Notes on using Analog Devices' DSP, audio, & video components from the Computer Products Division
Phone: (800) ANALOG-D or (781) 461-3881, FAX: (781) 461-3010, EMAIL: dsp.support@analog.com

SHARC Internal Power Consumption Measurements

Last Modified: 6/6/96

There have been many customer inquiries concerning typical power consumption of the SHARC processors. As you all know we only supply a maximum Pint which is based on experimentation. Iddin is measured while executing a radix-2 FFT butterfly with instruction in cache, one data fetch from each block of memory and a DMA transfer from internal memory to internal memory. A similar method of experimentation to try to determine "typical power".

The first issue was to determine what "typical" instructions would be so "typical" power can be determined. A guess was taken. The following is a description of the test cases:

Test Case 1 executes an addition, a subtraction, a PM data access and a DM data access.

Test Case 2 executes a multiplication, an addition, a PM data access and a DM data access.

Test case 3 executes a multiplication, an addition, a subtraction, a PM data access and a DM data access.

Test Case 4 executes a multiplication, an addition and a subtraction.

Test Case 5 executes an addition and a subtraction.

Test Case 6 executes a PM data access and a DM data access.

Test cases were selected assuming "typical" instructions would be associated with number crunching. A jump statement was used to sustain these instructions.

The experiments where performed on an ADSP 21062 rev 2.0 using 3 separate clock rates, 25MHz, 33 MHz, and 40 MHz. (A rev 0.6 part with a 24 MHz clock was also tested. The results were almost identical to those of the rev 2.0). Vddin was fixed at 5.25v. The following table describes the results:

Test Case	Iddin @ 24 MHz	Iddin @ 33 MHz	Iddin @ 40 MHz
1	380 mA	410 mA	470 mA
2	400 mA	440 mA	500 mA
3	400 mA	440 mA	510 mA
4	280 mA	330 mA	370 mA
5	280 mA	320 mA	360 mA
6a (50% Switching)	320 mA	380 mA	420 mA
6b (100% Switching)		390 mA	440 mA

The following is a copy of the program used.

```
#include "def21060.h"
#define N 22


.SEGMENT/DM     seg_dmda;
.VAR buffdm[4] =0x00000000,
                0x55555555,
                0xFFFFFFFF,
                0xAAAAAAAA;
.ENDSEG;


.SEGMENT/PM     seg_pmda;
.VAR buffpm[N] =0x4AA14B47,
                0x8DF675D4,
                0x43D49B8A,
                0xD14BA018,
                0x406E4387,
                0xCDE5483D,
                0x83C36DCA,
                0x113A7239,
                0x805D15C7,
                0x363B3B7C,
                0xC3B24032,
                0x799065C0,
                0x07076A2F,
                0x762A0DBC,
                0x03A1122C,
                0x72C3B5B9,
                0x28A1DB6F,
                0xB618E025,
                0x6BF705B2,
                0xF96E0A21,
                0x6890ADAF,
                0x1E6ED365;
.ENDSEG;

.SEGMENT/PM     seg_rth;
        nop;
            jump start;
```

```
.ENDSEG;

.SEGMENT/PM     seg_pmco;

start:
      l0=@buffdm;
      b0= buffdm;
       m0=    0x1;

      l8=@buffpm;
      b8= buffpm;
       m8=    0x1;

      r0=dm(i0,m0), r4 =pm(i8,m8);
      r8=dm(i0,m0), r12=pm(i8,m8);

      call addsub;

addsub:
      r7=r0+r4, r15=r0-r4,  r0=dm(i0,m0), r4 =pm(i8,m8);
      jump addsub (db);
      r7=r0+r4, r15=r0-r4,  r0=dm(i0,m0), r4 =pm(i8,m8);
      r7=r0+r4, r15=r0-r4,  r0=dm(i0,m0), r4 =pm(i8,m8);


mulacc:
      r7=r0*r4(SSFR), r15=r8+r12, r0=dm(i0,m0), r4
=pm(i8,m8);
      jump mulacc (db);
      r7=r0*r4(SSFR), r15=r8+r12, r0=dm(i0,m0), r4
=pm(i8,m8);
      r7=r0*r4(SSFR), r15=r8+r12, r0=dm(i0,m0), r4
=pm(i8,m8);


mas:  r7=r0*r4(SSFR), r15=r8+r12, r14=r8-r12,
r0=dm(i0,m0), r4 =pm(i8,m8);
      jump mas (db);
      r7=r0*r4(SSFR), r15=r8+r12, r14=r8-r12,
r0=dm(i0,m0), r4 =pm(i8,m8);
      r7=r0*r4(SSFR), r15=r8+r12, r14=r8-r12,
r0=dm(i0,m0), r4 =pm(i8,m8);

.ENDSEG;
```


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