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Chapter 1

Alphanumeric Display Controller

This class controls the hardware LCD Alphanumeric display.
The details on the usage and hardware features are described in the the Display datasheet component data sheet
This library is a variant derived by the original Arduino ShiftLCD library with some improvements and more parametrization. For better readability and developers customization and usage a doxygen-based comment set has been added.

1.1 Credits, Copyright and License

Date
January 2015

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2.0

Author
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Note
This software is licensed as open source under the GNU license.
Chapter 2

Hierarchical Index

2.1 Class Hierarchy

This inheritance list is sorted roughly, but not completely, alphabetically:

Print
  AlphaLCD ......................................................... 9
3.1 Class List

Here are the classes, structs, unions and interfaces with brief descriptions:

- AlphaLCD
Chapter 4

File Index

4.1 File List

Here is a list of all files with brief descriptions:

/Volumes/John Doe/Firmware/Arduino Libraries/AlphaLCD/AlphaLCD.cpp
   AlphaLCD, allows the LCD to be operated via a shift register  . . . . . . . . . . . . . . . . . . . 23

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   AlphaLCD, allows the LCD to be operated via a shift register  . . . . . . . . . . . . . . . . . . . 23
Chapter 5

Class Documentation

5.1 AlphaLCD Class Reference

#include "AlphaLCD.h"

Inheritance diagram for AlphaLCD:

```
AlphaLCD
  Print
```

Public Member Functions

- **AlphaLCD ()**
  Constructor with no parameters, to create initial class instances.
- **AlphaLCD (uint8_t dp, uint8_t cp, uint8_t lp)**
  Constructor with the hardware initialization parameters (pin numbers)
- **void init (uint8_t dp, uint8_t cp, uint8_t lp)**
  Hardware initialization.
- **void begin (uint8_t cols, uint8_t rows, uint8_t charsize=0x00)**
  Start the LCD modes and initializes the software configuration parameters.
- **void clear ()**
  Clear the display content and set the cursor to the position (0,0)
- **void home ()**
  Set the cursor to the position (0,0)
- **void noDisplay ()**
  Turn off the display.
- **void display ()**
  Turn on the display.
- **void noBlink ()**
  Turn off the blinking cursor.
- **void blink ()**
  Turn off the blinking cursor.
- **void noCursor ()**
  Turn off the underline cursor.
- **void cursor ()**
Turn on the underline cursor.

- void scrollDisplayLeft ()
  Scroll the display to the left by one position.

- void scrollDisplayRight ()
  Scroll the display to the right by one position.

- void leftToRight ()
  Flow the text from left to right.

- void rightToLeft ()
  Flow the text from right to left.

- void autoscroll ()
  Enable the automatic horizontal scrolling of the text.

- void noAutoscroll ()
  Disable the automatic horizontal scrolling of the text.

- void isDisplay (bool set)
  Helper method to set on/off the display.

- void isCursor (bool set)
  Helper method to set on/off the cursor visibility.

- void isBlinking (bool set)
  Helper method to set on/off the blinking cursor.

- void isRightToLeft (bool set)
  Helper method to set on/off the right-to-left writing direction.

- void isAutoscroll (bool set)
  Helper method to set on/off autoscroll.

- void createChar (uint8_t, uint8_t[])
  Create one of the 8 CGRAM memory locations from 0x00 to 0x07 with a user defined characters.

- void setCursor (uint8_t, uint8_t)
  Set the cursor to the requested position.

- virtual size_t write (uint8_t)
  Helper method to send data to the device.

- void command (uint8_t)
  Helper method to send commands to the device.

Private Member Functions

- void send (uint8_t, uint8_t)
  Write either command or data, with automatic 4/8-bit selection.

- void write4bits (uint8_t, uint8_t)
  Write the character on the device, 4 bits mode.

- void write8bits (uint8_t, uint8_t)
  Write the character on the device, 8 bits mode.

Private Attributes

- uint8_t _clock_pin
- uint8_t _data_pin
- uint8_t _latch_pin
- uint8_t _smart_enable
- uint8_t _displayfunction
- uint8_t _displaycontrol
- uint8_t _displaymode
- uint8_t _backlight
- uint8_t _initialized
- uint8_t _numlines
- uint8_t _currline
5.1 AlphaLCD Class Reference

5.1.1 Detailed Description

Definition at line 65 of file AlphaLCD.h.

