

BittWare Inc.

TS-Lib TS101

IEEE 754 Floating Point Optimised DSP Library
for the TigerSHARC TS101 DSP

Cycle Performance Manual

Version 2.1.0



TS-Lib Optimised DSP Library for the TigerSHARC

Library Cycle Performance Tables

The TS-Lib performance tables in this document lists the cycles for each routine in the library. The given cycles assume optimal data array placement in the internal DSP memory, so that parallel read and writes to the algorithms required data does not create any data bus stalls.

Memory usage can impact upon the cycle performance, the full library documentation includes memory configuration profiles that demonstrate the affect of array placement in memory. The ADSP-TS101S libraries include dm/pm routine entry point versions that uniquely identify the impact using the two data memory blocks. The ADSP-TS20xS processors possess multiple data memory sections therefore only the best-case and worst-case memory configuration cycle counts are documented. The worst-case memory configuration occurs when all arrays are held in the same memory section. The best-case memory configuration occurs when all arrays are held in different memory sections. The majority of the routines are also described with a cycle formula that indicates the cycle performance of the code in more detail. This can be broken into two parts, an initial overhead, which is normally a constant number of cycles, and a value based upon the input dimensions.

The published cycles are based upon the results from latest ADSP TigerSHARC silicon that was available when the library was tested and released. The BTB (and Caching for TS201) is enabled for all cycle performance tests.

Routine Naming Post-Fix

Each of the library routines is prefixed with the letters ez.. A postfix denotes the data-type (and hence the library from which the routine originates). They are as follows:

Floating-point library:

- `_f` : floating-point (using 128-bit quad-word memory access)
- `_sf` : floating-point with vector stride parameter

Fixed-point library:

- `_fr16` : fixed-point 16-bit fractional (using 128-bit quad-word memory access)
- `_fr32` : fixed-point 32-bit fractional (using 128-bit quad-word memory access)

Integer library:

- `_i` : integer (using 128-bit quad-word memory access)
- `_si` : integer with vector stride parameter

Memory Striding Routines

To increase functional versatility, the floating-point and 32-bit integer libraries include memory-striding versions of routines. These do not use the full quad-word data bandwidth since a stride greater than one accesses non-consecutive memory locations. The striding routines are fully optimised with this memory access overhead in-mind. The user should be aware that when using these routines, the performance may be reduced by up to four times, compared with a fully optimised routine. (All performance-metrics are documented for assessment).

Scalar Power Routines

Functionality	Routine Name	Cycles (array size)
Scalar Cube	ez_scube_f	25 cycles (1 points)
Scalar Exponential	ez_sexp_f	35 cycles (1 points)
Scalar Exponential Base10	ez_s10exp_f	46 cycles (1 points)
Scalar Exponential Base2	ez_s2exp_f	45 cycles (1 points)
Scalar Logarithm	ez_slog_f	102 cycles (1 points)
Scalar Logarithm Base10	ez_s10log_f	104 cycles (1 points)
Scalar Logarithm Base2	ez_s2log_f	104 cycles (1 points)
Scalar Power	ez_spow_f	–
Scalar Reciprocal Square Root	ez_srsqrt_f	45 cycles (1 points)
Scalar Square Root	ez_ssqrt_f	47 cycles (1 points)

Vector Power Routines

Functionality	Routine Name	Cycles (array size)
Vector Cube	ez_vcube_f	1,062 cycles (1024 points)
	ez_vcube_sf	1,069 cycles (1024 points)
Vector Distance	ez_vdist_f	5,299 cycles (1024 points)
	ez_vdist_sf	6,088 cycles (1024 points)
Vector Distance Square	ez_vdistsqr_f	1,058 cycles (1024 points)
	ez_vdistsqr_sf	2,096 cycles (1024 points)
Vector Exponential	ez_vexp_f	24,893 cycles (1024 points)
	ez_vexp_sf	24,905 cycles (1024 points)
Vector Exponential Base10	ez_v10exp_f	24,893 cycles (1024 points)
	ez_v10exp_sf	24,905 cycles (1024 points)
Vector Exponential Base2	ez_v2exp_f	24,893 cycles (1024 points)
	ez_v2exp_sf	24,905 cycles (1024 points)

Vector Power Routines cont...

Functionality	Routine Name	Cycles (array size)
Vector Logarithm	ez_vlog_f	32,043 cycles (1024 points)
	ez_vlog_sf	32,304 cycles (1024 points)
Vector Logarithm Base10	ez_v10log_f	32,043 cycles (1024 points)
	ez_v10log_sf	32,304 cycles (1024 points)
Vector Logarithm Base2	ez_v2log_f	32,043 cycles (1024 points)
	ez_v2log_sf	32,304 cycles (1024 points)
Vector Power of a Scalar	ez_vpows_f	19,483 cycles (1024 points)
	ez_vpows_sf	196,644 cycles (1024 points)
Vector Power of a Vector	ez_vpowv_f	20,507 cycles (1024 points)
	ez_vpowv_sf	20,517 cycles (1024 points)
Vector Pythagorus	ez_vpythag_f	8,750 cycles (1024 points)
Vector Reciprocal Square Root	ez_vrsqrt_f	3,873 cycles (1024 points)
	ez_vrsqrt_sf	3,629 cycles (1024 points)
Vector Reriprocal	ez_vrecip_f	2,349 cycles (1024 points)
	ez_vrecip_sf	2,482 cycles (1024 points)
Vector Signed Square	ez_vssqr_f	1,192 cycles (1024 points)
	ez_vssqr_sf	1,069 cycles (1024 points)
Vector Square	ez_vsqr_f	541 cycles (1024 points)
	ez_vsqr_sf	1,063 cycles (1024 points)
Vector Square Root	ez_vsqrt_f	4,129 cycles (1024 points)
	ez_vsqrt_sf	4,141 cycles (1024 points)

Complex Scalar Power Routines

Functionality	Routine Name	Cycles (array size)
Complex Scalar Exponential	ez_csexp_f	82 cycles (1 points)

Complex Vector Power Routines

Functionality	Routine Name	Cycles (array size)
Complex Vector Linear Magnitude	ez_cvlinmag_f	5,476 cycles (1024 points)
Complex Vector Log Magnitude	ez_cvlogmag_f	33,133 cycles (1024 points)
Complex Vector Magnitude Square	ez_cvmagsqr_f	1,062 cycles (1024 points)
	ez_cvmagsqr_sf	2,098 cycles (1024 points)
Complex Vector Magnitude Square and Vector Add.	ez_cvmagsqraddv_f	1,065 cycles (1024 points)

Scalar Trig Routines

Functionality	Routine Name	Cycles (array size)
Scalar Cosine	ez_scos_f	76 cycles (1 points)
Scalar Inverse Cosine	ez_sacos_f	61 cycles (1 points)
Scalar Inverse Sine	ez_sasin_f	55 cycles (1 points)
Scalar Inverse Tan	ez_satan_f	62 cycles (1 points)
Scalar Inverse Tan of Quotient	ez_sa2tan_f	122 cycles (1 points)
Scalar Sinc	ez_ssinc_f	118 cycles (1 points)
Scalar Sine	ez_ssin_f	63 cycles (1 points)
Scalar Sine and Cosine	ez_ssincos_f	87 cycles (1 points)
Scalar Tangent	ez_stan_f	84 cycles (1 points)

Vector Trig Routines

Functionality	Routine Name	Cycles (array size)
Vector Cosecant	ez_vcsec_f	98,017 cycles (1024 points)
Vector Cosine	ez_vcos_f	12,981 cycles (1024 points)
	ez_vcos_sf	15,563 cycles (1024 points)
Vector Cosine Waveform	ez_vcoswav_f	14,091 cycles (1024 points)

Vector Trig Routines cont...

