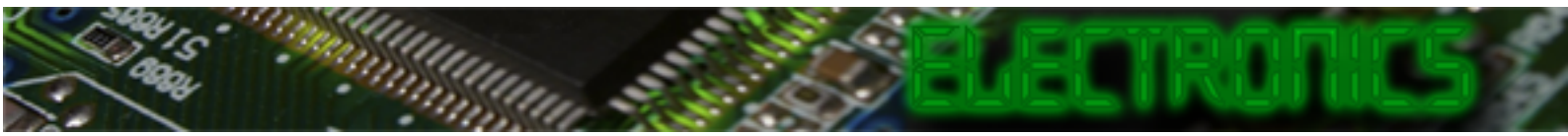
LCD5110_Graph

Arduino and chipKit library for Nokia 5110 compatible LCDs

Manual



PREFACE:

This library has been made to make it easy to use the Nokia 5110 LCD module as a graphics display on an Arduino or a chipKit.

Basic functionality of this library are based on the demo-code provided by ITead studio. You can find the latest version of the library at **http://www.henningkarlsen.com/electronics**

You can always find the latest version of the library at **http://electronics.henningkarlsen.com/**

If you make any modifications or improvements to the code, I would appreciate that you share the code with me so that I might include it in the next release. I can be contacted through **http://electronics.henningkarlsen.com/contact.php**.

For version information, please refer to **version.txt**.

Defined Literals:

Alignment

For use with print(), printNumI() and printNumF()

LEFT:	0
RIGHT:	9999
CENTER:	9998

Included Fonts:

TinyFont

Charactersize: 4x6 pixels
Number of characters: 95

SmallFont

Charactersize: 6x8 pixels
Number of characters: 95

MediumNumbers

Charactersize: 12x16 pixels
Number of characters: 13

BigNumbers

Charactersize: 14x24 pixels
Number of characters: 13

Functions:

LCD5110(SCK, MOSI, DC, RST, CS);

The main class constructor.

Parameters:
- SCK: Pin for Clock signal
- MOSI: Pin for Data transfer
- DC: Pin for Register Select (Data/Command)
- RST: Pin for Reset
- CS: Pin for Chip Select

Usage: `LCD5110 myGLCD(8, 9, 10, 11, 12); // Start an instance of the LCD5110 class`

InitLCD([contrast]);

Initialize the LCD.

Parameters:
- contrast: **<optional>** Specify a value to use for contrast (0-127) Default is 70

Usage: `myGLCD.initLCD(); // Initialize the display`

Notes: This will reset and clear the display.

setContrast(contrast);

Set the contrast of the LCD.

Parameters:
- contrast: Specify a value to use for contrast (0-127)

Usage: `myGLCD.setContrast(70); // Sets the contrast to the default value of 70`

enableSleep();

Put the display in Sleep Mode.

Parameters: None

Usage: `myGLCD.enableSleep(); // Put the display into Sleep Mode`

Notes: update() will not work while the display is in Sleep Mode.
Entering Sleep Mode will not turn off the backlight as this is a hardware function.

disableSleep();

Re-enable the display after it has been put in Sleep Mode.

Parameters: None

Usage: `myGLCD.disableSleep(); // Wake the display after putting it into Sleep Mode`

Notes: The display will automatically be updated with the contents of the buffer when Sleep Mode is disabled.
Exiting Sleep Mode will not turn on the backlight as this is a hardware function.

update();

Copy the screen buffer to the screen.
This is the only command, except invert(), that will make anything happen on the physical screen. All other commands only modify the screen buffer.

```
Parameters:     None
Usage:          myGLCD.update(); // Copy the screen buffer to the screen
Notes:          Remember to call update() after you have updated the screen buffer.
                Calling update() while the display is in Sleep Mode will not have any effect.
```

clrScr();

Clear the screen buffer.

```
Parameters:     None
Usage:          myGLCD.clrScr(); // Clear the screen buffer
```

fillScr();

Fill the screen buffer.

```
Parameters:     None
Usage:          myGLCD.fillScr(); // Fill the screen buffer
```

invert(mode);

