

## Overview

**IntegrIT Nature DSP Signal+** is a collection of signal processing functions needed for implementation of typical digital signal processing algorithms. All functions are manually optimized for Tensilica ConnX D2 DSP utilizing full data bus bandwidth and computing power of the ConnX D2. It outperforms TI's C55xx DSPLIB by 45-65% for FFTs and provides up to 4x acceleration for vector mathematics.. Another important feature is availability of bit exact library for x86 PC which makes development and simulation of complex DSP algorithms simpler and much more straight forward.

## Main Features of NatureDSP Signal+

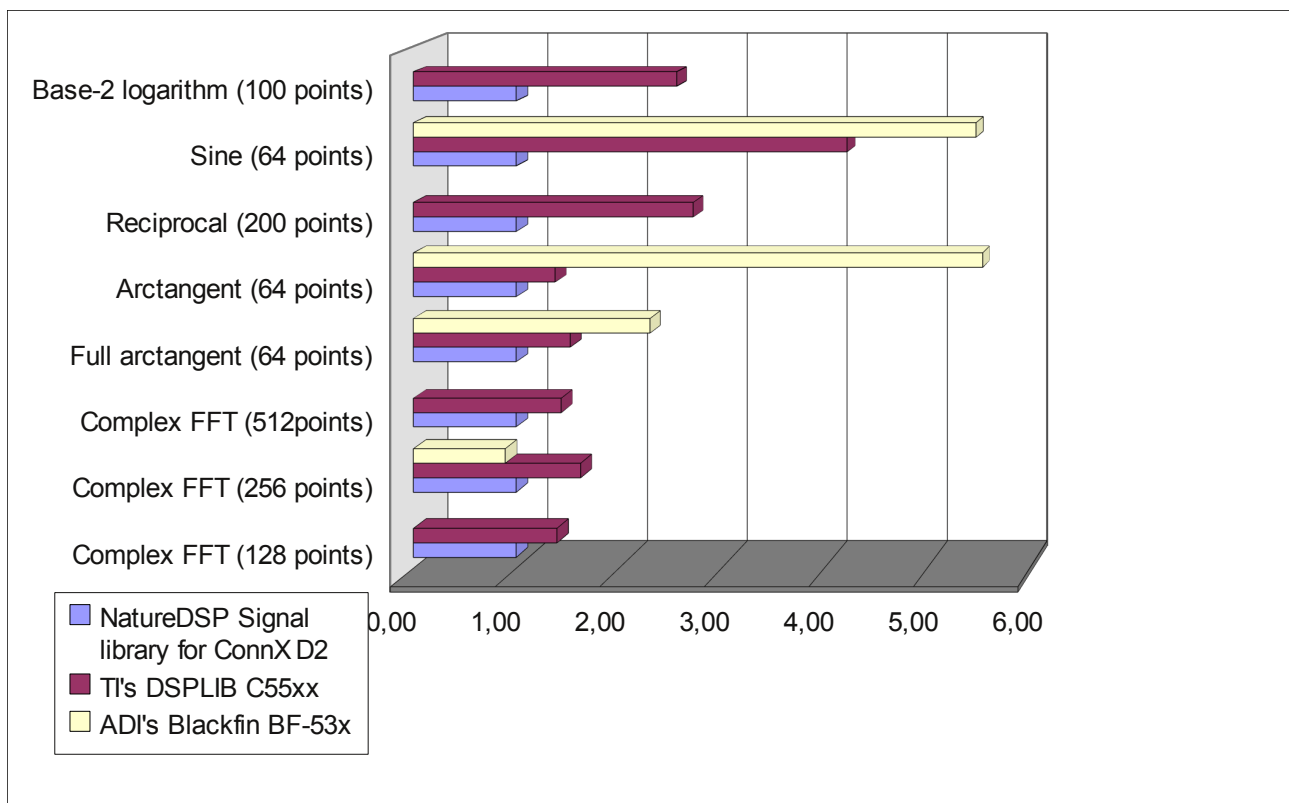
- Highly optimized for Tensilica ConnX D2 DSP
- Highly optimized for Texas Instruments C64 DSP
- True fixed point implementation with saturation, no floating point
- x86 version is available for Microsoft Visual Studio and GCC for bit exact software simulation on desktop computer

