Data Sheet

Continuum Vector

Signal Processing Library

continuum VECTOR

Features

- Signal Processing Library
- Optimized for PowerPC®/AltiVec™ and Intel®/SSE
- Industry-standard APIs and open- standard APIs including VSIPL
- Single and double precision
- Supported on Curtiss-Wright Controls Embedded Computing PowerPC® products
- PC compatible versions for either PowerPC® or Intel® target hardware
- VxWorks®, Linux® support

Overview

The Curtiss-Wright Controls Embedded Computing DSP function library, Continuum Vector, provides a comprehensive set of C-callable functions which have been optimized to exploit the performance of the SIMD instruction sets of Power Architecture™ (AltiVec™) and Intel® (SSE) processors. Supported Power Architecture™ processors include the Freescale™ MPC7410, MPC7447, MPC7448, MPC7457, MPC8640 and MPC8641 using the AltiVec™ instruction set. Supported Intel® processors include the Core™2 Duo and Core™ i7 using the SSE instruction set. By using the Continuum Vector library, a programmer can ignore the complexities of the SIMD instruction set and focus on the application problem. Continuum Vector is supported on all Power Architecture™ and Intel® processor products from Curtiss-Wright Controls. The Application Programming Interface (API) is common between AltiVec™ and SSE versions of the library, thus simplifying the task of migrating DSP application software from Power Architecture™ to the new family of Intel-based CHAMP-AV multi-processor products. Continuum Vector provides APIs which are compatible with other popular board vendor function library APIs and also with the open standard Vector Signal Image Processing Library (VSIPL Core Lite profile). This greatly simplifies the effort associated with porting existing software from other platforms to Curtiss-Wright Controls hardware. Many functions are available in both single and double precision arithmetic.

The Continuum Vector Library includes components to support algorithm development on standard Linux-based desktop PCs. For the case where the target hardware is PowerPC®, a C-language version of the library is included. For the case where the target hardware is an Intel® processor, the SSE version will run natively on the PC. (Core™2 duo or later)

Performance benchmarking reports are available upon request.

Licensing Information

Continuum Vector is licensed for use with any supported Curtiss-Wright Controls board. The development license permits software development for one project, unlimited users. Run-time licenses are sold separately.

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Table 1: Partial List of Functions

acorf	Frequency Domain Auto Correlation
acort	Time Domain Auto Correlation
aspec	Accumulating Autospectrum
blkman	Apply a Blackman Window to a Real Vector
ccdotp	Complex Conjugate Dot Product
ccorf	Frequency Domain Cross Correlation
ccort	Time Domain Cross Correlation
cdotpr	Complex Dot Product
cfft	Complex FFT, in Place - Fwd and Inv - Sizes to 1024 Cmplx
cfftf	Complex Forward FFT - Sizes to 1048576 (1 M) Cmplx
cffti	Complex Inverse FFT - Sizes to 1048576 (1 M) Cmplx
cfftsc	Complex FFT Scale
cft2fc	Two Dimensional Complex Forward FFT – Column Compact
cft2fr	Two Dimensional Complex Forward FFT - Row Compact
cft2ic	Two Dimensional Complex Inverse FFT – Column Compact
cft2ir	Two Dimensional Complex Inverse FFT - Row Compact
convd	Convolution with Decimation
cpow	Complex Vector Power with Add
crvdiv	Complex Vector Real Vector Divide
crvmul	Complex Vector Real Vector Multiply
cspec	Accumulating Cross Spectrum
cvabs	Complex Vector Absolute Value
cvadd	Complex Vector Add
cvcml	Complex Vector Conjugate Multiply
cvcmla	Complex Vector Conjugate Multiply with Add
cvcomb	Form Complex Vector from Two Real Vectors
cvconj	Complex Vector Conjugate
cvcsml	Complex Vector Complex Scalar Multiply
cvdiv	Complex Vector Complex Vector Division
cvexp	Complex Vector Exponential
cvfill	Set a Complex Vector to a Complex Scalar
cvma	Complex or Conjugate Vector Multiply w/Add
cvmags	Complex Vector Magnitude Squared
cvmexp	Complex Vector Exponential with Multiply
cvmgsa	Complex Vector Magnitude Squared w/ Add
cvml	Complex Vector Multiply
cvmla	Complex Vector Multiply with Add
cvmov	Complex Vector Move

