ADVANCED ANALOG

A Division of intech

ADC5610 SERIES

DESCRIPTION

The ADC5610 Series devices are successive approximation 12-bit A/D converters with 13μsec conversion time. These devices are laser trimmed for ultra accuracy and reliability and require no external adjustment.

These devices are available in four input voltage ranges: ±5V, ±10V, 0 to +10V and -10V to 0. Models are available complete with a highly accurate and stable internal reference, or for use with an even higher quality external reference. All devices in this series have ±½ LSB linearity guaranteed over the full operating temperature range.

The ADC5610 Series feature low power consumption 590 mW maximum, serial or parallel output data and TTL compatibility.

All models are available in military, industrial or commercial temperature ranges. Devices with military screening are also available.

HIGH SPEED 12-BIT A/D CONVERTERS

FEATURES

- 13μsec conversion time
- Low power consumption - 590 mW max.
- Small, 24-pin hermetic leadless ceramic package
- Adjustment free operation
- Laser trimmed for accuracy and stability
- TTL/CMOS compatible
- Full mil operation

BLOCK DIAGRAM
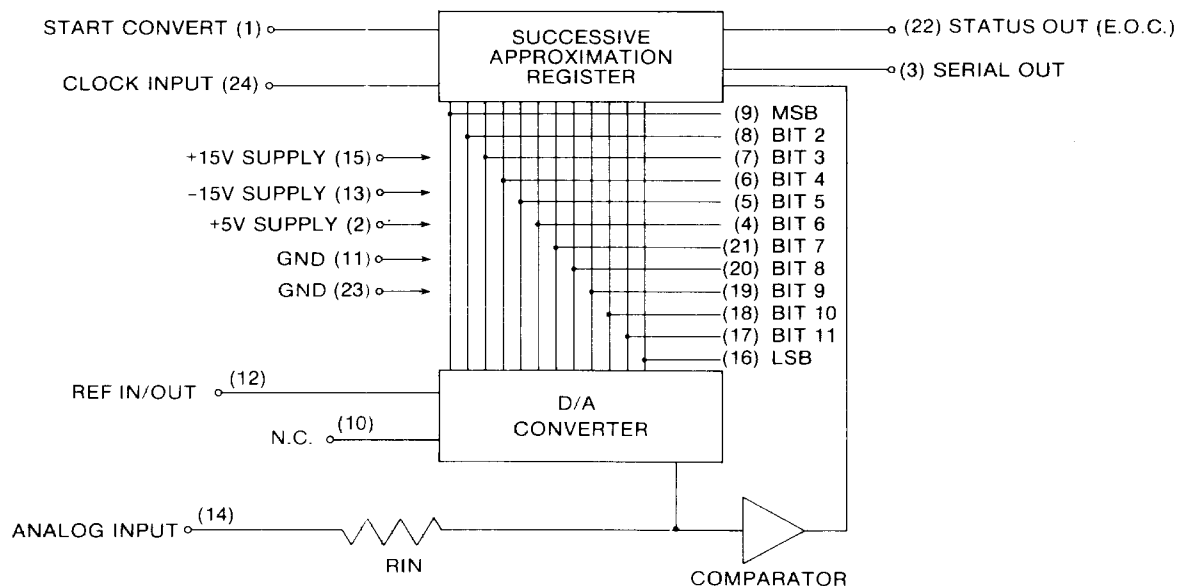
SPECIFICATIONS

ABSOLUTE MAXIMUM RATINGS

Operating Temperature Range: 0°C to +70°C
-25°C to +85°C
-55°C to +125°C
Storage Temperature Range -65°C to +150°C
Positive Supply, Pin 15 +18V
Negative Supply, Pin 13 -18V
Logic Supply, Pin 12 -0.5V to +7V
Analog Input, Pin 14 ± 25V
Digital Inputs, Pin 1, 24 -0.5V to +5.5V
Digital Outputs Logic Supply
Reference Input 0 to -15V

@ +25°C, ±15V +5V supply voltages, ±5% unless otherwise noted.
External reference devices V_{Ref} = -10.000V, unless otherwise noted.