Functionality	Routine Name	Cycles (array size)
Vector Cotangent	ez_vcot_f	21,055 cycles (1024 points)
	ez_vcot_sf	20,307 cycles (1024 points)
Vector Inverse Cosine	ez_vacos_f	35,877 cycles (1024 points)
	ez_vacos_sf	37,427 cycles (1024 points)
Vector Inverse Sine	ez_vasin_f	34,334 cycles (1024 points)
	ez_vasin_sf	35,882 cycles (1024 points)
Vector Inverse Tan of Quotient	ez_va2tan_f	30,776 cycles (1024 points)
	ez_va2tan_sf	33,621 cycles (1024 points)
Vector Inverse Tangent	ez_vatan_f	29,487 cycles (1024 points)
	ez_vatan_sf	30,274 cycles (1024 points)
Vector Secant	ez_vsec_f	98,020 cycles (1024 points)
Vector Sinc	ez_vsinc_f	16,408 cycles (1024 points)
	ez_vsinc_sf	19,231 cycles (1024 points)
Vector Sine	ez_vsin_f	12,978 cycles (1024 points)
	ez_vsin_sf	15,557 cycles (1024 points)
Vector Sine and Cosine	ez_vsincos_f	26,000 cycles (1024 points)
Vector Tangent	ez_vtan_f	21,051 cycles (1024 points)
	ez_vtan_sf	20,301 cycles (1024 points)

Scalar Hyperbolic Routines

Functionality	Routine Name	Cycles (array size)
Scalar Hyperbolic Cosecant	ez_scsech_f	155 cycles (1 points)
Scalar Hyperbolic Cosine	ez_scosh_f	138 cycles (1 points)
Scalar Hyperbolic Cotangent	ez_scoth_f	151 cycles (1 points)
Scalar Hyperbolic Inverse Cosine	ez_sacosh_f	74 cycles (1 points)
Scalar Hyperbolic Inverse Sine	ez_sasinh_f	224 cycles (1 points)
Scalar Hyperbolic Inverse Tangent	ez_satanh_f	191 cycles (1 points)

Scalar Hyperbolic Routines cont...

Functionality	Routine Name	Cycles (array size)
Scalar Hyperbolic Secant	ez_ssech_f	147 cycles (1 points)
Scalar Hyperbolic Sine	ez_ssinh_f	158 cycles (1 points)
Scalar Hyperbolic Tangent	ez_stanh_f	93 cycles (1 points)

Vector Hyperbolic Routines

Functionality	Routine Name	Cycles (array size)
Vector Hyperbolic Cosecant	ez_vcsech_f	61,824 cycles (1024 points)
Vector Hyperbolic Cosine	ez_vcosh_f	96,625 cycles (1024 points)
	ez_vcosh_sf	106,884 cycles (1024 points)
Vector Hyperbolic Cotangent	ez_vcoth_f	62,367 cycles (1024 points)
Vector Hyperbolic Inverse Cosine	ez_vacosh_f	81,604 cycles (1024 points)
	ez_vacosh_sf	94,944 cycles (1024 points)
Vector Hyperbolic Inverse Sine	ez_vasinh_f	73,397 cycles (1024 points)
	ez_vasinh_sf	86,737 cycles (1024 points)
Vector Hyperbolic Inverse Tangent	ez_vatanh_f	122,770 cycles (1024 points)
	ez_vatanh_sf	139,937 cycles (1024 points)
Vector Hyperbolic Secant	ez_vsech_f	103,062 cycles (1024 points)
Vector Hyperbolic Sine	ez_vsinh_f	96,625 cycles (1024 points)
	ez_vsinh_sf	106,885 cycles (1024 points)
Vector Hyperbolic Tangent	ez_vtanh_f	94,096 cycles (1024 points)
	ez_vtanh_sf	104,874 cycles (1024 points)

Vector 2 Input Mathematic Routines

Functionality	Routine Name	Cycles (array size)
Scalar-Vector Division	ez_sdivv_f	3,392 cycles (1024 points)
Scalar-Vector Subtraction	ez_ssubv_f	542 cycles (1024 points)
	ez_ssubv_sf	1,065 cycles (1024 points)

Vector 2 Input Mathematic Routines cont...

Functionality	Routine Name	Cycles (array size)
Vector Addition	ez_vaddv_f	543 cycles (1024 points)
	ez_vaddv_sf	2,094 cycles (1024 points)
Vector Division	ez_vdivv_f	3,391 cycles (1024 points)
	ez_vdivv_sf	3,636 cycles (1024 points)
Vector Dot Product	ez_vdotv_f	556 cycles (1024 points)
	ez_vdotv_sf	2,091 cycles (1024 points)
Vector Multiplication	ez_vmulv_f	543 cycles (1024 points)
	ez_vmulv_sf	2,094 cycles (1024 points)
Vector Subtraction	ez_vsubv_f	542 cycles (1024 points)
	ez_vsubv_sf	2,094 cycles (1024 points)
Vector-Scalar Addition	ez_vadds_f	542 cycles (1024 points)
	ez_vadds_sf	1,065 cycles (1024 points)
Vector-Scalar Division	ez_vdivs_f	554 cycles (1024 points)
	ez_vdivs_sf	1,069 cycles (1024 points)
Vector-Scalar Multiplication	ez_vmuls_f	542 cycles (1024 points)
	ez_vmuls_sf	1,065 cycles (1024 points)
Vector-Scalar Subtraction	ez_vsubs_f	542 cycles (1024 points)
	ez_vsubs_sf	1,065 cycles (1024 points)

Vector 3 Input Mathematic Routines

Functionality	Routine Name	Cycles (array size)
Vector Addition, Scalar Multiplication	ez_vaddvmuls_f	550 cycles (1024 points)
	ez_vaddvmuls_sf	2,096 cycles (1024 points)
Vector Addition, Scalar Multiplication	ez_vaddsmulv_f	548 cycles (1024 points)
	ez_vaddsmulv_sf	2,100 cycles (1024 points)
Vector Addition, Scalar Subtraction	ez_vaddvsubs_f	1,064 cycles (1024 points)
Vector Addition, Vector Addition	ez_vaddvaddv_f	1,058 cycles (1024 points)
	ez_vaddvaddv_sf	2,098 cycles (1024 points)

Vector 3 Input Mathematic Routines cont...

Functionality	Routine Name	Cycles (array size)
Vector Addition, Vector Multiplication	ez_vaddvmulv_f	805 cycles (1024 points)
Vector Addition, Vector Subtraction	ez_vaddvmulv_sf	2,098 cycles (1024 points)
Vector Addition, Vector Subtraction	ez_vaddvsubv_f	1,058 cycles (1024 points)
Vector Addition, Vector Subtraction	ez_vaddvsubv_sf	2,098 cycles (1024 points)
Vector Multiplication, Scalar Addition	ez_vmulvadds_f	550 cycles (1024 points)
Vector Multiplication, Scalar Addition	ez_vmulvadds_sf	2,096 cycles (1024 points)
Vector Multiplication, Scalar Multiplication	ez_vmulvmulv_f	1,064 cycles (1024 points)
Vector Multiplication, Scalar Subtraction	ez_vmulvmulv_sf	2,096 cycles (1024 points)
Vector Multiplication, Scalar Subtraction	ez_vmulvsubv_f	550 cycles (1024 points)
Vector Multiplication, Scalar Subtraction	ez_vmulvsubv_sf	2,096 cycles (1024 points)
Vector Multiplication, Vector Addition	ez_vmulvaddv_f	805 cycles (1024 points)
Vector Multiplication, Vector Addition	ez_vmulvaddv_sf	2,098 cycles (1024 points)
Vector Multiplication, Vector Multiplication	ez_vmulvmulv_f	1,058 cycles (1024 points)
Vector Multiplication, Vector Multiplication	ez_vmulvmulv_sf	2,098 cycles (1024 points)
Vector Multiplication, Vector Subtraction	ez_vmulvsubv_f	805 cycles (1024 points)
Vector Multiplication, Vector Subtraction	ez_vmulvsubv_sf	2,098 cycles (1024 points)
Vector Sub by, Vector Multiplication	ez_vsubbyvmulv_f	676 cycles (1024 points)
Vector Sub by, Vector Multiplication	ez_vsubbyvmulv_sf	2,098 cycles (1024 points)
Vector Subtraction, Scalar Addition	ez_vsubvadds_f	1,064 cycles (1024 points)
Vector Subtraction, Scalar Addition	ez_vsubvadds_sf	2,096 cycles (1024 points)
Vector Subtraction, Scalar Multiplication	ez_vsubvmulv_f	550 cycles (1024 points)
Vector Subtraction, Scalar Multiplication	ez_vsubvmulv_sf	2,096 cycles (1024 points)
Vector Subtraction, Scalar Subtraction	ez_vsubvsubv_f	1,064 cycles (1024 points)
Vector Subtraction, Scalar Subtraction	ez_vsubvsubv_sf	2,096 cycles (1024 points)
Vector Subtraction, Vector Addition	ez_vsubvaddv_f	1,058 cycles (1024 points)
Vector Subtraction, Vector Addition	ez_vsubvaddv_sf	2,098 cycles (1024 points)
Vector Subtraction, Vector Multiplication	ez_vsubvmulv_f	805 cycles (1024 points)
Vector Subtraction, Vector Multiplication	ez_vsubvmulv_sf	2,098 cycles (1024 points)

Vector 3 Input Mathematic Routines cont...

