

## Memory Card Interface Data Sheet

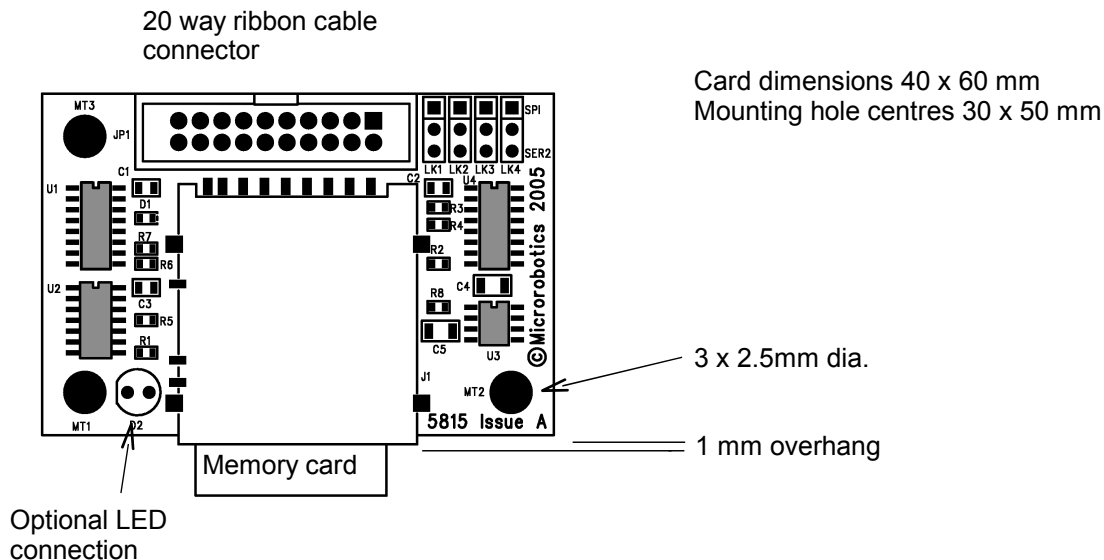
### Introduction

The 5815 Memory Card interface enables MMC (Multimedia Card) and SD (Secure Data) cards to be used with the Micro-Robotics VM-1 Controller. It can be attached to a Breakout Board (product code 5805) or Application Board 3 (product code 5811) via a short ribbon cable after fitting a suitable header to the application board.

Two different interface options can be used, one offering high speed using the VM-1's serial port 2 connections, the other leaving serial port 2 free for normal use.

The 5815 can easily be mounted on a bracket so the memory card aperture aligns with a front panel slot, or on pillars on a parallel flat surface.

### Mechanical



Note: the Issue B card differs only in component layout. Dimensions and functions are identical.

### Connection Kit

A connection kit, product code 5817, is available separately, comprising a short ribbon cable and 20 pin header to mount on a Micro-Robotics application board. You will need this if you do not source these components or their equivalents separately. We do not supply it with the memory card interface because final applications vary in cable length requirements, but we recommend that you purchase at least one for initial development and evaluation of the memory card interface.

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## Installation

To use the memory card interface you will need:

- VM-1 Control Module 5800 or 5801
- Suitable application board such as 5805 breakout board or 5811 module board
- Ribbon cable and 20 pin header (see Connection Kit above)
- Other components as required for use of application board (power supply, serial cables etc.)

## Connection

You can attach an external front panel LED to the position marked D2. This duplicates the function of the onboard LED.

Solder the pin header strip to pins 19-38 of JP4 on the application board. There should be marker pips printed on the board by pins 19-20 and 37-38 which help to locate the header correctly. See Illustration.

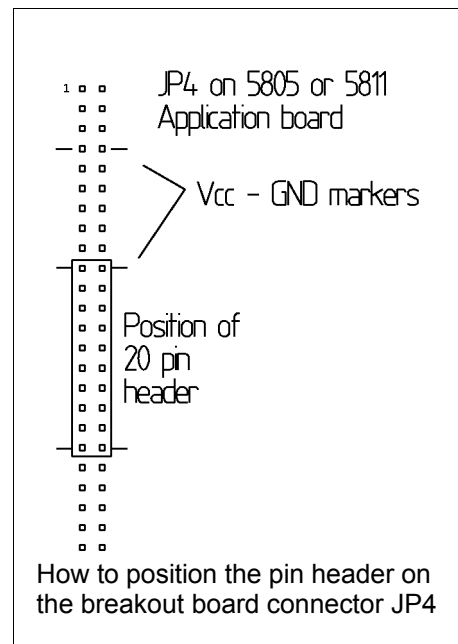
Connect the ribbon cable from this header to the box header on the memory card interface, making sure pin 1 in the memory card interface goes to pin 19 on application board JP4.

