

# **Cambridge Microprocessor Systems Limited**

## **3 Channel Serial**

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## 1. Introduction

The intelligent Three Channel Serial card is one of Cambridge Microprocessor Systems range of intelligent I/O cards. It uses the Micro-Midget controller board as the CPU engine which is plugged into a mother board containing the specialist I/O. The Micro-Midget uses Motorola's 68307 microcontroller, containing two 16-bit timer counters and a single serial port. This serial port can be used for communications using either RS-232 or RS-485 protocols depending on the serial buffers fitted to the Micro-Midget.

The board is available in several different forms. The basic board is supplied as a system CPU board featuring three serial ports. In this form two of the serial ports are configured as RS-232 serial ports for communication to devices such as PC's. The third serial port can be optionally a third RS-232 port or an RS-485 half duplex network port. The second version allows the board to be configured as one RS-232 port, one RS-232/RS-485 port and one port for direct connection to a Global Positioning System (GPS). Both versions of the board can be supplied with an optional power supply unit. This will allow the board to be powered from a d.c. supply or an a.c. supply.

## 2. Features

### 2.1. Controller

Micro-Midget CPU Engine  
68307 68000 compatible microcontroller  
7.3728 MHz operation (14.7456 MHz option)  
Up to 1 M-byte of EPROM on board  
Up to 512 k-byte of Static RAM on board  
Numerous low power modes

## 2.2. Serial Ports

Two full duplex RS-232 serial ports  
One full duplex RS-232 / half duplex RS-485 network  
Independent control of serial parameters  
Independent control of baud rates  
Hardware handshaking available on all RS-232 ports  
Automatic tristate control on RS-485 network port  
Auto wakeup on CPU serial port

## 2.3. Timer/Counters

Two independent 16-bit timer counters  
Interrupt on reference reached  
Interrupt on capture

## 2.4. Power Supply (optional)

Inputs  
7 - 35 Volts d.c.  
5 - 24 Volts rms a.c. 50/60 Hz  
Output  
5 Volt d.c. @ 1 Amp

## 3. Address Map

The memory map for the Intelligent 3 channel serial card is the same as that for the Micro-Midget. The address of the two 85C30 serial ports can be selected using the switch on the card. This will allow the card to be used with other serial ports such as the 307-Module evaluation board or the K600 series of serial I/O cards. The table below shows the base address of the serial ports for each switch setting. The factory default value is setting 3 placing the base address of the serial ports at \$12FFF8. With the switch in this position the Minos device initialisation tables (DITs) for the two serial ports are S1 and S2. With the switch in position 2 the DITs are S3 and S4, position 1 S5 and S6 and finally position 0 S7 and S8.

<b>Switch Setting</b>	<b>Base Address</b>
<b>0 or 4</b>	<b>\$12FF98</b>
<b>1 or 5</b>	<b>\$12FFB8</b>
<b>2 or 6</b>	<b>\$12FFD8</b>
<b>3 or 7</b>	<b>\$12FFF8</b>

## **4. The Micro-Midget**

The Micro-Midget is a powerful 68000 based CPU board. It can be fitted with up to 1 M-byte of EPROM and up to 512k-byte of static RAM depending on your application. For full details on the Micro-Midget CPU engine please refer to the Micro-Midget Manual set. The full set on manuals for this module consist of the Hardware Manual which describes all the features of the controller and how to connect it up, the 68307 user manual from Motorola which goes into great detail about the 68307 controller, a Minos operating system manual and a software support manual, either Modula-2 or C depending on your choice of programming language. This product makes use of the serial port, M-bus (or I<sup>2</sup>C bus), the bus interface circuitry and the two 16-bit timer/counters. The digital I/O lines available on the Micro-Module are not brought out to connectors on the Intelligent 3 Channel serial card. By default only NMI and I3 (pin a22 on the bus connector) is enabled as an interrupt source.

## **5. The Serial Ports**

This card has a total of three asynchronous serial ports.

Port S0 or TERM is operated by the serial port on the Micro-Midget. This serial port is equivalent to a 68681 type serial port as so requires the driver for such a serial port. In Minos systems this is called dr68681. It can be operated at baud rates between 50 and 38400 baud with the Micro-Midget running at 7.3728 MHz. Data lengths can be varied between 5 and 8 bits, parity may be odd, even or none and the number of stop bits can be programmed to be either 1, 1½ or 2.

