



**NAS** Software Limited

*Wynberg House, 1 Prospect Road, Prenton, CH42 8LE. UK*

Tel: +44 151 609 1911

Fax: +44 151 608 2796

# **MIPS VSIPL Core Lite Performance Figures**

**9th December 2005**

## Contents

<b>1</b>	<b>Introduction</b>	<b>1</b>
<b>2</b>	<b>Serial Library Performance Figures</b>	<b>2</b>
<b>3</b>	<b>Multiprocessor Library Performance Figures</b>	<b>8</b>

## 1 Introduction

This report documents the performance of the NAS MIPS64 serial and multiprocessor VSIPL libraries as at the date shown. The tables should be interpreted as follows:

### Numeric entries:

Performance is given in microseconds, on an 800MHz processor. Please note that these times may not scale exactly for processors of differing speeds: memory performance may be significant as well as processor cycle times

### Stride and Alignment:

Times are given for normal, unaligned, and strided data. These use the notation:

- N = Normal, aligned, stride of 1
- U = Unaligned, offset of 1, stride of 1
- S = Strided, stride of 5

### Arguments:

The following notation is used.

**Signal Processing Routines:**  $x$  is the input argument,  $y$  the output argument.

**Other routines:**  $R$  is the result;  $A$  and (if appropriate)  $B$  are input arguments.

### Precision:

All routines are single precision.

### Library Coverage:

The libraries implement the VSIPL Core Lite standard, with a few additional routines. Only vector computational routines are included in this performance summary.

### Platform:

The performance figures were obtained on an 800MHz MIPS64 board with two BCM1250 Pass 17 dual-core processors. The board has 2x128MB DDR SDRAM PC2100 (266MHz) ECC DIMMs; the operating system used was Linux, kernel version 2.4.21-sb20030722-2 - that is, with modifications by Broadcom for the SiByte processor. The serial library utilises two cores. Timings for the multiprocessor library were obtained using four cores (two processors).

## 2 Serial Library Performance Figures

*Mhz* 800

### FFT Routines

#### vsip\_ccfftop\_f:

Type/n:	256	512	1024	2048	4096
x=N y=N :	6.02	12.99	38.02	97.02	245.76
x=U y=U :	8.99	20.99	46.98	115.97	274.94
x=S y=S :	17.98	44.99	98.94	220.93	849.92
x=T y=T :	14.02	33.98	83.97	237.06	542.72

#### vsip\_rcfftop\_f:

Type/n:	256	512	1024	2048	4096
x=N y=N :	6.02	12.03	24.96	60.93	155.14
x=U y=U :	7.01	14.98	32.00	71.94	161.79
x=S y=S :	10.02	25.02	75.01	143.87	318.98
x=T y=T :	10.02	22.98	49.02	108.03	258.05

#### vsip\_crfftop\_f:

Type/n:	256	512	1024	2048	4096
x=N y=N :	4.99	11.01	23.04	57.09	151.04
x=U y=U :	7.01	14.02	29.95	71.94	176.13
x=S y=S :	10.02	25.02	57.98	147.97	360.96
x=T y=T :	10.02	20.99	48.00	105.98	282.11

### FIR Filter Routines

#### vsip\_firflt\_f:

Type/n:	256	512	1024	2048	4096
x=N y=N :	31.01	65.92	142.08	350.72	1075.20
x=U y=U :	30.02	67.20	143.36	353.28	911.36
x=S y=S :	42.88	92.16	194.56	486.40	1536.00
x=T y=T :	37.12	83.20	172.80	422.40	1223.68

vsip_cfirfft.f:					
Type/n:	256	512	1024	2048	4096
x=N y=N :	35.84	92.16	229.12	588.80	2083.84
x=U y=U :	39.04	97.92	331.52	704.00	1945.60
x=S y=S :	61.12	142.72	386.56	1006.08	3230.72
x=T y=T :	60.16	126.72	320.00	701.44	2544.64