Optionally mount the card to your hardware using the mounting holes provided.

If you are already using asynchronous serial port 2, you must use the SPI connection for the memory card.

If you do not need asynchronous serial port 2 in your application, you can use its data lines as a higher speed connection for the memory card. To do this on a 5811 application board you must remove the serial interface IC U4 from its socket on the application board.

Follow the configuration instructions below for your chosen connection method.



## Jumper Configuration

- To use the SPI connection, set all four jumpers to the position marked SPI on the board
- To use the higher speed serial port 2 connection, set all four jumpers to the position marked SER2, and remove IC U4 from application board if you are using the 5811 application board.

## Software Configuration

SPI connection:

```
MAKE fs FileSystem("MMC", 0, 0)
```

SER2 connection:

```
MAKE fs FileSystem("MMC", 1, 0)
```

Note that the string "MMC" is equally valid for SD cards: both are operated in SPI mode.

See the Venom-SC help file or PDF documentation for details on use of the file system.

The third parameter can be omitted and defaults to 0. It can be used to select a partition, though it is rare for a memory card to have more than 1 partition on it.

## Specification

The card uses I<sup>2</sup>C bus 1 for control of the activity LED and for detection of the card state.

A PCF8574A I<sup>2</sup>C digital I/O chip provides these functions. The chip is on I<sup>2</sup>C Bus 1 address 124 (equivalent to VM-1 digital channels 240 – 247) and the digital I/O connections are assigned as in the table below. You should not attach any other device with the same address to I<sup>2</sup>C bus 1.

Chan 240	Bit 0	Card removed = H (1)
Chan 241	Bit 1	Card write protected = H (1)
Chan 242	Bit 2	Clear card removed latch : Pulse L (0)
Chan 243	Bit 3	Power control: L (0) = power on (controls 3.3V regulator that powers memory card)
Chan 244	Bit 4	"Busy" LED : L (0) = LED on

The "card removed" state is set when a memory card is not present and remains set even if a card is then inserted, until the latch is cleared by software command.

The interface to the memory card itself uses SPI mode. There are two possible groups of VM-1 ports that can be used for the SPI connection:

- Software driven SPI using channels 7, 21, 22 and 23
- Serial port 2, using channels 25, 26, 27, 28 (faster but uses serial port 2)

## Ribbon Cable Connection

VM-1 Application Board		Memory Card Interface	
Pin	Chan	Pin	Description
19	V <sub>CC</sub>	1	V <sub>CC</sub>
20	GND	2	GND
21	21	3	SPI D <sub>IN</sub> = MMC D <sub>OUT</sub>
22	7	4	SPI D <sub>OUT</sub> = MMC D <sub>IN</sub>
23	22	5	SPI CLK = MMC CLK
24	-	6	-
25	23	7	MMC/SD CS
26	9	8	I <sup>2</sup> C bus 1 SDA
27	-	9	-
28	10	10	I <sup>2</sup> C bus 1 SCL
29	25	11	SER2 HS <sub>IN</sub> = CS
30	-	12	-
31	26	13	SER2 HS <sub>OUT</sub> = CLK
32	-	14	-
33	27	15	SER2 RXD = MMC D <sub>OUT</sub>
34	-	16	-
35	28	17	SER2 TXD = MMC D <sub>IN</sub>
36	-	18	-
37	V <sub>CC</sub>	19	V <sub>CC</sub>
38	GND	20	GND