5.1.2 Constructor & Destructor Documentation

5.1.2.1 AlphaLCD::AlphaLCD ( )

Constructor with no parameters, to create initial class instances.
Definition at line 32 of file AlphaLCD.cpp.

32
33
34 }

5.1.2.2 AlphaLCD::AlphaLCD ( uint8_t dp, uint8_t cp, uint8_t lp )

Constructor with the hardware initialization parameters (pin numbers)
parameters depends on the physical connection of the LCD-Alpha component.
Definition at line 41 of file AlphaLCD.cpp.
References init().

42 {
43     init (dp, cp, lp);
44 }

5.1.3 Member Function Documentation

5.1.3.1 void AlphaLCD::autoscroll ( void )

Enable the automatic horizontal scrolling of the text.
As the scrolling is done on the entire display content, the resulting effect is like the right justification
Definition at line 270 of file AlphaLCD.cpp.
References _displaymode, command(), LCD_ENTRYMODESET, and LCD_ENTRYSHIFTINCREMENT.
Referenced by isAutoscroll().

270 |
271     _displaymode |= LCD_ENTRYSHIFTINCREMENT;
272     command(LCD_ENTRYMODESET | _displaymode);
273 }

5.1.3.2 void AlphaLCD::begin ( uint8_t cols, uint8_t lines, uint8_t dotsize = 0x00 )

Start the LCD modes and initializes the software configuration parameters.

Note
The method avoid displays with more than 2 lines

int Number of columns (hardware settings: 16 characters) int number of lines (hardware settings: 2 lines)
Definition at line 83 of file AlphaLCD.cpp.

Generated on Tue Jan 27 2015 12:24:23 for Alphanumeric LCD Library for Arduino by Doxygen
References _clock_pin, _currline, _data_pin, _displaycontrol, _displayfunction, _displaymode, _numlines, clear(), command(), display(), LCD_2LINE, LCD_5x10DOTS, LCD_8BITMODE, LCD_BLINKOFF, LCD_CURSOROFF, LCD_DISPLAYON, LCD_ENTRYLEFT, LCD_ENTRYMODESET, LCD_ENTRYSHIFTDECREMENT, LCD_FUNCTIONON, and write4bits().

Referenced by init().

```cpp
if (lines > 1) {
    _displayfunction |= LCD_2LINE;
}

_numlines = lines;
_curline = 0;

// for some 1 line displays you can select a 10 pixel height font
if ((dotsize != 0) && (lines == 1)) {
    _displayfunction |= LCD_5x10DOTS;
}

// We need at least 40ms after power rises before sending commands.
delayMicroseconds(50000);
// clear the shift register by sending 16 0's to it (twice)
shiftOut(_data_pin, _clock_pin, LSBFIRST, B00000000);
shiftOut(_data_pin, _clock_pin, LSBFIRST, B00000000);

//put the LCD into 4 bit or 8 bit mode
if (! (_displayfunction & LCD_8BITMODE)) {
    // we start in 8bit mode, try to set 4 bit mode
    write4bits(0x03, LOW);
delayMicroseconds(4500);
    // second try
    write4bits(0x03, LOW);
delayMicroseconds(4500);
    // third go!
    write4bits(0x03, LOW);
delayMicroseconds(150);
    // set to 8-bit interface
    write4bits(0x02, LOW);
} else {
    // Send function set command sequence
    command(LCD_FUNCTIONSET | _displayfunction);
delayMicroseconds(4500);
    // second try
    command(LCD_FUNCTIONSET | _displayfunction);
delayMicroseconds(150);
    // third go
    command(LCD_FUNCTIONSET | _displayfunction);
}

// finally, set # lines, font size, etc.
command(LCD_FUNCTIONSET | _displayfunction);

// turn the display on with no cursor or blinking by default
_displaycontrol = LCD_DISPLAYON | LCD_CURSOROFF | LCD_BLINKOFF;
display();

// clear it off
clear();

// Initialize to default text direction (for romance languages)
_displaymode = LCD_ENTRYLEFT | LCD_ENTRYSHIFTDECREMENT;

5.1.3.3 void AlphaLCD::blink ( )

Turn off the blinking cursor.

Definition at line 229 of file AlphaLCD.cpp.
5.1 AlphaLCD Class Reference

References _displaycontrol, command(), LCD_BLINKON, and LCD_DISPLAYCONTROL.

Referenced by isBlinking().