## Vector Routines

vsip_vcos.f:					
Type/n:	256	512	1024	2048	4096
A=N R=N :	8.99	17.98	35.97	70.91	142.85
A=U R=U :	10.02	19.01	36.99	71.94	142.85
A=S R=S :	10.02	22.02	51.97	108.03	222.21
A=T R=T :	10.02	20.03	40.96	89.09	185.86
vsip_vsin.f:					
Type/n:	256	512	1024	2048	4096
A=N R=N :	10.02	19.01	38.02	75.01	150.02
A=U R=U :	11.01	20.03	39.04	76.03	151.04
A=S R=S :	11.01	20.99	55.04	112.90	224.77
A=T R=T :	10.02	20.99	45.06	94.98	192.00
vsip_vexp.f:					
Type/n:	256	512	1024	2048	4096
A=N R=N :	24.99	49.02	98.05	196.10	392.19
A=U R=U :	24.99	49.98	98.94	196.10	393.22
A=S R=S :	25.98	51.97	115.97	235.01	468.99
A=T R=T :	25.98	51.01	103.04	215.04	436.22
vsip_vlog.f:					
Type/n:	256	512	1024	2048	4096
A=N R=N :	20.00	40.00	81.02	162.05	326.14
A=U R=U :	20.99	41.02	81.02	162.05	326.14
A=S R=S :	22.02	46.98	99.97	206.08	412.16
A=T R=T :	22.02	44.03	88.06	182.02	377.86
vsip_vlog10.f:					
Type/n:	256	512	1024	2048	4096
A=N R=N :	20.00	40.00	80.00	158.98	317.95
A=U R=U :	20.99	41.02	81.02	160.00	318.98
A=S R=S :	22.02	46.02	102.02	203.01	431.10
A=T R=T :	22.02	44.03	88.06	182.02	373.25
vsip_vatan.f:					
Type/n:	256	512	1024	2048	4096
A=N R=N :	6.02	12.03	23.04	46.08	91.14
A=U R=U :	7.01	12.03	24.06	46.08	92.16
A=S R=S :	7.01	14.98	40.96	86.02	172.03
A=T R=T :	7.01	14.98	30.98	69.12	141.82

2 SERIAL LIBRARY PERFORMANCE FIGURES

vsip_vatan2.f:					
Type/n:	256	512	1024	2048	4096
A=N B=N R=N :	12.00	24.00	48.00	99.07	196.10
A=U B=U R=U :	12.99	25.02	49.02	99.07	197.12
A=S B=S R=S :	16.99	43.01	91.01	180.99	386.05
A=T B=T R=T :	16.00	30.98	62.98	151.04	305.15
vsip_vsqrt.f:					
Type/n:	256	512	1024	2048	4096
A=N R=N :	2.00	4.00	8.00	16.00	32.00
A=U R=U :	2.00	4.00	8.00	16.00	32.00
A=S R=S :	4.00	9.98	24.06	56.06	112.13
A=T R=T :	4.00	6.98	14.98	37.89	81.92
vsip_vsumval.f:					
Type/n:	256	512	1024	2048	4096
A=N :	1.00	1.00	2.00	3.99	7.01
A=U :	1.00	1.00	2.00	4.99	9.01
A=S :	1.00	2.00	13.06	30.98	73.22
A=T :	1.00	2.00	5.00	11.01	37.02
vsip_vsumsqval.f:					
Type/n:	256	512	1024	2048	4096
A=N :	1.00	1.00	2.00	3.99	7.01
A=U :	1.00	1.00	2.00	4.99	9.01
A=S :	1.00	2.00	6.00	37.12	73.22
A=T :	1.00	2.00	5.00	9.01	35.02
vsip_vadd.f:					
Type/n:	256	512	1024	2048	4096
A=N B=N R=N :	1.00	3.00	5.00	11.01	20.99
A=U B=U R=U :	1.00	3.00	5.00	11.01	20.99
A=S B=S R=S :	4.00	19.01	40.96	80.90	162.82
A=T B=T R=T :	4.00	8.00	19.97	50.94	120.83
vsip_cvadd.f:					
Type/n:	256	512	1024	2048	4096
A=N B=N R=N :	3.00	5.00	10.00	19.99	39.01
A=U B=U R=U :	3.00	5.00	10.00	20.99	39.01
A=S B=S R=S :	16.00	38.98	77.06	154.88	675.84
A=T B=T R=T :	4.99	16.00	50.94	108.03	217.09
vsip_svadd.f:					
Type/n:	256	512	1024	2048	4096
B=N R=N :	1.00	2.00	3.00	5.99	11.98
B=U R=U :	1.00	2.00	3.00	5.99	13.00
B=S R=S :	3.00	6.00	25.98	51.97	103.94
B=T R=T :	3.00	6.00	13.06	30.98	74.75
vsip_cvjdot.f:					
Type/n:	256	512	1024	2048	4096
A=N B=N :	2.00	4.00	8.00	16.00	33.02