Functionality	Routine Name	Cycles (array size)
Vector Subtraction, Vector Subtraction	ez_vsubvsubv_f	1,058 cycles (1024 points)
Vector-Scalar Addition, Scalar Multiplication	ez_vsubvsubv_sf	2,098 cycles (1024 points)
Vector-Scalar Addition, Scalar Subtraction	ez_vaddsmuls_f	554 cycles (1024 points)
Vector-Scalar Multiplication, Scalar Addition	ez_vaddsmuls_sf	1,079 cycles (1024 points)
Vector-Scalar Multiplication, Scalar Subtraction	ez_vaddssubs_f	555 cycles (1024 points)
Vector-Scalar Multiplication, Vector Addition	ez_vmulsadds_f	554 cycles (1024 points)
Vector-Scalar Multiplication, Vector Subtraction	ez_vmulsadds_sf	1,079 cycles (1024 points)
Vector-Scalar Multiplication, Vector Addition	ez_vmulssubs_f	554 cycles (1024 points)
Vector-Scalar Multiplication, Vector Subtraction	ez_vmulssubs_sf	1,079 cycles (1024 points)
Vector-Scalar Subtraction, Scalar Addition	ez_vmulsaddv_f	1,062 cycles (1024 points)
Vector-Scalar Subtraction, Scalar Multiplication	ez_vmulsaddv_sf	2,100 cycles (1024 points)
Vector-Scalar Subtraction, Vector Multiplication	ez_vmulssubv_f	1,062 cycles (1024 points)
Vector-Scalar Subtraction, Vector Multiplication	ez_vmulssubv_sf	2,100 cycles (1024 points)
Vector-Scalar Subtraction, Vector Multiplication	ez_vsubsadds_f	553 cycles (1024 points)
Vector-Scalar Subtraction, Vector Multiplication	ez_vsubsmuls_f	554 cycles (1024 points)
Vector-Scalar Subtraction, Vector Multiplication	ez_vsubsmuls_sf	1,079 cycles (1024 points)
Vector-Scalar Subtraction, Vector Multiplication	ez_vsubsmulv_f	548 cycles (1024 points)
Vector-Scalar Subtraction, Vector Multiplication	ez_vsubsmulv_sf	2,100 cycles (1024 points)

Vector 4 Input Mathematic Routines

Functionality	Routine Name	Cycles (array size)
Vector Addition, mult. by, Vector Addition	ez_vaddvmulbyvaddv_f	1,322 cycles (1024 points)
Vector Addition, mult. by, Vector Subtraction	ez_vaddvmulbyvaddv_sf	3,130 cycles (1024 points)
Vector Addition, mult. by, Vector Subtraction	ez_vaddvmulbyvsubv_f	1,322 cycles (1024 points)
Vector Mult., added to, Vector Mult.	ez_vaddvmulbyvsubv_sf	3,130 cycles (1024 points)
Vector Mult., added to, Vector Mult.	ez_vmulvaddbyvmulv_f	1,322 cycles (1024 points)
Vector Mult., added to, Vector Mult.	ez_vmulvaddbyvmulv_sf	3,130 cycles (1024 points)

Vector 4 Input Mathematic Routines cont...

Functionality	Routine Name	Cycles (array size)
Vector Mult., subtract a, Vector Mult.	ez_vmulvsubbyvmulv_f	1,322 cycles (1024 points)
Vector Subtraction, mult. by, Vector Subtraction	ez_vmulvsubbyvmulv_sf	3,130 cycles (1024 points)
	ez_vsubvmulbyvsubv_f	1,322 cycles (1024 points)
Vector-Scalar Add., mult. by, Vector-Scalar Add.	ez_vsubvmulbyvsubv_sf	3,130 cycles (1024 points)
	ez_vaddsmulbyvadds_f	1,063 cycles (1024 points)
Vector-Scalar Mult., added to, Vector-Scalar Mult.	ez_vaddsmulbyvadds_sf	2,102 cycles (1024 points)
	ez_vmulvaddbyvmulv_f	1,065 cycles (1024 points)
Vector-Scalar Mult., sub. by, Vector-Scalar Mult.	ez_vmulvaddbyvmulv_sf	2,102 cycles (1024 points)
	ez_vmulvsubbyvmulv_f	1,063 cycles (1024 points)
Vector-Scalar Sub., mult. by, Vector-Scalar Sub.	ez_vmulvsubbyvmulv_sf	2,102 cycles (1024 points)
	ez_vsubsmulbyvsubv_f	1,063 cycles (1024 points)
	ez_vsubsmulbyvsubv_sf	2,102 cycles (1024 points)

Complex Vector 2 Input Mathematic Routines

Functionality	Routine Name	Cycles (array size)
Complex Conjugate-Complex Vector Subtraction	ez_jvsubcv_f	1,061 cycles (1024 points)
Complex Conjugate-Real Vector Multiplication	ez_jvsubcv_sf	3,115 cycles (1024 points)
	ez_jvmulv_f	1,062 cycles (1024 points)
Complex Conjugate-Real Vector Scalar Addition	ez_jvmulv_sf	3,116 cycles (1024 points)
	ez_jvaddv_f	1,061 cycles (1024 points)
Complex Conjugate-Real Vector Scalar Subtraction	ez_jvaddv_sf	3,116 cycles (1024 points)
	ez_jvsubv_f	1,061 cycles (1024 points)
Complex Conjugate-Vector Conjugate-Scalar Addition	ez_jvsubv_sf	3,116 cycles (1024 points)
	ez_jvaddjs_f	1,064 cycles (1024 points)
Complex Conjugate-Vector Conjugate-Scalar Multiplication	ez_jvmuljs_f	2,089 cycles (1024 points)
Complex Conjugate-Vector Conjugate-Scalar Subtraction	ez_jvsubjs_f	1,064 cycles (1024 points)
Complex Conjugate-Vector Multiplication	ez_jvmuljv_f	2,088 cycles (1024 points)
	ez_jvmuljv_sf	2,441 cycles (1024 points)

Complex Vector 2 Input Mathematic Routines cont...

Functionality	Routine Name	Cycles (array size)
Complex Conjugate-Vector Scalar Addition	ez_jvaddcs_f	1,059 cycles (1024 points)
Complex Conjugate-Vector Scalar Addition	ez_jvaddcs_sf	2,090 cycles (1024 points)
	ez_jvaddjv_f	1,061 cycles (1024 points)
Complex Conjugate-vector Scalar Multiplication	ez_jvaddjv_sf	3,115 cycles (1024 points)
	ez_jvmulcs_f	2,084 cycles (1024 points)
Complex Conjugate-Vector Scalar Subtraction	ez_jvmulcs_sf	2,437 cycles (1024 points)
	ez_jvsubcs_f	1,059 cycles (1024 points)
Complex Conjugate-Vector Subtraction	ez_jvsubcs_sf	2,090 cycles (1024 points)
	ez_jvsubjv_f	1,062 cycles (1024 points)
Complex Vector Addition	ez_jvsubjv_sf	3,115 cycles (1024 points)
	ez_cvaddcv_f	1,059 cycles (1024 points)
Complex Vector Addition	ez_cvaddcv_sf	2,094 cycles (1024 points)
	ez_cvaddv_f	2,090 cycles (1024 points)
Complex Vector Division	ez_cvaddv_sf	2,095 cycles (1024 points)
	ez_cvdivcv_f	36,893 cycles (1024 points)
Complex Vector Dot Product	ez_cvdivcv_sf	10,287 cycles (1024 points)
	ez_cvdotjv_f	2,092 cycles (1024 points)
Complex Vector Dot Product	ez_cvdotjv_sf	2,112 cycles (1024 points)
	ez_cvdotcv_f	2,093 cycles (1024 points)
Complex Vector Multiplication	ez_cvdotcv_sf	2,112 cycles (1024 points)
	ez_cvmulcv_f	2,597 cycles (1024 points)
Complex Vector Scalar Multiplication	ez_cvmulcv_sf	2,442 cycles (1024 points)
	ez_cvmulcs_f	2,086 cycles (1024 points)
Complex Vector Scalar-Conjugate Addition	ez_cvmulcs_sf	2,436 cycles (1024 points)
	ez_cvaddjs_f	1,064 cycles (1024 points)
Complex Vector Scalar-Conjugate Multiplication	ez_cvmuljs_f	2,090 cycles (1024 points)
Complex Vector Scalar-Conjugate Subtraction	ez_cvsubjs_f	1,064 cycles (1024 points)
Complex Vector Subtraction	ez_cvsubcv_f	1,058 cycles (1024 points)
	ez_cvsubcv_sf	2,094 cycles (1024 points)

Complex Vector 2 Input Mathematic Routines cont...