```cpp
229  _displaycontrol |= LCD_BLINKON;
230  command(LCD_DISPLAYCONTROL | _displaycontrol);
231 }
```

5.1.3.4 void AlphaLCD::clear()

Clear the display content and set the cursor to the position (0,0)

Definition at line 152 of file AlphaLCD.cpp.

References command(), and LCD_CLEARDISPLAY.

Referenced by begin().

```cpp
153 {
154  command(LCD_CLEARDISPLAY);
155  delayMicroseconds(2000);
156 }
```

5.1.3.5 void AlphaLCD::command ( uint8_t value ) [inline]

Helper method to send commands to the device.

Definition at line 339 of file AlphaLCD.cpp.

References send().

Referenced by autoscroll(), begin(), blink(), clear(), createChar(), cursor(), display(), home(), leftToRight(), noAutoscroll(), noBlink(), noCursor(), noDisplay(), rightToLeft(), scrollDisplayLeft(), scrollDisplayRight(), and setCursor().

```cpp
339 {
340  send(value, false);
341 }
```

5.1.3.6 void AlphaLCD::createChar ( uint8_t location, uint8_t charmap[] )

Create one of the 8 CGRAM memory locations from 0x00 to 0x07 with a user defined characters.

The characters should be 5x8 dots font patterns, so the definition should be an 8 bytes array with the less 5 bits set accordingly with the pixels values of the character pattern.

Parameters

| int | The character memory location |
| int | the character map 8 bytes array |

Definition at line 324 of file AlphaLCD.cpp.

References command(), LCD_SETCGRAMADDR, and write().

```cpp
324 {
325  location &= 0x7; // No more than 7 memory locations
326  command(LCD_SETCGRAMADDR | (location << 3));
327  // Character definition loop
328  for (int i=0; i<8; i++) {
329   write(charmap[i]);
330  }
331 }
```
5.1.3.7 void AlphaLCD::cursor ( )

Turn on the underline cursor.

Definition at line 213 of file AlphaLCD.cpp.
References _displaycontrol, command(), LCD_CURSORON, and LCD_DISPLAYCONTROL.
Referenced by isCursor().

213 {
214 _displaycontrol |= LCD_CURSORON;
215 command(LCD_DISPLAYCONTROL | _displaycontrol);
216 }

5.1.3.8 void AlphaLCD::display ( )

Turn on the display.

Definition at line 197 of file AlphaLCD.cpp.
References _displaycontrol, command(), LCD_DISPLAYCONTROL, and LCD_DISPLAYON.
Referenced by begin(), and isDisplay().

197 {
198 _displaycontrol |= LCD_DISPLAYON;
199 command(LCD_DISPLAYCONTROL | _displaycontrol);
200 }

5.1.3.9 void AlphaLCD::home ( )

Set the cursor to the position (0,0)

Definition at line 161 of file AlphaLCD.cpp.
References command(), and LCD_RETURNHOME.

162 {
163 command(LCD_RETURNHOME);
164 delayMicroseconds(2000);
165 }

5.1.3.10 void AlphaLCD::init ( uint8_t dp, uint8_t cp, uint8_t lp )

Hardware initialization.
Initializes the hardware parameters for the LCD connection. The LCD mode is set to 4 bit by default due the hardware circuit settings

Parameters

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>int</td>
<td>Data Pin number</td>
</tr>
<tr>
<td>int</td>
<td>Clock Pin number</td>
</tr>
<tr>
<td>int</td>
<td>Latch Pin number</td>
</tr>
</tbody>
</table>

Definition at line 56 of file AlphaLCD.cpp.
References _backlight, _clock_pin, _data_pin, _displayfunction, _latch_pin, begin(), LCD_1LINE, LCD_4BITMODE, LCD_5x8DOTS, and LCD_BL_PIN.
Referenced by AlphaLCD().
5.1 AlphaLCD Class Reference

57 {
58  _data_pin = dp;
59  _clock_pin = cp;
60  _latch_pin = lp;
61  _backlight = LCD_BL_PIN;
62  pinMode(_data_pin, OUTPUT);
63  pinMode(_clock_pin, OUTPUT);
64  pinMode(_latch_pin, OUTPUT);
65  _displayfunction = LCD_4BITMODE | LCD_1LINE | LCD_5x8DOTS;
66  // Display size (characters and lines). By default it is set to 16 characters x 2 lines
67  // but should be set with the right number of lines and columns,
68  // accordingly with the hardware specifications
69  begin(16, 2);
70 }

5.1.3.11 void AlphaLCD::isAutoscroll ( bool set ) [inline]

Helper method to set on/off autoscroll.

Parameters

| bool | the flag setting |

Definition at line 309 of file AlphaLCD.cpp.

References autoscroll(), and noAutoscroll().

309 {
310  set ? autoscroll() : noAutoscroll();
311 }

5.1.3.12 void AlphaLCD::isBlinking ( bool set ) [inline]

Helper method to set on/off the blinking cursor.

Parameters

| bool | the flag setting |

Definition at line 297 of file AlphaLCD.cpp.

References blink(), and noBlink().

297 {
298  set ? blink() : noBlink();
299 }

5.1.3.13 void AlphaLCD::isCursor ( bool set ) [inline]

Helper method to set on/off the cursor visibility.

Parameters

| bool | the flag setting |

Definition at line 291 of file AlphaLCD.cpp.

References cursor(), and noCursor().

291 {
292  set ? cursor() : noCursor();
293 }
5.1.3.14 void AlphaLCD::isDisplay ( bool set ) [inline]

Helper method to set on/off the display.
5.1 AlphaLCD Class Reference

Parameters

| bool | the flag setting |

Definition at line 285 of file AlphaLCD.cpp.
References display(), and noDisplay().

