

MSI IBM PC Embedded PC Series

MSI-4000 ISOLATED ANALOG INPUT CARD

APPLICATIONS

- ◆ Isolation of analog inputs for signal processing in harsh industrial environments.
- ◆ Elimination of troublesome ground loops associated with analog signal inputs.
- ◆ Protection of monitoring equipment from electrical surges and large common-mode voltages.
- ◆ Excitation of transducer transmitters for thermocouple, RTD, and strain gauge inputs.
- ◆ RTU, SCADA, and data monitoring for IBM PC's and compatibles.

DESCRIPTION

The MSI-4000 isolated analog input card is designed for acquiring analog data in harsh electrical environments with IBM PC/XT/AT personal computers and compatibles. The unit is particularly useful in RTU, SCADA, and monitoring and control applications. Commonly encountered ground loop currents and voltages and large common-mode voltages associated with industrial monitoring applications are eliminated by onboard circuitry. The unit is implemented on a 4-layer half-width card using low-power CMOS components for operating in a temperature range of -25°C to 85°C .

The card provides four isolated input channels by utilizing individual onboard dc-to-dc converters for powering isolation amplifiers on each channel. These power converters are also designed to source 20 mA at a minimum of 12 VDC for exciting transducer transmitters such as thermo-couple, RTD, and strain gauge sensors for temperature, pressure, level, flow, etc. measurements. Seven commonly used input voltage and current ranges are individually jumper selectable with span and zero potentiometer adjustments. A 4-channel successive approximation analog-to-digital converter provides data to the computer.

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FEATURES

- ◆ Four isolated 12-bit differential analog input channels.
- ◆ Conversion accuracy of ± 1 LSB.
- ◆ Selectable input ranges of 0-20 mA, 4-20 mA, 0-1V, 0-5V, 0-10V, ± 5 V, and ± 10 V.
- ◆ Active 20 mA inputs for powering transducer transmitters.
- ◆ Conversion rate of 6,000 samples/second.
- ◆ Isolation voltage of 750V from input-to-input and input-to-PC BUS.
- ◆ Maximum overvoltage of 100V with surge protection on all inputs.
- ◆ Isolation-mode rejection (IMR) of 140 dB @ 60 Hz.
- ◆ Operating temperature range -25°C to 85°C .
- ◆ Simple software sequences for data input.
- ◆ Complete hardware documentation with schematics supplied with MSI-4000 User Manual.
- ◆ Low power CMOS design using a half-width 4-layer printed circuit board.
- ◆ 100% testing and 48-hour burn-in.
- ◆ One-year warranty from date of shipment.

Card addresses are switch selectable in the hexadecimal range from 0 to 3FF. Interrupt requests IRQ2, IRQ3 and IRQ5 are also switch selectable for processing conversions under interrupt control. Analog inputs are provided via a standard DA-15P connector. Complete hardware documentation with schematics are supplied with the *MSI-4000 User Manual*.

SOFTWARE

The MSI-4000 software drivers required for processing input data are simple sequences producing a start conversion command, a status check command, and a read data command. These sequences can be implemented under interrupt control if desired. The start conversion command is a write to the channel LO register. A polled ready status equal to 0 is present in bit 7 of the channel HI register, and data is read from the channel HI register bits 11 thru 8, most significant bits) and the channel LO register (bits 7 thru 0). The register addresses are

Channel	LO Reg Addr	HI Reg Addr
0	base	base+1
1	base+2	base+3
2	base+4	base+5
3	base+6	base+7

where base is the card address selected by the card address switches. A sample BASIC program for data input at hexadecimal card address 300 is

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100 BASE=&H300           'set Base
110 FOR I=0 TO 3         'select chan I
120 OUT BASE+2*I,0       'start convert
130 A=INP(BASE+2*I+1)    'input status
140 IF A>&H7F THEN GOTO 130 'READY?
150 IDATA(I)=(A AND &HF)*256+INP(BASE+2*I)
160 NEXT I

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Sample programs for assembly language and 'C' compilers are given in the *MSI-4000 User Manual*.

SPECIFICATIONS

Analog Inputs

Channels	4 Differential Input
Converter Type	12-Bit Successive Approximation
Accuracy	±1 LSB
Conversion Rate	6000 cps maximum
Isolation Voltage	750V Input-to-Input 750V Input-to-PC Bus
Maximum Overvoltage	100V
Isolation-mode Rejection (IMR)	140 dB @ 60 Hz
Coding	Binary
Input Ranges	0-20 mA, 4-20 mA, 0-1V, 0-5V, 0-10V, ±5V, and ±10V
Surge Suppressor	Varistor/capacitor with series resistor.

Power Consumption

+5V @ 200 mA maximum
+12V @ 20 mA maximum
-12V @ 20 mA maximum

Environmental

Operating Temperature -25° C to 85° C.

Physical Parameters

Size	6.5" x 4.5"
Input Connector	DA-15P

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MICROCOMPUTER SYSTEMS, INC

1814 Ryder Drive • Baton Rouge, LA 70808 • Phone (225) 769-2154 • Fax (225) 769-2155
Email: microcom@premier.net <http://www.microcomputersystems.com>