Erriez TM1638 library for Arduino

1.2.0

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Chapter 1

JY-LKM1638 7-segment display / button library for Arduino

This is a JY-MCU JY-LKM1638 library for Arduino.

This board supports:

- 3-wire serial interface
- TM1638 LED driver and key-scan chip
- Power: 3.3V .. 5V
- 8 digits 7-segment display
- 8 dual color LEDs
- 8 buttons

Order number

`Google.com` `DX.com SKU: 81873` `AliExpress.com` `eBay.com` Many more...

Note: This library has not been tested with a different "LED&KEY" board.

Hardware

Connect GND and +5V to the Arduino board.

Connect the following pins to the Arduino DIGITAL pins:

- DIO (Bi-directional data input/output)
- STB (Chip select)
- CLK (Clock)

Note: Some Arduino boards cannot deliver enough 5V power to drive the LED's.

Pins

Pin	LKM-1638	Arduino UNO / Nano / Mega2560 / Leonardo / Pro Micro	Node MCU	LOLIN32
1	VCC	5V (or 3.3V)	GND	GND
2	GND	GND	3V3	3V3
3	CLK	Digital pin 2	D2	0
4	DIO	Digital pin 3	D3	4
5	STB1	Digital pin 4	D4	5

Examples

Examples | JY-LKM1638:

- Brightness
- Buttons
- Counter
- Date
- Demo
- Temperature
- TestLEDs
- Time

Documentation

- Doxygen online HTML
- Doxygen PDF

Terms:

```
Segment:   One LED in a 7-segment display
Digit:     One 7-segment display (Value 0..9 and A..F)
Dot:       The dot LED in a 7-segment digit
Pos:       Print position 0...7 (MSB bit 7: left .. LB bit 0: right)
Radius:    DEC for decimal, HEX for hexadecimal, BIN for binary
MaxDigits: Reserve a number of digits to print a value
Pad:       Display fixed number of digits with 0 padding
Overflow:  Value does not fit on the display, display minus chars
LSB:       Most right digit, dual color LED8 or switch (SW8)
MSB:       Most left digit,  dual color LED1 or switch (SW1)
```

Usage

Initialization

```
{c++}
#include <ErriezLKM1638Board.h>

// Connect display pins to the Arduino DIGITAL pins
#define TM1638_CLK_PIN   2
#define TM1638_DIO_PIN   3
#define TM1638_STB0_PIN  4

// Create LKM1638 board
LKM1638Board lkm1638(TM1638_CLK_PIN, TM1638_DIO_PIN, TM1638_STB0_PIN);

void setup()
{
    // Initialize LKM1638Board
    lkm1638.begin();
}
```

Read 8 buttons

Buttons are 8-bit with bit 7 most left switch, bit 0 most right switch.

Note: The text on the board counts from S1 to S8!

```
{c++}
uint8_t buttons = lkm1638.getButtons();
```

Control 8 dual color LED's

Dual color LED 7 = most left (Text LED8) Dual color LED 0 = most right (Text LED0)

```
{c++}
// Turn LED 0 red on (firt LED on the right)
lkm1638.setColorLED(0, LedRed);

// Turn LED 0 green on
lkm1638.setColorLED(0, LedGreen);

// Turn LED 0 off
lkm1638.setColorLED(0, LedOff);

// Turn multiple LEDs on, color red
lkm1638.colorLEDsOn(0xA9, LedRed);

// Turn multiple LEDs off
lkm1638.colorLEDsOff(0x1F);
```

Clear display

```
{c++}
lkm1638.clear();
```

Set/get print display position

The print position can be set from 0..7. 7 = most left digit 0 = most right digit

```
{c++}
// Set postion 4
lkm1638.setPrintPos(4);

// Get print position
uint8_t pos = lkm1638.getPrintPos();
```

Print variable on 7-segment display

Printing starts from digit right to left with an optional maximum number of digits.

Minus '-' chars will be displayed when the value is out of range, or does not fit on the display.