Functionality	Routine Name	Cycles (array size)
Complex Vector-Conjugate Addition	ez_cvaddjv_f	1,062 cycles (1024 points)
	ez_cvaddjv_sf	2,094 cycles (1024 points)
Complex Vector-Conjugate Subtraction	ez_cvsubjv_f	1,062 cycles (1024 points)
	ez_cvsubjv_sf	2,094 cycles (1024 points)
Complex Vector-Conjugate Vector Multiplication	ez_cvmuljv_f	2,083 cycles (1024 points)
	ez_cvmuljv_sf	2,442 cycles (1024 points)
Complex Vector-Real Scalar Multiplication	ez_cvmuls_f	1,061 cycles (1024 points)
	ez_cvmuls_sf	1,065 cycles (1024 points)
Complex Vector-Real Vector Division	ez_cvdivv_f	6,726 cycles (1024 points)
	ez_cvdivv_sf	5,935 cycles (1024 points)
Complex Vector-Real Vector Multiplication	ez_cvmulv_f	2,091 cycles (1024 points)
	ez_cvmulv_sf	2,094 cycles (1024 points)
Complex Vector-Real Vector Subtraction	ez_cvsubv_f	2,090 cycles (1024 points)
	ez_cvsubv_sf	2,095 cycles (1024 points)
Complex Vector-Scalar Addition	ez_cvaddcs_f	1,059 cycles (1024 points)
	ez_cvaddcs_sf	1,062 cycles (1024 points)
Complex Vector-Scalar Subtraction	ez_cvsubcs_f	1,059 cycles (1024 points)
	ez_cvsubcs_sf	1,062 cycles (1024 points)
Real Vector-Complex Vector Subtraction	ez_vsubcv_f	2,090 cycles (1024 points)

Complex Vector 3 Input Mathematic Routines

Functionality	Routine Name	Cycles (array size)
Complex Vector Add., Conj. Vector Add.	ez_cvaddcvaddjv_f	2,086 cycles (1024 points)
	ez_cvaddcvaddjv_sf	2,097 cycles (1024 points)
Complex Vector Add., Conj. Vector Sub.	ez_cvaddcvsubjv_f	2,086 cycles (1024 points)
	ez_cvaddcvsubjv_sf	2,097 cycles (1024 points)
Complex Vector Add., Scalar Add.	ez_cvaddcvaddcs_f	2,086 cycles (1024 points)
	ez_cvaddcvaddcs_sf	2,094 cycles (1024 points)

Complex Vector 3 Input Mathematic Routines cont...

Functionality	Routine Name	Cycles (array size)
Complex Vector Add., Scalar Mult.	ez_cvaddecvmulcs_f	2,084 cycles (1024 points)
	ez_cvaddecvmulcs_sf	4,150 cycles (1024 points)
Complex Vector Add., Scalar Sub.	ez_cvaddecvsubcs_f	2,086 cycles (1024 points)
	ez_cvaddecvsubcs_sf	2,094 cycles (1024 points)
Complex Vector Add., Vector Add	ez_cvaddecvaddecv_f	2,086 cycles (1024 points)
	ez_cvaddecvaddecv_sf	2,098 cycles (1024 points)
Complex Vector Add., Vector Mult.	ez_cvaddecvmulcv_f	2,081 cycles (1024 points)
	ez_cvaddecvmulcv_sf	4,151 cycles (1024 points)
Complex Vector Add., Vector Sub.	ez_cvaddecvsubcv_f	2,086 cycles (1024 points)
	ez_cvaddecvsubcv_sf	2,098 cycles (1024 points)
Complex Vector Multiplicaiton, Vector Addition	ez_cvmulcvaddecv_f	2,086 cycles (1024 points)
	ez_cvmulcvaddecv_sf	4,149 cycles (1024 points)
Complex Vector Multiplication, Scalar Addition	ez_cvmulcvaddcs_f	2,080 cycles (1024 points)
	ez_cvmulcvaddcs_sf	4,147 cycles (1024 points)
Complex Vector Multiplication, Scalar Subtraction	ez_cvmulcvsubcs_f	2,080 cycles (1024 points)
	ez_cvmulcvsubcs_sf	4,147 cycles (1024 points)
Complex Vector Multiplication, Vector Subtraction	ez_cvmulcvsubcv_f	2,081 cycles (1024 points)
	ez_cvmulcvsubcv_sf	4,149 cycles (1024 points)
Complex Vector Subtraction, Scalar Subtraction	ez_cvsubcvsubcs_f	2,086 cycles (1024 points)
	ez_cvsubcvsubcs_sf	2,094 cycles (1024 points)
Complex Vector Subtraction, Conj. Vector Sub.	ez_cvsubcvsubjv_f	2,086 cycles (1024 points)
	ez_cvsubcvsubjv_sf	2,097 cycles (1024 points)
Complex Vector Subtraction, Scalar Addition	ez_cvsubcvaddcs_f	2,086 cycles (1024 points)
	ez_cvsubcvaddcs_sf	2,094 cycles (1024 points)
Complex Vector Subtraction, Scalar Multiplication	ez_cvsubcvmulcs_f	2,084 cycles (1024 points)
	ez_cvsubcvmulcs_sf	4,150 cycles (1024 points)
Complex Vector Subtraction, Vector Multiplication	ez_cvsubcvmulcv_f	2,081 cycles (1024 points)
	ez_cvsubcvmulcv_sf	4,151 cycles (1024 points)

Complex Vector 3 Input Mathematic Routines cont...

Functionality	Routine Name	Cycles (array size)
Complex Vector Subtraction, Vector Subtraction	ez_cvsubcvsubcv.f	2,086 cycles (1024 points)
Complex Vector-Conj. Vector Add., Conj. Vector Add.	ez_cvsubcvsubcv_sf	2,098 cycles (1024 points)
	ez_cvaddjvadjv.f	2,086 cycles (1024 points)
Complex Vector-Conj. Vector Add., Conj. Vector Sub.	ez_cvaddjvadjv_sf	3,122 cycles (1024 points)
	ez_cvaddjvsubjv.f	2,086 cycles (1024 points)
Complex Vector-Conj. Vector Add., Scalar Add.	ez_cvaddjvsubjv_sf	3,122 cycles (1024 points)
	ez_cvaddjvaddcs.f	2,086 cycles (1024 points)
Complex Vector-Conj. Vector Add., Scalar Add.	ez_cvaddjvaddcs_sf	2,098 cycles (1024 points)
	ez_cvaddjvsubcs.f	2,086 cycles (1024 points)
Complex Vector-Conj. Vector Mult, Vector Add.	ez_cvaddjvsubcs_sf	2,098 cycles (1024 points)
	ez_cvmuljvaddcv.f	2,086 cycles (1024 points)
Complex Vector-Conj. Vector Sub., Conj. Vector Sub.	ez_cvsubjvsubjv.f	2,086 cycles (1024 points)
	ez_cvsubjvsubjv_sf	3,122 cycles (1024 points)
Complex Vector-Conj. Vector Sub., Scalar Add.	ez_cvsubjvsubcs.f	2,086 cycles (1024 points)
	ez_cvsubjvsubcs_sf	2,098 cycles (1024 points)
Complex Vector-Real Scalar Mult., Vector Add.	ez_cvmulsaddcv.f	1,065 cycles (1024 points)
Complex Vector-Real Vector Mult., Vector Add.	ez_cvmulvaddev.f	1,574 cycles (1024 points)
Complex Vector-Scalar Add., Scalar Mult.	ez_cvaddcsmls.f	1,062 cycles (1024 points)
Complex Vector-Scalar Mult., Scalar Add.	ez_cvmulcsaddcs.f	2,086 cycles (1024 points)
Complex Vector-Scalar Mult., Vector Add.	ez_cvmulcsaddev.f	2,600 cycles (1024 points)

Matrix Matrix Math Routines

Functionality	Routine Name	Cycles (array size)
Extract Sub-Matrix	ez_mextsubm.f	42 cycles (1280 points)
Identity Matrix	ez_mid.f	334 cycles (1024 points)
Insert Sub-Matrix	ez_minsrtsubm.f	40 cycles (1280 points)
Matrix Addition	ez_maddm.f	552 cycles (1024 points)

Matrix Matrix Math Routines cont...

