ITDB02_Graph16 - Arduino library support for 16bit (W)QVGA LCD Boards

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

This library was originally made especially for the 3.2" TFT LCD Screen Module: ITDB02-3.2 by ITead studio, but has later been expanded to support multiple modules. This library has been designed to use 16bit mode, so it will not work with 8bit modules.

Supported controllers:
- HX8347-A
- ILI9325D
- ILI9327
- SSD1289

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://www.henningkarlsen.com/electronics/contact.php

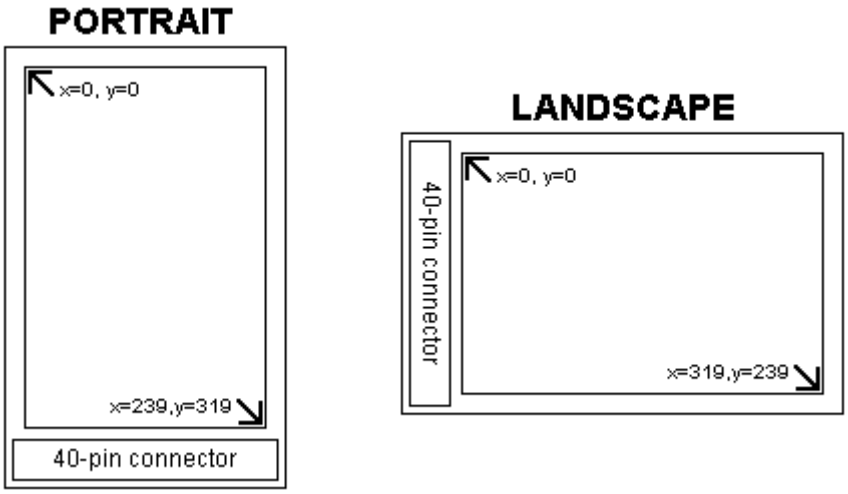
Version:	2.0	15 Aug 2010	• initial release
	2.1	30 Sep 2010	• Added Arduino Mega compatibility • Fixed a bug with CENTER and RIGHT in LANDSCAPE mode • Fixed a bug in printNumI and printNumF when the number to be printed was 0
	2.2	14 Oct 2010	• Added support for ITDB02-3.2WC • Added drawBitmap() with its associated tool
	2.3	24 Nov 2010	• Added Arduino Mega2560 compatibility • Added support for rotating text and bitmaps.
	2.4	18 Jan 2011	• Fixed an error in the requirements
	2.5	30 Jan 2011	• Added loadBitmap() • Optimized drawBitmap() when not using rotation
	2.6	04 Mar 2011	• Fixed a bug in printNumF when the number to be printed was (-)0.something
	3.0	19 Mar 2011	• General optimization
	3.01	20 Mar 2011	• Reduced memory footprint slightly
	4.0	27 Mar 2011	• Remade the font-system to make it more flexible
	4.1	19 Apr 2011	• Remade the tinyFAT integration. Moved loadBitmap() to the ITDB02_tinyFAT library
	4.2	22 Aug 2011	• Added support for more display modules

(*) Initial release is v2.0 to keep it in sync with the 8bit library.

IMPORTANT:
If you are upgrading from a version below v4.0 you have to delete the old library before unpacking v4.0+

INTEGRATION WITH tinyFAT:
tinyFAT integration has been moved to a separate library. Please use the ITDB02_tinyFAT16 library to enable integration.

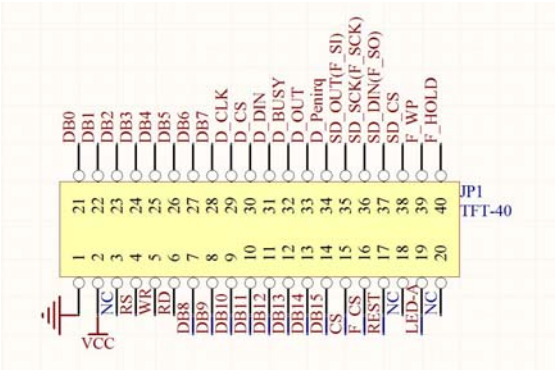
DISPLAY ORIENTATION:



Requirements:

The library require the following connections:

Signal	ITDB02 pin	Arduino pin*	Arduino Mega pin
DB0	21	D8	D37
DB1	22	D9	D36
DB2	23	D10	D35
DB3	24	D11	D34
DB4	25	D12	D33
DB5	26	D13	D32
DB6	27	A0 (D14)	D31
DB7	28	A1 (D15)	D30
DB8	7	D0	D22
DB9	8	D1	D23
DB10	9	D2	D24
DB11	10	D3	D25
DB12	11	D4	D26
DB13	12	D5	D27
DB14	13	D6	D28
DB15	14	D7	D29



