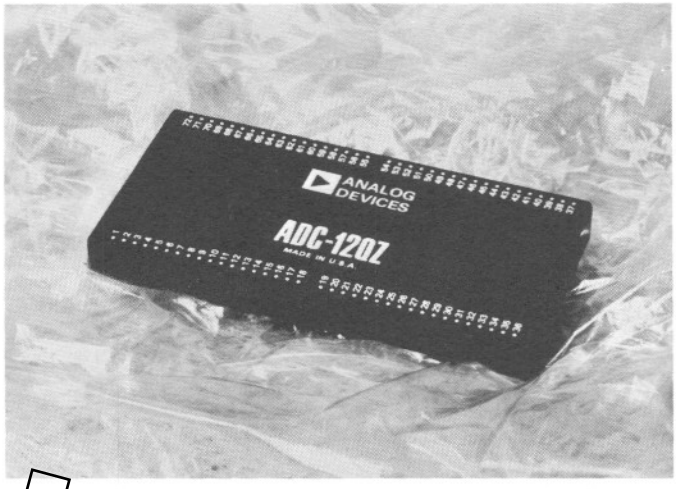
Low Cost General Purpose Analog-To-Digital Converter

ADC-12QZ

PRELIMINARY TECHNICAL DATA



FEATURES

- 12 Bit Resolution and Accuracy
- Very High Performance/Cost Ratio
- Monotonic from 0°C to +50°C
- 40μs Conversion Time
- Low Profile Module
- Parallel and Serial Outputs
- TTL/DTL Logic Levels
- User Selected Input Ranges
- Input Buffer Option Available

OBSOLETE

GENERAL DESCRIPTION

The ADC-12QZ is a 12-bit successive approximation type general purpose analog-to-digital converter that offers moderate speed and good performance at very low cost. Analog Devices' proprietary monolithic quad switches and a unique combination of thin film and hybrid technology have been incorporated in the ADC-12QZ, resulting in a converter that has the basic performance of a much higher priced unit. It is monotonic (no missing codes) from 0°C to +50°C, and has a maximum error of ±½LSB relative to full scale. The ADC-12QZ is packaged in a convenient, small, low profile module, and all of its logic inputs and outputs are fully TTL/DTL compatible.

EASY TO USE

The ADC-12QZ was designed specifically to make it easy to use. It contains its own temperature-compensated precision voltage reference, and any of four input ranges (0 to +10V, ±10V, 0 to +5V, ±5V) can be selected with jumpers and connections at the module terminals. If a high input impedance is required, the ADC-12QZ can be special ordered with an input buffer.

Binary output coding is used for unipolar operation, but for operation in the bipolar mode, the parallel output data can be either two's complement or offset binary at the user's option. The two codes differ only in that the MSB output (pin 72) is used for offset binary coding, while its complement, $\overline{\text{MSB}}$ (pin 70) is used for two's complement coding. STATUS, which indicates when the parallel output data is valid, and its complement, $\overline{\text{STATUS}}$, are both available.

A latched serial output having a nonreturn-to-zero (NRZ) format is taken from the output of a TTL flip-flop. The serial data is transmitted MSB first in binary code for unipolar operation and in offset binary code for bipolar operation. The STROBE output is used to synchronize the serial data with a receiving shift register.

TIMING

As shown in Figure 1, the leading edge ("0" to "1" transition) of the convert command pulse sets the STATUS and MSB outputs to the "1" state, and the outputs of bits 2-12 to "0". The conversion program begins on the trailing edge of the convert command pulse with the starting of the internal clock. The bit decisions are made on successive "1" to "0" clock pulse transitions, with the MSB decision occurring first. The 200ns wide strobe pulses are used to synchronize the transmission of serial data. Serial data bits are valid on successive leading edges ("0" to "1" transitions) of the strobe pulses. At the completion of the conversion, the STATUS output returns to zero, signaling that the parallel output data is valid.

