DESCRIPTION

The IS31FL3706 is a general purpose 9×8 or 8×9 LED Matrix programmed via 1MHz I2C compatible interface. Each LED can be dimmed individually with 8-bit PWM data, and each CSy has 8-bit DC scaling (Color Calibration) data which allowing 256 steps of linear PWM dimming for each dot and 256 steps of DC current adjustable level for each CSy.

Additionally each LED open and short state can be detected, IS31FL3706 store the open or short information in Open-Short Registers. The Open-Short Registers allowing MCU to read out via I2C compatible interface. Inform MCU whether there are LEDs open or short and the locations of open or short LEDs.

FEATURES

- Supply voltage range: 2.7V to 5.5V
- 8 current sinks
- Support 8×n (n=1~9), 9×8 LED matrix configurations
- Individual 256 PWM control steps
- 256 DC current steps for each CSy
- 64 global current steps
- SDB rising edge reset I2C module
- Register programmable PWM frequency: 0.25kHz to 220kHz
- 1MHz I2C-compatible interface
- Individual open and short error detect function
- PWM 180 degrees phase shift
- Spread spectrum
- De-ghost
- QFN-24 (4mm×4mm) package
- RoHS & Halogen-Free Compliance
- TSCA Compliance

QUICK START

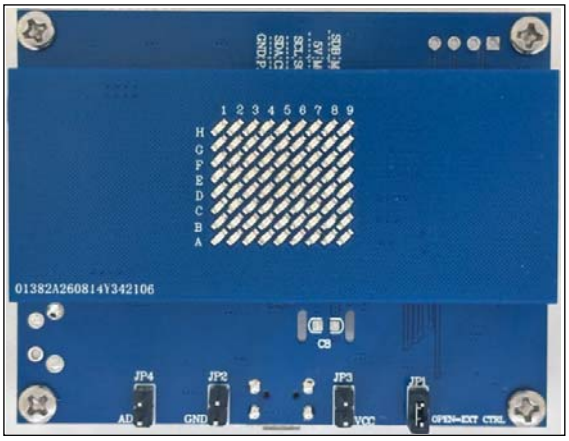


Figure 1 Photo of IS31FL3706 Evaluation Board

RECOMMENDED EQUIPMENT

- 5.0V, 2A power supply

ABSOLUTE MAXIMUM RATINGS

- ≤ 5.5V power supply

Caution: Do not exceed the conditions listed above, otherwise the board will be damaged.

PROCEDURE

The IS31FL3706 evaluation board is fully assembled and tested. Follow the steps listed below to verify board operation.

Caution: Do not turn on the power supply until all connections are completed.

1) Short JP1.
2) Connect the 5V DC power to VCC (JP3) / GND (JP2), or plug in the USB power input to USB Type-C (CON1).
3) Turn on the power supply/Plug in the USB Type-C Pay attention to the supply current. If the current exceeds 1A, please check for circuit fault.

EVALUATION BOARD OPERATION

The IS31FL3706 evaluation board has three animation displays modes. Toggling the MODE button (S1) can switch the modes.

1) Line-shaded animation
2) Heart animation
3) Dot-shaded line animation
4) All LED turn on

Note: IS31FL3706 solely controls the FxLED function on the evaluation board.

ORDERING INFORMATION

Part No.	Temperature Range	Package
IS31FL3706-QFLS4-EB	-40°C to +125°C (Industrial)	QFN-24 Lead-free

Table 1 Ordering Information

For pricing, delivery, and ordering information, please contacts Lumissil's analog marketing team at analog@Lumissil.com or (408) 969-6600.

SOFTWARE SUPPORT

JP1 default setting is closed (jumper on). If it is open (no jumper), the on-board MCU will configure its own I2C/SDB/AD pins to High Impedance status so an external source can drive the I2C/SDB signals to control the IS31FL3706 LED driver.

The AD pin is pulled low via R5 setting the device address of IS31FL3706 to 0x68.

