New-Product Brief

8-BIT LOW-COST µP-COMPATIBLE IC DAC

AD558 Is Really Complete: Reference, Op Amp, Latches, Pre-Trimmed, Single-Supply, Fast, Low-Power, 16-Pin DIP

The AD558* is a complete voltage-output 8-bit digital-to-analog converter on a single monolithic chip, housed in either a plastic or a hermetically sealed ceramic 16-pin dual in-line package—or available in die form.

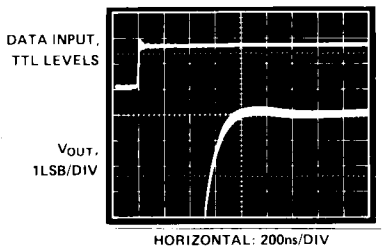
It contains a precision voltage reference, an output amplifier, a latching register with *nor*'d CHIP SELECT and CHIP ENABLE inputs, for efficient µP interfacing, and a precision DAC circuit.

The device is laser-trimmed at the wafer stage, eliminating any need for external adjustments; calibration accuracy is guaranteed over the full temperature range to within ±1LSB at full scale or zero (AD558K/T), and all versions are monotonic over temperature.

Truly microprocessor-compatible, the 8-bit AD558 will run from the same single supply used by the host µP, at any voltage from +4.5V to 16.5V, with a choice of two output ranges: 0 to 2.56V (10mV/bit) and 0 to 10V (39.1mV/bit, for $V_{CC} \geqslant 11.4V$).

The AD558's low dissipation (75mW) is useful in battery-powered and portable operation, and the wide range of V_{CC} permits automotive and computer-mainframe-powered applications. Settling time to full scale is typically 0.8µs to within 1/2LSB (2.56V range).

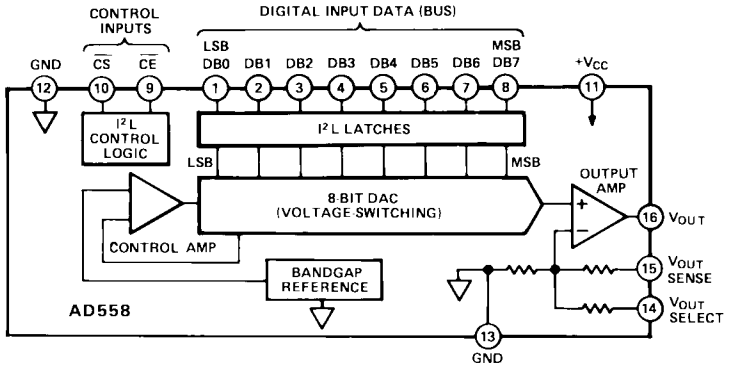
And its price is low: from $5.95 (100+, AD558JN).



AD558 settling characteristic detail
0V to 2.56V output range full-scale step.

KEYS TO THE AD558

The block diagram shows the elements of the AD558, which is a triumph of circuit design, processing, and trimming technology, much of it covered by ADI patents.



First, its design is fully integrated, rather than a collection of stock circuits. This means a small chip (hence better yield and lower cost), low dissipation (hence better performance over temperature, and a wider range of applications), and a compact pinout (only 16 pins, hence improved reliability and a smaller footprint).

Second, the use of proven Analog Devices I^2L, bandgap reference, and thin-film-on-silicon technologies provide these important benefits: I^2L (integrated injection logic) permits efficient use of a single chip for digital and high-performance analog circuitry; bandgap reference provides tracking reference voltage with low tempcos, excellent long-term stability, and low-V_{CC} operation; and thin-film-on-silicon permits stable, linear, trimmable resistors to be fabricated for high-accuracy conversion.

Finally, the device is automatically laser-trimmed at the wafer stage. This proven Analog Devices technology results in converters that are fully calibrated—ending rejections in expensive packages and requiring no user trims, even when bought as chips—and monotonic over the entire operating temperature range.

EASY TO INTERFACE

The AD558's low-current logic inputs, set for TTL threshold voltage, can be operated by TTL or low-voltage CMOS over the entire operating V_{CC} range. The 100-µA maximum current minimizes bus loading.

The AD558's input latches simplify interfacing to 8- and 16-bit data buses. The latches are controlled by $\overline{CS}$ and $\overline{CE}$ inputs (as mentioned earlier), internally *nor*'d so that the latches transmit input data to the DAC section only when $\overline{CS}$ and $\overline{CE}$ are both at logic zero. When either of the control inputs goes to logic 1, the input data is latched into the registers and held until both are again returned to zero. If the application does not involve control of inputs from a common data bus, both control inputs can be tied to 0 for transparency.

The AD558 acts like a "write only" location in memory. It can double up with a ROM slot, with no interaction; or, if doubled up with read-write memory, the memory will retain the word written into the DAC and can read it back without disturbing the DAC. Connections to an 8080A µP are shown in the figure.

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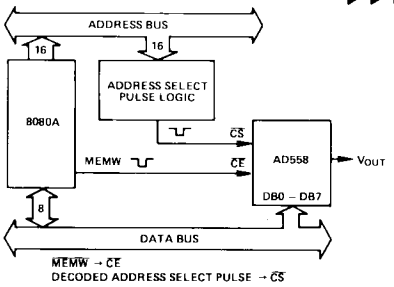

8080A/AD558 interface