## Applications

- VoIP
- Telephony
- Mobile
- SDR

## Performance comparison

Figure below compares number of cycles taken for typical DSP algorithms by **Nature DSP Signal+** for ConnX D2, Texas Instrument's DSPLIB for C55xx and Analog Devices Blackfin DSP library for BF53x.



## Contacts

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## NatureDSP Signal+ Library API

Function	Description	Function	Description
<code>fir_bk()</code>	Block real FIR filter	<code>vec_log10()</code>	Base 10 vector logarithm
<code>fir_cbk()</code>	Complex block FIR filter	<code>vec_sine()</code>	Vector sine
<code>fir_sr()</code>	Symmetrical block real FIR filter	<code>vec_cosine()</code>	Vector cosine
<code>fir_dec()</code>	Decimating block real FIR filter	<code>vec_tan()</code>	Vector tangent
<code>fir_interp()</code>	Interpolating block real FIR filter	<code>vec_atan2()</code>	Full phase vector arctangent
<code>fir_ss()</code>	Single-sample real FIR filter	<code>vec_atan()</code>	Vector arctangent ( $\pm\pi/4$ )
<code>fir_convol()</code>	Convolution	<code>vec_bexp()</code>	Minimum exponent over a vector
<code>fir_xcorr()</code>	Correlation	<code>iir_bqc()</code>	Biquad complex block IIR filter
<code>fir_acorr()</code>	Autocorrelation	<code>iir_bqd()</code>	Biquad real double precision block IIR filter
<code>fir_dlms()</code>	Raw single sample delayed LMS algorithm	<code>iir_latr()</code>	Lattice real block IIR
<code>fir_blms()</code>	Blockwise adaptive LMS algorithm	<code>iir_latc()</code>	Lattice complex block IIR
<code>vec_dot()</code>	Vector dot product	<code>iir_latd()</code>	Lattice double precision real IIR filter
<code>vec_add()</code>	Vector sum	<code>mtx_mpy()</code>	Matrix multiply
<code>vec_power()</code>	Vector power	<code>mtx_trans()</code>	Matrix transpose
<code>vec_shift()</code>	Vector scaling with saturation	<code>fft_cplx()</code>	Complex FFT 16x16
<code>vec_recip16()</code>	Vector reciprocal	<code>fft_real()</code>	Real FFT 16x16
<code>vec_divide()</code>	Vector division	<code>ifft_cplx()</code>	Complex inverse FFT 16x16
<code>vec_log2()</code>	Base 2 vector logarithm	<code>ifft_real()</code>	Real inverse FFT 16x16
<code>vec_logn()</code>	Natural vector logarithm		

## About Tensilica ConnX D2:

Tensilica ConnX D2 is the high-performance, small, low-power ConnX D2 16-bit dual-MAC (Multiply Accumulator) DSP (Digital Signal Processor) engine for its proven Xtensa LX dataplane processor cores for SOC (System-on-Chip) designs. The ConnX D2 DSP engine provides uncompromised performance from C code, unlike many other DSPs that require time consuming assembly coding for maximum performance. This means that virtually any C program, including those written with C intrinsic functions for the TI C6x family or ITU (International Telecommunications Union) reference code, can run unmodified and with excellent performance on the ConnX D2 DSP engine. See more details at <http://www.tensilica.com>

## Availability

This library is available in binaries and in source code written on fully portable C-language for:

- Tensilica ConnX D2
- TMS320C64xx, OMAP, DaVinci
- x86 Microsoft Visual Studio
- x86 GCC

[Request IntegrIT NatureDSP Signal+ Library](#) for your platform.

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