

● Introduce

The LE-1600 is a 16-way LED expansion board based on MassDuino , the main chip is MD-8088. MD-8088 integrates a wealth of digital peripherals and analog peripherals, it offers great flexibility and play space for the users of the product design. LE -1600 using SPI communication with main processor, its benefits can save a lot of ports. If you have a need, in this way can also extend other modules from the control board, such as the sensor module , ADC acquisition module and so on. MD-8088 chip is editable in the Arduino environment, so we can use a USB to serial cable for LE-1600 for upgrade firmware. The module is high performance low power, low cost , and it support secondary development.

About MassDuino , please refer to: <http://www.inhaos.com/uploadfile/otherpic/UM-MASSDUINO-V01-EN.pdf>

● Features

- Can be program in the Arduino environment, very easy to use
- Support secondary development
- 8K bytes of in-system programmable FLASH, innovative data encryption technology
- 504 bytes of data FLASH, support byte read (simulate E2PROM)
- 1K SRAM bytes on-chip
- Programmable synchronous / asynchronous USART
- Can work in master / slave mode SPI Serial Interface
- I2C -compatible two-wire serial communication interface protocols , supporting master and slave device mode
- 32 8it general purpose working registers
- Support the expansion of the chip in-circuit debugging functions
- By SWD interface programming for FLASH, EEPROM, system configuration area , the ISP function
- Up to 30 programmable I / O
- High-performance, low -power and low-cost

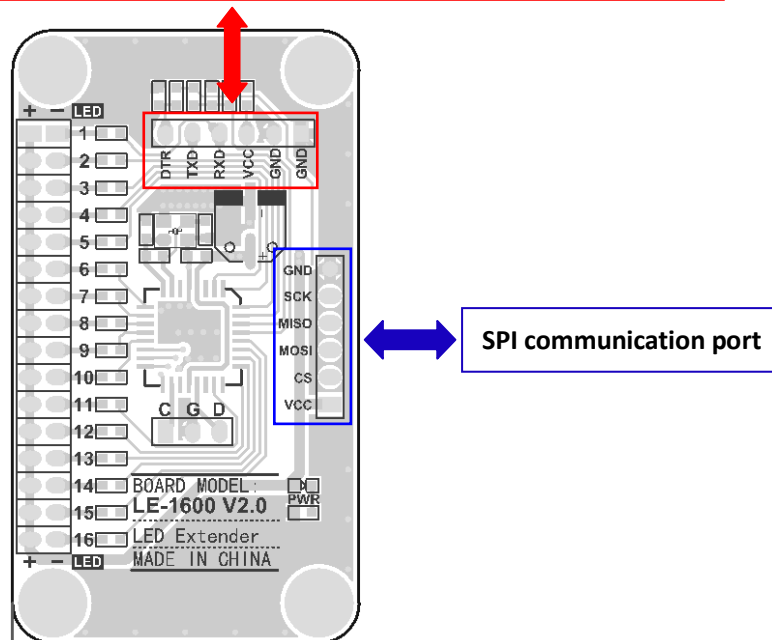
● SPI communication ports

When we use the LE-1600, we can use the DuPong cable to connect it to the master chip SPI communication port

	LE-1600	Arduino UNO R3	Description
Pin Connection	VCC	VCC/3.3V	Operating Voltage
	CS	IO8	Chip Select Port
	MOSI	D11	SPI Interface
	MISO	D12	
	SCK	D13	
	GND	GND	GND

● Pin Description

Massduino upload port , upload sketch via Arduino USB2SERIAL Light cable



● SPI Protocol

The LE-1600 was working in SPI Slave mode , after power on , the chip will wait for command form SPI Master ,then implement it if the it received valid command.

