

## GoFast® for ColdFire and CodeWarrior C/C++ Compiler

### **Features**

- Fast
- Reentrant
- ROMable
- Conforms to IEEE 754
- “Link and Go” compiler support for CodeWarrior
- Includes complete source, test programs, project files, and startup code

### **Description**

GoFast® for ColdFire was carefully designed for high performance operation in embedded applications and ease of use including “link and go” compatibility with the CodeWarrior C/C++ compiler. GoFast provides ROMable, reentrant IEEE and ANSI compatible ColdFire floating point support. It boosts the performance of an application’s math calculations or eliminates the need for a hardware floating-point coprocessor, in order to reduce product manufacturing cost. It is delivered with full assembly source code.

Note: This version of GoFast uses the ColdFire DIV instruction, which first appeared on the 5206e. Please contact us if you are using an older ColdFire.

### **Functionality**

GoFast ColdFire offers the following reentrant floating point routines, for both single and double precision:

- intrinsic basic operations + - \* /
- intrinsic conversions
- sqrt
- sin, cos, tan
- asin, acos, atan, atan2
- sinh, cosh, atanh
- log, log10, exp, pow
- floor, ceil, fabs
- modf, fmod, frexp, ldexp

### **Floating Point Technology**

GoFast is based on “Architecture Independent Technology” (AIT) and proven floating point algorithms that were developed for over a decade. The algorithms have been thoroughly tested using automated methods.

### **Conformance and Testing**

The accuracy of each GoFast Floating Point Library is within one (least significant) bit for arithmetic functions and two bits for transcendental functions, in most cases. The IEEE 754 Floating Point Format defines special representations for underflow, overflow, and invalid operation. The GoFast routines use these formats and adhere to the IEEE 754 error handling procedures in all applicable cases. Quality

assurance and testing procedures have assured proper product operation. In addition, each delivery includes target specific test programs assuring confidence of product operation.

## **Timings**

The following table gives the times for all floating point operations, for GoFast and the CodeWarrior floating point library. The times, in microseconds, were measured using the indicated processor and evaluation board. The basic operations (add, subtract, multiply, divide, conversions, and comparisons) in the CodeWarrior C library are hand-coded and have comparable speed to GoFast. Some are faster, so the CodeWarrior versions are used instead. (If you only need these basic operations, you don't need GoFast.) Thus, the routines linked are a mixture of both libraries, as indicated in **bold** below. GoFast provides the greatest benefit for the more complex operations, typically offering a 4 times performance boost, and much higher for some.

## Microsecond Timings

### M5275EVB, 150MHz, External SDRAM

Function	Double-Precision		Single-Precision	
	GoFast	CW	GoFast	CW
add	14.54	12.50	8.81	8.91
subtract	15.42	12.35	9.27	9.41
multiply	18.16	19.29	9.29	10.74
divide	28.3	20.61	13.75	10.36
sqrt	49.30	148.52	26.95	158.78
exp	92.48	357.79	21.93	376.37
log	110.17	383.32	36.56	406.54
log10	116.96	469.26	38.21	477.85
pow	206.19	1257.25	61.17	1321.70
sin	68.98	366.36	22.38	375.83
cos	69.02	374.61	22.16	383.00
tan	116.54	662.16	29.97	656.48
asin	143.08	494.11	55.67	501.04
acos	160.84	439.00	61.81	448.61
atan	91.73	423.69	31.03	423.63
atan2	112.69	486.46	39.69	506.11
sinh	112.08	565.64	31.73	592.64
cosh	110.15	406.27	29.29	431.53
tanh	110.33	546.20	36.16	575.13
modf	16.50	17.26	10.20	28.78
fmod	34.95	109.36	29.43	121.83
fabs	4.58	3.18	3.44	11.90
floor	7.08	22.36	5.44	29.71
ceil	7.18	22.21	5.46	29.62
ldexp	7.19	18.08	5.76	24.13
frexp	6.14	6.84	5.06	15.89
cmp	7.78	7.12	5.67	4.66
feq/gt/lt...	7.57	6.91	5.63	4.64
fp to long	5.59	5.24	4.75	3.82
fp to ulong	5.61	4.46	4.59	3.05
long to fp	6.73	4.95	5.86	5.47
ulong to fp	9.00	6.77	7.78	6.88
fp to llong	7.13	941.82	6.36	883.37
fp to ullong	7.11	578.60	6.08	549.23
llong to fp	12.88	697.78	13.73	753.11
ullong to fp	13.69	722.47	12.15	676.72
sgl to dbl	6.00	4.00	–	–
dbl to sgl	6.72	6.00	–	–

GoFast is a registered trademark of Lantronix Inc. ColdFire is a registered trademark of Freescale.  
s:\marketing\lit\datasheets\gofast\gofast\_coldfire.doc 10/17/08