Functionality	Routine Name	Cycles (array size)
Matrix Determinant (2x2)	ez_m2x2det.f	24 cycles (4 points)
Matrix Determinant (3x3)	ez_m3x3det.f	35 cycles (9 points)
Matrix Kronecker	ez_mkron.f	7,160 cycles (36 points)
Matrix Multiplication	ez_mmulm.f	22,758 cycles (1024 points)
Matrix Multiplication (15x15)	ez_m15x15mulm.f	2,274 cycles (225 points)
Matrix Multiplication (25x25)	ez_m25x25mulm.f	8,997 cycles (625 points)
Matrix Multiplication (2x2)	ez_m2x2mulm.f	29 cycles (4 points)
Matrix Multiplication (3x3)	ez_m3x3mulm.f	41 cycles (9 points)
Matrix Multiplication (4x4)	ez_m4x4mulm.f	76 cycles (16 points)
Matrix Pivot	ez_mpivot.f	81,827 cycles (1024 points)
Matrix Subtraction	ez_msubm.f	551 cycles (1024 points)
Matrix Transpose	ez_mtrans.f	1,530 cycles (1024 points)

Matrix Vector Math Routines

Functionality	Routine Name	Cycles (array size)
Matrix-Vector Multiplication	ez_mmulv.f	1,126 cycles (1024 points)
Matrix-Vector Multiplication (2x2)	ez_m2x2mulv.f	27 cycles (4 points)
Matrix-Vector Multiplication (3x3)	ez_m3x3mulv.f	31 cycles (9 points)
Matrix-Vector Multiplication (4x4)	ez_m4x4mulv.f	32 cycles (16 points)
Vector-Matrix Multiplication	ez_vmulm.f	644 cycles (1024 points)
Vector-Matrix Multiplication (2x2)	ez_v2x2mulm.f	26 cycles (4 points)
Vector-Matrix Multiplication (3x3)	ez_v3x3mulm.f	30 cycles (9 points)
Vector-Matrix Multiplication (4x4)	ez_v4x4mulm.f	33 cycles (16 points)

Matrix Scalar Math Routines

Functionality	Routine Name	Cycles (array size)
Matrix-Scalar Addition	ez_madds_f	553 cycles (1024 points)
Matrix-Scalar Division	ez_mddivs_f	563 cycles (1024 points)
Matrix-Scalar Multiplication	ez_mmuls_f	552 cycles (1024 points)
Matrix-Scalar Subtraction	ez_msubs_f	553 cycles (1024 points)

Complex Matrix Matrix Math Routines

Functionality	Routine Name	Cycles (array size)
Complex Conjugate-Matrix Matrix Multiplication	ez_jmmulcm_f	74,914 cycles (1024 points)
Complex Conjugate-Matrix Multiplication	ez_jmmuljm_f	74,914 cycles (1024 points)
Complex Matrix Addition	ez_cmaddcm_f	1,068 cycles (1024 points)
Complex Matrix Conjugate Transpose	ez_jmtrans_f	2,651 cycles (1024 points)
Complex Matrix Matrix-Conjugate Multiplication	ez_cmmuljm_f	74,914 cycles (1024 points)
Complex Matrix Multiplication	ez_cmmulcm_f	74,914 cycles (1024 points)
Complex Matrix Subtraction	ez_cmsubcm_f	1,067 cycles (1024 points)
Complex Matrix Transpose	ez_cmtrans_f	1,581 cycles (1024 points)

Complex Matrix Vector Math Routines

Functionality	Routine Name	Cycles (array size)
Complex Conjugate-Matrix Conjugate-Vector Multiplication	ez_jmmuljv_f	2,350 cycles (1024 points)
Complex Conjugate-Matrix Vector Multiplication	ez_jmmulcv_f	2,350 cycles (1024 points)
Complex Conjugate-Vector Conjugate-Matrix Multiplication	ez_jvmuljm_f	2,350 cycles (1024 points)
Complex Conjugate-Vector Matrix Multiplication	ez_jvmulcm_f	2,350 cycles (1024 points)
Complex Matrix Conjugate-Vector Multiplication	ez_cmmuljv_f	2,350 cycles (1024 points)
Complex Matrix Vector Multiplication	ez_cmmulcv_f	2,350 cycles (1024 points)

Complex Matrix Vector Math Routines cont...

Functionality	Routine Name	Cycles (array size)
Complex Vector Matrix Multiplication	ez_cvmulcm_f	2,350 cycles (1024 points)
Complex Vector Matrix-Conjugate Multiplication	ez_cvmuljm_f	2,350 cycles (1024 points)

Complex Matrix Scalar Math Routines

Functionality	Routine Name	Cycles (array size)
Complex Conjugate-Matrix Conjugate-Scalar Addition	ez_jmaddjs_f	1,067 cycles (1024 points)
Complex Conjugate-Matrix Conjugate-Scalar Multiplication	ez_jmmuljs_f	2,092 cycles (1024 points)
Complex Conjugate-Matrix Conjugate-Scalar Subtraction	ez_jmsubjs_f	1,067 cycles (1024 points)
Complex Conjugate-Matrix Scalar Addition	ez_jmaddcs_f	1,067 cycles (1024 points)
Complex Conjugate-Matrix Scalar Multiplication	ez_jmmulcs_f	2,092 cycles (1024 points)
Complex Conjugate-Matrix Scalar Subtraction	ez_jmsubcs_f	1,067 cycles (1024 points)
Complex Matrix Scalar Addition	ez_cmaddcs_f	1,067 cycles (1024 points)
Complex Matrix Scalar Multiplication	ez_cmmulcs_f	2,093 cycles (1024 points)
Complex Matrix Scalar Subtraction	ez_cmsubcs_f	1,067 cycles (1024 points)
Complex Matrix Scalar-Conjugate Addition	ez_cmaddjs_f	1,067 cycles (1024 points)
Complex Matrix Scalar-Conjugate Multiplication	ez_cmmuljs_f	2,093 cycles (1024 points)
Complex Matrix Scalar-Conjugate Subtraction	ez_cmsubjs_f	1,067 cycles (1024 points)

Scalar Standard Operations

Functionality	Routine Name	Cycles (array size)
Scalar Absolute	ez_sabs_f	21 cycles (1 points)
Scalar Ceil	ez_sceil_f	26 cycles (1 points)
Scalar Floating Point Remainder	ez_srem_f	42 cycles (1 points)
Scalar Floor	ez_sfloor_f	26 cycles (1 points)
Scalar Mantissa and Exponent	ez_smant_f	29 cycles (1 points)

Vector Standard Operations

Functionality	Routine Name	Cycles (array size)
Vector Absolute	ez_vabs_f	297 cycles (1024 points)
	ez_vabs_sf	1,062 cycles (1024 points)
Vector Ceil	ez_vceil_f	4,126 cycles (1024 points)
	ez_vceil_sf	3,367 cycles (1024 points)
Vector Clear	ez_vclr_f	287 cycles (1024 points)
	ez_vclr_sf	1,055 cycles (1024 points)
Vector Fill	ez_vfill_f	296 cycles (1024 points)
	ez_vfill_sf	1,055 cycles (1024 points)
Vector Float to integer	ez_vfloat2int_f	559 cycles (1024 points)
Vector Floating Point Remainder	ez_vrem_f	18,464 cycles (1024 points)
Vector Floor	ez_vfloor_f	4,126 cycles (1024 points)
	ez_vfloor_sf	3,367 cycles (1024 points)
Vector Integer to float	ez_vint2float_f	559 cycles (1024 points)
Vector Inverse	ez_vinv_f	2,349 cycles (1024 points)
Vector Multiply by $\frac{1}{\pi}$	ez_vmulpi_f	551 cycles (1024 points)
	ez_vmulpi_sf	1,063 cycles (1024 points)
Vector Multiply by π	ez_vmulpi_f	542 cycles (1024 points)
	ez_vmulpi_sf	1,063 cycles (1024 points)
Vector Negate	ez_vneg_f	418 cycles (1024 points)
	ez_vneg_sf	1,062 cycles (1024 points)
Vector Negative Absolute	ez_vnabs_f	303 cycles (1024 points)
	ez_vnabs_sf	1,062 cycles (1024 points)
Vector Null	ez_vnull_f	295 cycles (1024 points)
Vector Reverse	ez_vrev_f	1,320 cycles (1024 points)
	ez_vrev_sf	2,088 cycles (1024 points)
Vector Set	ez_vset_f	295 cycles (1024 points)

Vector Standard Operations cont...

