DATASHEET

4D SYSTEMS

TURNING TECHNOLOGY INTO ART

Arduino Mini Display Shield with 2.2” Display / Breakout Board

4DLCDM-22

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Please refer to the 4D Systems website for the latest Revision of this document

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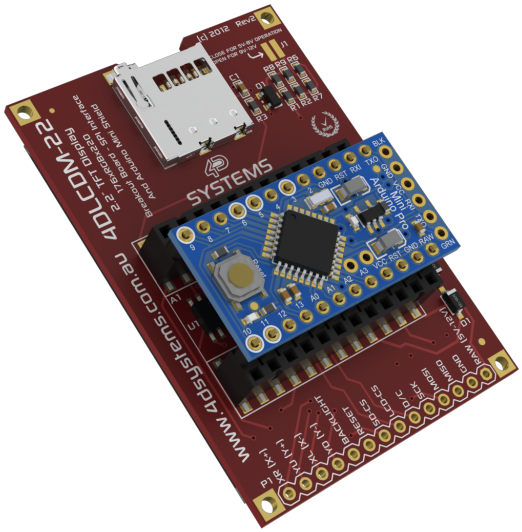
1. Description

The 4DLCDM-22 provides an easy way of connecting a display up to your Arduino Mini, or as a general purpose SPI Breakout display.

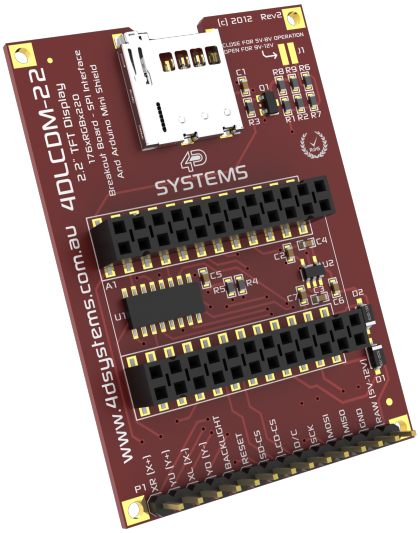
The 4DLCDM-22 features a 176 x 220 LCD-TFT display with a SPI interface for the Arduino Mini, or other suitable SPI host, along with a 4-wire resistive touch screen.

It features a uSD Card socket to provide the Arduino Mini with a means to store external data, with an SPI interface.

The communication interface between the 4DLCDM-22 and the Arduino Mini is a combination of the SPI bus, and the digital pins on the Arduino.



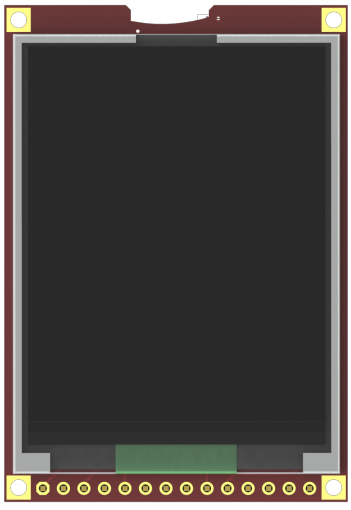
4DLCDM-22 Arduino Mini Shield



4DLCDM-22 as Breakout Board

2. Features

- On-board micro-SD memory card adaptor for storing of data, for the Arduino to read/write.
- Powered from the Arduino board (when Arduino Mini 5V version is used with FTDI cable), or an external 5 – 12V source (see 'Powering the 4DLCDM-22' section)
- 176 x 220 resolution, 262K true to life colours, LCD-TFT screen with SPI Interface.
- 2.2" diagonal size, Viewing Area: 49.4mm x 36.7mm.
- 4-wire Resistive Touch screen
- LED back lighting with greater than 150° viewing angle.
- RoHS Compliant.
- Compatible with Arduino Mini and Arduino Mini Pro, 5V versions only, the 3.3V Versions are not supported. (see 'Powering the 4DLCDM-22' section)
- Arduino Mini headers are soldered on the board, and a male 14x1 way 2.54mm header is provided separately, which can be soldered by the user if required.