Set inversion of the display on or off.

```
Parameters:     mode: true  - Invert the display
                      false – Normal display
Usage:          myGLCD.invert(true); // Set display inversion on
```

setPixel(x, y);

Turn on the specified pixel in the screen buffer.

```
Parameters:     x:  x-coordinate of the pixel
                y:  y-coordinate of the pixel
Usage:          myGLCD.setPixel(0, 0); // Turn on the upper left pixel (in the screen buffer)
```

clrPixel(x, y);

Turn off the specified pixel in the screen buffer.

```
Parameters:     x:  x-coordinate of the pixel
                y:  y-coordinate of the pixel
Usage:          myGLCD.clrPixel(0, 0); // Turn off the upper left pixel (in the screen buffer)
```

invPixel(x, y);

Invert the state of the specified pixel in the screen buffer.

```
Parameters:     x:  x-coordinate of the pixel
                y:  y-coordinate of the pixel
Usage:          myGLCD.invPixel(0, 0); // Invert the upper left pixel (in the screen buffer)
```

print(st, x, y);

Print a string at the specified coordinates in the screen buffer.
You can use the literals LEFT, CENTER and RIGHT as the x-coordinate to align the string on the screen.

Parameters: st: the string to print
x: x-coordinate of the upper, left corner of the first character
y: y-coordinate of the upper, left corner of the first character

Usage: myGLCD.print("Hello World",CENTER,0); // Print "Hello World" centered at the top of the screen (in the screen buffer)

Notes: The string can be either a char array or a String object

printNumI(num, x, y[, length[, filler]]);

Print an integer number at the specified coordinates in the screen buffer.
You can use the literals LEFT, CENTER and RIGHT as the x-coordinate to align the string on the screen.

Parameters: num: the value to print (-2,147,483,648 to 2,147,483,647) *INTEGERS ONLY*
x: x-coordinate of the upper, left corner of the first digit/sign
y: y-coordinate of the upper, left corner of the first digit/sign
length: **<optional>**
minimum number of digits/characters (including sign) to display
filler: **<optional>**
filler character to use to get the minimum length. The character will be inserted in front of the number, but after the sign. Default is ' ' (space).

Usage: myGLCD.print(num,CENTER,0); // Print the value of "num" centered at the top of the screen (in the screen buffer)

printNumF(num, dec, x, y[, divider[, length[, filler]]]);

Print a floating-point number at the specified coordinates in the screen buffer.
You can use the literals LEFT, CENTER and RIGHT as the x-coordinate to align the string on the screen.
WARNING: Floating point numbers are not exact, and may yield strange results when compared. Use at your own discretion.

Parameters: num: the value to print (*See note*)
dec: digits in the fractional part (1-5) *0 is not supported. Use printNumI() instead.*
x: x-coordinate of the upper, left corner of the first digit/sign
y: y-coordinate of the upper, left corner of the first digit/sign
divider: **<Optional>**
Single character to use as decimal point. Default is '.'
length: **<optional>**
minimum number of digits/characters (including sign) to display
filler: **<optional>**
filler character to use to get the minimum length. The character will be inserted in front of the number, but after the sign. Default is ' ' (space).

Usage: myGLCD.print(num, 3, CENTER,0); // Print the value of "num" with 3 fractional digits top centered (in the screen buffer)

Notes: Supported range depends on the number of fractional digits used.
Approx range is +/- 2*(10^(9-dec))

invertText(mode);

Select if text printed with print(), printNumI() and printNumF() should be inverted.

Parameters: mode: true - Invert the text
false – Normal text

Usage: myGLCD.invertText(true); // Turn on inverted printing

Notes: SetFont() will turn off inverted printing

setFont(fontname);

Select font to use with print(), printNumI() and printNumF().