## 2 SERIAL LIBRARY PERFORMANCE FIGURES

A=U B=U :	4.00	6.98	16.00	26.11	51.00
A=S B=S :	11.01	28.03	65.02	131.07	403.97
A=T B=T :	3.00	6.98	29.06	75.01	150.02
vsip_vdiv.f:					
Type/n:	256	512	1024	2048	4096
A=N B=N R=N :	2.00	4.00	7.00	14.00	28.98
A=U B=U R=U :	2.00	4.00	7.00	14.00	28.98
A=S B=S R=S :	4.00	14.98	44.03	87.04	181.25
A=T B=T R=T :	4.00	6.98	16.00	56.06	116.22
vsip_svdiv.f:					
Type/n:	256	512	1024	2048	4096
B=N R=N :	2.00	3.00	6.00	12.01	24.99
B=U R=U :	2.00	3.00	6.00	13.00	24.99
B=S R=S :	3.00	8.00	24.96	51.97	102.91
B=T R=T :	3.00	6.00	12.01	30.98	74.24
vsip_vdot.f:					
Type/n:	256	512	1024	2048	4096
A=N B=N :	1.00	1.00	3.00	4.99	11.01
A=U B=U :	1.00	2.00	3.99	6.99	13.98
A=S B=S :	2.00	6.00	28.03	70.91	141.82
A=T B=T :	2.00	4.00	9.00	34.05	88.06
vsip_vmul.f:					
Type/n:	256	512	1024	2048	4096
A=N B=N R=N :	1.00	3.00	5.00	10.01	20.99
A=U B=U R=U :	1.00	3.00	5.00	10.01	22.02
A=S B=S R=S :	4.00	12.99	40.96	81.92	208.90
A=T B=T R=T :	4.00	6.98	23.04	50.94	120.83
vsip_cvmul.f:					
Type/n:	256	512	1024	2048	4096
A=N B=N R=N :	3.00	5.00	11.00	20.99	41.98
A=U B=U R=U :	3.00	5.00	12.01	21.99	43.01
A=S B=S R=S :	16.00	41.98	82.94	167.94	742.40
A=T B=T R=T :	7.01	17.98	57.98	115.97	259.07
vsip_svmul.f:					
Type/n:	256	512	1024	2048	4096
B=N R=N :	1.00	2.00	3.00	5.99	13.00
B=U R=U :	1.00	2.00	3.00	5.99	13.00
B=S R=S :	3.00	6.98	24.06	51.97	103.94
B=T R=T :	3.00	6.00	12.01	34.05	74.75
vsip_csvmul.f:					
Type/n:	256	512	1024	2048	4096
B=N R=N :	2.00	3.00	6.00	12.01	24.01
B=U R=U :	2.00	3.00	6.00	14.00	24.01
B=S R=S :	10.02	22.98	51.97	125.95	267.78
B=T R=T :	4.99	11.01	29.95	81.92	163.84