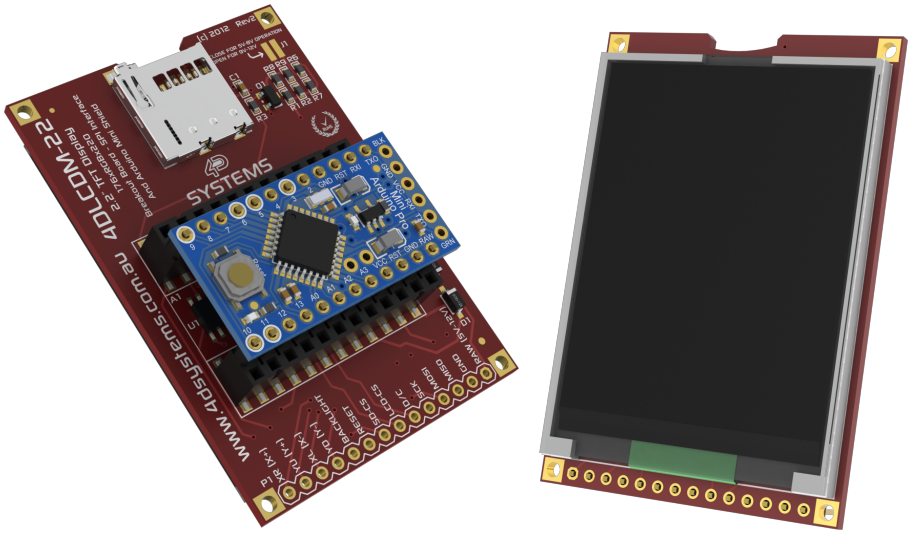
4DLCDM-22

3. Hardware Description

3.1. 4DLCDM-22 Arduino Mini Shield

The 4DLCDM-22 is an Arduino Mini Shield featuring a 2.2" LCD-TFT display with a resistive touch.
The 4DLCDM-22 provides an SPI interface to the Arduino Mini platform, allowing a quick and easy connection to your Arduino Project.

4D Systems has a simple library to get you started using this Shield, which includes an example sketch that demo's the key attributes of the library.



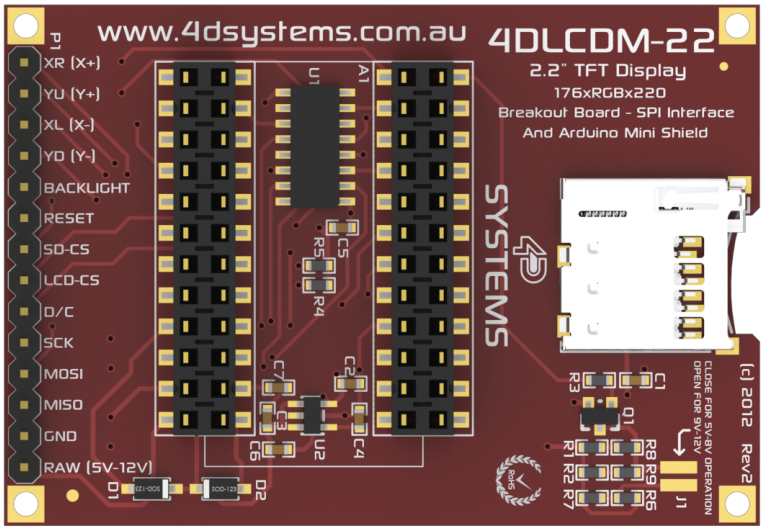
- The shield utilises the SPI bus connected to the Arduino, which are MOSI pin **D11**, MISO pin **D12** and SCK pin **D13**.
- The shield includes a uSD card socket, to provide the Arduino the means to access data stored on a uSD card. The uSD SPI Card Select pin is **D10**.
- The display on the 4Display-Shield-18 has an SPI interface, which is shared with the uSD card socket. The Display Card Select pin is **D6**.
- The display utilises an RS pin for selecting if data is written or if a command is written the display, utilising pin **D5**.
- There is also a display Reset pin which utilises pin **D8**.
- The control of the LCD Backlight is done with pin **D9**, which can have PWM applied to it if desired to adjust the brightness of the display.
- The resistive touch utilises Analog pins **A0** and **A1**, and Digital pins **D3** and **D4**.

If the 4DLCDM-22 is not required to be connected to an Arduino Mini, and is instead used as a general Breakout SPI Display, a 14x1 way 2.54mm header (included with the display) can be soldered onto the PCB and can plug in directly to a breadboard. Alternatively, wires can be soldered directly.