Optional padding can be used to display zero's. This is for example useful to print hours and minutes with fixed 2 digits.

```
{c++}
// Print int16_t on print position
lkm1638.print(1234);

// Print signed 32-bit value
lkm1638.print(-1234567);

// Print 16-bit unsigned casted value
lkm1638.print((uint16_t)65535);

// Print 16-bit hexadecimal unsigned value
uint16_t value = 0xBEEF;
lkm1638.print(value, HEX);

// Print value with maximum 2 digits
uint8_t value = 99;
lkm1638.print(value++, DEC, 2);

// Print -- when value is greater than 2 digits
lkm1638.print(value, DEC, 2);

// Print 16-bit unsigned value with max 4 digits and 4 digits padding: 0009
uint16_t value = 9;
lkm1638.print(value, DEC, 4, 4);

// Print 32-bit unsigned value
lkm1638.print(12345678UL);

// Print binary uint8_t 0xA9 = 10101001
uint8_t value = 0xA9;
lkm1638.print(value, BIN, 8, 8);
```

Control 8 display dots

```
{c++}
// Turn one dot on in digit 7 (most left)
lkm1638.dotOn(7);

// Turn one dot off in digit 0 (most right)
lkm1638.dotOff(0);

// Set multiple dots on and off
lkm1638.setDots(0x85);
```

Display special characters

```
{c++}
// Turn digit off
lkm1638.setSegmentsDigit(5, SEGMENTS_OFF);

// Display minus character
lkm1638.setSegmentsDigit(4, SEGMENTS_MINUS);

// Display degree selsius symbol + C
lkm1638.setSegmentsDigit(1, SEGMENTS_DEGREE);
lkm1638.setSegmentsDigit(0, SEGMENTS_C);
```

Write a custom character to the display

```
{c++}
// Display single LED in a digit
lkm1638.setSegmentsDigit(0, 0b0001000);
```

Library dependencies

- Erriez TM1638

Library installation

Please refer to the Wiki page.

Other Arduino Libraries and Sketches from Erriez

- Erriez Libraries and Sketches

Chapter 2

Hierarchical Index

2.1 Class Hierarchy

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

TM1638
  LKM1638Board 13

Chapter 3

Class Index

3.1 Class List

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

LKM1638Board
LKM1638Board class, derived from TM1638 library 13

Chapter 4

File Index

4.1 File List

Here is a list of all documented files with brief descriptions:

src/ErriezLKM1638Board.cpp
JY-LKM1638 board v1.1 library for Arduino 25
src/ErriezLKM1638Board.h
JY-LKM1638 board v1.1 library for Arduino 26

Chapter 5

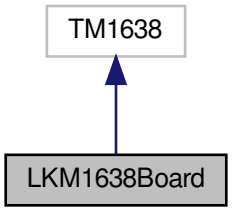
Class Documentation

5.1 LKM1638Board Class Reference

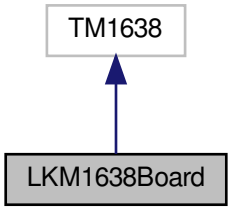
LKM1638Board class, derived from TM1638 library.

`#include <ErriezLKM1638Board.h>`

Inheritance diagram for LKM1638Board:



Collaboration diagram for LKM1638Board:



Public Member Functions

- LKM1638Board (uint8_t clkPin, uint8_t dioPin, uint8_t stbPin)

  LKM1638 constructor.
- uint8_t getButtons ()

  Read buttons.
- void clear ()

  Turn all LED's off.
- void setColorLED (uint8_t led, LedColor color)

  Set dual color LED.
- void colorLEDsOn (uint8_t leds, LedColor color)

  Turn multiple color LED's on.
- void colorLEDsOff (uint8_t leds)

  Turn multiple color LED's off.
- void refresh ()

  Refresh display.
- void dotOn (uint8_t pos)

  Turn dot LED on.
- void dotOff (uint8_t pos)

  Turn dot LED off.
- void setDots (uint8_t dots)

  Turn multiple dots on or off.
- void setPrintPos (uint8_t pos)

  Set print position.
- uint8_t getPrintPos ()

  Get print position.
- void setSegmentsDigit (uint8_t pos, uint8_t leds)

  Write LED segments of a digit.
- void setDigit (uint8_t pos, uint8_t digit)

  Write digit.
- void print (uint8_t value)

  Print uint8_t value.
- void print (uint8_t value, uint8_t radius)

  Print uint8_t with radius.
- void print (uint8_t value, uint8_t radius, uint8_t maxDigits)

  Print uint8_t with radius and maximum number of digits.
- void print (uint8_t value, uint8_t radius, uint8_t maxDigits, uint8_t pad)

