



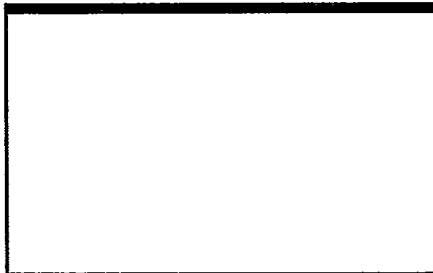
A Subsidiary of
SILICON TRANSISTOR CORP.

MODEL

2837

T-51-10-90

17-Bit Integrating A/D Converter



Description

Highly accurate, stable, auto-zeroed A/D conversions at rates up to 250 per second make the Model 2837 a natural choice for many precision, moderate throughput data acquisition systems. Featuring a quadruple-phase, triple-slope integrating conversion technique, the 2837 provides 16-bit plus sign resolution conversions, with $\pm 0.00075\%$ linearity error, and $\pm 0.00025\%$ differential linearity. Fully ratiometric measurements can be made using either the

internal precision 10V reference, or an external reference. At the completion of each conversion, the 2837 enters an auto-zero calibration phase, where system offsets, common mode voltages up to $\pm 50\text{mV}$ dc or errors due to internal drift are eliminated, assuring highly accurate conversions every time.

Stability over temperature is very good, with a maximum offset tempco of $\pm 6\mu\text{V}/^\circ\text{C}$, and gain tempco of $\pm 10\text{ppm}/^\circ\text{C}$. Unadjusted absolute accuracy is $\pm 0.005\%$ FSR, which can be adjusted down to $\pm 0.0027\%$ FSR. Warm-up time to rated performance is 5 minutes.

The 2837 is packaged in a fully EMI/RFI shielded metal enclosure measuring $2.00" \times 4.00" \times 0.44"$. Power dissipation from the $\pm 15\text{V}$ and $+5\text{V}$ power supplies is less than 2.1 watts maximum, with an operating temperature range of 0°C to $+70^\circ\text{C}$.

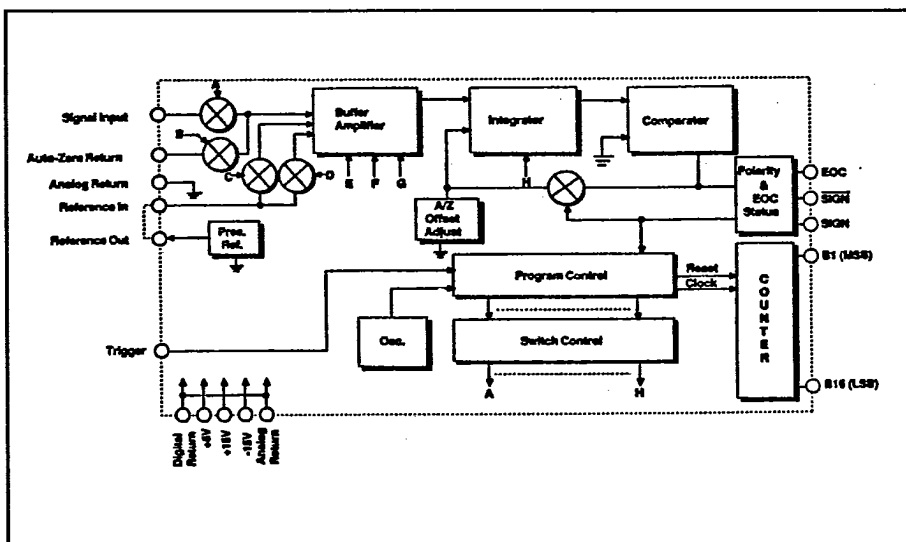


Figure 1. 2837 Block Diagram

Features

- ☐ **High Resolution**
16-bits plus sign
- ☐ **High Conversion Rate**
Up to 250 conversion per second
- ☐ **Very High Linearity**
<7.5ppm FSR error maximum
- ☐ **Very High Differential Linearity**
 $\pm 2.5\text{ppm}$ FSR maximum
- ☐ **Guaranteed Monotonicity**
- ☐ **Ratiometric Measurements**
Precision Internal or External References
- ☐ **Small Size**
 $2.00" \times 4.00" \times 0.44"$