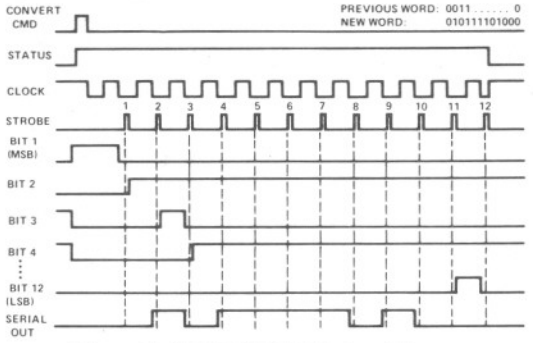


Figure 1. ADC-12QZ Timing Diagram

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HIGH PERFORMANCE GENERAL PURPOSE A/D CONVERTERS ADC-QM, ADC-QU

GENERAL DESCRIPTION

These converters are characterized primarily by high performance and general utility. The use of μDAC® monolithic quad switches with μDAC monolithic thin film resistance networks provide these converters with the best stability and linearity generally available. Prices are kept at moderate levels by large volume manufacturing.

ADC-QM

The ADC-QM is a high performance, general purpose A/D converter packaged in a low profile 2" x 4" module. It offers excellent stability over both time and temperature at moderate cost. It is complete with an input buffer, and the desired input range is selected by the user with jumpers and connections at the module terminals. The digital output code of the binary version is natural binary for a unipolar input, but is selected by the user to be either offset binary or two's complement with a bipolar input. The ADC-QM is available in 8, 10, and 12 bit versions.

ADC-QU

The ADC-QU is a modular analog-to-digital converter that is very similar to the ADC-QM, except that it offers an appreciably shorter conversion time. The 12 bit version performs a conversion in 15μs maximum. The ADC-QU's speed is the result of the use of Analog Devices' AD551 μDAC® high speed quad current switches in its internal DAC. The ADC-QU is pin-compatible with the ADC-QM, and in most applications can serve as a direct plug-in replacement for it. When mounted on an AC4451 mounting card, the ADC-QU becomes a pin-compatible substitute for the older model ADC-U.

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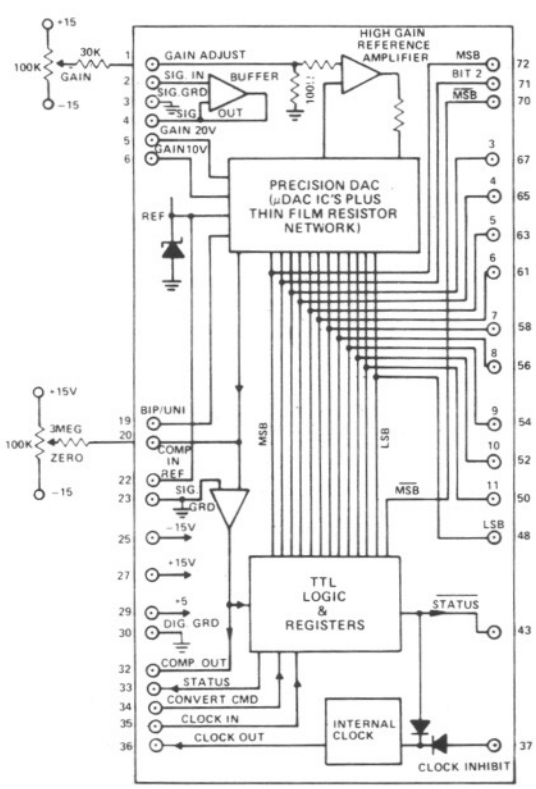
BLOCK DIAGRAM ADC-QM & ADC-QU



Note: In the ADC-8QM and ADC-8QU, bit 8 is the LSB, and pins 48, 50, 52 and 54 are deleted. In the ADC-10QM and ADC-10QU, bit 10 is the LSB, and pins 48 and 50 are deleted.

DATA ACQUISITION APPLICATIONS

An ADC-QM or an ADC-QU can be combined with a SHA-1A or SHA-2A sample-and-hold amplifier, and one or more MPX-8A multiplexers to form a data acquisition subsystem. The table below shows the maximum throughput rates (conversions/sec) that can be achieved using various combinations of these products. The settling time of the MPX-8A does not affect the throughput rate because it can be settling on a new input signal at the same time the A/D converter is converting the signal being held constant by the sample-and-hold amplifier.