  Print uint8_t with radius, maximum number of digits and padding digits.
- void **print** (uint16_t value)
- void **print** (uint16_t value, uint8_t radius)
- void **print** (uint16_t value, uint8_t radius, uint8_t maxDigits)
- void **print** (uint16_t value, uint8_t radius, uint8_t maxDigits, uint8_t pad)
- void **print** (unsigned long value)
- void **print** (unsigned long value, uint8_t radius)
- void **print** (unsigned long value, uint8_t radius, uint8_t maxDigits)
- void **print** (unsigned long value, uint8_t radius, uint8_t maxDigits, uint8_t pad)
- void **print** (int8_t value)
- void **print** (int8_t value, uint8_t radius)
- void **print** (int8_t value, uint8_t radius, uint8_t maxDigits)
- void **print** (int16_t value)
- void **print** (int16_t value, uint8_t radius)
- void **print** (int16_t value, uint8_t radius, uint8_t maxDigits)
- void **print** (long value)
- void **print** (long value, uint8_t radius)
- void **print** (long value, uint8_t radius, uint8_t maxDigits)

Protected Member Functions

- void writeDigit (uint8_t pos)

  Write digit position.
- void writeUnsignedValue (uint32_t value, uint8_t radius, uint8_t maxDigits, uint8_t pad)

  Write unsigned value to display.
- void writeSignedValue (int32_t value, uint8_t radius, uint8_t maxDigits)

  Write signed value to display.
- uint8_t getNumDigits (uint32_t value, uint8_t radius)

  Get number of digits of a signed 32-bit value.
- void displayOverflow (uint8_t numDigits)

  Display overflow with - characters.
- uint8_t swapBits (uint8_t data)

  Swap bits.
- uint8_t swapPos (uint8_t pos)

  Swap digit position.
- uint8_t swapLeds (uint8_t led)

  Swap dual color LED's.

Protected Attributes

- uint8_t _leds [NUM_DIGITS]

  LED digits.
- uint8_t _pos

  Print position.
- uint8_t _dots

  Dot LED's.

5.1.1 Detailed Description

LKM1638Board class, derived from TM1638 library.

Definition at line 66 of file ErriezLKM1638Board.h.

5.1.2 Constructor & Destructor Documentation

5.1.2.1 LKM1638Board()

```
LKM1638Board::LKM1638Board (
            uint8_t clkPin,
            uint8_t dioPin,
            uint8_t stbPin )
```

LKM1638 constructor.

Parameters

clkPin	Clock pin
dioPin	Data pin (bi-directional)
stbPin	Strobe pin (low is enable)

Definition at line 80 of file ErriezLKM1638Board.cpp.

5.1.3 Member Function Documentation

5.1.3.1 colorLEDsOff()

```
void LKM1638Board::colorLEDsOff (
            uint8_t leds )
```

Turn multiple color LED's off.

Parameters

leds	Byte with 8 LED's

Definition at line 190 of file ErriezLKM1638Board.cpp.

5.1.3.2 colorLEDsOn()

```
void LKM1638Board::colorLEDsOn (
            uint8_t leds,
            LedColor color )
```

Turn multiple color LED's on.

Parameters

leds	Byte with 8 LED's
color	0: Off 1: Green 2: Red

Definition at line 177 of file ErriezLKM1638Board.cpp.

5.1.3.3 displayOverflow()

```
void LKM1638Board::displayOverflow (
            uint8_t numDigits )  [protected]
```

Display overflow with - characters.

Parameters

numDigits	Number of digits to display

Definition at line 575 of file ErriezLKM1638Board.cpp.

5.1.3.4 dotOff()

```
void LKM1638Board::dotOff (
            uint8_t pos )
```

Turn dot LED off.

Parameters

pos	Position 0..7

Definition at line 275 of file ErriezLKM1638Board.cpp.

5.1.3.5 dotOn()

```
void LKM1638Board::dotOn (
            uint8_t pos )
```

Turn dot LED on.

Parameters

pos	Position 0..7

Definition at line 263 of file ErriezLKM1638Board.cpp.

5.1.3.6 getButtons()

```
uint8_t LKM1638Board::getButtons ( )
```

Read buttons.

Returns

Value of 8 buttons

Definition at line 93 of file ErriezLKM1638Board.cpp.

5.1.3.7 getNumDigits()

```
uint8_t LKM1638Board::getNumDigits (
            uint32_t value,
            uint8_t radius )  [protected]
```

Get number of digits of a signed 32-bit value.