Parameters: fontname: Name of the array containing the font you wish to use

Usage: myGLCD.setFont(SmallFont); // Select the font called SmallFont

Notes: You must declare the font-array as an external or include it in your sketch.

drawLine(x1, y1, x2, y2);

Draw a line between two points in the screen buffer.

```
Parameters:     x1: x-coordinate of the start-point
                y1: y-coordinate of the start-point
                x2: x-coordinate of the end-point
                y2: y-coordinate of the end-point
Usage:          myGLCD.drawLine(0,0,83,47); // Draw a line from the upper left to the lower right corner
```

clrLine(x1, y1, x2, y2);

Clear a line between two points in the screen buffer.

```
Parameters:     x1: x-coordinate of the start-point
                y1: y-coordinate of the start-point
                x2: x-coordinate of the end-point
                y2: y-coordinate of the end-point
Usage:          myGLCD.clrLine(0,0,83,47); // Clear a line from the upper left to the lower right corner
```

drawRect(x1, y1, x2, y2);

Draw a rectangle between two points in the screen buffer.

```
Parameters:     x1: x-coordinate of the start-corner
                y1: y-coordinate of the start-corner
                x2: x-coordinate of the end-corner
                y2: y-coordinate of the end-corner
Usage:          myGLCD.drawRect(42,24,83,47); // Draw a rectangle in the lower right corner of the screen
```

clrRect(x1, y1, x2, y2);

Clear a rectangle between two points in the screen buffer.

```
Parameters:     x1: x-coordinate of the start-corner
                y1: y-coordinate of the start-corner
                x2: x-coordinate of the end-corner
                y2: y-coordinate of the end-corner
Usage:          myGLCD.clrRect(42,24,83,47); // Clear a rectangle in the lower right corner of the screen
```

drawRoundRect(x1, y1, x2, y2);

Draw a rectangle with slightly rounded corners between two points in the screen buffer.
The minimum size is 5 pixels in both directions. If a smaller size is requested the rectangle will not be drawn.

```
Parameters:     x1: x-coordinate of the start-corner
                y1: y-coordinate of the start-corner
                x2: x-coordinate of the end-corner
                y2: y-coordinate of the end-corner
Usage:          myGLCD.drawRoundRect(0,0,41,23); // Draw a rounded rectangle in the upper left corner of the screen
```

clrRoundRect(x1, y1, x2, y2);

Clear a rectangle with slightly rounded corners between two points in the screen buffer.
The minimum size is 5 pixels in both directions. If a smaller size is requested the rectangle will not be drawn/cleared.

```
Parameters:     x1: x-coordinate of the start-corner
                y1: y-coordinate of the start-corner
                x2: x-coordinate of the end-corner
                y2: y-coordinate of the end-corner
Usage:          myGLCD.clrRoundRect(0,0,41,23); // Clear a rounded rectangle in the upper left corner of the screen
```

drawCircle(x, y, radius);

Draw a circle with a specified radius in the screen buffer.

```
Parameters:     x:      x-coordinate of the center of the circle
                y:      y-coordinate of the center of the circle
                radius: radius of the circle in pixels
Usage:          myGLCD.drawCircle(41,23,20); // Draw a circle in the middle of the screen with a radius of 20 pixels
```

clrCircle(x, y, radius);

Clear a circle with a specified radius in the screen buffer.

```
Parameters:     x:      x-coordinate of the center of the circle
                y:      y-coordinate of the center of the circle
                radius: radius of the circle in pixels
Usage:          myGLCD.clrCircle(41,23,20); // Clear a circle in the middle of the screen with a radius of 20 pixels
```

drawBitmap (x, y, data, sx, sy);

Draw a bitmap in the screen buffer.

Parameters:
```
x:     x-coordinate of the upper, left corner of the bitmap
y:     y-coordinate of the upper, left corner of the bitmap
data:  array containing the bitmap-data
sx:    width of the bitmap in pixels
sy:    height of the bitmap in pixels
```

Usage:
```
myGLCD.drawBitmap(0, 0, bitmap, 32, 32); // Draw a 32x32 pixel bitmap in the upper left corner
```

Notes:
```
You can use the online-tool "ImageConverter Mono" to convert pictures into compatible arrays.
The online-tool can be found on my website.
Requires that you #include <avr/pgmspace.h> when using an Arduino other than Arduino Due.
While the bitmap data MUST be a multiple of 8 pixels high you do not need to display all the rows.
Example: If the bitmap is 24 pixels high and you specify sy=20 only the upper 20 rows will be
displayed.
```