```
285  [inline]
286    set ? display() : noDisplay();
287 }
```

5.1.3.15 void AlphaLCD::isRightToLeft ( bool set ) [inline]

Helper method to set on/off the right-to-left writing direction.

Parameters

| bool | the flag setting |

Definition at line 303 of file AlphaLCD.cpp.
References leftToRight(), and rightToLeft().

```
303  [inline]
304    set ? rightToLeft() : leftToRight();
305 }
```

5.1.3.16 void AlphaLCD::leftToRight ( void )

Flow the text from left to right.

Definition at line 253 of file AlphaLCD.cpp.
References _displaymode, command(), LCD_ENTRYLEFT, and LCD_ENTRYMODESET.
Referenced by isRightToLeft().

```
253  [inline]
254    _displaymode |= LCD_ENTRYLEFT;
255    command(LCD_ENTRYMODESET | _displaymode);
256 }
```

5.1.3.17 void AlphaLCD::noAutoscroll ( void )

Disable the automatic horizontal scrolling of the text.

Definition at line 278 of file AlphaLCD.cpp.
References _displaymode, command(), LCD_ENTRYMODESET, and LCD_ENTRYSHIFTINCREMENT.
Referenced by isAutoscroll().

```
278  [inline]
279    _displaymode &= ~LCD_ENTRYSHIFTINCREMENT;
280    command(LCD_ENTRYMODESET | _displaymode);
281 }
```

5.1.3.18 void AlphaLCD::noBlink ( )

Turn off the blinking cursor.

Definition at line 221 of file AlphaLCD.cpp.

---

Generated on Tue Jan 27 2015 12:24:23 for Alphanumeric LCD Library for Arduino by Doxygen
References `_displaycontrol`, `command()`, `LCD_BLINKON`, and `LCD_DISPLAYCONTROL`.

Referenced by `isBlinking()`.

```c
221 {
222  _displaycontrol &= ~LCD_BLINKON;
223  command(LCD_DISPLAYCONTROL | _displaycontrol);
224 }
```

5.1.3.19 `void AlphaLCD::noCursor()`

Turn off the underline cursor.

Definition at line 205 of file AlphaLCD.cpp.

References `_displaycontrol`, `command()`, `LCD_CURSORON`, and `LCD_DISPLAYCONTROL`.

Referenced by `isCursor()`.

```c
205 {
206  _displaycontrol &= ~LCD_CURSORON;
207  command(LCD_DISPLAYCONTROL | _displaycontrol);
208 }
```

5.1.3.20 `void AlphaLCD::noDisplay()`

Turn off the display.

Definition at line 189 of file AlphaLCD.cpp.

References `_displaycontrol`, `command()`, `LCD_DISPLAYCONTROL`, and `LCD_DISPLAYON`.

Referenced by `isDisplay()`.