Parameters

value	32-bit signed value
radius	Radius

Returns

Number of digits

Definition at line 554 of file ErriezLKM1638Board.cpp.

5.1.3.8 getPrintPos()

```
uint8_t LKM1638Board::getPrintPos ( )
```

Get print position.

Returns

Position 0..7

Definition at line 311 of file ErriezLKM1638Board.cpp.

5.1.3.9 print() [1/4]

```
void LKM1638Board::print (
            uint8_t value )
```

Print uint8_t value.

Parameters

value	Display value 0..255

Definition at line 323 of file ErriezLKM1638Board.cpp.

5.1.3.10 print() [2/4]

```
void LKM1638Board::print (
            uint8_t value,
            uint8_t radius )
```

Print uint8_t with radius.

Parameters

value	Display value 0..255
radius	Radius 2 for binary, 10 for decimal, 16 for HEX

Definition at line 333 of file ErriezLKM1638Board.cpp.

5.1.3.11 print() [3/4]

```
void LKM1638Board::print (
            uint8_t value,
            uint8_t radius,
            uint8_t maxDigits )
```

Print uint8_t with radius and maximum number of digits.

Parameters

value	Display value 0..255
radius	Radius 2 for binary, 10 for decimal, 16 for HEX
maxDigits	Maximum number of digits

Definition at line 344 of file ErriezLKM1638Board.cpp.

5.1.3.12 print() [4/4]

```
void LKM1638Board::print (
            uint8_t value,
            uint8_t radius,
            uint8_t maxDigits,
            uint8_t pad )
```

Print uint8_t with radius, maximum number of digits and padding digits.

Parameters

value	Display value 0..255
radius	Radius 2 for binary, 10 for decimal, 16 for HEX
maxDigits	Maximum number of digits
pad	Number of digits starting with a 0

Definition at line 356 of file ErriezLKM1638Board.cpp.

5.1.3.13 setColorLED()

```
void LKM1638Board::setColorLED (
            uint8_t led,
            LedColor color )
```

Set dual color LED.

Parameters

led	LED number (0 = most right, 7 = most left)
color	0: Off 1: Green 2: Red

Definition at line 144 of file ErriezLKM1638Board.cpp.

5.1.3.14 setDigit()

```
void LKM1638Board::setDigit (
            uint8_t pos,
            uint8_t digit )
```

Write digit.

Parameters

pos	Position 0..7
digit	Value 0..9, A..F

Definition at line 235 of file ErriezLKM1638Board.cpp.

5.1.3.15 setDots()

```
void LKM1638Board::setDots (
            uint8_t dots )
```

Turn multiple dots on or off.

Parameters

dots	Byte with dots

Definition at line 287 of file ErriezLKM1638Board.cpp.

5.1.3.16 setPrintPos()

```
void LKM1638Board::setPrintPos (
            uint8_t pos )
```

Set print position.

Parameters

pos	Position 0..7

Definition at line 300 of file ErriezLKM1638Board.cpp.

5.1.3.17 setSegmentsDigit()

```
void LKM1638Board::setSegmentsDigit (
            uint8_t pos,
            uint8_t segments )
```

Write LED segments of a digit.

Parameters

pos	Position 0..7
segments	Segment LED's

Definition at line 222 of file ErriezLKM1638Board.cpp.

5.1.3.18 swapBits()

```
uint8_t LKM1638Board::swapBits (
            uint8_t data )  [protected]
```

Swap bits.

Parameters

data	9-bit unsigned value

Returns

Swapped bits

Definition at line 610 of file ErriezLKM1638Board.cpp.

5.1.3.19 swapLeds()

```
uint8_t LKM1638Board::swapLeds (
            uint8_t led )  [protected]
```

Swap dual color LED's.

Parameters

led	LED's

Returns

Swapped LED bits

Definition at line 599 of file ErriezLKM1638Board.cpp.

5.1.3.20 swapPos()

```
uint8_t LKM1638Board::swapPos (
            uint8_t pos )  [protected]
```

Swap digit position.

Parameters

pos	Position

Returns

Swapped position

Definition at line 588 of file ErriezLKM1638Board.cpp.

5.1.3.21 writeDigit()

```
void LKM1638Board::writeDigit (
            uint8_t pos )  [protected]
```

Write digit position.

Parameters

pos	Digit number 0 is most right digit, 7 is most left digit

Definition at line 206 of file ErriezLKM1638Board.cpp.

