

## 54ACT/74ACT705 Arithmetic Logic Unit for Digital Signal Processing Applications

### General Description

The 'ACT705 is a high-speed arithmetic processing integrated circuit which is packaged in an 84-pin leadless chip carrier. It features separate input buses that provide data and instruction codes to a high-speed single-cycle 16-bit ALU and an 8-bit by 8-bit parallel multiplier/accumulator.

The ALU is a 16-bit parallel design which supports sixteen arithmetic and logic functions, as well as carry-in/out and borrow-in/out. The multiplier/accumulator, which offers a full 16-bit product, provides for unsigned, signed, mixed mode and imaginary number multiplication. Product accumulation with sum and difference arithmetic is available in each multiplier operating mode.

The 16-bit results of the ALU and multiplier/accumulator are multiplexed to a single set of TRI-STATE® output buffers. The two ALU and multiplier/accumulator carry-out bits, as well as the 4-bit status field indicating ALU and multiplier/accumulator error conditions make up the remaining six bits of the entire 22-bit output.

### Features

- 84-pin, PCC, CPGA
- Outputs source/sink 8 mA
- 'ACT705 has TTL-compatible inputs
- High throughput achieved with high degree of parallelism in the architecture
- Pipelined stages
- High-speed 16-bit ALU and an 8 x 8 complex multiplier

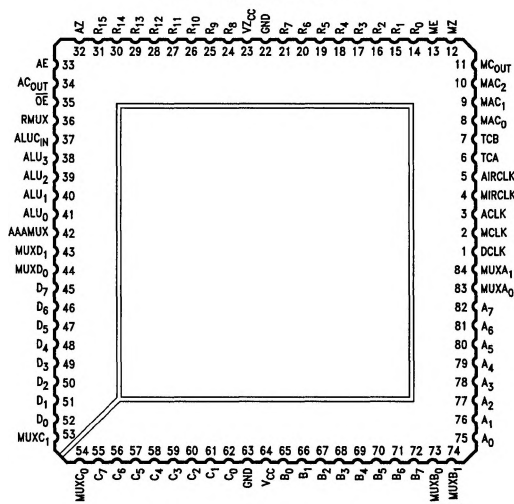
- 16-bit full ALU performs sixteen Boolean and arithmetic functions with carry-in and carry-out
- 8 x 8 parallel multiplier supports unsigned, signed, complex or mixed mode multiplications, produces 16-bit result with carry-out
- Separate data and instruction buses allow instruction fetches in parallel with execution—single cycle operation
- Accepts 8- or 16-bit data and delivers a 16-bit output
- Data register bank configured to accept a combination of 8- or 16-bit data
- Separate clocks for ALU instruction, multiplier instruction, data, ALU accumulator and multiplier accumulator registers
- Clustered clock pins for ease of board design
- 16-bit ALU/accumulator with feedback to ALU input
- Status of accumulator inputs is monitored: conditions monitored include twos complement overflow, underflow or equal-to-zero

### Applications

- Voice-band signal processing
- Discrete Fourier transform applications
  - FIR filters
  - IIR filters
- Fast Fourier transform applications
  - Spectrum analysis
  - Speech recognition

### Connection Diagram

Pin Assignment for PCC



TL/F/10135-1