Applications

- ☐ Precision Process Control Systems
- ☐ Pharmaceutical Mixing and Grading Systems
- ☐ Laboratory Instrumentation
- ☐ Clinical Chemistry Analyzers
- ☐ Gas Chromatography Systems

Specifications

All Specifications Guaranteed at 25°C Unless Otherwise Noted

T-51-10-90

Analog Input**Input Configuration**

Differential

Input Voltage Range $\pm 10\text{V}$ maximum**Overvoltage Protection** $\pm 15\text{V}$ without damage**Input Impedance**1000 M Ω minimum // 50pF maximum**Input Bias Current**

50nA, typical, at 100 conversions/second

Input Integration Time640 μs nominal**Reference Input** $+10\text{V}$, $\pm 30\%$ **Accuracy (25°C $\pm 5^\circ\text{C}$)****Relative Accuracy****200Hz Conversion Rate** $\pm 7.5\text{ppm}$ FSR maximum**250Hz Conversion Rate** $\pm 5.0\text{ppm}$ FSR maximum**Absolute Accuracy** $\pm 0.005\%$ FSR, maximum, without adjustment; $\pm 0.0027\%$ FSR maximum, adjusted**Differential Linearity** $\pm 2.5\text{ppm}$ FSR maximum**Resolution**

16 bits plus sign

Conversion Time

250Hz maximum, controlled externally

Noise15 μV rms**Stability****Offset Tempco** $\pm 6\mu\text{V}/^\circ\text{C}$ maximum**Gain Tempco** $\pm 10\text{ppm}/^\circ\text{C}$ maximum**Warm-up Time**

<5 minutes to rated accuracy

Digital Inputs/Outputs**Inputs****Trigger**0.1 μs minimum, negative-going pulse;
conversion starts on positive transition;
3-CMOS and 3-74LS loads**Outputs****Data**16-bits plus sign and sign
sign and absolute value format;
1 LSTTL load for each data bit;
2 TTL loads for Sign and Sign**End-of-Conversion (EOC)****Logic "1" (High)**

conversion in process

Logic "0" (Low)output data is valid;
allow 10ns delay from EOC high to low
transition before reading data; 2 TTL loads**Power Supply Requirements****+15V, $\pm 3\%$** **-15V, $\pm 3\%$**

30mA maximum

25mA maximum

+5V, $\pm 5\%$

250mA maximum

Environmental and Mechanical**Operating Temperature Range**

0°C to +70°C

Storage Temperature Range

-25°C to +85°C

Relative Humidity

0 to 95%, non-condensing up to 40°C

Dimensions

2.00" x 4.00" x 0.44"

(50.8x101.6x11.1mm)

Shielding

Electromagnetic 5 sides

Electrostatic 6 sides

Using the 2837

T-51-10-90

Input Connections

A typical circuit configuration utilizing the **2837** is shown in Figure 2. The input signal is connected between the **INPUT** and **ANALOG RETURN** pins. The second input formed by the **ANALOG RETURN** and **AUTOZERO RETURN** may be used to remove common mode voltages that may exist between the signal and **2837** grounds, or a system offset correction voltage may be applied. In either case, the signal that is digitized is the difference between the signals present on the two inputs. If the system offset correction or common mode voltages are zero, jumper the **ANALOG RETURN** and **AUTOZERO RETURN** pins.

Ratiometric Measurements

The **2837** has an internal precision 10V reference, which is normally connected to the **REFERENCE INPUT** of the converter (**REFERENCE**

OUT to **REFERENCE INPUT**). For ratiometric measurements that utilize an external system reference or other reference source, the jumper between **REFERENCE OUT** and **REFERENCE INPUT** is removed, and the external reference source is connected to the **REFERENCE INPUT** pin. A voltage of 10V $\pm 10\%$ may be used as the external reference. It should be noted that at reduced reference voltages, the apparent noise relative to one LSB will be significant due to the reduction in voltage represented by a single LSB.