ITDB02 pinout

* All boards with pinout like the Arduino Duemilanove / Arduino UNO

Defined Literals:

Alignment

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

```
     LEFT:  0
    RIGHT:  9999
   CENTER:  9998
```

Orientation

For use with InitLCD()

```
 PORTRAIT:  0
LANDSCAPE:  1
```

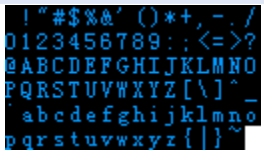
Display model

For use with ITDB02()

```
   ITDB32:  0
 ITDB32WC:  1
TFT01_32W:  1
  ITDB32S:  2
 TFT01_32:  2
 TFT01_24:  3
```

Included Fonts:

SmallFont



```
Charactersize:  8x12 pixels
Number of characters:  95
```

BigFont

```
Charactersize:  16x16 pixels
Number of characters:  95
```

SevenSegNumFont

```
Charactersize:  32x50 pixels
Number of characters:  10
```

Functions:

ITDB02(RS, WR, CS, RST[, Model]);

The main class of the interface.

```
Parameters:     RS:     Arduino pin for Register Select
                WR:     Arduino pin for Write
                CS:     Arduino pin for Chip Select
                RST:    Arduino pin for Reset
                Model:  <optional>
                        See the separate document for the supported display modules
Usage:          ITDB02 myGLCD(19,18,17,16); // Start an instance of the ITDB02 class
```

InitLCD([orientation]);

Initialize the LCD and set display orientation.

```
Parameters:     Orientation: <optional>
                             PORTRAIT (default)
                             LANDSCAPE
Usage:          myGLCD.initLCD(); // Initialize the display
Notes:          This will reset color to white with black background. Font size will be reset to FONT_SMALL.
```

clrScr();

Clear the screen. The background-color will be set to black.

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

fillScr(r, g, b);

Fill the screen with a specified color.

```
Parameters:     r: Red component of an RGB value (0-255)
                g: Green component of an RGB value (0-255)
                b: Blue component of an RGB value (0-255)
Usage:          myGLCD.fillScr(255,127,0); // Fill the screen with orange
```

setColor(r, g, b);

Set the color to use for all draw*, fill* and print commands.

```
Parameters:     r: Red component of an RGB value (0-255)
                g: Green component of an RGB value (0-255)
                b: Blue component of an RGB value (0-255)
Usage:          myGLCD.setColor(0,255,255); // Set the color to cyan
```

setBackColor(r, g, b);

Set the background color to use for all print commands.

```
Parameters:     r: Red component of an RGB value (0-255)
                g: Green component of an RGB value (0-255)
                b: Blue component of an RGB value (0-255)
Usage:          myGLCD.setBackColor(255,255,255); // Set the background color to white
```

drawPixel(x, y);

Draw a single pixel.

```
Parameters:     x: x-coordinate of the pixel (0-239)
                y: y-coordinate of the pixel (0-319)
Usage:          myGLCD.drawPixel(119,159); // Draw a single pixel at the center of the screen
```

drawLine(x1, y1, x2, y2);

Draw a line between two points.

```
Parameters:     x1: x-coordinate of the start-point (0-239)
                y1: y-coordinate of the start-point (0-319)
                x2: x-coordinate of the end-point (0-239)
                y2: y-coordinate of the end-point (0-319)
Usage:          myGLCD.drawLine(0,0,239,319); // Draw a line from the upper left to the lower right corner
```

drawRect(x1, y1, x2, y2);

Draw a rectangle between two points.

```
Parameters:     x1: x-coordinate of the start-corner (0-239)
                y1: y-coordinate of the start-corner (0-319)
                x2: x-coordinate of the end-corner (0-239)
                y2: y-coordinate of the end-corner (0-319)
Usage:          myGLCD.drawRect(119,159,239,319); // Draw 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. 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 (0-239)
                y1: y-coordinate of the start-corner (0-319)
                x2: x-coordinate of the end-corner (0-239)
                y2: y-coordinate of the end-corner (0-319)
Usage:          myGLCD.drawRoundRect(0,0,119,159); // Draw a rounded rectangle in the upper left corner of the screen
```

fillRect(x1, y1, x2, y2);