2 SERIAL LIBRARY PERFORMANCE FIGURES

vsip_vsub.f:					
Type/n:	256	512	1024	2048	4096
A=N B=N R=N :	1.00	3.00	5.00	10.01	20.99
A=U B=U R=U :	1.00	3.00	5.00	10.01	20.99
A=S B=S R=S :	4.99	14.98	36.99	81.92	168.96
A=T B=T R=T :	4.00	6.98	19.97	56.06	120.83
vsip_cvsub.f:					
Type/n:	256	512	1024	2048	4096
A=N B=N R=N :	3.00	5.00	12.01	19.99	39.01
A=U B=U R=U :	3.00	5.00	13.06	19.99	39.01
A=S B=S R=S :	16.99	38.98	77.06	193.02	634.88
A=T B=T R=T :	4.99	12.03	48.00	108.03	217.09
vsip_vmax.f:					
Type/n:	256	512	1024	2048	4096
A=N B=N R=N :	2.00	3.00	6.00	12.01	24.01
A=U B=U R=U :	2.00	3.00	6.00	12.01	24.01
A=S B=S R=S :	4.00	12.99	41.98	86.02	202.24
A=T B=T R=T :	4.00	8.00	18.05	48.90	112.13
vsip_vmaxval.f:					
Type/n:	256	512	1024	2048	4096
A=N :	4.00	8.00	17.02	34.05	68.10
A=U :	4.00	8.00	17.02	34.05	68.10
A=S :	4.00	8.00	23.04	61.95	138.75
A=T :	4.00	8.00	17.02	35.07	88.06
vsip_vmin.f:					
Type/n:	256	512	1024	2048	4096
A=N B=N R=N :	2.00	3.00	6.00	12.01	24.01
A=U B=U R=U :	2.00	3.00	6.00	12.01	24.01
A=S B=S R=S :	4.00	17.02	41.98	83.97	209.92
A=T B=T R=T :	4.00	8.00	22.02	58.11	113.15
vsip_vminval.f:					
Type/n:	256	512	1024	2048	4096
A=N :	4.00	8.00	17.02	33.02	67.07
A=U :	4.00	9.02	17.02	33.02	67.07
A=S :	4.00	9.02	18.05	69.12	138.75
A=T :	4.00	8.00	17.02	33.02	79.87
vsip_vfill.f:					
Type/n:	256	512	1024	2048	4096
R=N :	1.00	1.00	2.00	3.00	7.01
R=U :	1.00	1.00	2.00	3.00	7.01
R=S :	2.00	3.00	6.00	12.01	24.99
R=T :	2.00	3.00	6.00	12.01	22.99
vsip_vramp.f:					
Type/n:	256	512	1024	2048	4096
R=N :	1.00	2.00	3.99	6.99	13.98

## 2 SERIAL LIBRARY PERFORMANCE FIGURES

---

R=U :	1.00	2.00	3.99	6.99	13.98
R=S :	3.00	6.00	11.00	21.99	43.98
R=T :	3.00	6.00	11.00	21.99	43.98
Other Routines					
vsip_vhisto.f:					
Type/n:	256	512	1024	2048	4096
A=N R=N :	16.00	17.98	54.02	120.06	182.78
A=U R=U :	7.01	28.99	33.02	56.06	226.82
A=S R=S :	10.02	30.02	44.03	113.92	245.76
A=T R=T :	12.99	16.00	50.94	114.94	132.10
vsip_vrandu.f:					
Type/n:	256	512	1024	2048	4096
R=N :	8.99	17.02	34.94	69.12	138.24
R=U :	8.99	17.02	34.94	69.12	138.24
R=S :	8.99	17.02	34.94	71.94	144.90
R=T :	8.99	17.02	34.94	69.12	138.75



### 3 Multiprocessor Library Performance Figures

small

Mhz                    800  
FFT Routines

vsip\_ccfftop\_f:

Type/n:	256	512	1024	2048	4096
x=N y=N :	7.01	12.99	40.06	88.06	182.78
x=U y=U :	8.99	19.01	54.02	108.03	216.06
x=S y=S :	20.99	44.99	78.98	192.00	624.64
x=T y=T :	15.01	35.97	67.97	151.04	392.19

vsip\_rcfftop\_f:

Type/n:	256	512	1024	2048	4096
x=N y=N :	6.02	12.03	24.96	62.98	154.11
x=U y=U :	8.00	16.00	39.04	80.13	171.01
x=S y=S :	12.00	28.99	51.97	111.10	261.12
x=T y=T :	11.01	22.02	50.94	100.10	211.97

vsip\_crfftop\_f:

Type/n:	256	512	1024	2048	4096
x=N y=N :	6.02	12.03	25.98	57.09	148.99
x=U y=U :	7.01	16.00	34.94	75.01	172.03
x=S y=S :	12.00	27.01	59.01	112.90	276.99
x=T y=T :	11.01	22.98	49.02	99.07	211.97