Functionality	Routine Name	Cycles (array size)
Vector Swap	ez_vswap_f	548 cycles (1024 points)
	ez_vswap_sf	2,084 cycles (1024 points)
Vector Unity	ez_vunity_f	295 cycles (1024 points)

Complex Scalar Standard Operations

Functionality	Routine Name	Cycles (array size)
Complex Scalar Absolute	ez_csabs_f	49 cycles (1 points)
Complex Scalar Addition	ez_csaddcs_f	23 cycles (1 points)
Complex Scalar Angle	ez_csang_f	121 cycles (1 points)
Complex Scalar Conjugate	ez_js_f	22 cycles (1 points)
Complex Scalar Conjugate Scalar Multiplication	ez_csmuljs_f	26 cycles (1 points)
Complex Scalar Division	ez_csdivcs_f	42 cycles (1 points)
Complex Scalar Inverse	ez_csinv_f	40 cycles (1 points)
Complex Scalar Magnitude	ez_csmag_f	71 cycles (1 points)
Complex Scalar Multiplication	ez_csmulcs_f	25 cycles (1 points)
Complex Scalar Subtraction	ez_cssubcs_f	23 cycles (1 points)
Conjugate Scalar Complex Scalar Multiplication	ez_jsmulcs_f	26 cycles (1 points)
Conjugate Scalar Multiplication	ez_jsmuljs_f	26 cycles (1 points)

Complex Vector Standard Operations

Functionality	Routine Name	Cycles (array size)
Complex Vector Absolute	ez_cvabs_f	8,773 cycles (1024 points)
	ez_cvabs_sf	6,470 cycles (1024 points)
Complex Vector Angle	ez_cvang_f	33,626 cycles (1024 points)
	ez_cvang_sf	33,619 cycles (1024 points)
Complex Vector Conjugate	ez_jv_f	554 cycles (1024 points)
	ez_jv_sf	1,062 cycles (1024 points)

Complex Vector Standard Operations cont...

Functionality	Routine Name	Cycles (array size)
Complex Vector Fill	ez_cvfill_f	543 cycles (1024 points)
	ez_cvfill_sf	1,055 cycles (1024 points)
Complex Vector Imaginary	ez_cvimag_f	546 cycles (1024 points)
	ez_cvimag_sf	1,061 cycles (1024 points)
Complex Vector Inverse	ez_cvinv_f	7,227 cycles (1024 points)
	ez_cvinv_sf	6,187 cycles (1024 points)
Complex Vector Join Real-Imaginary	ez_cvjoin_f	1,058 cycles (1024 points)
	ez_cvjoin_sf	2,090 cycles (1024 points)
Complex Vector Magnitude	ez_cvmag_f	8,773 cycles (1024 points)
	ez_cvmag_sf	6,470 cycles (1024 points)
Complex Vector Negate	ez_cvneg_f	677 cycles (1024 points)
	ez_cvneg_sf	1,062 cycles (1024 points)
Complex Vector Real	ez_cvreal_f	546 cycles (1024 points)
	ez_cvreal_sf	1,061 cycles (1024 points)
Complex Vector Split Real-Imaginary	ez_cvsplit_f	1,057 cycles (1024 points)
	ez_cvsplit_sf	2,089 cycles (1024 points)

Vector Test

Functionality	Routine Name	Cycles (array size)
Complex Vector Equal	ez_cveq_f	4,138 cycles (1024 points)
	ez_cveq_sf	2,100 cycles (1024 points)
Complex Vector Not-Equal	ez_cvneq_f	4,138 cycles (1024 points)
	ez_cvneq_sf	2,100 cycles (1024 points)
Vector Equal	ez_veq_f	2,086 cycles (1024 points)
	ez_veq_sf	2,094 cycles (1024 points)
Vector Logic Greater than Zero Test	ez_vlg_f	1,062 cycles (1024 points)
	ez_vlg_sf	2,096 cycles (1024 points)

Vector Test cont...

Functionality	Routine Name	Cycles (array size)
Vector Logic Greater than/or Equal Test	ez_vlge_f	1,062 cycles (1024 points)
	ez_vlge_sf	2,096 cycles (1024 points)
Vector Logic Less than Zero Test	ez_vll_f	1,062 cycles (1024 points)
	ez_vll_sf	2,096 cycles (1024 points)
Vector Logic Less than/or Zero Test	ez_vlle_f	1,062 cycles (1024 points)
	ez_vlle_sf	2,096 cycles (1024 points)
Vector Logic Not Zero Test	ez_vlne_f	1,062 cycles (1024 points)
	ez_vlne_sf	2,096 cycles (1024 points)
Vector Logic Zero Test	ez_vle_f	1,062 cycles (1024 points)
	ez_vle_sf	2,096 cycles (1024 points)
Vector Not-Equal	ez_vneq_f	2,086 cycles (1024 points)
	ez_vneq_sf	2,095 cycles (1024 points)

Threshold Operations

Functionality	Routine Name	Cycles (array size)
Vector Clip	ez_vclip_f	1,581 cycles (1024 points)
	ez_vclip_sf	2,872 cycles (1024 points)
Vector Clip	ez_vkclip_f	1,578 cycles (1024 points)
	ez_vkclip_sf	2,873 cycles (1024 points)
Vector Inverse Clip	ez_viclip_f	1,840 cycles (1024 points)
Vector Limit	ez_vlimit_f	809 cycles (1024 points)
	ez_vlimit_sf	1,589 cycles (1024 points)
Vector Threshold	ez_vthrsh_f	809 cycles (1024 points)
	ez_vthrsh_sf	1,583 cycles (1024 points)
Vector Threshold	ez_vthres_f	808 cycles (1024 points)
	ez_vthres_sf	1,587 cycles (1024 points)

Sorting Operations

Functionality	Routine Name	Cycles (array size)
Vector Greater-Equal Merge	ez_vtmerge_f	1,066 cycles (1024 points)
Vector Negative Merge	ez_vnmerge_f	1,065 cycles (1024 points)
Vector Not-Zero Merge	ez_vnzmerge_f	1,065 cycles (1024 points)
Vector Positive Merge	ez_vpmerge_f	1,065 cycles (1024 points)
Vector Quick Sort	ez_vqsort_f	55 cycles (128 points)
Vector Selection Sort	ez_vssort_f	22 cycles (128 points)
Vector Zero Merge	ez_vzmerge_f	1,065 cycles (1024 points)

Matrix Checking Operations

Functionality	Routine Name	Cycles (array size)
Matrix Orthogonality	ez_morth_f	40,448 cycles (1024 points)
Matrix Partial Pivot	ez_mpivp_f	3,858 cycles (1024 points)
Matrix Skew	ez_mskew_f	1,109 cycles (256 points)
Matrix Symmetry	ez_msym_f	932 cycles (256 points)
Matrix Trace	ez_mtrace_f	89 cycles (64 points)

Vector Sum and Average Routines

Functionality	Routine Name	Cycles (array size)
Complex Vector Sum of Magnitudes	ez_cvsumm_f	7,236 cycles (1024 points)
	ez_cvsumm_sf	7,237 cycles (1024 points)
Complex Vector Sum of Squares	ez_cvsums_f	1,066 cycles (1024 points)
	ez_cvsums_sf	1,067 cycles (1024 points)
Vector First Non-Zero	ez_vfirst_f	2,081 cycles (1024 points)
	ez_vfirst_sf	2,085 cycles (1024 points)

Vector Sum and Average Routines cont...

