

Alphanumeric LCD Library for Arduino
1.0.4

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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

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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:

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Chapter 3

Class Index

3.1 Class List

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

[AlphaLCD](#) 9

Chapter 4

File Index

4.1 File List

Here is a list of all files with brief descriptions:

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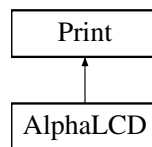
Chapter 5

Class Documentation

5.1 AlphaLCD Class Reference

```
#include "AlphaLCD.h"
```

Inheritance diagram for AlphaLCD:



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 on the blinking cursor.
- void [noCursor](#) ()
Turn off the underline cursor.
- void [cursor](#) ()
Turn on the underline 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`

5.1.1 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 phisical 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.

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_FUNCTIONSET`, and `write4bits()`.

Referenced by `init()`.

```

83                                     {
84     if (lines > 1) {
85         _displayfunction |= LCD_2LINE;
86     }
87
88     _numlines = lines;
89     _currline = 0;
90
91     // for some 1 line displays you can select a 10 pixel height font
92     if ((dotsize != 0) && (lines == 1)) {
93         _displayfunction |= LCD_5x10DOTS;
94     }
95
96     // We need at least 40ms after power rises before sending commands.
97     delayMicroseconds(50000);
98     // clear the shift register by sending 16 0's to it (twice)
99     shiftOut(_data_pin, _clock_pin, LSBFIRST, B00000000);
100    shiftOut(_data_pin, _clock_pin, LSBFIRST, B00000000);
101
102    //put the LCD into 4 bit or 8 bit mode
103    if (! (_displayfunction & LCD_8BITMODE)) {
104
105        // we start in 8bit mode, try to set 4 bit mode
106        write4bits(0x03, LOW);
107        delayMicroseconds(4500);
108
109        // second try
110        write4bits(0x03, LOW);
111        delayMicroseconds(4500);
112
113        // third go!
114        write4bits(0x03, LOW);
115        delayMicroseconds(150);
116
117        // set to 8-bit interface
118        write4bits(0x02, LOW);
119    } else {
120        // Send function set command sequence
121        command(LCD_FUNCTIONSET | _displayfunction);
122        delayMicroseconds(4500);
123
124        // second try
125        command(LCD_FUNCTIONSET | _displayfunction);
126        delayMicroseconds(150);
127
128        // third go
129        command(LCD_FUNCTIONSET | _displayfunction);
130    }
131
132    // finally, set # lines, font size, etc.
133    command(LCD_FUNCTIONSET | _displayfunction);
134
135    // turn the display on with no cursor or blinking by default
136    _displaycontrol = LCD_DISPLAYON | LCD_CURSOROFF |
LCD_BLINKOFF;
137    display();
138
139    // clear it off
140    clear();
141
142    // Initialize to default text direction (for romance languages)
143    _displaymode = LCD_ENTRYLEFT |
LCD_ENTRYSHIFTDECREMENT;
144    // set the entry mode
145    command(LCD_ENTRYMODESET | _displaymode);
146
147 }
```

5.1.3.3 void AlphaLCD::blink ()

Turn off the blinking cursor.

Definition at line 229 of file AlphaLCD.cpp.

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

Referenced by `isBlinking()`.

```
229         {
230     _displaycontrol |= LCD_BLINKON;
231     command(LCD_DISPLAYCONTROL | _displaycontrol);
232 }
```

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()`.

```
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()`.

```
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

<i>int</i>	The character memory location
<i>int</i>	the character map 8 bytes array

Definition at line 324 of file AlphaLCD.cpp.

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

```
324         {
325
326     location &= 0x7; // No more than 7 memory locations
327
328     command(LCD_SETCGRAMADDR | (location << 3));
329
330     // Character definition loop
331     for (int i=0; i<8; i++) {
332         write(charmap[i]);
333     }
334 }
```

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

<i>int</i>	Data Pin number
<i>int</i>	Clock Pin number
<i>int</i>	Latch Pin number

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()`.

```

57 {
58     _data_pin = dp;
59     _clock_pin = cp;
60     _latch_pin = lp;
61
62     _backlight = LCD_BL_PIN;
63
64     pinMode(_data_pin, OUTPUT);
65     pinMode(_clock_pin, OUTPUT);
66     pinMode(_latch_pin, OUTPUT);
67
68     _displayfunction = LCD_4BITMODE | LCD_1LINE |
LCD_5x8DOTS;
69
70     // Display size (characters and lines). By default it is set to 16 characters x 2 lines
71     // but should be set with the right number of lines and columns,
72     // accordingly with the hardware specifications
73     begin(16, 2);
74 }

```

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

Helper method to set on/off autoscroll.