Offset and Gain Calibration

Offset Calibration

At the completion of each conversion, the **2837** automatically returns to auto-zero mode until the next trigger is received and a conversion is started. During the time when the converter is in the auto-zero mode, any system offsets or common-mode voltages present between the

AUTOZERO RETURN and **ANALOG RETURN** pins are zeroed out. No external offset calibration is therefore required.

Gain Calibration

The **2837** gain is calibrated at the factory. For special systems applications, a slight adjustment of the gain may be required. Connect a voltage reference source as shown in Figure 2. Apply +9.999977V to the input, continuously trigger the converter and monitor the output data. Adjust the +RANGE potentiometer located on the side of the converter until the binary output for a positive full scale output is 11 111 111 111 111, and the LSB alternates equally between 0 and 1. Reverse the input leads, and adjust the -RANGE potentiometer until the full scale negative binary output is 01 111 111 111 111 111, and the LSB alternates equally between 0 and 1.

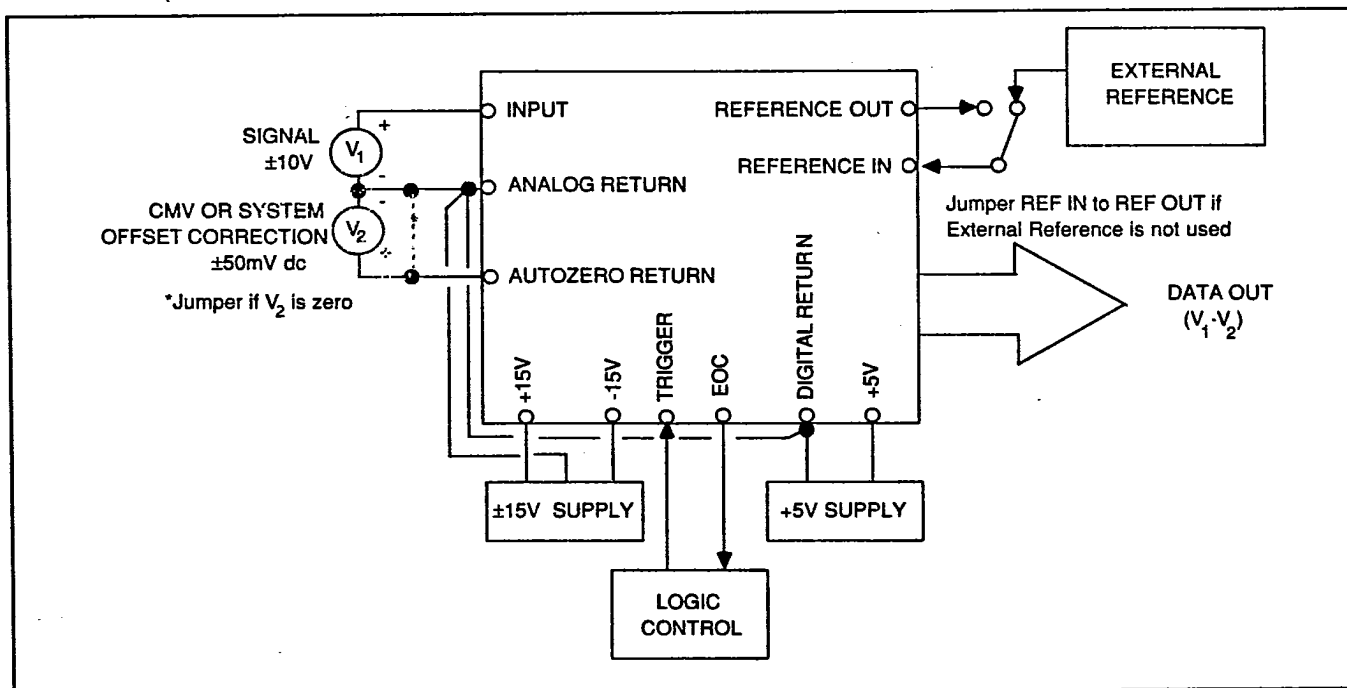
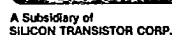


Figure 2. Typical Connections



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