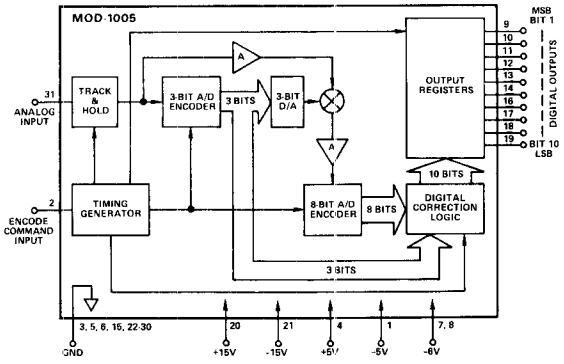
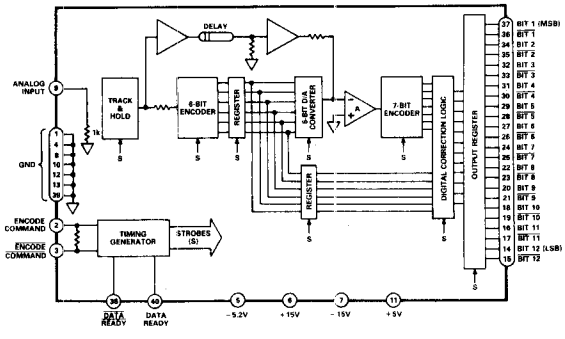


MOD-1005

10 Bits @ 5MHz Word Rate
One-27 Sq. In. PC Board
Built-In Track-and-Hold – 25ps Aperture Uncertainty
20MHz Analog Input Bandwidth
TTL Compatible
Low (10-Watt) Power Dissipation
Signal-to-Noise Ratio Greater Than 58dB
Noise Power Ratio Greater Than 49dB
Completely Repairable

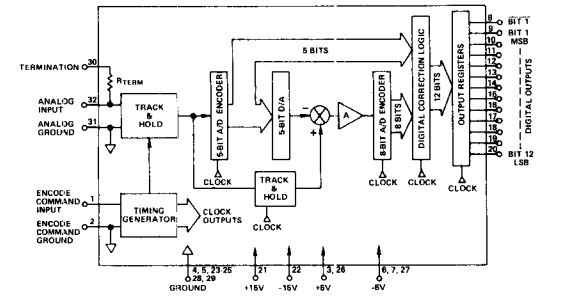
APPLICATIONS
Radar Digitizing
Digital Communications
Real Time Spectrum Analysis
High Resolution TV



MOD-1020

10 Bits @ 20MHz Word Rates
One-35 Sq. In. PC Board
Built-In Track-and-Hold – 25ps Aperture
15MHz Large-Signal Input Bandwidth
ECL Compatible
Signal-to-Noise Ratio Greater Than 56dB
Noise Power Ratio Greater Than 45dB

APPLICATIONS
Television Digitizing
Radar Digitizing
Medical Instrumentation
Digital Communications
Spectrum Analysis
Sonar Digitizing



MOD-1205

12 Bits @ 5MHz Word Rate
One-27 Sq. In. PC Board
Built-In Track-and-Hold – 25ps Aperture Uncertainty
15MHz Analog Input Bandwidth
TTL Compatible
Low (13-Watt) Power Dissipation
Signal-to-Noise Ratio Greater Than 66dB
Noise Power Ratio Greater Than 56dB
Completely Repariable

APPLICATIONS
Radar Digitizing
Digital Communications
Real Time Spectrum Analysis
Signature Analysis

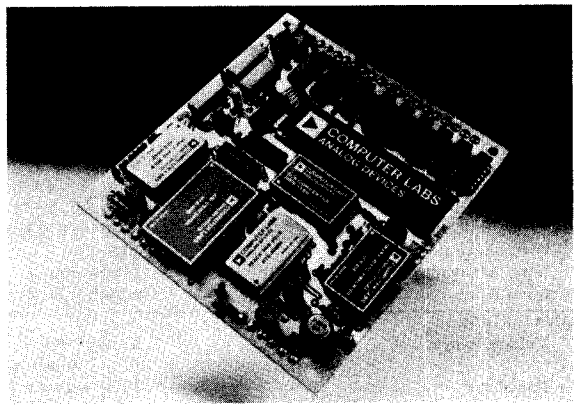
ANALOG DEVICES

12-Bit Video Analog-to-Digital Converter

MOD-1205

FEATURES
12 Bits @ 5MHz Word Rate
One-27 Sq. In. PC Board
Built-In Track-and-Hold — 25ps Aperture Uncertainty
15MHz Analog Input Bandwidth
TTL Compatible
Low (13-Watt) Power Dissipation
Signal-to-Noise Ratio Greater Than 66dB
Noise Power Ratio Greater Than 56dB
Completely Repairable

APPLICATIONS
Radar Digitizing
Digital Communications
Real Time Spectrum Analysis
Signature Analysis



GENERAL DESCRIPTION

Analog Devices' model MOD-1205 is a very high-speed A/D converter capable of digitizing video input signals to 12-bit accuracy at random or periodic word rates of dc through 5MHz. The MOD-1205 is truly a breakthrough in high-speed A/D technology. It utilizes the latest state-of-the-art conversion technique called digital correcting subranging (DCS) to effectively eliminate errors normally associated with subranging type ADCs. It is the most cost effective A/D in this speed category, combining small size and low power dissipation with low cost.