Parameters

<i>bool</i>	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

<i>bool</i>	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

<i>bool</i>	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.

Parameters

<i>bool</i>	the flag setting
-------------	------------------

Definition at line 285 of file AlphaLCD.cpp.

References `display()`, and `noDisplay()`.

```
285
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

<i>bool</i>	the flag setting
-------------	------------------

Definition at line 303 of file AlphaLCD.cpp.

References `leftToRight()`, and `rightToLeft()`.

```
303
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
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
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.

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

Referenced by `isBlinking()`.

```
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()`.

```
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()`.

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

5.1.3.21 void AlphaLCD::rightToLeft (void)

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()`.

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

5.1.3.22 void AlphaLCD::scrollDisplayLeft (void)

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`.


```

238         {
239     command(LCD_CURSORSHIFT | LCD_DISPLAYMOVE |
LCD_MOVELEFT);
240 }

```

5.1.3.23 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`.

```

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

```

5.1.3.24 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()`.

```

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

```

5.1.3.25 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

<i>int</i>	column
<i>int</i>	row

Definition at line 176 of file AlphaLCD.cpp.

References `_numlines`, `command()`, and `LCD_SETDDRAMADDR`.

```

177 {
178     int row_offsets[] = { 0x00, 0x40, 0x14, 0x54 };
179     if ( row > _numlines ) {
180         row = _numlines-1;
181     }
182
183     command(LCD_SETDDRAMADDR | (col + row_offsets[row]));
184 }

```

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     digitalWrite(_latch_pin, HIGH);
382     shiftOut(_data_pin, _clock_pin, LSBFIRST, data | cmd);
383     digitalWrite(_latch_pin, LOW);
384     delayMicroseconds(1);
385
386     cmd &= ~EN_SWITCH;
387     digitalWrite(_latch_pin, HIGH);
388     shiftOut(_data_pin, _clock_pin, LSBFIRST, data | cmd);
389     digitalWrite(_latch_pin, LOW);
390     delayMicroseconds(1);
391
392     cmd |= EN_SWITCH;
393     digitalWrite(_latch_pin, HIGH);
394     shiftOut(_data_pin, _clock_pin, LSBFIRST, data | cmd);
395     digitalWrite(_latch_pin, LOW);
396
397     delayMicroseconds(100);
398 }
```

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;
```

```
409     int cmd = 0;
410     if (!mode) {
411         cmd = 0;
412     } else {
413         cmd = RS_SWITCH;
414     }
415     //set enable low
416     cmd |= EN_SWITCH;
417     digitalWrite (_latch_pin, HIGH);
418     shiftOut(_data_pin, _clock_pin, LSBFIRST, cmd);
419     shiftOut(_data_pin, _clock_pin, LSBFIRST, value);
420     digitalWrite (_latch_pin, LOW);
421     //delay (500);
422     //set enable high;
423     cmd &= ~EN_SWITCH;
424     digitalWrite (_latch_pin, HIGH);
425     shiftOut(_data_pin, _clock_pin, LSBFIRST, cmd);
426     shiftOut(_data_pin, _clock_pin, LSBFIRST, value);
427     digitalWrite (_latch_pin, LOW);
428     delayMicroseconds (1);
429     //delay (500);
430     //set enable low
431     cmd |= EN_SWITCH;
432     digitalWrite (_latch_pin, HIGH);
433     shiftOut(_data_pin, _clock_pin, LSBFIRST, cmd);
434     shiftOut(_data_pin, _clock_pin, LSBFIRST, value);
435     digitalWrite (_latch_pin, LOW);
436     delayMicroseconds (100);
437
438 }
```

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.

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.

```
#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.

```
#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_SETCGRAMADDR 0x40`
- `#define LCD_SETDRAMADDR 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_SETCGRAMADDR 0x40

Definition at line 34 of file AlphaLCD.h.

Referenced by AlphaLCD::createChar().

6.2.2.31 #define LCD_SETDRAMADDR 0x80

Definition at line 35 of file AlphaLCD.h.

Referenced by AlphaLCD::setCursor().

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