The communication protocol as below:

Package Format:								
Name	CMD ID	PARA_LEN	PARA_0	PARA_1	PARA_2	PARA_3	PARA_4	CKS
No. of the Bytes	0	1	2	3	4	5	6	7
Length (Bytes)	1	1	5					1
Value Range	0~255	0~255	0~255					0~255
Description	CMD type	CMD Valid length	Parameter, fill 0x00 for the invalid data					Bitwise NOT operation for sum of byte0 to byte6

In the master side , the SPI initial code as below:

```
//SPI Master side , to communication to LE-6000
#include <SPI.h>

int LE_1600_SS = 8; // assign SPI CS pin, in this code the SPI D8 connect to LE-1600's SS Pin

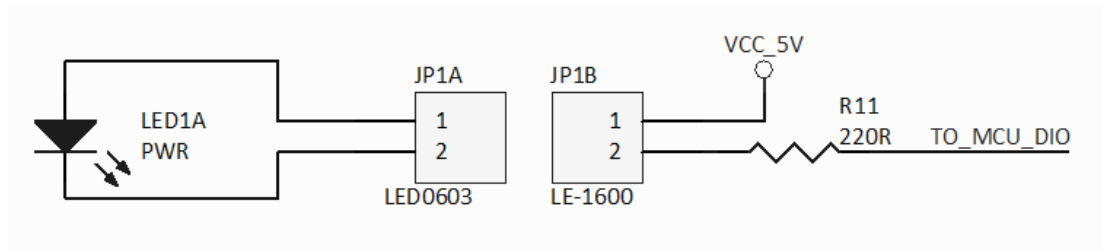
void setup (void)
{
  pinMode(LE_1600_SS, OUTPUT); // set SS pin is output
  digitalWrite(LE_1600_SS, HIGH); // set SS pin to high , pull low the SS pin during SPI communication
  SPI.setClockDivider(SPI_CLOCK_DIV8); // set SPI clock to 2MHz
  SPI.begin (); // Start SPI communication
}
```

LE-1600 supported command as below:

Command List:								
Description	Command ID	Para_Len	PARA_0	PARA_1	PARA_2	PARA_3	PARA_4	Description
TURNED_LED_ON	0xFE	2	LED16 to 9	LED 8 to 1				Turned specified LED ON , High bit ON , Other bit no change
TURNED_LED_OFF	0xFD	2	LED16 to 9	LED 8 to 1				Turned specified LED OFF , High bit OFF , Other bit no change
SET_LED_VALUE	0xFC	2	LED16 to 9	LED 8 to 1				High bit LED ON, Low Bit LED Off
SET_LED_FLASH	0xFB	5	LED16 to 9	LED 8 to 1	LED ON (x50mS)	LED OFF (x50mS)	Repeat times (0 = always flash)	Turned specified LED flash , high bit enable flash mode , low bit no change, if repeat times = 0, the LED will always flash

LED Connection

Below figure show the connection of the LED and LE-1600 , in most application the board can be directly driver a LED with 5V power. if user need to driver a bigger power LED, you can add a power driver for the LED and control by LE-1600.



Arduino Source Code

Two code will coming with this board:

1, LE_1600.rar

This is arduino source code for LE-1600 , to development the LE-1600 , user need to install MassDuino driver, and write code in arduino , and upload sketch via USB2SERIAL light cable, the relational link as below:

MassDuino support package: http://www.inhaus.com/downcount.php?download_id=139

USB2SERIAL Light cable: <http://www.inhaus.com/uploadfile/otherpic/DOC-BUONO-USB2SERIAL-V01-EN.pdf>

2, LE_1600_UNO_MASTER.rar

This is arduino source code for UNO , the UNO will working with LE-1600, this code demo how to use LE-1600 in Arduino.

All code can be download from www.inhaus.com

Application:

- Extend IO and save code for UNO to drive many leds
- Arduino car / robotics
- Color LED drive
- State indication
- Toy

Contact us

1111 Oakmont Drive #C, San Jose, CA 95117

Contact: John Huang

Tel No: +1-408-981-6615

E-mail: support@inhaus.com