Functionality	Routine Name	Cycles (array size)
Vector Last Non-Zero	ez_vlast_f	2,081 cycles (1024 points)
	ez_vlast_sf	2,084 cycles (1024 points)
Vector Least Squares Fit	ez_vlsqr_f	3,651 cycles (1024 points)
	ez_vlsqr_sf	6,442 cycles (1024 points)
Vector Linear Average	ez_vlina_f	1,221 cycles (1024 points)
Vector Mean	ez_vmean_f	1,078 cycles (1024 points)
	ez_vmean_sf	1,075 cycles (1024 points)
Vector Mean of Magnitudes	ez_vmeanm_f	1,079 cycles (1024 points)
	ez_vmeanm_sf	1,077 cycles (1024 points)
Vector Mean of signed Squares	ez_vmeanss_f	1,083 cycles (1024 points)
	ez_vmeanss_sf	1,090 cycles (1024 points)
Vector Mean of Squares	ez_vmeans_f	1,079 cycles (1024 points)
	ez_vmeans_sf	1,077 cycles (1024 points)
Vector Range	ez_vrange_f	2,092 cycles (1024 points)
	ez_vrange_sf	1,063 cycles (1024 points)
Vector Root Mean of Squares	ez_vrms_f	1,087 cycles (1024 points)
	ez_vrms_sf	1,098 cycles (1024 points)
Vector Running Sum	ez_vrsum_f	1,571 cycles (1024 points)
Vector Running Sum Scaled	ez_vrsums_f	2,078 cycles (1024 points)
Vector Sum	ez_vsum_f	1,069 cycles (1024 points)
	ez_vsum_sf	1,060 cycles (1024 points)
Vector Sum of Magnitudes	ez_vsumm_f	1,071 cycles (1024 points)
	ez_vsumm_sf	1,061 cycles (1024 points)
Vector Sum of Signed Squares	ez_vsumss_f	1,077 cycles (1024 points)
	ez_vsumss_sf	1,073 cycles (1024 points)
Vector Sum of Squared Errors	ez_vsumse_f	2,109 cycles (1024 points)
	ez_vsumse_sf	2,094 cycles (1024 points)
Vector Sum of Squares	ez_vsums_f	1,071 cycles (1024 points)
	ez_vsums_sf	1,061 cycles (1024 points)

Vector Sum and Average Routines cont...

Functionality	Routine Name	Cycles (array size)
Vector Sum of Window	ez_vsumwin_f	45 cycles (1024 points)
Weighted Mean	ez_vmeanw_f	1,078 cycles (1024 points)
	ez_vmeanw_sf	2,111 cycles (1024 points)
Weighted Sum	ez_vsumw_f	2,110 cycles (1024 points)
	ez_vsumw_sf	2,095 cycles (1024 points)
Zero Crossing	ez_zero_f	953 cycles (1024 points)

Vector Limits Routines

Functionality	Routine Name	Cycles (array size)
Complex Vector Max and Min of Magnitude	ez_cvmaxminmag_f	2,090 cycles (1024 points)
Vector Max	ez_vmax_f	560 cycles (1024 points)
	ez_vmax_sf	1,059 cycles (1024 points)
Vector Max and Min	ez_vmaxmin_f	1,076 cycles (1024 points)
	ez_vmaxmin_sf	1,066 cycles (1024 points)
Vector Max and Min of Magnitude	ez_vmaxminm_f	1,338 cycles (1024 points)
	ez_vmaxminm_sf	1,069 cycles (1024 points)
Vector Max Index	ez_vmaxi_f	2,092 cycles (1024 points)
	ez_vmaxi_sf	2,101 cycles (1024 points)
Vector Max of Magnitude	ez_vmaxm_f	823 cycles (1024 points)
	ez_vmaxm_sf	1,064 cycles (1024 points)
Vector Max of Magnitudes Index	ez_vmaxmi_f	2,121 cycles (1024 points)
	ez_vmaxmi_sf	2,105 cycles (1024 points)
Vector Maximum	ez_vmaxv_f	548 cycles (1024 points)
	ez_vmaxv_sf	2,094 cycles (1024 points)
Vector Min	ez_vmin_f	560 cycles (1024 points)
	ez_vmin_sf	1,059 cycles (1024 points)
Vector Min Index	ez_vmini_f	2,092 cycles (1024 points)
	ez_vmini_sf	2,101 cycles (1024 points)

Vector Limits Routines cont...

Functionality	Routine Name	Cycles (array size)
Vector Min of Magnitude	ez_vminm_f	822 cycles (1024 points)
	ez_vminm_sf	1,065 cycles (1024 points)
Vector Min of Magnitude with Index	ez_vminmi_f	2,121 cycles (1024 points)
	ez_vminmi_sf	2,105 cycles (1024 points)
Vector Minimum	ez_vminv_f	548 cycles (1024 points)
	ez_vminv_sf	2,094 cycles (1024 points)

Matrix Limits Routines

Functionality	Routine Name	Cycles (array size)
Matrix Max	ez_mmax_f	568 cycles (1024 points)
Matrix Max Index	ez_mmaxi_f	2,150 cycles (1024 points)
Matrix Max Magnitude	ez_mmaxm_f	835 cycles (1024 points)
Matrix Max Magnitude with index	ez_mmaxmi_f	2,152 cycles (1024 points)
Matrix Max Min Magnitude	ez_mmaxminm_f	1,352 cycles (1024 points)
Matrix Min	ez_mmin_f	571 cycles (1024 points)
Matrix Min Index	ez_mmini_f	2,149 cycles (1024 points)
Matrix Min Magnitude	ez_mminm_f	834 cycles (1024 points)
Matrix Min Magnitude with index	ez_mminmi_f	2,152 cycles (1024 points)

Probability Routines

Functionality	Routine Name	Cycles (array size)
Combination	ez_comb_f	35 cycles (1 points)
Factorial	ez_fact_f	32 cycles (1 points)
Mean Deviation	ez_meandev_f	1,102 cycles (1024 points)
	ez_meandev_sf	1,089 cycles (1024 points)
Mean Squared Error	ez_mse_f	1,094 cycles (1024 points)

Probability Routines cont...

Functionality	Routine Name	Cycles (array size)
Permutation	ez_perm_f	34 cycles (1 points)
Standard Deviation	ez_std_f	1,155 cycles (1024 points)
	ez_std_sf	1,108 cycles (1024 points)
Variance	ez_var_f	1,102 cycles (1024 points)
	ez_var_sf	1,081 cycles (1024 points)

Vector Scatter Routines

Functionality	Routine Name	Cycles (array size)
Vector Gather	ez_vgather_f	2,082 cycles (1024 points)
Vector Index	ez_vindex_f	2,071 cycles (1024 points)
Vector Scatter	ez_vscatter_f	88,114 cycles (1024 points)

Histogram Routines

Functionality	Routine Name	Cycles (array size)
Vector Histogram	ez_vhist_f	15,451 cycles (1024 points)

Intergration Routines

Functionality	Routine Name	Cycles (array size)
Vector Polynomial	ez_vpoly_f	1,128,515 cycles (1024 points)
Vector Ramp	ez_vramp_f	1,057 cycles (1024 points)
	ez_vramp_sf	1,057 cycles (1024 points)
Vector Simpsons Integrate	ez_vsimps_f	63,441 cycles (1024 points)
Vector Trapezoidal Integration	ez_vtrapz_f	2,335 cycles (1024 points)
	ez_vtrapz_sf	2,344 cycles (1024 points)

Interpolation Routines

Functionality	Routine Name	Cycles (array size)
Vector Linear Interpolation	ez_vlini_f	1,068 cycles (1024 points)

Linear Phase Routines

Functionality	Routine Name	Cycles (array size)
Linear Phase Table	ez_linphasetable_f	3,103 cycles (1024 points)
Magnitude Weighted Linear Phase	ez_mwlinphase_f	15,407 cycles (1024 points)

Convolution Routines

Functionality	Routine Name	Cycles (array size)
Real 2D Convolution	ez_r2dconv_f	2,670,083 cycles (1024 points)
Real 2D Convolution (3x3)	ez_r3x3conv_f	99,506 cycles (1024 points)
Real 2D Convolution (5x5)	ez_r5x5conv_f	324,181 cycles (1024 points)
Real Convolution	ez_rconv_f	654,410 cycles (1024 points)

Correlation Routines

Functionality	Routine Name	Cycles (array size)
Complex Auto-Correlation	ez_cautocorr_f	1,060,919 cycles (1024 points)
Complex Cross-Correlation	ez_ccrosscorr_f	1,060,921 cycles (1024 points)
Real 2D Cross-Correlation	ez_r2dcrosscorr_f	33,427 cycles (1024 points)
Real Auto-Correlation	ez_rautocorr_f	273,212 cycles (1024 points)
	ez_rautocorr_sf	4,307 cycles (1024 points)
Real Cross-Correlation	ez_rcrosscorr_f	273,215 cycles (1024 points)
	ez_rcrosscorr_sf	1,118,805 cycles (1024 points)

FIR Routines

Functionality	Routine Name	Cycles (array size)
Complex FIR Filter	ez_cfir_f	31,982 cycles (1024 points)
Complex FIR Filter with Decimation	ez_cfir_d_f	34,270 cycles (1024 points)
Decimating Complex FIR Filter with no delay	ez_cfir_dnd_f	31,624 cycles (1024 points)
Decimating Real FIR Filter with no delay	ez_rfir_dnd_f	10,685 cycles (1024 points)
Real FIR Filter	ez_rfir_f	9,378 cycles (1024 points)
Real FIR Filter with Decimation	ez_rfir_d_f	11,187 cycles (1024 points)
Real IIR Filter (Biquad)	ez_riir_f	4,145 cycles (1024 points)