cvmul	Complex Vector or Conjugate Multiply
cvneg	Complex Vector Negate
cvphas	Complex Vector Phase
cvrcip	Complex Vector Reciprocal
cvreal	Make a Complex Vector from a Real Vector
cvsma	Scale Complex Vector and Add to Second Complex Vector
cvsmul	Complex Vector Scalar Multiply
cvsqrt	Complex Vector Square Root
cvsub	Complex Vector Subtract
deq22	Difference Equation, 2 Poles, 2 Zeroes
dotpr	Real Dot Product
envel	Vector Envelope
fftwts	Create FFT Complex Exponential Tables
fix2n	Vector Fix to Two-byte Integer and Round
fix4	Vector Fix to Four-byte Integer and Truncate
fix4n	Vector Fix to Four-byte Integer and Round
fixbn	Vector Fix to One-byte Integer and Round
flt2	Float Integer (2 Byte) Vector
flt2iq	Float Integer (2 Byte) I,Q Pairs and Demux 2 Channels
flt4	Float Integer (4 Byte) Vector
fltb	Float Signed Byte
fltbu	Float Byte Unsigned
fxsl2n	Vector Scale, Limit, & Fix to Two-byte Integer and Round
fxsl4n	Vector Scale, Limit, & Fix to Four-byte Integer & Round
fxslbn	Vector Scale, Limit, & Fix to One-byte Integer & Round
gcexp	Generate a Complex Exponential with Constant Rotation
gcosf	Vector Generate Cosines
hamm	Apply a Hamming Window to a Real Vector
hann	Apply a Hanning Window to a Real Vector
hlbrt	Hilbert Transform
lveq	Logical Vector Equal
lvge	Logical Vector Greater Than or Equal
lvgt	Logical Vector Greater
lvle	Logical Vector Less Than or Equal
lvlt	Logical Vector Less
lvne	Logical Vector Not Equal
lvnot	Logical Vector Not Equal to Zero
maxmgv	Maximum Magnitude Element of Vector



Table 1: Partial List of Functions Continued

maxv	Find the Maximum Value and its Location
meamgv	Mean Magnitude of Real Vector
meanv	Mean of Real Vector
measqv	Mean of Square of Real Vector
minmgv	Find the Minimum Magnitude and its Location
minv	Find the Minimum Value and its Position
mvessq	Mean of Signed Square of Vector Elements
mxmla	Matrix Multiply and Add
mxmls	Matrix Multiply and Subtract
mxmov	Matrix / Submatrix move
mxmul	Matrix Multiply
polar	Rectangular to Polar Coordinate Conversion
rect	Polar to Rectangular Coordinate Conversion
reqs	Find Location of First Element Equal to a Scalar
rfft	Real FFT, in Place - Fwd and Inv - Sizes to 2048 Reals
rfftf	Real Forward FFT - Sizes to 2097152 (2 Meg) Reals
rffti	Real Inverse FFT - Sizes to 2097152 (2 Meg) Reals
rfftsc	Real FFT Scale and Format
rft2fc	Two Dimensional Real Forward FFT - Column Compact
rft2fr	Two Dimensional Real Forward FFT - Row Compact
rft2ic	Two Dimensional Real Inverse FFT - Column Compact
rft2ir	Two Dimensional Real Inverse FFT - Row Compact
rges	Find Location of First Element Greater/Equal to a Scalar
rgts	Find Location of First Element Greater Than a Scalar
rlts	Find Location of First Element Less Than a Scalar
rmax	Find the Maximum Value and its Location
rmaxmg	Find the Maximum Magnitude
rmin	Find the Minimum Value and its Position
rminmg	Find the Minimum Magnitude
rmsqv	Root Mean Square of a Real Vector
rnes	Find Position of First Element Not Equal to a Scalar
rsve	Running Sum of Real Vector
shphu	Schafer's Phase Unwrapping
shphuf	Schafer's Phase Unwrapping, Fraction of a Circle Argument
sn2	Sum the Squared Difference Between Two Vectors
svdiv	Divide Scalar by Vector
sve	Sum of Real Vector
svemg	Sum of Vector Magnitudes
svesq	Sum of Vector Elements Squared