```c
189 {
190  _displaycontrol &= ~LCD_DISPLAYON;
191  command(LCD_DISPLAYCONTROL | _displaycontrol);
192 }
```

5.1.3.21 `void AlphaLCD::rightToLeft()`

Flow the text from right to left.

Definition at line 261 of file AlphaLCD.cpp.

References `_displaymode`, `command()`, `LCD_ENTRYLEFT`, and `LCD_ENTRYMODESET`.

Referenced by `isRightToLeft()`.

```c
261 {
262  _displaymode &= ~LCD_ENTRYLEFT;
263  command(LCD_ENTRYMODESET | _displaymode);
264 }
```

5.1.3.22 `void AlphaLCD::scrollDisplayLeft()`

Scroll the display to the left by one position.

The method does not change the ram content.

Definition at line 238 of file AlphaLCD.cpp.

References `command()`, `LCD_CURSORSHIFT`, `LCD_DISPLAYMOVE`, and `LCD_MOVELEFT`. 
5.1 AlphaLCD Class Reference

5.1.3.23

```cpp
void AlphaLCD::scrollDisplayRight ( void )
```

Scroll the display to the right by one position.
The method does not change the ram content.
Definition at line 246 of file AlphaLCD.cpp.
References command(), LCD_CURSORSHIFT, LCD_DISPLAYMOVE, and LCD_MOVERIGHT.

```cpp
246 {
247 command(LCD_CURSORSHIFT | LCD_DISPLAYMOVE |
248 LCD_MOVERIGHT);
249 }
```

5.1.3.24

```cpp
void AlphaLCD::send ( uint8_t value, uint8_t mode ) [private]
```

Write either command or data, with automatic 4/8-bit selection.
Definition at line 353 of file AlphaLCD.cpp.
References _displayfunction, LCD_8BITMODE, write4bits(), and write8bits().
Referenced by command(), and write().

```cpp
353 {
354 if (_displayfunction & LCD_8BITMODE) {
355 write8bits(value, mode);
356 } else {
357 write4bits(value>>4, mode);
358 write4bits(value, mode);
359 }
360 }
361 }
```

5.1.3.25

```cpp
void AlphaLCD::setCursor ( uint8_t col, uint8_t row )
```

Set the cursor to the requested position.
The method take care avoiding out of bound row and column values.

Note
The row and column are zero-based offset.

Parameters

<table>
<thead>
<tr>
<th>int</th>
<th>column</th>
</tr>
</thead>
<tbody>
<tr>
<td>int</td>
<td>row</td>
</tr>
</tbody>
</table>

Definition at line 176 of file AlphaLCD.cpp.
References _numlines, command(), and LCD_SETDDRAMADDR.