5.1.3.22 writeSignedValue()

```
void LKM1638Board::writeSignedValue (
            int32_t value,
            uint8_t radius,
            uint8_t maxDigits )  [protected]
```

Write signed value to display.

Parameters

value	signed value -2^31..2^31
radius	Radius 2 for binary, 10 for decimal, 16 for HEX
maxDigits	Maximum number of digits

Definition at line 506 of file ErriezLKM1638Board.cpp.

5.1.3.23 writeUnsignedValue()

```
void LKM1638Board::writeUnsignedValue (
            uint32_t value,
            uint8_t radius,
            uint8_t maxDigits,
            uint8_t pad )  [protected]
```

Write unsigned value to display.

Parameters

value	Unsigned value 0..2^32
radius	Radius 2 for binary, 10 for decimal, 16 for HEX
maxDigits	Maximum number of digits
pad	Number of digits starting with a 0

Definition at line 471 of file ErriezLKM1638Board.cpp.

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

- src/ErriezLKM1638Board.h
- src/ErriezLKM1638Board.cpp

Chapter 6

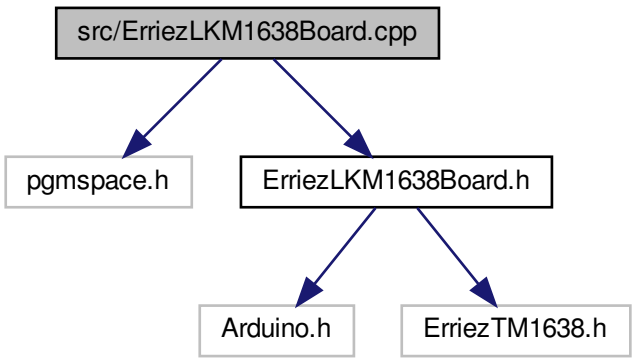
File Documentation

6.1 src/ErriezLKM1638Board.cpp File Reference

JY-LKM1638 board v1.1 library for Arduino.

```
#include <pgmspace.h>
#include "ErriezLKM1638Board.h"
```

Include dependency graph for ErriezLKM1638Board.cpp:



6.1.1 Detailed Description

JY-LKM1638 board v1.1 library for Arduino.

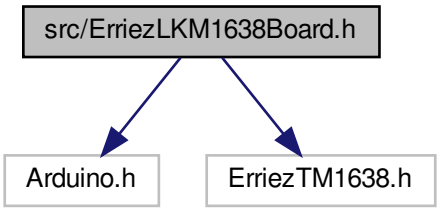
Source: https://github.com/Erriez/ErriezTM1638 Source: https://github.com/↩ Erriez/ErriezLKM1638 Documentation: https://erriez.github.io/ErriezLKM1638

6.2 src/ErriezLKM1638Board.h File Reference

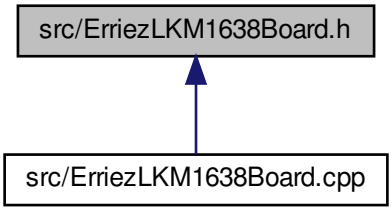
JY-LKM1638 board v1.1 library for Arduino.

```
#include <Arduino.h>
#include <ErriezTM1638.h>
```

Include dependency graph for ErriezLKM1638Board.h:



This graph shows which files directly or indirectly include this file:



Classes

- class LKM1638Board

  LKM1638Board class, derived from TM1638 library.

Macros

- #define NUM_COLOR_LEDS 8

  Number of dual color LED's.
- #define NUM_DIGITS 8

  Number of digits.
- #define SEGMENTS_OFF 0b00000000

  7-sgement digit all LED's off

- #define SEGMENTS_MINUS 0b01000000

  7-sgement digit minus character
- #define SEGMENTS_DEGREE 0b01100011

  7-sgement digit degree symbol
- #define SEGMENTS_C 0b00111001

  7-sgement digit Celsius symbol

Enumerations

- enum LedColor { **LedOff** = 0, **LedRed** = 1, **LedGreen** = 2 }

  Dual color LED.

6.2.1 Detailed Description

JY-LKM1638 board v1.1 library for Arduino.

Source: https://github.com/Erriez/ErriezTM1638 Source: https://github.com/↩ Erriez/ErriezLKM1638 Documentation: https://erriez.github.io/ErriezLKM1638

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