3.2. 4DLCDM-22 as SPI Breakout Display

A male 14x1 header has been included with the display, and can be soldered by the user if required. This header “breaks out” the signals which go to the Arduino Mini headers, so it can be easily plugged into a breadboard or wires attached.
All signals are 5V tolerant.

XR = X-Axis Positive Touch
YU = Y-Axis Positive Touch
XL = X-Axis Negative Touch
YD = Y-Axis Negative Touch
Backlight = Active High to Activate
Reset = Active Low to Reset
SD-CS = uSD Card Chip Select, Active Low
LCD-CS = LCD Chip Select, Active Low
D/C = Data/Command Select for SPI Data
SCK = SPI Bus Clock
MOSI = SPI MOSI
MISO = SPI MISO
GND
RAW = 5V to 12V Power Input



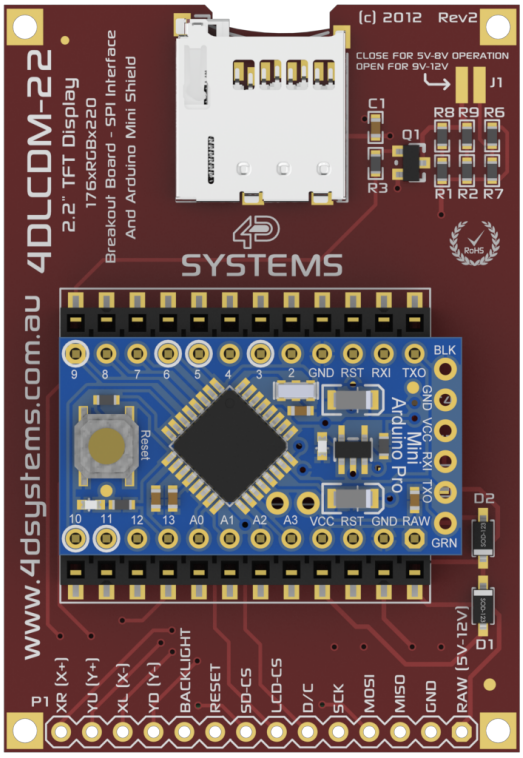
Please refer to the Arduino Library and Library Example which has been written for this display, to get an understanding of how this display should be programmed. This can be easily ported to another platform.

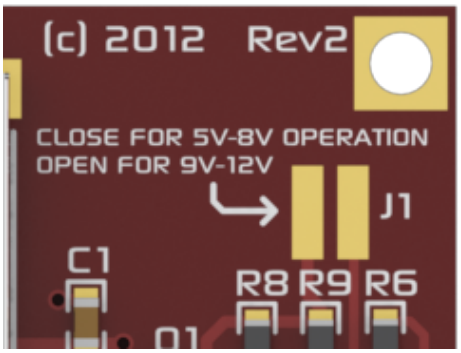
3.3. Powering the 4DLCDM-22

The 4DLCDM-22 is capable of being powered from 5 to 12V. It is capable of being powered from the 5V supply from your PC, via the USB/FTDI cable, or via an external source.

If powering the display via the Arduino Mini 5V FTDI cable or connector board, or with an external 5V – 8V source connected to the RAW pin, then Jumper 1 (J1) will need to be bridged with solder, otherwise the backlight of the display will be very dim.

If powering the display from an external 9V – 12V source connected to the RAW pin, then J1 needs to be open (un-soldered) – which is how the unit comes out of the box.





NOTE: having J1 soldered (closed) and 9-12V being applied to the board may damage the display on the 4DLCDM-22 and/or the PCB. Please have J1 unsoldered (open) when using 9-12V.

4. Library Overview

4.1. Library Functions

The following are functions made available to the Arduino using the 4D Systems Library. Please see the website to download this library, www.4dsystems.com.au

begin()
Initialise the display

---

clear()
Clears the display

---

invert(flag)
Inverts the display.
Parameters:
Flag = true to invert, false for normal.

---

setBacklight(flag)
Turns the backlight on or off.
Parameters:
flag = true for on, false for off.

---

setDisplay(flag)
Turns the display on or off.
Parameters:
flag = true for on, false for off.

---

setOrientation(orientation)
Sets the orientation of the display.
Parameters:
orientation = 0 Portrait, 1 Right Rotated Landscape, 2 Reverse Portrait, 3 Left Rotated Landscape.

