DYMEC

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 ±0.00075% linearity error, and ±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 ±50mV 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 ±6µV/°C, and gain tempco of ±10ppm/°C. Unadjusted absolute accuracy is ±0.005% FSR, which can be adjusted down to ±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" x 4.00" x 0.44". Power dissipation from the ±15V and +5V power supplies is less than 2.1 watts maximum, with an operating temperature range of 0°C to +70°C.

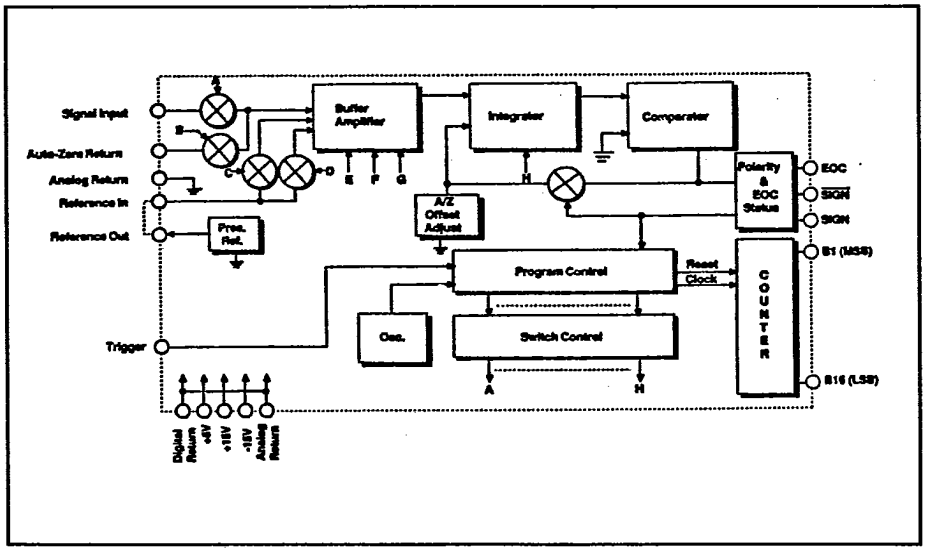


Figure 1. 2837 Block Diagram

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**
  ±2.5ppm FSR maximum
- **Guaranteed Monotonicity**
- **Ratiometric Measurements**
  Precision Internal or External References
- **Small Size**
  2.00" x 4.00" x 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

Analog Input

Input Configuration
Differential
Input Voltage Range
±10V maximum
Overvoltage Protection
±15V without damage
Input Impedance
1000 MΩ minimum // 50pF maximum
Input Bias Current
50nA, typical, at 100 conversions/second
Input Integration Time
640µs nominal
Reference Input
+10V, ±30%

Accuracy (25°C ±5°C)

Relative Accuracy
200Hz Conversion Rate
±7.5ppm FSR maximum
250Hz Conversion Rate
±5.0ppm FSR maximum
Absolute Accuracy
±0.005% FSR, maximum, without adjustment;
±0.0027% FSR maximum, adjusted
Differential Linearity
±2.5ppm FSR maximum
Resolution
16 bits plus sign
Conversion Time
250Hz maximum, controlled externally
Noise
15µV rms

Stability

Offset Tempco
±6µV/°C maximum
Gain Tempco
±10ppm/°C maximum
Warm-up Time
<5 minutes to rated accuracy

Digital Inputs/Outputs

Inputs

Trigger
0.1µs minimum, negative-going pulse;
conversion starts on positive transition;
3-CMOS and 3-74LS loads

Outputs

Data
16-bits plus sign and $\overline{\text{sign}}$
sign and absolute value format;
1 LSTTL load for each data bit;
2 TTL loads for Sign and $\overline{\text{Sign}}$
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, ±3%
30mA maximum
-15V, ±3%
25mA maximum
+5V, ±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

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 in connected to the **REFERENCE INPUT** pin. A voltage of 10V ±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 poteniometer located on the side of the converter until the binary output for a positive full scale output is 11 111 111 111 111 111, 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.