ANALOG INPUTS	P/N (int. ref.)		P/N (ext. ref.)		
Input Range (Input Impedance)					
-5V to +5V (5KΩ)	ADC5611		ADC5614		
-10V to +10V (10KΩ)	ADC5612		ADC5615		
0 to -10V (5KΩ)	ADC5610		ADC5613		
0 to +10V (5KΩ)	ADC5616		ADC5617		

TRANSFER CHARACTERISTICS	TYP.	MAX.	TYP.	MAX.	UNITS
Linearity Error[1] +25°C	± ¼	± ½	± ¼	± ½	LSB
0°C to +70°C	± ¼	± ½	± ¼	± ½	LSB
-55°C to +125°C		± ½		± ½	LSB
Differential Linearity Error		± ½		± ½	LSB
No Missing Codes					
			Guaranteed over temperature		
Full scale Absolute Accuracy Error					
+25°C	± 0.025	± 0.05	± 0.025	± 0.05	% FSR
0°C to +70°C	± 0.2	± 0.4	± 0.05	± 0.1	% FSR
-55°C to +125°C		± 0.4		± 0.1	% FSR
Zero Error: +25°C	± 0.01	± 0.025	± 0.01	± 0.025	% FSR
0°C to +70°C	± 0.025	± 0.05	± 0.025	± 0.05	% FSR
-55°C to +125°C		± 0.05		± 0.05	% FSR
Gain Error	± 0.025		± 0.025		% FSR
Gain Drift	± 10 ppm		± 3 ppm		ppm/°C
Conversion Time[4]		13		13	μsec

REFERENCE INPUT/OUTPUT[10]	MINIMUM	TYPICAL	MAXIMUM	UNITS
Internal Reference: Voltage		-6.3		V
Accuracy		± 1		%
Tempco of Drift		± 5 ppm		°C
Max. External Current			4	mA
External Reference: Voltage		-10.000		V
Loading			-.5	mA
POWER SUPPLIES				
Power Supply Range ·15V supplies	·11.4	±15	·16.5	Volts

POWER SUPPLIES	TYP.	MAX.	TYP.	MAX.	UNITS
Power Supply Rejection[5]: +15V supply	± 0.005	± 0.02	± 0.005	± 0.02	% FSR/% V_S
-15V supply	± 0.01	± 0.05	± 0.005	± 0.02	% FSR/% V_S
Current Drain: +15V supply	13	18	13	18	mA
-15V supply	-15	-19	-15	-19	mA
+ 5V supply	10	15	10	15	mA
Power Consumption	470	590	470	590	mW

DIGITAL INPUTS (All Models)	MINIMUM	TYPICAL	MAXIMUM	UNITS
Logic Levels: Logic "1"	2.0			V
Logic "0"			0.7	V
Clock Input:[6] Pulse Width High	45			nsec
Pulse Width Low	45			nsec
Loading High (V_{IN}=2.4V)		2	20	μA
Loading Low (V_{IN}=0.3V)		-0.25	-0.4	mA
Frequency			1	MHz
Start Convert Input: Loading High (V_{IN}=2.4V)		4	40	μA
Loading Low (V_{IN}=0.3V)		-0.25	-0.4	mA
Set-up Time Start Low to Clock[7]	10			nsec

DIGITAL OUTPUTS (All Models)				
Logic Coding[8]: Unipolar ranges		Complementary Straight Binary		
Bipolar ranges		Complementary Offset Binary		
Logic Levels: Logic "1"	+2.4	+3.6		V
Logic "0"	+0.15		+0.3	V
Output Drive Capability, All Outputs[9]:				
Logic "1"	8 TTL Loads			
Logic "0"	2 TTL Loads			

Devices are available with military screening.

2

NOTES:

1. Intech Advanced Analog tests and guarantees maximum linearity error at ambient temperature and at both the high and low extremes of the specified operating temperature range.

2. 1LSB for a 12-bit converter corresponds to 0.024%FSR. See Note 3.

3. FSR stands for Full Scale Range and is equal to the peak to peak voltage of the selected input range. For the ±10V input range, FSR is 20 volts and 1 LSB is equal to 4.88 mV. For the ±5V ranges, FSR is 10 volts and 1 LSB is equal to 2.44 mV.

4. Conversion time is defined as the width of the converter's STATUS (E.O.C.) pulse (see Timing Diagram.) Intech Advanced Analog guarantees ADC561x Series converters will meet all specs with clock frequencies up to 1 MHz. A 1 MHz clock gives a STATUS pulse that is 12μsec wide. The 13μsec spec reflects the fact that unless careful timing precautions are taken, it will usually take 13 clock periods to update digital output data.