---

uint16_t getOrientation()
Gets the current orientation of the display.
Returns:
0 = Portrait
1 = Right Rotated Landscape
2 = Reverse Portrait
3 = Left Rotated Landscape.

---

uint16_t fontX()
Gets the font size, x-axis.
Returns:
Horizontal size of current font, in pixels

---

uint16_t fontY()
Gets the font size, y-axis.
Returns:
Vertical size of current font, in pixels

---

uint16_t maxX()
Gets the size of the screen, x-axis.
Returns:
Horozontal size of the screen, in pixels.
Note: 128 means 128 pixels and thus 0..127 coordinates (decimal)

---

uint16_t maxY()
Gets the size of the screen, y-axis.
Returns:
Vertical size of the screen, in pixels.
Note: 160 means 160 pixels and thus 0..159 coordinates (decimal)

---

circle(x0, y0, radius, colour)
Draws a circle from x0, y0 center with specified radius and colour.
Parameters:
x0 = x-axis centre
y0 = y-axis centre
radius = radius of circle in pixels
colour = 16 bit colour

---

solidCircle(x0, y0, radius, colour)
Draws a solid circle from x0, y0 center with specified radius and colour.
Parameters:
x0 = x-axis centre
y0 = y-axis centre
radius = radius of circle in pixels
colour = 16 bit colour

---

setBackGroundColour(colour)
Sets the background colour of the display, default is Black.
Parameters:
colour = 16 bit colour

---

line(x1, y1, x2, y2, colour)
Draws a line from x1, y1 to x2, y2 with specified colour.
Parameters:
x1 = x-axis start pixel
y1 = y-axis start pixel
x2 = x-axis end pixel
y2 = y-axis end pixel
colour = 16 bit colour

---

rectangle(x1, y1, x2, y2, colour)
Draws a rectangle from x1, y1 to x2, y2 with specified colour.
Parameters:
x1 = x-axis start pixel
y1 = y-axis start pixel
x2 = x-axis end pixel
y2 = y-axis end pixel
colour = 16 bit colour

---

solidRectangle(x1, y1, x2, y2, colour)
Draws a solid rectangle from x1, y1 to x2, y2 with specified colour.
Parameters:
x1 = x-axis start pixel
y1 = y-axis start pixel
x2 = x-axis end pixel
y2 = y-axis end pixel
colour = 16 bit colour

---

point(x1, y1, colour)
Draws a pixel at from x1, y1 with specified colour.
Parameters:
x1 = x-axis pixel
y1 = y-axis pixel
colour = 16 bit colour

---

text(x0, y0, string, textColour, backColour, x-multiplier, y-multiplier)
Draw ASCII Text at the pixel coordinates with set colours and size.
Parameters:
x0 = x-axis pixel
y0 = y-axis pixel
string = text string
textColour = 16 bit colour of Text
backColour = 16 bit colour of background
x-multiplier = multiplier of x-axis text (default=1)
y-multiplier = multiplier of y-axis text (default=1)

---

boolean getTouch(x, y)
Gets touch activity and coordinates.
Parameters:
x = x-axis coordinate
y = y-axis coordinate
Note: x and y coordinates are consistent with the orientation
Returns:
true = pressed
false = otherwise

