

# 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**.

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## Defined Literals:

Alignment
For use with print(), printNumI() and printNumF()  LEFT: 0 RIGHT: 9999 CENTER: 9998

## Included Fonts:

TinyFont
 Character size: 4x6 pixels Number of characters: 95

SmallFont
 Character size: 6x8 pixels Number of characters: 95

MediumNumbers
 Character size: 12x16 pixels Number of characters: 13

BigNumbers
 Character size: 14x24 pixels Number of characters: 13

## Functions:

<b>LCD5110(SCK, MOSI, DC, RST, CS);</b>	
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

<b>InitLCD([contrast]);</b>	
Initialize the LCD.	
Parameters:	contrast: <b>&lt;optional&gt;</b> 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.

<b>setContrast(contrast);</b>	
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

<b>enableSleep();</b>	
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.

<b>disableSleep();</b>	
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, sx, sy, data);`

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  
                  sx:      width of the bitmap in pixels  
                  sy:      height of the bitmap in pixels  
                  data:     array containing the bitmap-data

Usage:           myGLCD.drawBitmap(0, 0, 32, 32, bitmap); // 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.