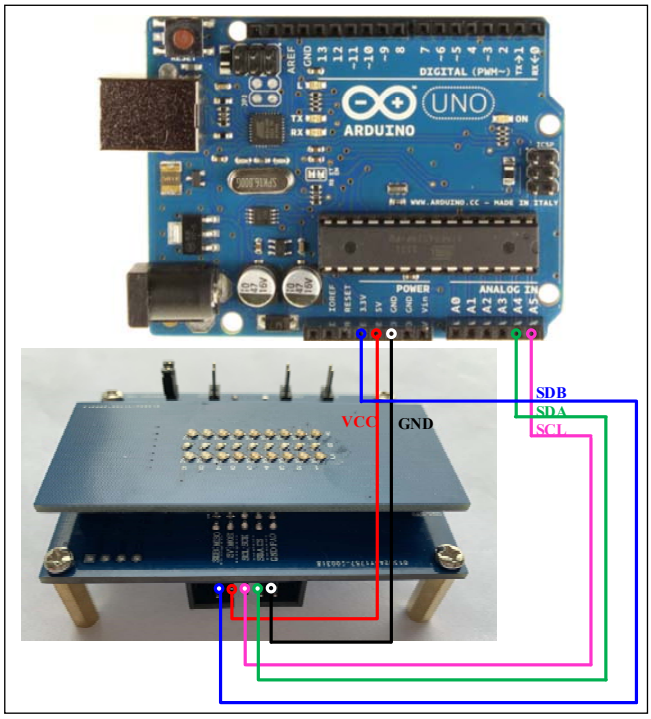


Figure 2 Photo of Arduino UNO connected to Evaluation Board

The steps listed below is an example of using the Arduino for external control.

The Arduino hardware consists of an Atmel microcontroller with a bootloader allowing quick firmware updates. First download the latest Arduino Integrated Development Environment IDE (1.6.12 or greater) from www.arduino.cc/en/Main/Software. Also download the Wire.h library from www.arduino.cc/en/reference/wire and verify that pgmspace.h is in the directory …program Files(x86)/Arduino/hardware/tools/avr/avr/include/avr /. Then download the latest IS31FL3706 test firmware (sketch) from the Lumissil website http://www.lumissil.com/products/led-driver/fxled.

1) Open JP1.
2) Connect the 5 pins from Arduino board to IS31FL3706 EVB:
   a) Arduino 5V pin to IS31FL3706 EVB PVCC.
   b) Arduino GND to IS31FL3706 EVB GND.
   c) Arduino SDA (A4) to IS31FL3706 EVB P1.
   d) Arduino SCL (A5) to IS31FL3706 EVB P3.
   e) If Arduino uses 3.3V MCU VCC, connect 3.3V to IS31FL3706 EVB SDB, if Arduino use 5.0V MCU VCC, connect 5.0V to EVB SDB.
   (Arduino UNO MCU VCC is 5V, so SDB can be 5V or 3.3V)
3) Use the test code in appendix I or download the test firmware (sketch) from the Lumissil website, a .txt file and copy the code to Arduino IDE, compile and upload to Arduino.
4) Run the Arduino code as appendix I.
5) In EVB code, the AD pin is pulled low via 10k, so the device address is 0x68. When JP1 is open, the AD pin can be changed by connecting the AD as follows:
   a) AD=VCC, device address=0x6E.
   b) AD=SCL, device address=0x6A.
   c) AD=SDA, device address=0x6C.

Please refer to the datasheet to get more information about IS31FL3706.

