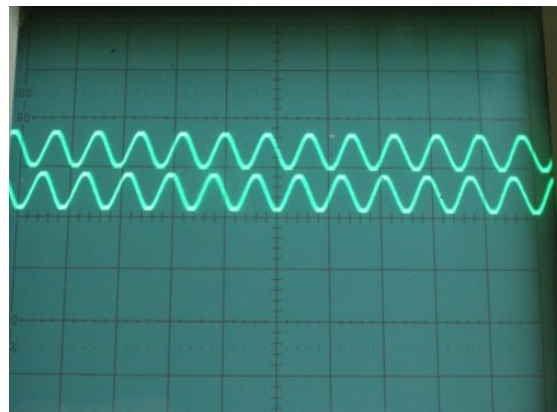
- simultaneous Sine and Cosine outputs (I and Q)

### Implementation:

- pipelined IV quadrant algorithmus

### Applications:

- SDR (software defined radio)
- DDS (Direct Digital Synthesis)
- NCO (Numerically Controlled Oscillator)
- spectral analysis
- Modulator
- Demodulator
- frequency hopping
- ultrasonic signal generator
- sin/cos coprocessor



example results for 12 bit output:

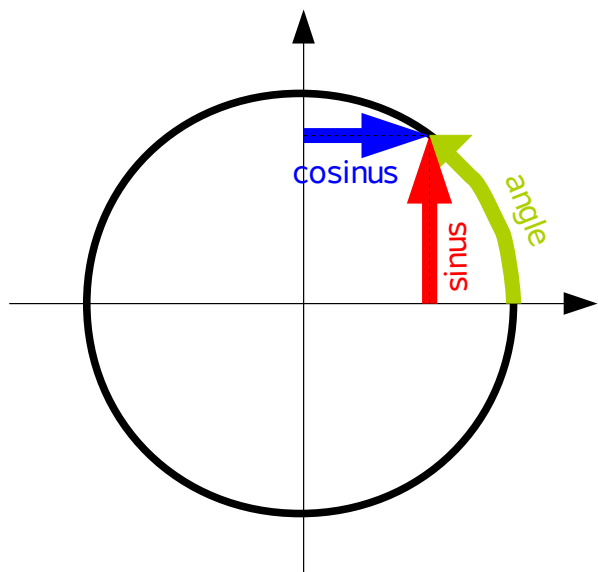
Clock rates:

up to 450Mhz Virtex5

up to 220Mhz Spartan3

Device Utilization:

Number of Slices:	158
Number of Slice Flip Flops:	278
Number of 4 input LUTs:	283



Disclaimer:

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# IP-CORE

## Cosine/Sine Generator

### Description:

This core was written device independent. None manufacture reserved commands are used. Cordic is a hardware efficient algorithmus that only use simple basic digital elements. It can be achieve a good preformance in speed, resources.

The core generates cosine and sine values associated to phase angle. Both values are available after the latency of interations.

It is simply to build a NCO with a quatrature phase alignment. The sine an cosine have the same frequency, but a 90° phase difference.

### Port Description:

#### **Generic:**

angle\_bits:= 12;

output\_bits:=10;

#### Input:

Signal	Type	Size
Angle	signed (2's complement)	angle_bits
CLK	bit	1

#### Output:

Signal	Type	Size
SIN	signed (2's complement)	output_bits
COS	signed (2's complement)	output_bits



#### Disclaimer:

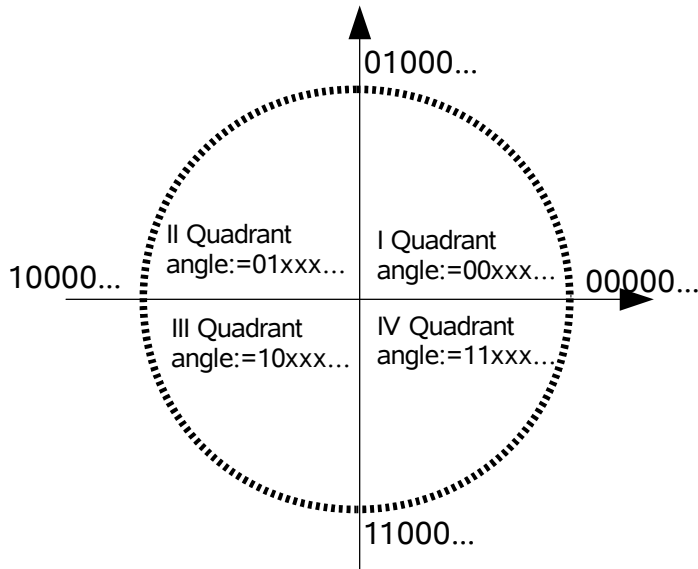
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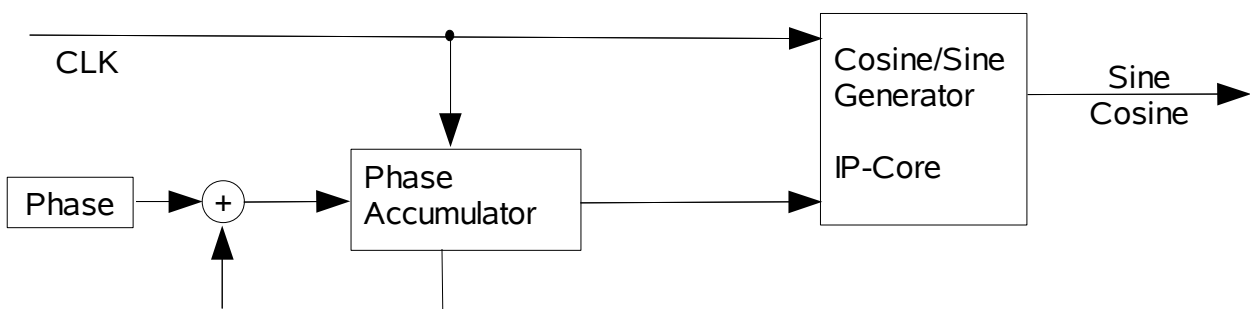
Range of angle:

Quadrant I and II are positive value and Quadrant III and IV are negative values.



Application example:

*NCO (numeric controlled oscillator)*



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