```cpp
177 {
178 int row_offsets[] = { 0x00, 0x40, 0x14, 0x54 };
179 if ( row > _numlines ) {
180 row = _numlines-1;
181 }
182 command(LCD_SETDDRAMADDR | (col + row_offsets[row]));
183 }
```
5.1.3.26  size_t AlphaLCD::write ( uint8_t value ) [inline],[virtual]

Helper method to send data to the device.
Definition at line 346 of file AlphaLCD.cpp.
References send().
Referenced by createChar().

346 {
347    send(value, true);
348 }

5.1.3.27  void AlphaLCD::write4bits ( uint8_t value, uint8_t mode ) [private]

Write the character on the device, 4 bits mode.
int the character data mode the backlight on/off writing mode always on by default
Definition at line 369 of file AlphaLCD.cpp.
References _backlight, _clock_pin, _data_pin, _latch_pin, and LCD_RS_PIN.
Referenced by begin(), and send().

369 {
370    int EN_SWITCH = B00000010;
371    int RS_SWITCH = B00000001;
372    int cmd = 0;
373    int data = 0;
374    if (!mode) {
375        cmd = 0 | _backlight;
376    } else {
377        cmd = LCD_RS_PIN | _backlight;
378    }
379    data = value<<4 & B11110000;
380    cmd |= EN_SWITCH;
381    shiftOut(_data_pin, _clock_pin, LSBFIRST, data | cmd);
382    digitalWrite(_latch_pin, LOW);
383    delayMicroseconds(1);
384    cmd &= ~EN_SWITCH;
385    digitalWrite(_latch_pin, HIGH);
386    shiftOut(_data_pin, _clock_pin, LSBFIRST, data | cmd);
387    digitalWrite(_latch_pin, LOW);
388    delayMicroseconds(1);
389    cmd |= EN_SWITCH;
390    digitalWrite(_latch_pin, HIGH);
391    shiftOut(_data_pin, _clock_pin, LSBFIRST, data | cmd);
392    digitalWrite(_latch_pin, LOW);
393    delayMicroseconds(100);
394 }

5.1.3.28  void AlphaLCD::write8bits ( uint8_t value, uint8_t mode ) [private]

Write the character on the device, 8 bits mode.
int the character data mode the backlight on/off writing mode always on by default
Definition at line 406 of file AlphaLCD.cpp.
References _clock_pin, _data_pin, and _latch_pin.
Referenced by send().

406 {
407    int EN_SWITCH = B00000010;
408    int RS_SWITCH = B00000001;

Generated on Tue Jan 27 2015 12:24:23 for Alphanumeric LCD Library for Arduino by Doxygen
```
int cmd = 0;
if (!mode) {
    cmd = 0;
} else {
    cmd = RS_SWITCH;
}
//set enable low
cmd |= EN_SWITCH;
shiftOut (_latch_pin, _clock_pin, LSBFIRST, cmd);
shiftOut (_latch_pin, _clock_pin, LSBFIRST, value);
digitalWrite (_latch_pin, HIGH);
shiftOut (_data_pin, _clock_pin, LSBFIRST, cmd);
shiftOut (_data_pin, _clock_pin, LSBFIRST, value);
digitalWrite (_latch_pin, LOW);
//delay (500);
//set enable high;
cmd &=-EN_SWITCH;
digitalWrite (_latch_pin, HIGH);
shiftOut (_latch_pin, _clock_pin, LSBFIRST, cmd);
shiftOut (_latch_pin, _clock_pin, LSBFIRST, value);
digitalWrite (_latch_pin, LOW);
delayMicroseconds (1);
//delay (500);
//set enable low
cmd |= EN_SWITCH;
digitalWrite (_latch_pin, HIGH);
shiftOut (_latch_pin, _clock_pin, LSBFIRST, cmd);
shiftOut (_latch_pin, _clock_pin, LSBFIRST, value);
digitalWrite (_latch_pin, LOW);
delayMicroseconds (100);
```

### 5.1.4 Member Data Documentation

#### 5.1.4.1 `uint8_t AlphaLCD::_backlight` [private]

Definition at line 112 of file AlphaLCD.h.

Referenced by `init()`, and `write4bits()`.

#### 5.1.4.2 `uint8_t AlphaLCD::_clock_pin` [private]

Definition at line 105 of file AlphaLCD.h.

Referenced by `begin()`, `init()`, `write4bits()`, and `write8bits()`.

#### 5.1.4.3 `uint8_t AlphaLCD::_currline` [private]

Definition at line 114 of file AlphaLCD.h.

Referenced by `begin()`.

#### 5.1.4.4 `uint8_t AlphaLCD::_data_pin` [private]

Definition at line 106 of file AlphaLCD.h.

Referenced by `begin()`, `init()`, `write4bits()`, and `write8bits()`.

#### 5.1.4.5 `uint8_t AlphaLCD::_displaycontrol` [private]

Definition at line 110 of file AlphaLCD.h.

Referenced by `begin()`, `blink()`, `cursor()`, `display()`, `noBlink()`, `noCursor()`, and `noDisplay()`.

#### 5.1.4.6 `uint8_t AlphaLCD::_displayfunction` [private]

Definition at line 109 of file AlphaLCD.h.

---

Generated on Tue Jan 27 2015 12:24:23 for Alphanumeric LCD Library for Arduino by Doxygen
Referenced by begin(), init(), and send().

5.1.4.7 uint8_t AlphaLCD::_displaymode [private]

Definition at line 111 of file AlphaLCD.h.
Referenced by autoscroll(), begin(), leftToRight(), noAutoscroll(), and rightToLeft().

5.1.4.8 uint8_t AlphaLCD::_initialized [private]

Definition at line 113 of file AlphaLCD.h.

5.1.4.9 uint8_t AlphaLCD::_latch_pin [private]

Definition at line 107 of file AlphaLCD.h.
Referenced by init(), write4bits(), and write8bits().

5.1.4.10 uint8_t AlphaLCD::_numlines [private]

Definition at line 114 of file AlphaLCD.h.
Referenced by begin(), and setCursor().

5.1.4.11 uint8_t AlphaLCD::_smart_enable [private]

Definition at line 108 of file AlphaLCD.h.

The documentation for this class was generated from the following files:

- /Volumes/John Doe/Firmware/Arduino Libraries/AlphaLCD/AlphaLCD.h
- /Volumes/John Doe/Firmware/Arduino Libraries/AlphaLCD/AlphaLCD.cpp
Chapter 6

File Documentation

6.1 /Volumes/John Doe/Firmware/Arduino Libraries/AlphaLCD/AlphaLCD.cpp File Reference

AlphaLCD, allows the LCD to be operated via a shift register.