---

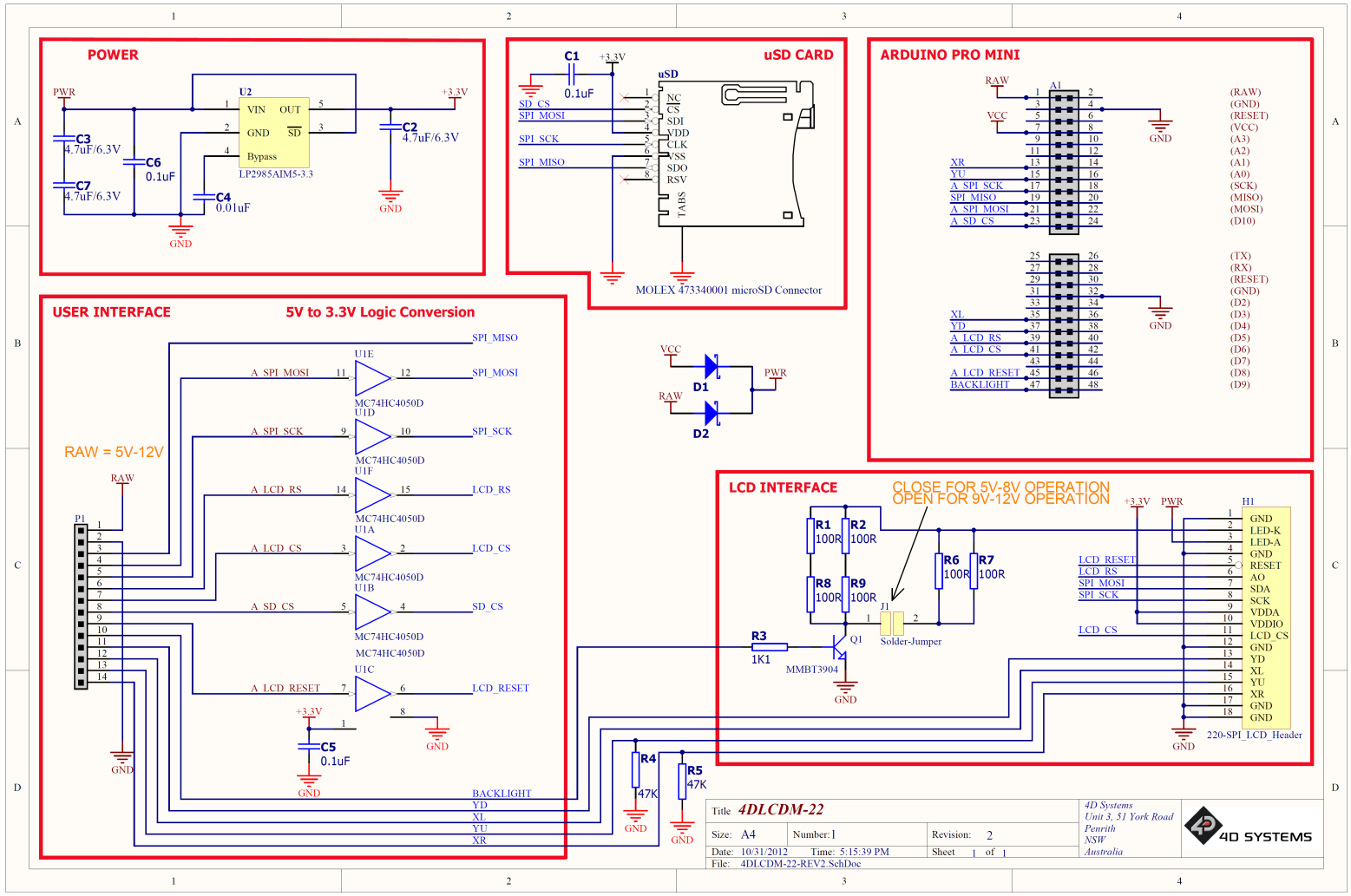
uint16_t setColour(red, green, blue)
Calculates the 16-bit colour from 8-bit Red-Green-Blue components
Parameters:
red = 0x00..0xff Red Component
green = 0x00..0xff Green Component
blue = 0x00..0xff Blue Component
Returns:
16 bit colour

---

splitcolour(rgb, red, green, blue)
Calculate the 8-bit Red-Green-Blue components from a 16-bit colour
Parameters:
rgb = 16-bit colour
red = 0x00..0xff Red Component
green = 0x00..0xff Green Component
blue = 0x00..0xff Blue Component

Please refer to the actual library for more detail regarding these functions, available for download from the 4D Systems website, www.4dsystems.com.au

5. Schematic Design



6. Specifications and Ratings

RECOMMENDED OPERATING CONDITIONS					
Parameter	**Conditions**	**Min**	**Typ**	**Max**	**Units**
Supply Voltage (VCC)		4.5	5.0	12	V
Operating Temperature		-10	--	+65	°C
Input Low Voltage (VIL)	All pins	GND	--	0.8VCC	V
Input High Voltage (VIH)	All pins	2.0VCC	--	VCC	V
Reset Pulse (tRP)	External Open Collector	5.0	--	--	ms

ORDERING INFORMATION
Order Codes: • 4DLCDM-22 **Package:** 105mm x 65mm x 30mm **Packaging:** Module sealed in antistatic foam padded 4D Systems Box

7. Legal Notice

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