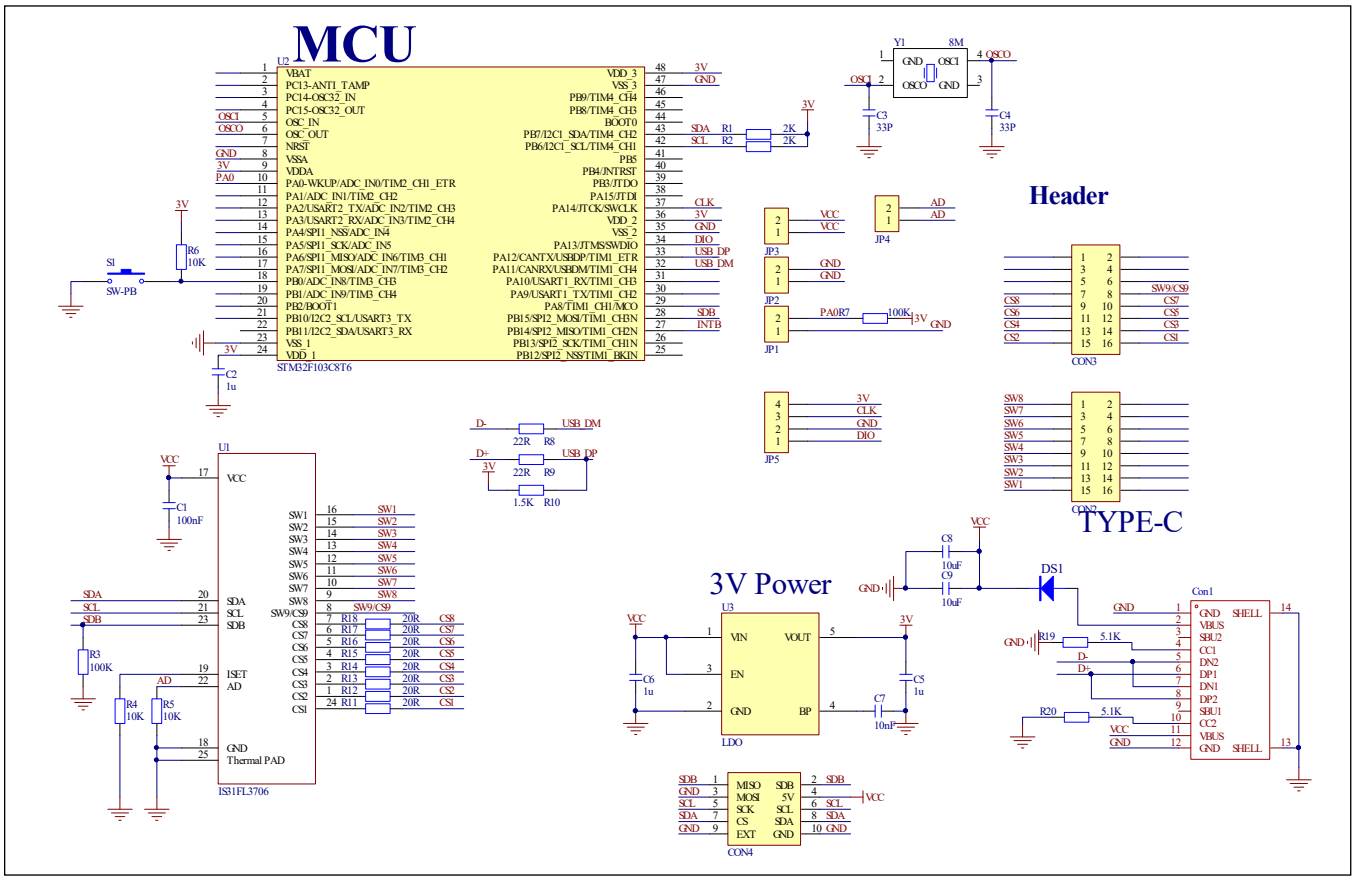


Figure 3 IS31FL3706 Application Schematic

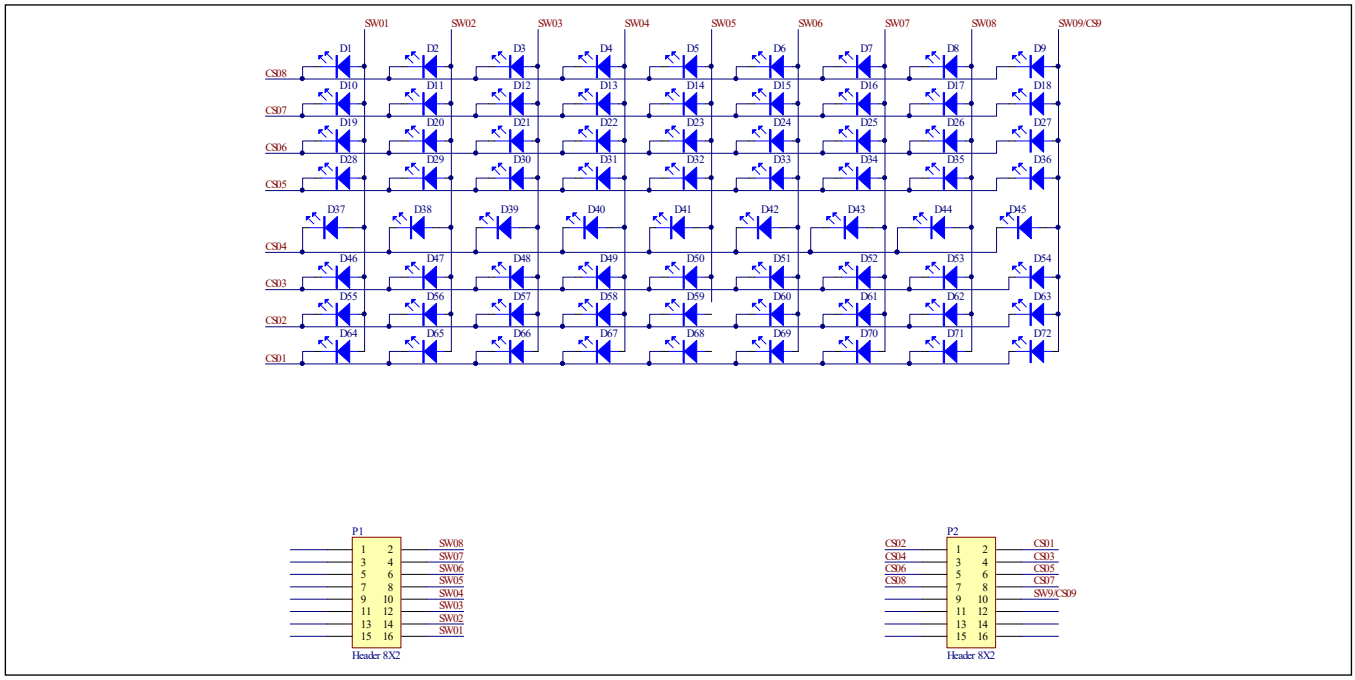


Figure 4 FxLED 9×8 ARRAY Application Schematic

BILL OF MATERIALS

Name	Symbol	Description	Qty	Supplier	Part No.
LED Driver	U1	Matrix LED Driver	1	Lumissil	IS31FL3706
MCU	U2	Microcontroller	1	STM	STM32F103C8T6
LDO	U3	Reduced voltage	1	SGMICRO	SGM2019-3.3V
Crystal	Y1	Crystal, 8MHz	1	JB	HC-49S
Diode	DS1	Diode, SMD	1	DIODES	DFLS240
Resistor	R1,R2	RES,2k,1/16W,±5%,SMD	2	Yageo	RC0603JR-072KL
Resistor	R3,R7	RES,100k,1/16W,±5%,SMD	2	Yageo	RC0603JR-07100KL
Resistor	R4,R5,R6	RES,10k,1/16W,±5%,SMD	3	Yageo	RC0603JR-0710KL
Resistor	R8,R9	RES,22R,1/16W,±5%,SMD	2	Yageo	RC0603JR-0722RL
Resistor	R10	RES,1.5k,1/16W,±5%,SMD	1	Yageo	RC0603JR-071K5L