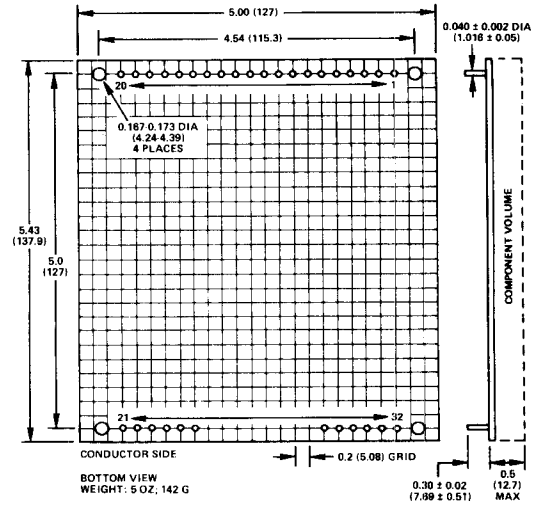
The MOD-1205 is constructed on a single printed circuit card which is intended for mounting on a system mother board and occupies only 27 square inches. Within this A/D is the required sample/track-and-hold amplifier, encoder, timing circuits and output latches for a true simultaneous, all-parallel digital output.

The encode command input and digital outputs are TTL compatible. The A/D requires only an external encode command pulse and external power supplies for operation. NO external parts are required. Gain and offset potentiometers are provided on the card. The A/D is fully repairable either at the factory or in the field.

The MOD-1205 is ideally suited for systems requiring the ultimate in conversion speed and accuracy. Such applications include radar digitizing, digital communications, spectrum analysis, and many others. Each MOD-1205 is backed by Analog Devices' limited one year warranty.

OUTLINE DIMENSIONS

Dimensions shown in inches and (mm).



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SPECIFICATIONS (typical @ +25°C with nominal power supplies unless otherwise noted)

MODEL	MOD-1205
RESOLUTION (FS = FULL SCALE)	12 Bits (0.024% FS)
LSB WEIGHT	1mV
ACCURACY (INCLUDING LINEARITY) @ DC	±0.0125% Full Scale ±1/2LSB
Monotonicity	Guaranteed (0 to +70°C)
Nonlinearity vs. Temperature	0.005% of FS/°C, max
Gain vs. Temperature	0.01% of FS/°C, type; 0.03% of FS/°C, max
DYNAMIC CHARACTERISTICS	
AC Linearity[1] (dc to 1MHz)	Spurious Signals >70dB below FS, max
(1MHz to 2.5MHz)	Spurious Signals >65dB below FS, max; >68dB, typ
Conversion Time	See Text and Timing Diagram
Conversion Rate (Word Rate)	5MHz
Aperture Uncertainty (Jitter)	±25ps max
Aperture Time	30ns (±10ns from unit to unit)
Signal to Noise Ratio[2]	66dB min; 68dB, typ
Noise Power Ratio[3]	56dB min, 58dB typ
Transient Response[4]	12-Bit (0.0125%) Accuracy within 200ns
Overvoltage Recovery Time[5]	200ns
Input Bandwidth (small signal, 3dB)	15MHz min
Input Bandwidth (large signal, 3dB)	10MHz min; flat within ±0.1dB, dc through 5MHz
ANALOG INPUT	
Voltage Range	±2.048V FS
	±4V Absolute max
Impedance	400Ω with pin 30 open, 50Ω with pin 30 grounded
Offset Voltage	Adjust to 0 with On Board Potentiometer
Offset vs. Temperature	0.02% FS/°C, type; 0.05% of FS/°C, max
Bias Current	1nA max
ENCODE COMMAND INPUT	
Logic Levels, TTL Compatible	"0" = 0 to +0.4V
	"1" = +2.4V to +5V
Logic Loading	2 Standard TTL Gates
Rise and Fall Times	10ns max
Duration min/max	25ns/50% of Duty Cycle
Frequency (Random or Periodic)	5MHz
DIGITAL DATA OUTPUT	
Format	12 Parallel Bits, NRZ
Logic Levels, TTL Compatible	"0" = 0 to +0.4V
	"1" = +2.4V to +5V
Drive (Not Short Circuit Protected)	Up to 1 Schottky TTL or
	2 Standard TTL Loads
Time Skew	10ns max
Coding	Offset Binary (OBN) or 2's complement (2SC)
Conversion Time	See Text on the Next Page
POWER REQUIREMENTS[6]	
+15V ±5%	200mA
-15V ±5%	150mA
-6V ±4%	700mA
+5V ±5%	800mA
Power Consumption	13 Watts
TEMPERATURE RANGE	
Operating	0 to +70°C
Storage	-55°C to +85°C
Cooling Requirements	500 Linear Feet Per Min (LFPM) @ +70°C
PHYSICAL CHARACTERISTICS	
Construction	Single Printed Circuit Card