svessq	Sum of Vector Element Signed Squares
tconv	Tapered Convolution
trans	Complex Vector Divided by Real Vector (Transfer)
vaam	Vector Add, Add, and Multiply
vabs	Vector Absolute Value
vacos	Vector Arccosine
vadd	Add Two Vectors
vaint	Vector Align to Integer
vam	Vector Add and Multiply
vanint	Vector Align to Nearest Integer
vasbm	Vector Add, Subtract, and Multiply
vasin	Vector Arcsine
vasm	Vector Add and Scalar Multiply
vatan	Vector Arctangent
vatan2	Vector Arctangent of Two Arguments
vatn2f	Vector Arctangent of Two Arguments in Fractions
vavexp	Vector Exponential Averaging
vavlin	Vector Linear Averaging
vclip	Vector Clip
vclr	Zero a Vector
vcmprs	Vector Compress
vcos	Vector Cosine
vcosf	Vector Cosine in Fractions
vdbpwr	Vector Conversion to dB
vdiv	Divide One Vector by Another
vdpsp	Vector Convert Double to Single Precision
veucl2	Vector Euclidean Distance
veucl3	Vector Euclidean Distance (3 Dimensional)
vexp	Vector Exponentiation
vexp10	Vector Base 10 Exponential
vexp2	Vector Base 2 Exponential
vfill	Set a Vector in Memory to a Scalar Value
vfrac	Vector Truncate to Fraction
vfracn	Vector Truncate to Nearest Fraction
vgathr	Vector Gather
vgen	Generate a Vector in Memory
viadd	Add Two Integer Vectors
viand	And Two Integer Vectors
viars	Vector Integer Arithmetic Right Shift

Table 1: Partial List of Functions Continued

viclip	Vector Inverse Clip
vils	Vector Integer Left Shift
vimag	Extract Imaginary Part of Complex Vector
vimul	Multiply Two Integer Vectors
vindex	Vector Index, Truncate
vineg	Vector Integer Negate
vintb	Vector Interpolate
vior	Vector Integer OR Two Integer Vectors
virs	Vector Integer Right Shift
visub	Subtract Two Integer Vectors
vixor	Exclusive OR (XOR) Two Integer Vectors
vlim	Vector Limit
vlint	Vector Linear Interpolate
vlmerg	Vector Logical Merge
vlog	Compute the Natural Logarithm of a Vector
vlog10	Vector Base 10 Logarithm
vlog2	Vector Base 2 Logarithm
vma	Vector Multiply and Add
vmax	Vector Maximum
vmaxmg	Vector Maximum Magnitude
vmin	Vector Minimum
vminmg	Vector Minimum Magnitude
vmma	Vector Multiply, Multiply, and Add
vmmsb	Vector Multiply, Multiply, and Subtract
vmov	Copy One Vector to Another
vmsa	Vector Multiply and Scalar Add
vmsb	Vector Multiply and Subtract
vmul	Multiply Two Vectors
vnabs	Vector Negative Absolute Value
vneg	Negate a Vector
vnmsa	Vector Negative Multiply and Scalar Add
vpmerg	Vector Positive Merge
vpoly	Vector Polynomial Evaluation
vqint	Vector Quadratic Interpolate
vramp	Generate a Ramp in a Vector
vrand	Single Precision Random Number Generator
vreal	Extract Real Part of Complex Vector

vrecip	Compute Reciprocal of Vector
vrsqrt	Vector Reciprocal Square Root
vrvrs	Reverse a Vector
vsadd	Add a Scalar to a Vector
vsbm	Vector Subtract and Multiply
vsbsbm	Vector Subtract, Subtract, and Multiply
vsbsm	Vector Subtract and Scalar Multiply
vscatr	Vector Scatter
vsdiv	Divide Vector by Scalar
vsimps	Simpsons Rule Integration
vsin	Vector Sine
vsinf	Vector Sine in Fractions
vsinrf	Vector Sine in Fractions, Reduced Range
vsm2sa	Multiply Two Vectors by Scalars and Add a Scalar
vsma	Vector Scalar Multiply and Add
vsma2	Two Vector Multiply and Scalar Add
vsma3	Three Vector Multiply and Scalar Add
vsma4	Four Vector Multiply and Scalar Add
vsmsa	Multiply Vector by a Scalar and Add Scalar
vsmsb	Vector Scalar Multiply and Subtract
vsmul	Multiply Vector by a Scalar
vspdp	Vector Convert Single to Double Precision
vsq	Vector Square
vsqrt	Vector Square Root
vssq	Vector Signed Square
vsub	Subtract One Vector from Another
vsum	Vector Sum
vswap	Vector Swap
vtabi	Vector Table Look-up, Linear Interpolate
vtan	Vector Tangent
vtanf	Vector Tangent in Fractions of a Circle
vthr	Vector Threshold
vthres	Replace Elements Less Than Scalar with Zero
vtrapz	Trapezoidal Rule Integration
vxcs	Real Vector Multiplied by Complex Exponential
vxcsf	Real Vector Multiplied by Fractional Complex Exponential
wiener	Wiener Levinson Equation Solverdeleteadd here



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