The other two serial ports, S1 and S2 are based on a 85C30 type DUART. The Minos driver for this device is called dr8530. The serial ports can be set up to operate over the same sets of parameters as the terminal port. The 85C30 is clocked using a 3.6864 MHz crystal to allow it to generate the correct baud rates. The PCLK signal for this device is  $\frac{1}{4}$  the speed of the clock for the Micro-Midget.

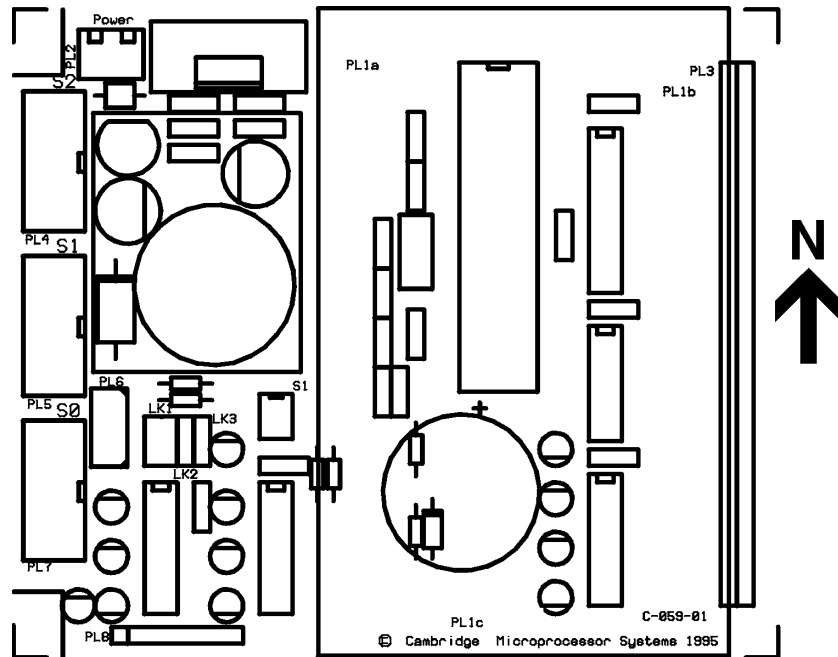
When used with RS-232 buffers all three serial ports can be connected directly to a 9 pin PC serial port using a 10 way IDC cable. Pin 10 on the connector does not get connected to a PC. To connect to a device such as a printer or a bar code reader the RTS/CTS and RXD/TXD signals will need to be swapped over. Serial ports S1 and S2 feature a link option to allow the hardware handshaking to be disabled. If this option is used the terminal will need to be configured appropriately. The CMS terminal program "Target" does expect the hardware handshaking to be enabled.

## 6. Power Supply

The Intelligent 3 Channel Serial card can be supplied with a power supply fitted. If this option is fitted then the board can be powered from a wide range of supplies. As long as the power supply to the board is in the range 7 to 35 Volts d.c. or 5 to 24 Volts a.c. the on board switch mode regulator will supply a clean 5 Volt supply to power the board. This power supply can supply up to 1 Amp in total. The +/- 12 Volt supplies are not driven by the power supply, if these are required then a second supply must be used. Because the input is full wave rectified the power supply can be connected to PL2 with either polarity.

The power supply is based around a LM2575 switch mode regulator. The input and output filtering on the power supply is designed to prevent noise being transmitted on the power supply lines. All the switching components are located within a metal rf screening can. The heatsink for the regulator is designed to screen this device.

## 7. Board Layout



## 8. Links

### 8.1. Port Select, LK1

This link is used to determine which serial port connector the third serial port is connected to. It is a 6 way link which can be fitted in three positions for the three different sources.

## **8.2. Handshake disable Port 2, LK2**

This 3 way link can be used to disable the hardware handshaking for serial port 2 (S2). If this link is fitted north then the hardware handshaking is disabled, if it is fitted south then the handshaking is enabled.

## **8.3. Handshake disable Port 1, LK3**

This 3 way link can be used to disable the hardware handshaking for serial port 1 (S1). If this link is fitted north then the hardware handshaking is disabled, if it is fitted south then the handshaking is enabled.

# **9. Connectors**

## **9.1. Micro-Midget, PL1**

This is a three part connector which allows the Micro-Midget to be plugged into the card. For full details on these connectors please refer to the Micro-Midget hardware manual.

## **9.2. Power Supply, PL2**

This is a two terminal screw connector to allow bare wires to be used to power the card. As the input from this connector is full wave rectified it does not matter which polarity the power supply is connected. If the power supply is fitted the input to the board can be in the range 7 to 35 Volts d.c. or 5 to 24 Volts a.c. If the power supply is not fitted then the input must be between 4.7 to 5,25 Volts d.c. only.

