GoFast® for SH Series

Features

- Fast
- Reentrant
- ROMable
- Conforms to IEEE 754
- Includes single and double precision
- "Link and Go" compiler support for GNU C and Hitachi
- Includes test programs and make files

Description

GOFAST® for SH1, SH2 and SH3 was carefully designed for high performance operation and ease of use including "link and go" compatibility with SH7000 specific C compilers. GOFAST provides full IEEE and ANSI compatible floating point support for the Hitachi SH Series architectures.

Floating Point Technology

Technology" (AIT) and proven floating point algorithms the company has been developing for over decade. The algorithms have been thoroughly tested using automated methods. GOFAST was specifically optimized and integrated for enhanced performance on SH Series C processors.

GOFAST libraries are designed for "link and go" operation with each compiler. These libraries provide the user with a significant speed advantage when no floating point coprocessor hardware is available. This is of particular significance in real-time embedded systems.

Compiler Support

GOFAST for SH Series includes drop-in libraries for "link and go", seamless operation with the SH Series C compilers. GNU compiler support is available for SH1, SH2, and SH3 while Hitachi compiler support is available for SH3 only.

The GOFAST routines directly replace the compiler's floating point runtime library routines. In addition, routines normally not supported by the compiler are available with GOFAST

Performance

GOFAST delivers the optimized performance you expect with an SH2 library and

processor. The following timings were measured using an E7000 emulator at 6.144 MHz, with data and instruction cache enabled.

Microsecond Timings

Function	Double	Single
add	57.3	36.0
subtract	61.5	38.3
multiply	62.0	33.9
divide	84.5	44.6
sqrt	225.1	76.2
exp	314.7	75.7
log	380.2	91.1
log10	390.8	94.3
sin	273.5	66.6
cos	272.0	65.3
tan	373.0	77.5
asin	520.6	195.4
acos	586.0	216.0
atan	341.9	109.4
atan2	400.2	139.7
pow	577.6	179.7

The following table gives the timing of some floating-point operations in microseconds. The times were measured using the 7708 processor, 15 MHz board and 60MHz CPU.

Microsecond Timings

FUNCTION	GNU C with GOFAST		GNU C with Original Library		Hitachi C with GOFAST		Hitachi C with Original Library	
	DOUBLE	SINGLE	DOUBLE	SINGLE	DOUBLE	SINGLE	DOUBLE	SINGLE
Add	18.2	12.7	54.8	36.4	17.5	10.8	19.6	10.6
Subtract	20.8	13.9	60.8	39.6	19.8	12.4	23.1	10.9
Multiply	18.6	11.2	170.2	60.2	17.9	9.7	26.1	9.9
Divide	29.8	16.6	158.7	63.4	29.7	15.4	79.9	13.8
Sqrt	45.7	27.3	240.9	120.6	44.7	25.9	167.5	57.5
Exp	73.2	19.3	2126.8	984.6	65.4	18.1	642.5	310.4
Log	97.7	27.6	3159.9	1358.8	88.0	26.4	563.9	270.5
Log10	101.0	28.6	3508.0	1535.7	94.7	27.4	588.1	286.0
Sin	70.8	19.4	1723.7	714.1	62.0	18.1	359.2	169.3
Cos	65.3	19.6	2152.9	950.0	58.0	18.4	335.3	157.1
Tan	91.0	25.9	3654.6	1538.3	83.8	24.7	476.6	212.5
Asin	113.3	58.1	3931.7	1765.6	106.1	57.1	912.5	385.6
Acos	107.3	66.4	3623.0	1569.7	98.6	65.6	934.5	401.5
Atan	95.7	29.7	3593.8	1589.7	88.1	28.8	560.6	234.4
Atan2	118.9	39.7	3871.3	1737.0	113.5	38.1	685.2	265.5
pow	153.0	50.2	10172.7	4498.1	146.1	48.8	1268.4	605.1