```cpp
#include "AlphaLCD.h"
#include <stdio.h>
#include <string.h>
#include <inttypes.h>
#include "Arduino.h"
```

6.1.1 Detailed Description

AlphaLCD, allows the LCD to be operated via a shift register.

Definition in file AlphaLCD.cpp.

6.2 /Volumes/John Doe/Firmware/Arduino Libraries/AlphaLCD/AlphaLCD.h File Reference

AlphaLCD, allows the LCD to be operated via a shift register.

```cpp
#include <inttypes.h>
#include "Print.h"
```

Classes

- class AlphaLCD

Macros

- #define LCD_CLEARDISPLAY 0x01
- #define LCD_RETURNHOME 0x02
- #define LCD_ENTRYMODESET 0x04
- #define LCD_DISPLAYCONTROL 0x08
• #define LCD_CURSORSHIFT 0x10
• #define LCD_FUNCTIONSET 0x20
• #define LCD_SETGRAMADDR 0x40
• #define LCD_SETDDRAMADDR 0x80
• #define LCD_ENTRYRIGHT 0x00
• #define LCD_ENTRYLEFT 0x02
• #define LCD_ENTRYSHIFTINCREMENT 0x01
• #define LCD_ENTRYSHIFTDECREMENT 0x00
• #define LCD_DISPLAYON 0x04
• #define LCD_DISPLAYOFF 0x00
• #define LCD_CURSORON 0x02
• #define LCD_CURSOROFF 0x00
• #define LCD_BLINKON 0x01
• #define LCD_BLINKOFF 0x00
• #define LCD_DISPLAYMOVE 0x08
• #define LCD_CURSORMOVE 0x00
• #define LCD_MOVERIGHT 0x04
• #define LCD_MOVELEFT 0x00
• #define LCD_8BITMODE 0x10
• #define LCD_4BITMODE 0x00
• #define LCD_2LINE 0x08
• #define LCD_1LINE 0x00
• #define LCD_5x10DOTS 0x04
• #define LCD_5x8DOTS 0x00
• #define LCD_RS_PIN 0x01
• #define LCD_EN_PIN 0x02
• #define LCD_BL_PIN 0x04

6.2.1 Detailed Description

AlphaLCD, allows the LCD to be operated via a shift register.

Definition in file AlphaLCD.h.

6.2.2 Macro Definition Documentation

6.2.2.1 #define LCD_1LINE 0x00

Definition at line 57 of file AlphaLCD.h.

Referenced by AlphaLCD::init().

6.2.2.2 #define LCD_2LINE 0x08

Definition at line 56 of file AlphaLCD.h.

Referenced by AlphaLCD::begin().

6.2.2.3 #define LCD_4BITMODE 0x00

Definition at line 55 of file AlphaLCD.h.

Referenced by AlphaLCD::init().
6.2.2.4 #define LCD_5x10DOTS 0x04
Definition at line 58 of file AlphaLCD.h.
Referenced by AlphaLCD::begin().

6.2.2.5 #define LCD_5x8DOTS 0x00
Definition at line 59 of file AlphaLCD.h.
Referenced by AlphaLCD::init().

6.2.2.6 #define LCD_8BITMODE 0x10
Definition at line 54 of file AlphaLCD.h.
Referenced by AlphaLCD::begin(), and AlphaLCD::send().

6.2.2.7 #define LCD_BL_PIN 0x04
Definition at line 63 of file AlphaLCD.h.
Referenced by AlphaLCD::init().

6.2.2.8 #define LCD_BLINKOFF 0x00
Definition at line 47 of file AlphaLCD.h.
Referenced by AlphaLCD::begin().

6.2.2.9 #define LCD_BLINKON 0x01
Definition at line 46 of file AlphaLCD.h.
Referenced by AlphaLCD::blink(), and AlphaLCD::noBlink().

6.2.2.10 #define LCD_CLEARDISPLAY 0x01
Definition at line 28 of file AlphaLCD.h.
Referenced by AlphaLCD::clear().

6.2.2.11 #define LCD_CURSORMOVE 0x00
Definition at line 50 of file AlphaLCD.h.