FIR Filter Routines

vsip\_firflt\_f:

Type/n:	256	512	1024	2048	4096
x=N y=N :	32.96	67.84	162.56	360.96	824.32
x=U y=U :	32.96	67.84	162.56	353.28	870.40

### 3 MULTIPROCESSOR LIBRARY PERFORMANCE FIGURES

x=S y=S :	44.16	92.80	190.72	473.60	1223.68
x=T y=T :	40.96	83.84	183.04	391.68	1003.52

vsip\_cfirflt.f:

Type/n:	256	512	1024	2048	4096
x=N y=N :	38.08	101.76	220.16	424.96	1203.20
x=U y=U :	39.04	99.20	217.60	432.64	1172.48
x=S y=S :	62.08	151.04	285.44	619.52	2094.08
x=T y=T :	48.96	138.88	249.60	570.88	1479.68

Vector Routines

vsip\_vcos.f:

Type/n:	256	512	1024	2048	4096
A=N R=N :	8.99	17.98	20.99	37.89	74.75
A=U R=U :	10.02	19.01	22.02	39.94	75.78
A=S R=S :	10.02	25.02	28.03	57.09	114.18
A=T R=T :	10.02	20.03	24.06	44.03	93.18

vsip\_vsin.f:

Type/n:	256	512	1024	2048	4096
A=N R=N :	10.02	19.01	20.99	39.94	76.80
A=U R=U :	11.01	20.03	23.04	40.96	78.85
A=S R=S :	11.01	22.02	25.98	58.11	118.78
A=T R=T :	11.01	20.99	24.06	45.06	95.23

vsip\_vexp.f:

Type/n:	256	512	1024	2048	4096
A=N R=N :	24.99	49.02	51.97	101.12	198.14
A=U R=U :	25.98	49.98	52.99	101.12	199.17
A=S R=S :	27.01	52.99	59.01	121.09	261.12
A=T R=T :	25.98	51.97	55.04	109.06	220.16

vsip\_vlog.f:

Type/n:	256	512	1024	2048	4096
A=N R=N :	20.00	41.02	43.01	82.94	163.84
A=U R=U :	20.99	41.02	44.03	83.97	164.86
A=S R=S :	23.01	49.98	50.94	105.98	214.02
A=T R=T :	22.02	44.03	46.98	91.90	189.95

vsip\_vlog10.f:

Type/n:	256	512	1024	2048	4096
---------	-----	-----	------	------	------

3 MULTIPROCESSOR LIBRARY PERFORMANCE FIGURES

A=N R=N :	20.00	40.00	43.01	81.92	160.77
A=U R=U :	20.99	41.02	43.01	83.97	162.82
A=S R=S :	23.01	44.99	50.05	103.94	209.92
A=T R=T :	22.02	44.03	48.00	90.88	187.90
vsip_vatan.f:					
Type/n:	256	512	1024	2048	4096
A=N R=N :	6.02	12.03	13.95	25.01	48.03
A=U R=U :	7.01	12.03	14.98	26.11	49.00
A=S R=S :	8.00	16.00	20.99	47.10	93.18
A=T R=T :	8.00	14.98	18.05	33.02	71.17
vsip_vatan2.f:					
Type/n:	256	512	1024	2048	4096
A=N B=N R=N :	12.00	24.00	27.01	50.94	100.86
A=U B=U R=U :	12.99	25.02	27.01	51.97	101.89
A=S B=S R=S :	16.00	41.02	44.03	93.95	224.26
A=T B=T R=T :	16.00	30.98	34.05	70.91	159.23
vsip_vsqr.f:					
Type/n:	256	512	1024	2048	4096
A=N R=N :	2.00	4.00	6.00	11.01	19.00
A=U R=U :	3.00	4.00	7.00	11.01	19.00
A=S R=S :	4.00	8.00	13.06	32.00	60.93
A=T R=T :	4.00	6.98	10.00	18.00	41.98
vsip_vsumval.f:					
Type/n:	256	512	1024	2048	4096
A=N :	1.00	1.00	3.00	3.99	5.99
A=U :	1.00	2.00	3.99	4.99	7.01
A=S :	1.00	3.00	7.00	11.01	37.99
A=T :	1.00	3.00	5.00	9.01	13.98
vsip_vsumsqval.f:					
Type/n:	256	512	1024	2048	4096
A=N :	1.00	1.00	3.00	3.99	5.99
A=U :	1.00	2.00	3.99	4.99	7.01
A=S :	1.00	3.00	7.00	12.01	37.99
A=T :	1.00	3.00	5.00	7.99	13.98
vsip_vadd.f:					
Type/n:	256	512	1024	2048	4096
A=N B=N R=N :	2.00	3.00	5.00	5.99	13.00
A=U B=U R=U :	2.00	3.00	3.99	6.99	13.00
A=S B=S R=S :	4.00	12.99	17.02	44.03	115.20
A=T B=T R=T :	4.00	6.98	11.00	30.98	62.98

