

# **MSI STD BUS Embedded Series**

# **MSI-C988 V20 (80C88) Universal SBC CARD**

## **APPLICATIONS**

- ◆ Ideal for low-power embedded applications requiring a single board computer (SBC) with multi-function capabilities requiring only +5V power at 50 mA.
- ◆ Realtime monitoring and control operations in harsh industrial environments.
- ◆ RTU and SCADA systems.
- ◆ Test and measurement instruments.

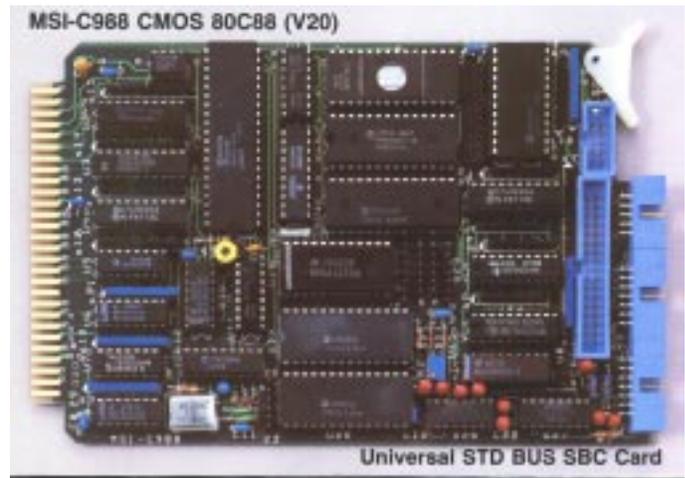
## **DESCRIPTION**

The MSI-C988 is designed for embedded applications including RTU, SCADA, test and measurement instruments, and monitoring and control tasks requiring low power and withstanding harsh industrial environments.

The card incorporates a CMOS V20 processor and operates from a single +5V supply. The card provides up to 32K Bytes each of onboard PROM and RAM (type 27C64/27C256 and 6264/62256) and a MM58167A real time clock with battery back-up for the RAM and clock (battery power supplied off board via backplane pin 5). Two 82C52 CMOS UARTs produce RS-232C serial I/O ports with BAUD rates from 110 to 38,400 via 14-pin connectors (T&B Ansley 609-1407 or equivalent). An 82C54 provides three programmable timers or counters with I/O supplied by a 10-pin connector (T&B Ansley 609-1007). An 82C59A programmable interrupt controller provides 8 interrupts that are cascadable to 64 via a 10-pin connector.

Eight parallel outputs, sixteen parallel inputs and an optional analog input are provided using a 34-pin connector (T&B Ansley 609-3407). The optional analog input gives 10-bit conversion using a National Semiconductor ADC 1005 converter. The analog input range is 0-5V. Other input ranges are available. Request the *MSI-C988 User Manual* for detailed information.

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## **FEATURES**

- ◆ V20 (80C88) CMOS microprocessor.
- ◆ Up to 65,536 Bytes of onboard PROM/RAM.
- ◆ MM58167 real time clock with calendar.
- ◆ Battery back-up circuitry for real time clock and RAM.
- ◆ Two RS-232C serial ports from 110 to 38,400 BAUD.
- ◆ 24 parallel TTL I/O lines (16 In/8 Out).
- ◆ Three 16-bit programmable counter/timers.
- ◆ 82C59A cascadable interrupt controller.
- ◆ Optional 10-bit analog input (0-5V standard).
- ◆ Single +5V supply at 50 mA typical.
- ◆ Software development on IBM PC using assembly language or C compiler.
- ◆ On board execution monitor PROM for use with IBM PC in program development.
- ◆ All IC's socketed & low-profile PCB connectors.
- ◆ Low power CMOS design using a standard size STD BUS 6-layer printed circuit board.
- ◆ 100% testing and 48-hour burn-in.
- ◆ One-year warranty from date of shipment.

## SOFTWARE SUPPORT

An IBM PC becomes a powerful development station using the MSI-C988M Monitor PROM and an RS-232C serial port of the MSI-C988. A floppy disk provides drivers for downloading programs generated on the IBM PC into the C988. C compilers, such as the Aztec C compiler, available from MANX, allows the user to write C programs that can be located absolutely and programmed into PROM following development and debugging in RAM. The process produces very efficient code that is independent of the MS DOS environment. Assembly language programs can also be developed in a similar manner.

The execution monitor provides numerous functions for debugging programs in the C988 hardware including memory, register and I/O operations, upload and download operations with an IBM PC, arithmetic operations, and breakpoint execution for two breakpoints. Request the *MSI-C988M User Manual* for detailed information.

## SPECIFICATIONS

### Processor

NEC V20 (80C88)  
Clock Frequency - 5 MHz

### Onboard Memory

RAM Type	HEX Address
6264	00000-01FFF FE000-FFFFFF
62256	00000-07FFF F8000-FFFFFF
PROM Type	HEX Address
27C64	FE000-FFFFFF
27C256	F8000-FFFFFF

### Interrupt Controller

82C59A - 8 interrupt inputs cascadable to 64

### Real Time Clock

58167A - Time-of-day & calendar

### Programmable Interval Timer

82C54 - Three 16-bit counter/timers

### Parallel I/O Ports

74HC244 - 16 TTL input lines  
74HC374 - 8 TTL output lines

### Serial I/O Ports

82C52 - 2 RS-232C ports with MAX232 buffers  
BAUD rate - 110 to 38,400

### Analog Input (Optional)

ADC1005 10-bit A/D Converter  
Input range = 0-5V (other ranges on request)  
Accuracy =  $\pm$ LSB, Conversion time = 50  $\mu$ s

### Power Requirement

+5V @ 50 mA typical.

### Environmental

Operating Temperature -25° C to 85° C

### Physical Parameters

Size 6.5" x 4.5"



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