NOTES
[1] AC linearity expressed in terms of spurious in-band signals generated at specified encode rates at analog input frequencies ( ).
[2] rms signal to rms noise at 500kHz analog input.
[3] dc to 2.4MHz white noise bandwidth with slot frequency of 512kHz.
[4] For full-scale step input, attains 12-bit accuracy in time specified.
[5] Recovers to 12-bit accuracy after 2 × FS input overvoltage in time specified.
[6] ±15V supplies must be equal and opposite within 200mV and track over temperature.

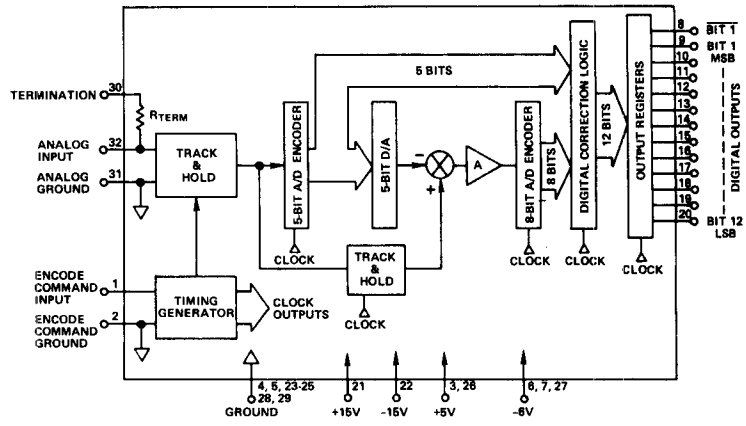
Specifications subject to change without notice.

PIN	FUNCTION
1	ENCODE COMMAND
2	GND*
3	+5V
4	GND*
5	GND*
6	-6V
7	-6V
8	$\overline{\text{BIT 1}}$
9	BIT 1 (MSB)
10	BIT 2
11	BIT 3
12	BIT 4
13	BIT 5
14	BIT 6
15	BIT 7
16	BIT 8

PIN	FUNCTION
17	BIT 9
18	BIT 10
19	BIT 11
20	BIT 12 (LSB)
21	+15V
22	-15V
23	GND*
24	GND*
25	GND*
26	+5V
27	-6V
28	GND*
29	GND*
30	TERMINATION
31	GND*
32	ANALOG INPUT

*ALL GROUND PINS ARE CONNECTED TOGETHER WITHIN THE MOD-1205

Pin Designations



NOTE: WITH PIN 30 OPEN, ANALOG INPUT IMPEDANCE IS 400Ω. WITH PIN 30 GROUNDED, ANALOG IMPEDANCE IS 50Ω.

MOD-1205 Block Diagram

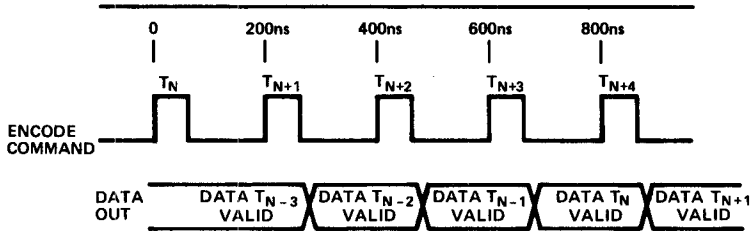
ORDERING INFORMATION

Order model number MOD-1205 A/D converter. Mating pin sockets for the MOD-1205 are model number MSB-2 (32 required per A/D).

CONVERSION TIME

Output data is valid two encode command clock periods plus 275ns ±25ns after application of an initial encode command pulse. Due to the pipeline delay effect of the A/D, a total of three encode command pulses are required to shift the data to the output of the A/D. For example, with a 5MHz encode rate, data is valid 675ns ±25ns after the application of the first encode command pulse—assuming that two pulses occur after the first.