vsip_cvadd.f:					
Type/n:	256	512	1024	2048	4096
A=N B=N R=N :	3.00	5.00	8.00	12.01	22.02
A=U B=U R=U :	3.00	5.00	8.00	13.00	22.99
A=S B=S R=S :	12.00	38.98	44.03	92.93	361.98
A=T B=T R=T :	4.99	14.98	24.06	55.04	112.13
vsip_svadd.f:					
Type/n:	256	512	1024	2048	4096
B=N R=N :	1.00	2.00	3.99	4.99	9.01
B=U R=U :	1.00	2.00	3.99	5.99	9.01
B=S R=S :	3.00	6.00	12.01	26.88	55.81
B=T R=T :	3.00	6.00	9.00	18.00	33.02
vsip_cvjdot.f:					
Type/n:	256	512	1024	2048	4096
A=N B=N :	2.00	4.00	7.00	11.01	19.00
A=U B=U :	4.00	6.98	8.00	16.00	28.98
A=S B=S :	4.99	32.00	33.02	77.06	245.25
A=T B=T :	3.00	6.98	13.95	34.05	82.94
vsip_vdiv.f:					
Type/n:	256	512	1024	2048	4096
A=N B=N R=N :	2.00	4.00	6.00	9.01	17.00
A=U B=U R=U :	2.00	4.00	6.00	10.01	17.00
A=S B=S R=S :	4.99	14.02	19.97	46.08	117.76
A=T B=T R=T :	4.00	9.02	11.00	24.01	60.93
vsip_svdiv.f:					
Type/n:	256	512	1024	2048	4096
B=N R=N :	2.00	3.00	6.00	9.01	15.00
B=U R=U :	2.00	4.00	6.00	9.01	15.00
B=S R=S :	3.00	11.01	13.06	26.88	73.22
B=T R=T :	3.00	6.00	9.00	19.99	41.01
vsip_vdot.f:					
Type/n:	256	512	1024	2048	4096
A=N B=N :	1.00	2.00	3.99	4.99	7.99
A=U B=U :	1.00	2.00	3.99	5.99	9.01
A=S B=S :	2.00	5.00	12.01	37.12	76.80
A=T B=T :	2.00	4.00	6.00	14.00	37.02
vsip_vmul.f:					
Type/n:	256	512	1024	2048	4096
A=N B=N R=N :	1.00	3.00	5.00	6.99	13.00
A=U B=U R=U :	2.00	3.00	5.00	7.99	13.98