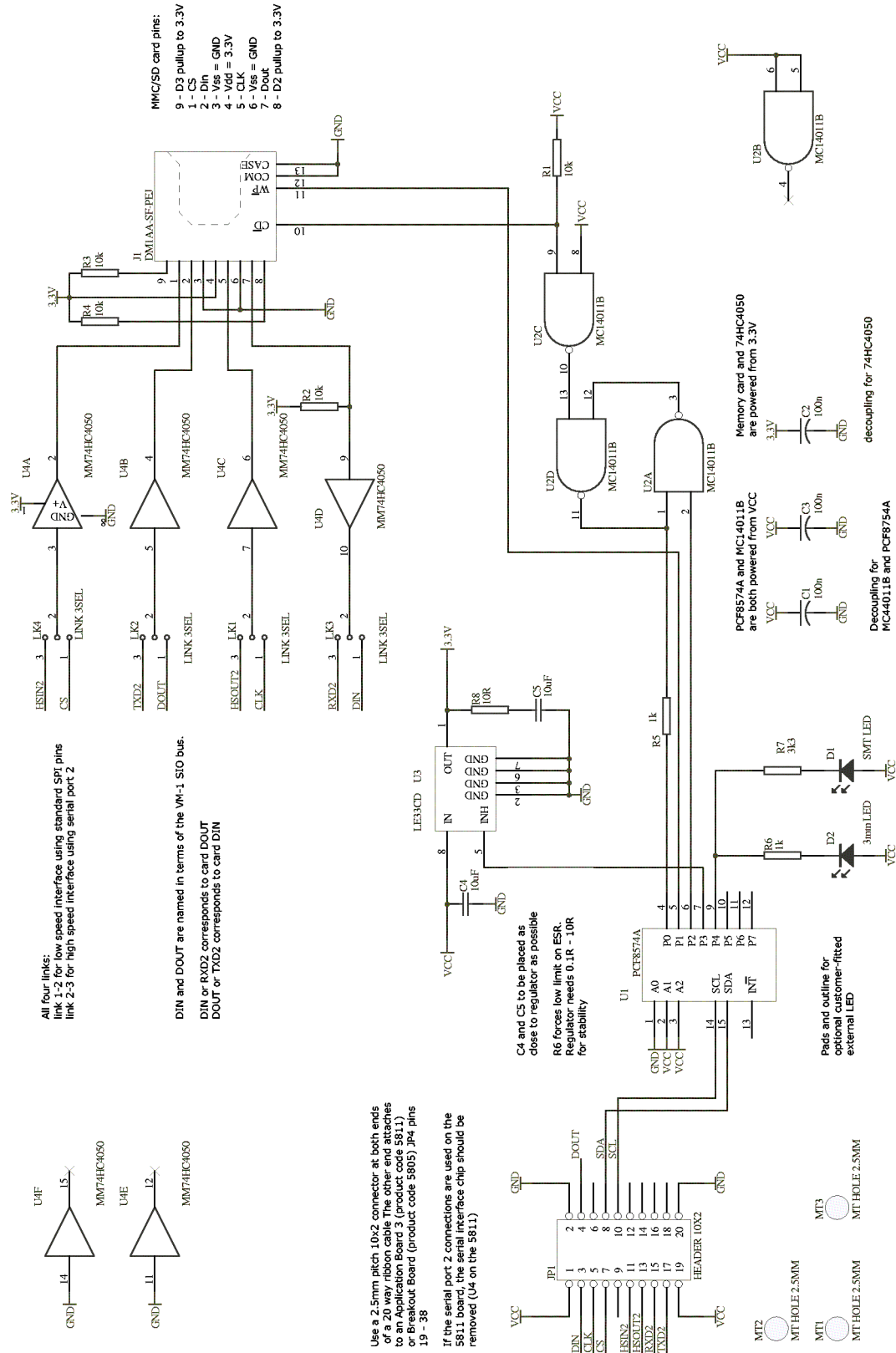
## Power

The current consumption of the memory card interface itself is less than 10mA from the 5V line.

The memory card uses 3.3V power regulated on board from the 5V supply.

Memory cards typically consume around 50mA when in operation – consult manufacturer's data for details. This figure is added to the 5V current consumption of the assembly.

# Schematic



Use a 2.5mm pitch 10x2 connector at both ends of a 20 way ribbon cable. The other end attaches to an Applikon Board 3 (Product code 5802), or Applikon Board (Product code 5802). J14 pins 19 - 38

If the serial port 2 connections are used on the 5811 board, the serial interface chip should be removed (U4 on the 5811)