ADC	SHA	MAX. THROUGHPUT RATE
ADC-12QM	SHA-1A	34kHz
ADC-12QM	SHA-2A	39kHz
ADC-12QU	SHA-1A	50kHz
ADC-12QU	SHA-2A	67kHz

ORDERING GUIDE: ADC-QM and ADC-QU

ADC-XX	XX	/XXX

No. of Bits	Series	Output Code
8	QM	BIN (binary)
10	QU	BCD (binary)
12		coded decimal)

SPECIFICATION SUMMARY (Typical @ +25°C unless otherwise noted)

Model	ADC-QM	ADC-QU
Resolution, Bits	8, 10, 12	*
Linearity Error	±½LSB	*
Analog Input Ranges[1] (Volts)	±2.5, ±5, ±10, +10, +5	*
Input Impedance		
Without Buffer[2]	2.5k – 10k ohms	*
With Buffer	10^8 ohms	*
Conversion Time	18μs 22μs 25μs	6.4μs 8μs 15μs
Digital Control Inputs & Outputs	TTL/DTL Compatible	*
Data Outputs	TTL Positive True	*
Output Codes		
Standard	BIN, OBN, 2SC	*
Optional	BCD	
Status or Busy Output	"1" During Conversion	*
Serial Data Output	No	Yes
Temperature Coefficient		
Gain (of Reading)	5ppm/°C	*
Offset (Unipolar)	50μV/°C	*
(Bipolar)	75μV/°C	*
Power Required	+15V @ 25mA	+15V @ 25mA
	-15V @ 35mA	-15V @ 50mA
	+5V @ 200mA	+5V @ 300mA
Package Style	C-3	*
Package Size	2" x 4" x 0.4"	*
Price (1–9)	ADC-8QM $250.	ADC-8QU $260.
	ADC-10QM $280.	ADC-10QU $290.
	ADC-12QM $305.	ADC-12QU $315.

[1] The desired input range is selected by the user with connections and jumpers at the module terminals.
[2] Input impedance without buffer is proportional to input voltage range.
*Specifications same as for ADC-QM.

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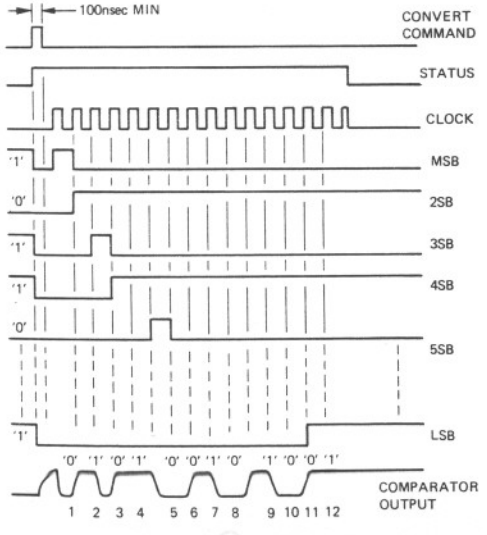
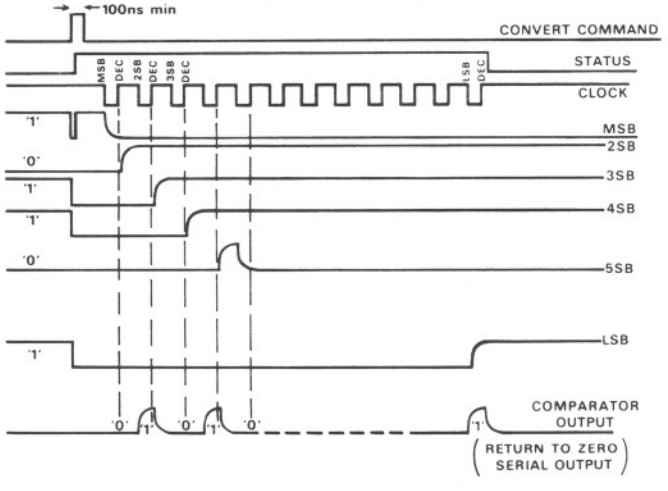
TIMING DIAGRAM ADC-QM