6.2.2.12 #define LCD_CURSOROFF 0x00
Definition at line 45 of file AlphaLCD.h.
Referenced by AlphaLCD::begin().
6.2.2.13 #define LCD_CURSORON 0x02
Definition at line 44 of file AlphaLCD.h.
Referenced by AlphaLCD::cursor(), and AlphaLCD::noCursor().

6.2.2.14 #define LCD_CURSORSHIFT 0x10
Definition at line 32 of file AlphaLCD.h.
Referenced by AlphaLCD::scrollDisplayLeft(), and AlphaLCD::scrollDisplayRight().

6.2.2.15 #define LCD_DISPLAYCONTROL 0x08
Definition at line 31 of file AlphaLCD.h.
Referenced by AlphaLCD::blink(), AlphaLCD::cursor(), AlphaLCD::display(), AlphaLCD::noBlink(), AlphaLCD::noCursor(), and AlphaLCD::noDisplay().

6.2.2.16 #define LCD_DISPLAYMOVE 0x08
Definition at line 49 of file AlphaLCD.h.
Referenced by AlphaLCD::scrollDisplayLeft(), and AlphaLCD::scrollDisplayRight().

6.2.2.17 #define LCD_DISPLAYOFF 0x00
Definition at line 43 of file AlphaLCD.h.

6.2.2.18 #define LCD_DISPLAYON 0x04
Definition at line 42 of file AlphaLCD.h.
Referenced by AlphaLCD::begin(), AlphaLCD::display(), and AlphaLCD::noDisplay().

6.2.2.19 #define LCD_EN_PIN 0x02
Definition at line 62 of file AlphaLCD.h.

6.2.2.20 #define LCD_ENTRYLEFT 0x02
Definition at line 38 of file AlphaLCD.h.
Referenced by AlphaLCD::begin(), AlphaLCD::leftToRight(), and AlphaLCD::rightToLeft().

6.2.2.21 #define LCD_ENTRYMODESET 0x04
Definition at line 30 of file AlphaLCD.h.
Referenced by AlphaLCD::autoscroll(), AlphaLCD::begin(), AlphaLCD::leftToRight(), AlphaLCD::noAutoscroll(), and AlphaLCD::rightToLeft().

6.2.2.22 #define LCD_ENTRYRIGHT 0x00
Definition at line 37 of file AlphaLCD.h.
6.2.2.23 `#define LCD_ENTRYSHIFTDECREMENT 0x00`

Definition at line 40 of file AlphaLCD.h.
Referenced by AlphaLCD::begin().

6.2.2.24 `#define LCD_ENTRYSHIFTINCREMENT 0x01`

Definition at line 39 of file AlphaLCD.h.
Referenced by AlphaLCD::autoscroll(), and AlphaLCD::noAutoscroll().

6.2.2.25 `#define LCD_FUNCTIONSET 0x20`

Definition at line 33 of file AlphaLCD.h.
Referenced by AlphaLCD::begin().

6.2.2.26 `#define LCD_MOVELEFT 0x00`

Definition at line 52 of file AlphaLCD.h.
Referenced by AlphaLCD::scrollDisplayLeft().

6.2.2.27 `#define LCD_MOVERIGHT 0x04`

Definition at line 51 of file AlphaLCD.h.
Referenced by AlphaLCD::scrollDisplayRight().

6.2.2.28 `#define LCD_RETURNHOME 0x02`

Definition at line 29 of file AlphaLCD.h.
Referenced by AlphaLCD::home().

6.2.2.29 `#define LCD_RS_PIN 0x01`

Definition at line 61 of file AlphaLCD.h.
Referenced by AlphaLCD::write4bits().

6.2.2.30 `#define LCD_SETGRAMADDR 0x40`

Definition at line 34 of file AlphaLCD.h.
Referenced by AlphaLCD::createChar().

6.2.2.31 `#define LCD_SETDDRAMADDR 0x80`

Definition at line 35 of file AlphaLCD.h.
Referenced by AlphaLCD::setCursor().
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