IMP50E20 EPAC

Programmable Gain and Function Amplifier

Electrically Programmable Analog Circuit

Introduction

The IMP50E20 is a Field-Programmable Gain and Function Amplifier implemented with Electrically Programmable Analog Circuit (EPAC™) technology. A dual EEPROM/SRAM architecture allows parameters for gain control, polarity, input channel selection, A-to-D conversion, offset compensation and input level shifting to be programmed into the device. In addition, the device may be re-configured in the system if demanded by the application.

The input multiplexer connects eight single-ended or four differential signals to a gain module with over 30,000 gain settings. Fine gain resolution is 0.1% with better then 12-bit linearity. System offsets are nulled to 100µV.

Features

- Analog multiplexer with eight single-ended or four differential inputs
- Three amplifier modules
  - Digital gain setting
  - Gain from 3.95 to 384 in 0.1% steps
- ADC Mode
- "Floating input" detector
- 100µV auto-zeroed system offset
- 100kHz large signal bandwidth
  - 38MHz equivalent gain-band width product
  - Unconditionally stable
- On-chip low pass anti-alias filter: 15kHz
- Auxiliary opamp configurable as a reference buffer
- Temperature Sensor

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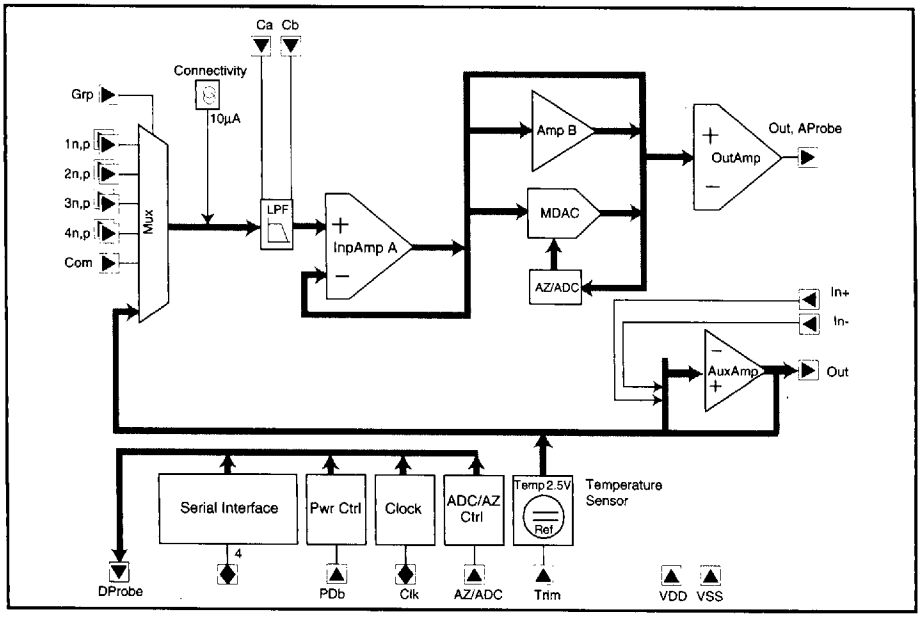
Figure 1 IMP50E20 Architecture



General Description

The IMP50E20 is a programmable amplifier with fine-gain control and multiple inputs. With 30,000 programmable gain settings and user-configurable functions, it serves diverse application environments: data acquisition boards, PCMCIA plug-in measurement systems, data logging, remote measurement, sensor conditioning, open and closed loop process control, automatic test equipment and medical instrumentation.

Electrical performance and function information is stored in on-chip EEPROM and/or SRAM memory and can be changed in-circuit through a serial interface. IMP's Windows-based ***Analog Magic™*** development software makes circuit design and modification easy and quick. Chips can be re-programmed as often as needed.

Among the user-configurable features are: an on-chip analog multiplexer, a trimmable voltage reference and an output module that can be programmed as a linear amplifier, rectifier, reference buffer or comparator with user-set trip points. A multifunction DAC removes system offsets, level-shifts signals, and can also be configured as an 8-bit successive-approximation ADC.

Under user control, a "connectivity mode" can be entered when a 10µA current sink/source (see ***Figure 1***) is added to the multiplexer output. Low impedance or floating inputs can be detected, as can button or switch closure events. Input resistance measurement is another application possibility.

An uncommitted auxiliary amplifier (***AuxAmp***) allows each system be customized without additional component or cost penalty. It can buffer the trimmable internal reference, provide current source excitation for a sensor, or create a 4 to 20mA current loop transmitter with an external transistor.

As with all EPAC circuits, internal analog and digital nodes can be monitored in real time. Analog nodes can be sensed through the dual function Out, AProbe pin. Digital signals are monitored through the DProbe pin.

An on-chip temperature sensor is also included.

Analog Magic software, a PC and an IMP development system make circuit design easy and inexpensive. Circuit changes can be made in minutes by reprogramming devices with Analog Magic or, when high volumes are needed, with standard EEPROM programmers.

Normal operation requires 40mW from a single 5V supply. When the sleep mode is entered, power drops to only 0.25mW. The IMP50E20 will be offered in a 28-pin surface-mount package and will operate over the extended industrial temperature range, -40°C to 85°C.