Windowing Routines

Functionality	Routine Name	Cycles (array size)
Bartlett Window	ez_bartlett_f	2,878 cycles (1024 points)
Blackman Window	ez_blkman_f	3,133 cycles (1024 points)
Blackman-Harris Window	ez_blkmnh_f	3,133 cycles (1024 points)
Hamming Window	ez_hamm_f	3,133 cycles (1024 points)
Hanning window	ez_hann_f	2,098 cycles (1024 points)
Welch Window	ez_welch_f	1,744 cycles (1024 points)

Gridding Routines

Functionality	Routine Name	Cycles (array size)
Complex 1D Gridding	ez_c1dgrid_f	14,370 cycles (512 points)
Complex 1D Gridding (m=4)	ez_c1dgrid4m_f	6,191 cycles (512 points)
Complex 2D Gridding	ez_c2dgrid_f	47,651 cycles (512 points)
Complex 2D Gridding (m=4)	ez_c2dgrid4m_f	29,735 cycles (512 points)

Conversion Routines

Functionality	Routine Name	Cycles (array size)
Scalar Polar to Rectangular Conversion	ez_spol2rect.f	142 cycles (1 points)
Scalar Rectangular to Polar Conversion	ez_srect2pol.f	214 cycles (1 points)
Vector Decibel to Linear Amplitude Conversion	ez_vdb2lina.f	24,893 cycles (1024 points)
Vector Decibel to Linear Power Conversion	ez_vdb2linp.f	24,893 cycles (1024 points)
Vector Degrees to Radians Conversion	ez_vdeg2rad.f	547 cycles (1024 points)
Vector Linear Amplitude to Decibel Conversion	ez_vlina2db.f	32,039 cycles (1024 points)
Vector Linear Power to Decibel Conversion	ez_vlinp2db.f	32,039 cycles (1024 points)
Vector Polar to Rectangular Conversion	ez_vpol2rect.f	139,316 cycles (1024 points)
	ez_vpol2rect.sf	35,371 cycles (1024 points)
Vector Radians to Degrees Conversion	ez_vrad2deg.f	547 cycles (1024 points)
Vector Rectangular to Polar Conversion	ez_vrect2pol.f	40,326 cycles (1024 points)
	ez_vrect2pol.sf	40,124 cycles (1024 points)

Complex FFT

Functionality	Routine Name	Cycles (array size)
Complex (Radix-2) FFT	ez_c2afft.f	24,333 cycles (2048 points)
Complex (Radix-2) FFT	ez_c2fft.f	24,334 cycles (2048 points)
Complex (Radix-2) Inverse FFT	ez_ci2afft.f	25,861 cycles (2048 points)
Complex (Radix-2) Inverse FFT	ez_ci2fft.f	25,861 cycles (2048 points)
Complex (Radix-2) Two-Dimensional FFT	ez_c2fft2d.f	27,285 cycles (32 points)
Complex (Radix-2) Two-Dimensional FFT	ez_c2afft2d.f	27,297 cycles (32 points)
Complex (Radix-4) FFT	ez_c4afft.f	10,382 cycles (1024 points)
Complex (Radix-4) FFT	ez_c4fft.f	10,379 cycles (1024 points)
Complex (Radix-4) Inverse FFT	ez_ci4afft.f	11,146 cycles (1024 points)
Complex (Radix-4) Inverse FFT	ez_ci4fft.f	11,143 cycles (1024 points)

Complex FFT cont...

Functionality	Routine Name	Cycles (array size)
Complex (Radix-4) Two-Dimensional FFT	ez_c4fft2d_f	80,844 cycles (64 points)
Complex (Radix-4) Two-Dimensional FFT	ez_c4afft2d_f	80,844 cycles (64 points)
Complex FFT (128 point)	ez_cfft128_f	1,089 cycles (128 points)
Complex FFT (1k point)	ez_cfft1k_f	9,903 cycles (1024 points)
Complex FFT (256 point)	ez_cfft256_f	2,203 cycles (256 points)
Complex FFT (2k point)	ez_cfft2k_f	21,369 cycles (2048 points)
Complex FFT (4k point)	ez_cfft4k_f	46,275 cycles (4096 points)
Complex FFT (512 point)	ez_cfft512_f	4,613 cycles (512 points)
Complex FFT (8k point)	ez_cfft8k_f	99,924 cycles (8192 points)
Complex Inverse FFT (128 point)	ez_cifft128_f	1,591 cycles (128 points)
Complex Inverse FFT (1k point)	ez_cifft1k_f	13,092 cycles (1024 points)
Complex Inverse FFT (256 point)	ez_cifft256_f	3,092 cycles (256 points)
Complex Inverse FFT (2k point)	ez_cifft2k_f	27,631 cycles (2048 points)
Complex Inverse FFT (4k point)	ez_cifft4k_f	58,684 cycles (4096 points)
Complex Inverse FFT (512 point)	ez_cifft512_f	6,267 cycles (512 points)
Complex Inverse FFT (8k point)	ez_cifft8k_f	124,613 cycles (8192 points)

Real FFT

Functionality	Routine Name	Cycles (array size)
Real (Radix-2) FFT	ez_r2afft_f	5,239 cycles (512 points)
Real (Radix-2) FFT	ez_r2fft_f	23,296 cycles (2048 points)
Real (Radix-4) FFT	ez_r4afft_f	10,770 cycles (1024 points)
Real (Radix-4) FFT	ez_r4fft_f	10,241 cycles (1024 points)

FFT Operations

Functionality	Routine Name	Cycles (array size)
1/2 Complex Twiddle Factor Generation	ez_r2fftw_f	17,958 cycles (2048 points)
3/4 Complex Twiddle Factor Generation	ez_r4fftw_f	36,392 cycles (4096 points)
Complex Twiddle Factor Generation	ez_cfftw_f	395,355 cycles (4096 points)

DCT Routines

Functionality	Routine Name	Cycles (array size)
Real DCT (8x8)	ez_r8x8dct_f	7,447 cycles (64 points)

Z Transform

Functionality	Routine Name	Cycles (array size)
Chirped Z-Transform (Radix-2)	ez_c2chirpz_f	–
Chirped Z-Transform (Radix-4)	ez_c4chirpz_f	–
Initialise Chirped Z-Transform (Radix-2)	ez_ic2chirpz_f	–
Initialise Chirped Z-Transform (Radix-4)	ez_ic4chirpz_f	–

Coordinate Transform

Functionality	Routine Name	Cycles (array size)
Matrix Translate and Rotate 2D	ez_coord2d_f	5,524 cycles (1024 points)
Matrix Translate and Rotate 3D	ez_coord3d_f	11,323 cycles (1024 points)

Accumalating Spectrum Routines

Functionality	Routine Name	Cycles (array size)
Accumulated Auto-Spectrum	ez_aaspec.f	47,151 cycles (1024 points)
Accumulated Cross-Spectrum	ez_acspec.f	2,108 cycles (1024 points)

Random Number Routines

Functionality	Routine Name	Cycles (array size)
Initialise Random Number Generator	ez_irand.f	10,035 cycles (1 points)
Scalar Random number (normal)	ez_srandn.f	325 cycles (1 points)
Scalar Random number (uniform)	ez_srandu.f	162,969 cycles (1024 points)
Vector Random number (normal)	ez_vrandn.f	162,969 cycles (1024 points)
Vector Random number (uniform)	ez_vrandu.f	15,396 cycles (1024 points)

Move Routines

Functionality	Routine Name	Cycles (array size)
Complex Matrix Move	ez_cmmov.f	551 cycles (1024 points)
Complex Vector Move	ez_cvmov.f	546 cycles (1024 points)
	ez_cvmov_sf	1,061 cycles (1024 points)
Matrix Move	ez_mmov.f	297 cycles (1024 points)
Matrix Swap Columns	ez_mswapc.f	8,217 cycles (1024 points)
Matrix Swap Rows	ez_mswapr.f	7,203 cycles (1024 points)
Vector Move	ez_vmov.f	297 cycles (1024 points)
	ez_vmov_sf	1,060 cycles (1024 points)

Misc. Routines

Functionality	Routine Name	Cycles (array size)
Doppler Signal	ez_doppler_f	9,902 cycles (1024 points)
Library Copyright	ez_copyright_f	–
Library Version	ez_version_f	–
Monopulse	ez_monopulse_f	6,092 cycles (1024 points)
Signal-Noise Density	ez_signal2noise_f	1,137 cycles (1024 points)