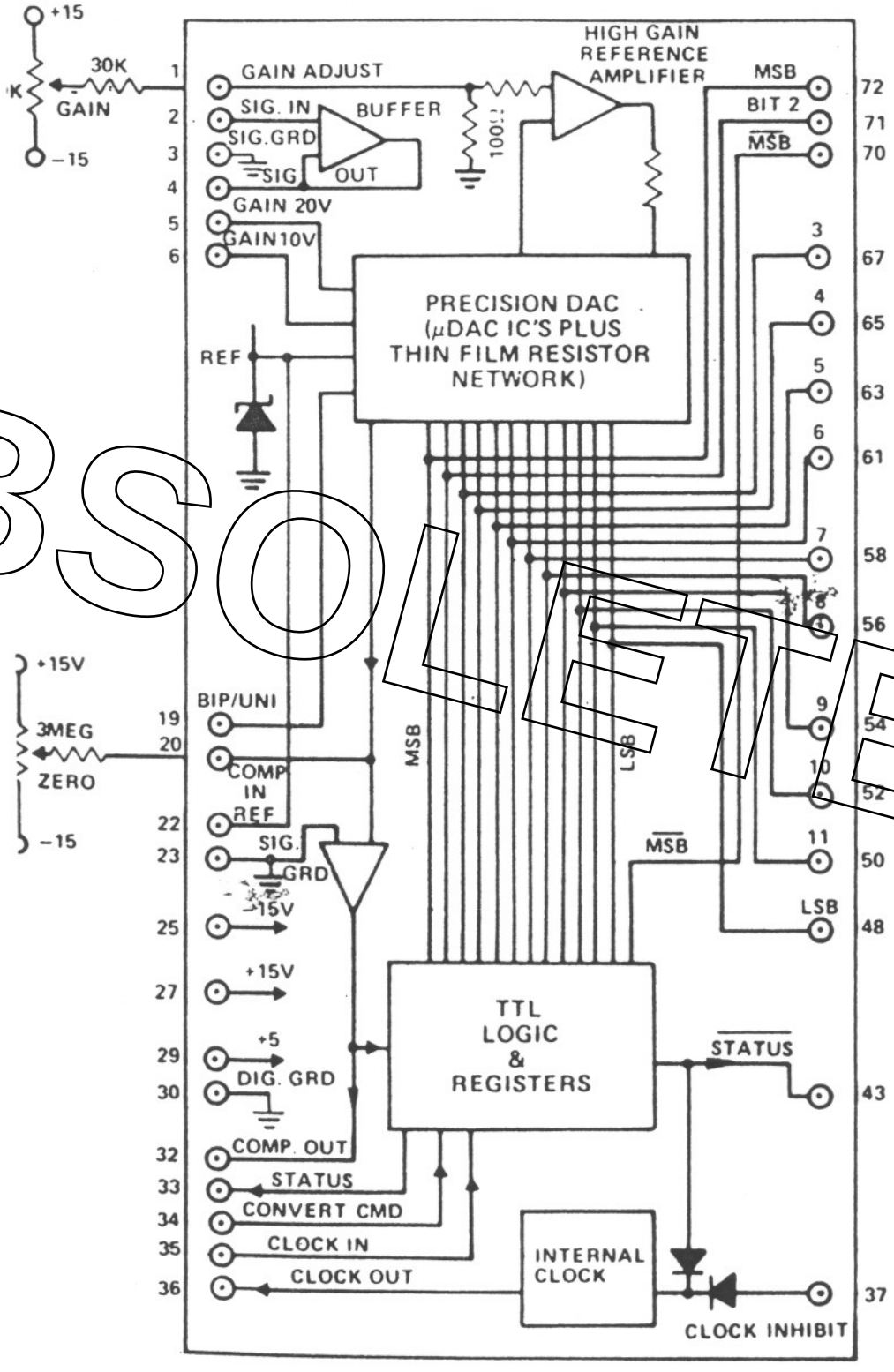


TIMING DIAGRAM ADC-QU



PREV CODE: 10110...1 NEW CODE: 01010...1

BLOCK DIAGRAM
ADC-QM & ADC-QU



OBSOLETE

:: In the ADC-8QM and ADC-8QU, bit 8 is the LSB, pins 48, 50, 52 and 54 are deleted. In the ADC-10QM ADC-10QU, bit 10 is the LSB, and pins 48 and 50 leleted.