Draw a filled rectangle between two points.

```
Parameters:     x1: x-coordinate of the start-corner (0-239)
                y1: y-coordinate of the start-corner (0-319)
                x2: x-coordinate of the end-corner (0-239)
                y2: y-coordinate of the end-corner (0-319)
Usage:          myGLCD.fillRect(119,0,239,159); // Draw a filled rectangle in the upper right corner of the screen
```

fillRoundRect(x1, y1, x2, y2);

Draw a filled rectangle with slightly rounded corners between two points. 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 (0-239)
                y1: y-coordinate of the start-corner (0-319)
                x2: x-coordinate of the end-corner (0-239)
                y2: y-coordinate of the end-corner (0-319)
Usage:          myGLCD.fillRoundRect(0,159,119,319); // Draw a filled, rounded rectangle in the lower left corner of the
                screen
```

drawCircle(x, y, radius);

Draw a circle with a specified radius.

```
Parameters:     x:      x-coordinate of the center of the circle (0-239)
                y:      y-coordinate of the center of the circle (0-319)
                radius: radius of the circle in pixels
Usage:          myGLCD.drawCircle(119,159,20); // Draw a circle in the middle of the screen with a radius of 20 pixels
```

fillCircle(x, y, radius);

Draw a filled circle with a specified radius.

```
Parameters:     x:      x-coordinate of the center of the circle (0-239)
                y:      y-coordinate of the center of the circle (0-319)
                radius: radius of the circle in pixels
Usage:          myGLCD.fillCircle(119,159,10); // Draw a filled circle in the middle of the screen with a radius of 10
                pixels
```

print(st, x, y[, deg]);

Print a string at the specified coordinates. An optional background color can be specified. Default background is black.
You can use the literals LEFT, CENTER and RIGHT as the x-coordinate to align the string on the screen.

Changed in v2.3

```
Parameters:     st:  the string to print
                x:   x-coordinate of the upper, left corner of the first character (0-239)
                y:   y-coordinate of the upper, left corner of the first character (0-319)
                deg: <optional>
                     Degrees to rotate text (0-359). Text will be rotated around the upper left corner.
Usage:          myGLCD.print("Hello, World!",CENTER,0); // Print "Hello, World!" centered at the top of the screen
Notes:          CENTER and RIGHT will not calculate the coordinates correctly when rotating text.
```

printNumI(num, x, y);

Print an integer number at the specified coordinates. An optional background color can be specified. Default background is black.
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 (0-239)
y:   y-coordinate of the upper, left corner of the first digit/sign (0-319)
```
Usage:
```
myGLCD.print(num,CENTER,0); // Print the value of "num" centered at the top of the screen
```

printNumF(num, dec, x, y);

Print a floating-point number at the specified coordinates. An optional background color can be specified. Default background is black.
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 (0-239)
y:   y-coordinate of the upper, left corner of the first digit/sign (0-319)
```
Usage:
```
myGLCD.print(num, 3, CENTER,0); // Print the value of "num" with 3 fractional digits top centered
```
Notes: Supported range depends on the number of fractional digits used.

Fractional digits	Approx range
1	+/- 200000000
2	+/- 20000000
3	+/- 2000000
4	+/- 200000
5	+/- 20000

setFont(fontname);

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

Added in v4.0

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

Usage:
```
myGLCD.setFont(BigFont); // Select the font called BigFont
```
Notes: You must declare the font-array as an external or include it in your sketch.

drawBitmap (x, y, sx, sy, data[, scale]);

Draw a bitmap on the screen.

Added in v2.2

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
scale: <optional>
       Scaling factor. Each pixel in the bitmap will be drawn as <scale>x<scale> pixels on screen.
```
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 565*" or "*ImageConverter565.exe*" in the Tools-folder to convert pictures into compatible arrays. The online-tool can be found on my website.
Requires that you #include <avr/pgmspace.h>

drawBitmap (x, y, sx, sy, data, deg, rox, roy);

Draw a bitmap on the screen with rotation.

Added in v2.3

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
deg:  Degrees to rotate bitmap (0-359)
rox:  x-coordinate of the pixel to use as rotational center relative to bitmaps upper left corner
roy:  y-coordinate of the pixel to use as rotational center relative to bitmaps upper left corner
```
Usage:
```
myGLCD.drawBitmap(50, 50, 32, 32, bitmap, 45, 16, 16); // Draw a bitmap rotated 45 degrees around its center
```
Notes: You can use the online-tool "*ImageConverter 565*" or "*ImageConverter565.exe*" in the Tools-folder to convert pictures into compatible arrays. The online-tool can be found on my website.
Requires that you #include <avr/pgmspace.h>