## **9.3. Module Bus Connector, PL3**

Row B	Pin Number	Row A
D0	1	D8
D1	2	D9
D2	3	D10

D3	4	D11
D4	5	D12
D5	6	D13
D6	7	D14
D7	8	D15
GND	9	GND
CLK	10	SCL
GND	11	A17
DS1	12	NRST
DS0	13	A18
WRITE	14	A19
A20	15	A0
DTACK	16	A21
GND	17	A22
PAS	18	NMI
MAS	19	N/C
A23	20	I5
IACK	21	I4
A16	22	I3
SDA	23	A15
A7	24	A14
A6	25	A13
A5	26	A12
A4	27	A11
A3	28	A10
A2	29	A9
A1	30	A8
-12 Volts	31	+12 Volts
VCC	32	VCC

A0 - A23      68000 Address Bus  
 D0 - D15      68000 Data Bus  
 DS0 - DS1    68000 Lower & Upper Data Strobes  
 WRITE        68000 Write Strobe  
 DTACK        Data Acknowledge  
 SDA           M-bus (I<sup>2</sup>C) Data Line  
 SCL           M-Bus (I<sup>2</sup>C) Clock Line

### 3 Channel Serial

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NMI	Non Maskable Interrupt
I3 - I5	Open Collector Interrupt Input (I3 only enabled)
NRST	Peripheral Reset Signal

Note that +/-12 Volts are not used on the Intelligent Serial Card.

#### 9.4. RS-232 Serial Ports , PL4 & PL5

These two serial ports allow 9 pin PC Serial ports to be connected directly to the Intelligent 3 Channel Serial ports. The recommended method of connection is to use a 10 pin IDC socket, a 9 pin IDC cable and a 9 pin IDC D socket. Pin 1 of the cable should be connected to pin 1 on both connectors. Pin 10 on the 10 pin IDC socket should not be connected.

N/C	10	9	GND
N/C	8	7	N/C
RTS	6	5	RXD
CTS	4	3	TXD
VCC	2	1	N/C

#### 9.5. GPS Connector, PL6

This connector allows a particular GPS unit to be plugged into the Intelligent 3 Channel Serial board. A mating part will be a 8 way 2mm pitch connector.

GND	8	7	N/C
N/C	6	5	RXD
Vbat	4	3	TXD
VCC	2	1	VCC

#### 9.6. RS-232/RS-485 Serial Port, PL7

This connector allows a serial device to be connected to the serial port on the Micro-Midget. Depending on the setting of the serial link

and the buffers fitted to the Micro-Midget this serial port will support either RS-232 or RS-485 communications.

A	10	9	GND
B	8	7	N/C
RTS	6	5	RXD
CTS	4	3	TXD
VCC	2	1	N/C

RXD	RS-232 Receiver Input
TXD	RS-232 Transmitter Output
RTS,CTS	RS-232 Handshaking lines
A,B	RS-485 Data lines

### 9.7. Secondary GPS, PL8

This connector allows another GPS unit to be interfaced to the 3 channel serial port connector.

TX (MCT)	8
RX (MCT)	7
TX (SP)	6
RX (SP)	5
RX (GPS)	4
TX (GPS)	3
GND	2
Vin	1

Vin is connected to the regulated output from the Power input connector.

## 10. Specification

Processor Unit  
68307 Micro-Midget  
7.3728 MHz operation (14.7456 MHz option)

### 3 Channel Serial

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Up to 1 M-byte of EPROM/Flash Memory  
Up to 512 k-byte Static RAM  
2 16-bit timer counters

#### Serial Ports

2 RS-232 Serial Ports  
1 RS-232/RS-485 Serial Port  
Independent baud rate selection, 50 to 38400 baud  
Independent data format, parity, data bits, stop bits  
Hardware handshaking on RS-232 ports  
PC Compatible serial interfaces  
Auto tristate enable of RS-485 port  
Multidrop networking using RS-485 port  
10 pin IDC boxed header

#### Bus Interface

Standard Module Bus interface  
Module Bus controller card  
4 Address options  
A24:D16  
DIN41642 64 way ab plug

#### Power Supply

Inputs  
7 to 35 Volts d.c.  
5 to 24 Volts a.c.  
Output  
5 Volts @ 1 Amp

#### Battery (if fitted)

Battery backup for GPS unit  
Vanadium Lithium 20mAh VL2020/1HF

#### Physical

118 x 100 x 30 mm  
0 to 60 degC  
0 to 90% RH (non condensing)