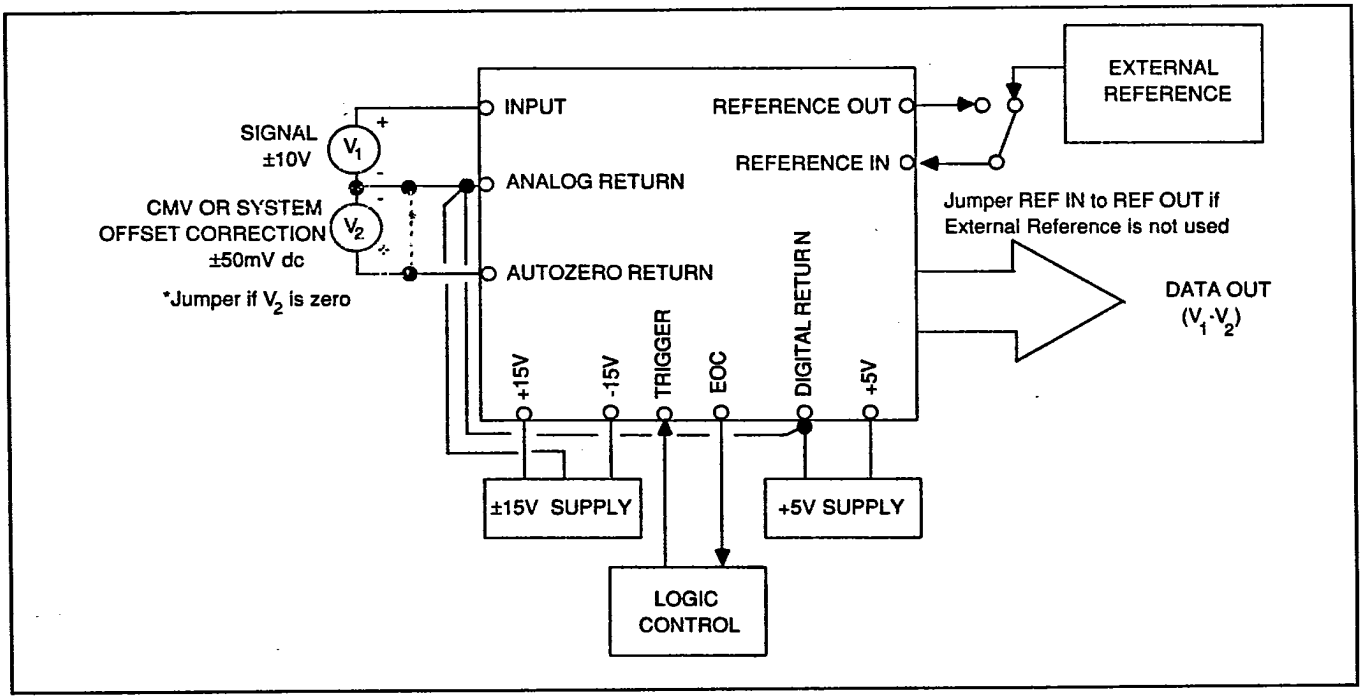


Figure 2. Typical Connections

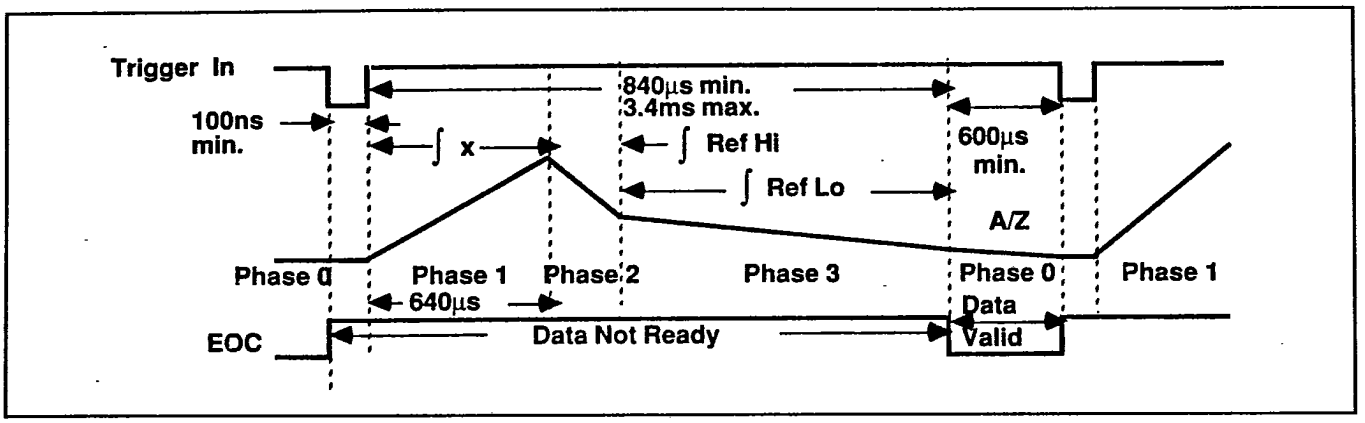
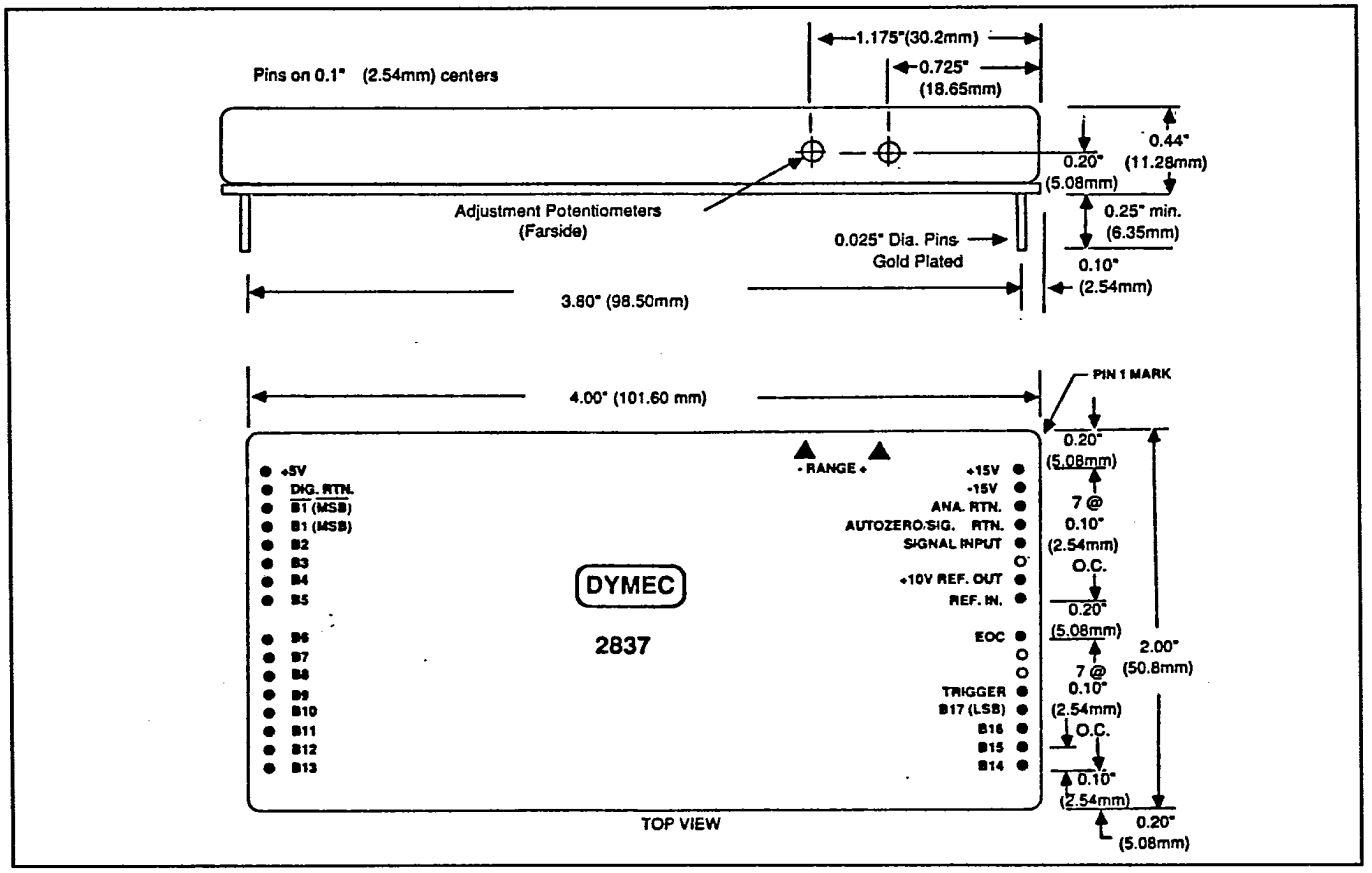


Figure 3. Typical Timing



Mechanical Dimensions & Pinout

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