Use of the trailing edge of the encode command is recommended for strobing output data into external register (see Figure 1).



DATA T_N (THE RESULT OF ENCODE COMMAND T_N) OCCURS TWO CONVERSION PERIODS PLUS 275ns ±25ns AFTER ENCODE COMMAND T_N. FOR A 5MHz WORD RATE AS SHOWN, DATA IS VALID 275ns ±25ns AFTER THE THIRD ENCODE COMMAND PULSE OR T_N + 675ns ±25ns. IN ALL CASES, THREE ENCODE COMMAND PULSES ARE REQUIRED FOR TRANSFER OF DATA TO THE OUTPUT, DUE TO THE PIPELINE DELAY EFFECT THROUGH THE A/D. NO DATA READY PULSE IS SUPPLIED.

Figure 1. MOD-1205 Timing Diagram

GROUND CONNECTIONS

It should be noted that the MOD-1205 PC board has 9 ground pins. These are all connected to the ground plane on the board. For best results it is recommended that ALL of these pins be connected to a massive system or "mother board" ground plane.

CALIBRATION PROCEDURE (MOD-1205)

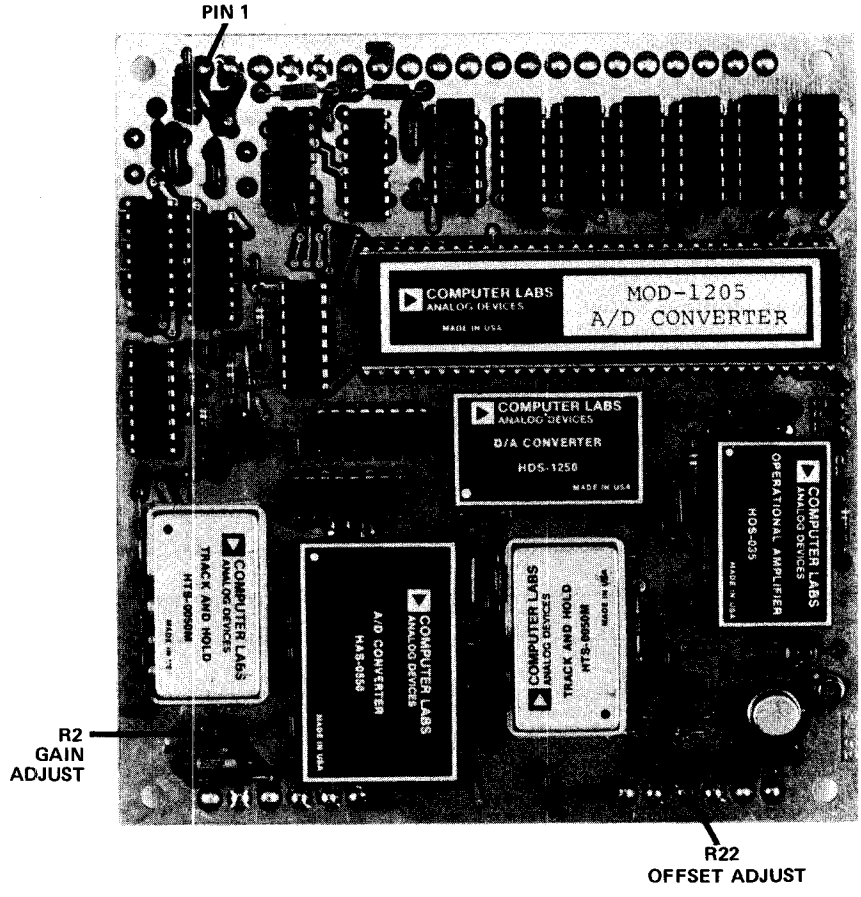
The MOD-1205 A/D is precisely calibrated at the factory before shipments and should need no further calibration. However, if slight readjustments of the A/D are required in the system, the following procedure should be followed. This procedure refers to a binary output.

Offset Adjustment

The offset is adjusted by varying potentiometer R22 with 0 volts applied to the analog input. To obtain the proper output code, observe that the digital output is changing between 100000000000 and 011111111111 at this adjustment level. When properly adjusted a digital code of 100000000000 will represent analog input 1LSB above zero volts, and a digital code of 011111111111 will represent an analog input of 1LSB below zero volts.

Gain Adjustment

The gain is adjusted by varying potentiometer R2. This adjustment is made by applying +2.0465V (FS -1 1/2LSB) to the analog input and while monitoring the digital output, adjust R2 for the output code varying between 111111111110 and 111111111111 (FS). If the user needs to offset the entire range of the A/D, this can be accomplished by a readjusting R22 as required. However, in this procedure, the offset should always be adjusted first.



Location of Adjustment Potentiometers