3 MULTIPROCESSOR LIBRARY PERFORMANCE FIGURES

A=S B=S R=S :	4.00	14.02	18.94	44.03	93.18
A=T B=T R=T :	4.00	6.98	12.01	27.90	61.95
vsip_cvmul.f:					
Type/n:	256	512	1024	2048	4096
A=N B=N R=N :	3.00	5.00	8.00	14.00	24.01
A=U B=U R=U :	3.00	5.00	8.00	13.00	24.99
A=S B=S R=S :	14.02	41.98	45.06	126.98	439.81
A=T B=T R=T :	6.02	16.00	20.99	54.02	117.76
vsip_svmul.f:					
Type/n:	256	512	1024	2048	4096
B=N R=N :	1.00	2.00	3.99	5.99	7.99
B=U R=U :	1.00	2.00	3.99	4.99	9.01
B=S R=S :	3.00	9.98	13.95	29.95	55.81
B=T R=T :	3.00	6.00	9.00	16.00	37.99
vsip_csvmul.f:					
Type/n:	256	512	1024	2048	4096
B=N R=N :	2.00	3.00	6.00	7.99	15.00
B=U R=U :	2.00	3.00	5.00	9.01	15.97
B=S R=S :	11.01	24.00	28.03	57.09	151.04
B=T R=T :	6.02	12.03	18.05	35.07	74.24
vsip_vsub.f:					
Type/n:	256	512	1024	2048	4096
A=N B=N R=N :	1.00	3.00	5.00	6.99	13.00
A=U B=U R=U :	2.00	3.00	3.99	6.99	13.98
A=S B=S R=S :	4.00	14.02	18.94	44.03	107.01
A=T B=T R=T :	4.00	6.98	10.00	25.01	60.93
vsip_cvsub.f:					
Type/n:	256	512	1024	2048	4096
A=N B=N R=N :	3.00	5.00	8.00	13.00	22.99
A=U B=U R=U :	3.00	5.00	8.00	13.00	24.01
A=S B=S R=S :	12.00	38.98	43.01	103.94	373.76
A=T B=T R=T :	4.99	12.03	24.06	49.92	114.18
vsip_vmax.f:					
Type/n:	256	512	1024	2048	4096
A=N B=N R=N :	2.00	3.00	6.00	7.99	15.00
A=U B=U R=U :	2.00	3.00	5.00	7.99	15.00
A=S B=S R=S :	4.99	14.98	18.94	46.08	104.96
A=T B=T R=T :	4.00	9.02	12.01	22.99	59.90
vsip_vmaxval.f:					
Type/n:	256	512	1024	2048	4096

### 3 MULTIPROCESSOR LIBRARY PERFORMANCE FIGURES

---

A=N :	4.00	9.02	11.00	19.00	37.02
A=U :	4.00	9.02	11.00	19.99	37.02
A=S :	4.00	9.02	12.01	24.01	67.07
A=T :	4.00	9.02	11.00	19.99	39.01
vsip_vmin.f:					
Type/n:	256	512	1024	2048	4096
A=N B=N R=N :	2.00	3.00	5.00	7.99	13.98
A=U B=U R=U :	2.00	3.00	5.00	7.99	15.00
A=S B=S R=S :	4.99	14.02	19.97	46.08	96.26
A=T B=T R=T :	4.99	9.02	13.06	25.01	58.88
vsip_vminval.f:					
Type/n:	256	512	1024	2048	4096
A=N :	4.00	9.02	11.00	19.00	35.99
A=U :	4.00	9.02	11.00	19.00	35.99
A=S :	4.00	9.02	12.01	26.11	66.05
A=T :	4.00	9.02	11.00	19.99	41.01
vsip_vfill.f:					
Type/n:	256	512	1024	2048	4096
R=N :	1.00	1.00	3.00	3.99	5.99
R=U :	1.00	1.00	3.00	3.99	5.99
R=S :	2.00	3.00	5.00	9.01	15.97
R=T :	2.00	3.00	5.00	7.99	13.98
vsip_vramp.f:					
Type/n:	256	512	1024	2048	4096
R=N :	1.00	2.00	3.99	5.99	9.98
R=U :	1.00	2.00	3.99	4.99	9.98
R=S :	3.00	6.00	8.00	14.00	24.99
R=T :	3.00	6.00	8.00	13.00	24.01
Other Routines					
vsip_vhisto.f:					
Type/n:	256	512	1024	2048	4096
A=N R=N :	16.00	17.98	34.05	62.98	154.11
A=U R=U :	7.01	28.99	24.96	55.04	131.07
A=S R=S :	10.02	28.99	40.06	58.11	142.85
A=T R=T :	12.99	16.00	43.01	69.89	68.10
vsip_vrandu.f:					
Type/n:	256	512	1024	2048	4096
R=N :	8.99	17.02	34.94	69.12	138.75
R=U :	8.99	17.02	34.94	69.12	138.75

### 3 MULTIPROCESSOR LIBRARY PERFORMANCE FIGURES

---

R=S :	8.99	17.02	35.97	71.94	144.90
R=T :	8.99	17.02	34.94	69.89	138.75