5. Intech Advanced Analog tests and guarantees Power Supply Rejection over the ±15V±3% range.

6. The clock may be asymetrical with minimum positive or negative pulse width. See Note 4.

7. In order to reset the converter, START CONVERT must be brought low at least 10 nsec prior to a low to high clock transition. See Timing Diagram.

8. CSB = Complementary Straight Binary
   COB = Complementary Offset Binary
Serial and parallel output data have the same coding. Serial data is Non-Return to Zero (NRZ) format. See Output Coding and Timing Diagram.9. One TTL load is defined as sinking 40μA with a logic "1" applied and sourcing 1.6 mA with a logic "0" applied.

10. ADC5610, ADC5611, ADC5612 and ADC5616 have an internal -6.3V reference; ADC5613, ADC5614, ADC5615 and ADC5617 require an external -10.000V reference.

DATA OUTPUT

The ADC5610 Series provides the user with both serial and parallel outputs. Serial and parallel output data have the same coding. Serial data is in Non-return to Zero format.

SAMPLE AND HOLD

For those applications that require a sample and hold amplifier, the SH346/347 is an ideal device. It is a high speed, adjustment free sample/hold amplifier that features 1.0μsec acquisition time, 0.01% accuracy and a low glitch and droop rate.

DIGITAL OUTPUT CODING

| ADC5611/5614 ± 5V	ADC5612/5615 ± 10V	ADC5610/5613 0 to -10V	ADC5616/5617 0 to +10V	DIGITAL OUTPUT
+4.9976V	+9.9951V	-0.0024V	+9.9976V	0000 0000 0000
+4.9951V	+9.9902V	0.0048V	+9.9951V	0000 0000 0001
+0.0024V	+0.0049V	-4.9976V	+5.0024V	0111 1111 1110
0.0000V	0.0000V	-5.0000V	+5.0000V	0111 1111 1111
-0.0024V	-0.0049V	-5.0024V	+4.9976V	1000 0000 0000
-4.9976V	-9.9951V	9.9976V	+0.0024V	1111 1111 1110
-5.0000V	-10.0000V	-10.0000V	0.0000V	1111 1111 1111

TIMING DIAGRAM
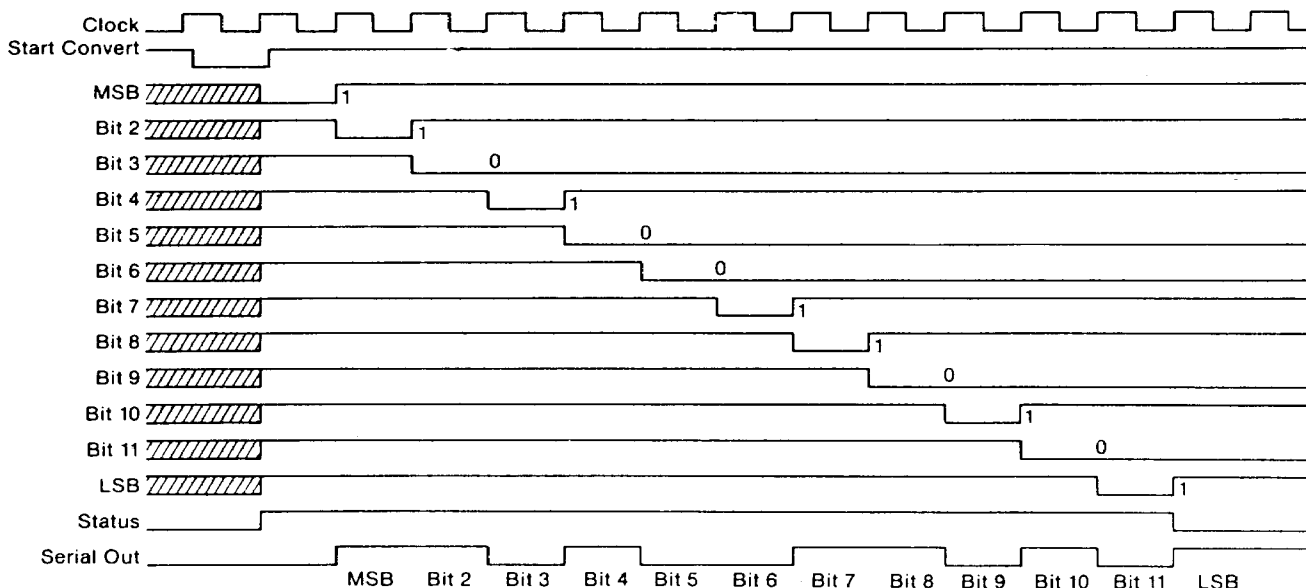
SERIAL TO PARALLEL CONVERSION

