

ADSP-1102/1103/1516/1517

FEATURES

- High Speed**
 - 35ns Pipelined Multiply Time (ADSP-1102/1103)
 - 65ns Multiply Time
- 250mW Power Dissipation with TTL-Compatible CMOS Technology**
- Improved Second Sources to Am29516, Am29517, MPY016HJ1 and MPY016KJ1**
- Twos-Complement, Unsigned-Magnitude or Mixed-Mode Multiplication**
- Single +5 Volt Power Supply Operation Available in Hermetically-Sealed 64-Pin DIP, Hermetically-Sealed 68-Pin Grid Array, or Plastic 64-Pin DIP**
- Available Specified from -55°C to +125°C Ambient**

APPLICATIONS

- Fourier Transformations
- Digital Filtering
- Matrix Manipulations
- Video Processing
- Array Processing

GENERAL DESCRIPTION

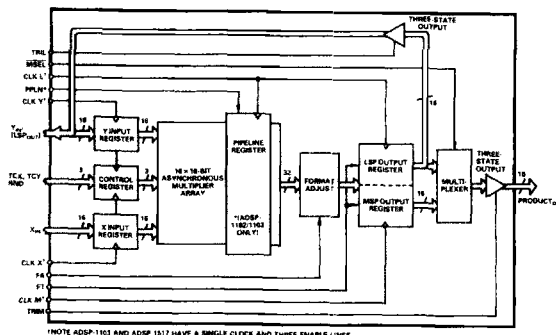
The ADSP-1102, ADSP-1103, ADSP-1516, and ADSP-1517 are high-speed, low-power 16 × 16-bit multipliers fabricated in aluminum, 1.5 micron CMOS. The ADSP-1102 and ADSP-1516 are pin-for-pin compatible (in a DIP package) with Analog Devices' Am29516. The ADSP-1103 and ADSP-1517 are pin-for-pin compatible (in a DIP package) with Am29517.

The ADSP-1102/1103 have internal pipeline registers (enabled by the PPLN control) that nearly halve their 65ns maximum clocked multiply time to a throughput rate of 3.5ns. The ADSP-1516/1517 lack this pipeline register and are functionally identical to the Am29516/29517. The ADSP-1102/1516 differ from the ADSP-1103/1517 only in how internal registers are clocked.

The power consumption of each of these four multipliers is at or below 200mW, less than 5% of the power required by equivalent bipolar and ECL multipliers. The differential between these devices' junction temperature and the ambient temperature stays small because of this low power dissipation. Thus, unlike most equivalent bipolar and ECL devices, they can be safely specified for operation at environmental temperatures over their extended range (-55°C to +125°C ambient).

The four multipliers each have two 16-bit input ports and a 16-bit product output port. The inputs can be twos-complement, unsigned-magnitude or mixed-mode. The internal multiplier product is 32 bits in width and consists of a 16-bit Most Significant Product (MSP) and a 16-bit Least Significant Product (LSP).

ADSP-1102/1103 AND ADSP-1516/1517
FUNCTIONAL BLOCK DIAGRAM



The LSP can be routed back through the Y input port, multiplexed through the product output port, or both. A pin used for supply GND in the MPY016HJ1, MPY016KJ1, ADSP-1016, and ADSP-1016A is functionally redefined as a MSP select control pin.

When low, the MSP select control multiplexes the MSP to the three-state driver at the product port, insuring the compatibility of the ADSP-1102 and ADSP-1516 with the MPY016HJ1, MPY016KJ1, ADSP-1016, and ADSP-1016A. When high, the MSP select control makes the LSP available at the product port.

All input pins are diode-protected. The input, LSP, and MSP registers are D-type positive-edge-triggered flip-flops. With the ADSP-1102/1516, all four registers are controlled by independent clock lines. With the ADSP-1103/1517, there is a single clock, enabled by three independent register enables for the two input registers and the pair of product registers. Independent controls for the input registers simplify repeated multiplication by a constant. Three-state outputs and clocked inputs allow the four multipliers to be connected directly to a 16-bit bus.

The RND control rounds the product to the 16 most significant bits by adding a 1 to the Most Significant Bit (MSB) of the LSP. The FA control format-adjusts twos-complement output by shifting the MSP and the MSB of the LSP left one bit and then repeating the sign bit in the MSB of the LSP. For asynchronous output, the feed-through (FT) control allows the LSP and MSP to bypass the output registers and flow directly to the three-state output drivers.

These four multipliers are all available for both commercial and MIL temperature ranges. Extended temperature range parts are available with high-reliability processing ("PLUS" parts). MIL grade parts are available processed and tested fully to MIL-STD-883, Class B. Additionally, all versions are available in either a 64-pin hermetically-sealed ceramic DIP, a hermetically-sealed 68-pin grid array, or a plastic 64-pin DIP.