Data may be sent in serial format and converted to parallel as shown. This process can reduce the number of transmission lines from 14 to 3 for a 12-bit A/D converter.
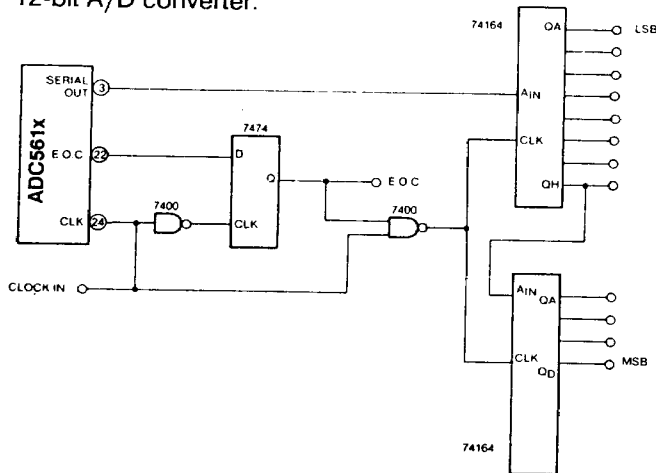
MECHANICAL OUTLINE
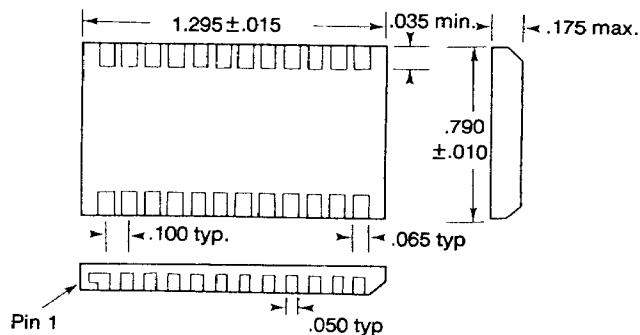
PART NUMBER

ADC561X X /B

Model

Analog Inputs
- 0 - 0 to -10V(5KΩ)int.ref.
- 1 - -5V to +5V(5KΩ)int.ref.
- 2 - -10V to +10V(10KΩ)int.ref.
- 3 - 0 to -10V(5KΩ)ext.ref.
- 4 - -5V to +5V(5KΩ)ext.ref.
- 5 - -10V to +10V(10KΩ)ext.ref.
- 6 - 0 to +10V(5KΩ)int.ref.
- 7 - 0 to +10V(5KΩ)ext.ref.

Mil screening.
Omit for comm'l or industrial.

Temperature Range
H - -55°C to +125°C
Omit for standard 0°C to +70°C
E - -25°C to +85°C

©Intech Advanced Analog

HANDLING OF GROUNDS

Layout and decoupling techniques: Ground pins 11 and 23 are not internally connected and should be connected externally as directly or close to the package as possible. They must be connected to the system analog ground, preferably through a large ground plane under the package.

To run the grounds separately, connect a 1μF bypass capacitor between pins 11 and 23.

Power supplies should be decoupled by using tantalum and electrolytic capacitors as close to the pins as possible for peak performance and noise rejection.
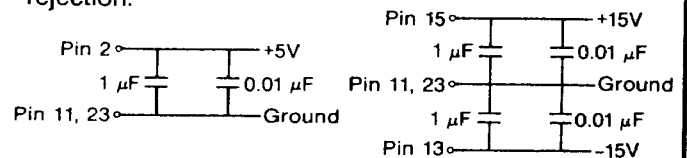
Power Supply Decoupling

SHORT CYCLE OPERATION

The ADC5610 Series can be short cyled to less than 12 bits resolution, which gives a faster conversion time.

When a conversion is in process, bit (n+1) will go low as bit n is being set. The Start Convert signal is high at this point and Status (IC2 output) will go low gating off the clock at IC3, thus ending the conversion.

1-8707

ADVANCED ANALOG

A Division of intech

MIL-STD-1772
Certified

2270 MARTIN AVENUE, SANTA CLARA, CALIFORNIA 95050-2781
TELEPHONE (408) 988-4930   TWX 910-338-2213

008942 X _ X