Resistor	R11~R18	RES,20R,1/10W,±5%,SMD	5	Yageo	RC0603JR-0720RL
Resistor	R19,R20	RES,5.1k,1/16W,±5%,SMD	2	Yageo	RC0603JR-075K1L
Capacitor	C1	CAP,0.1μF,16V,±20%,SMD	1	Yageo	CC0603MRX7R7BB104
Capacitor	C2,C5,C6	CAP,1μF,16V,±20%,SMD	3	Yageo	CC0603KRX7R7BB105
Capacitor	C3,C4	CAP,33pF,16V,±20%,SMD	2	Yageo	CQ0603JRNPO9BN330
Capacitor	C7	CAP,10nF,16V,±20%,SMD	1	Yageo	CC0603KRX7R7BB103
Capacitor	C8,C9	CAP,10μF,16V, ±20%,SMD	2	Yageo	CC0805MKX5R7BB106
Button	S1	Button SMD	1		

Bill of Materials, refer to Figure 3 above.

FxLED ARRAY

Name	Symbol	Description	Qty	Supplier	Part No.
LED	D1~D72	Diode, LED Blue, SMD	9	Everlight	19-217/BHC-ZL1M2RY/3T

Bill of Materials, refer to Figure 4 above.

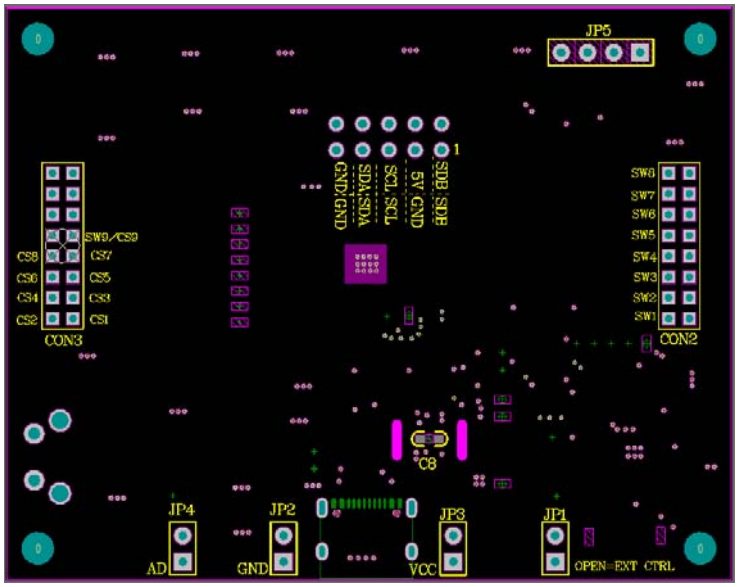


Figure 5 Board Component Placement Guide - Top Layer

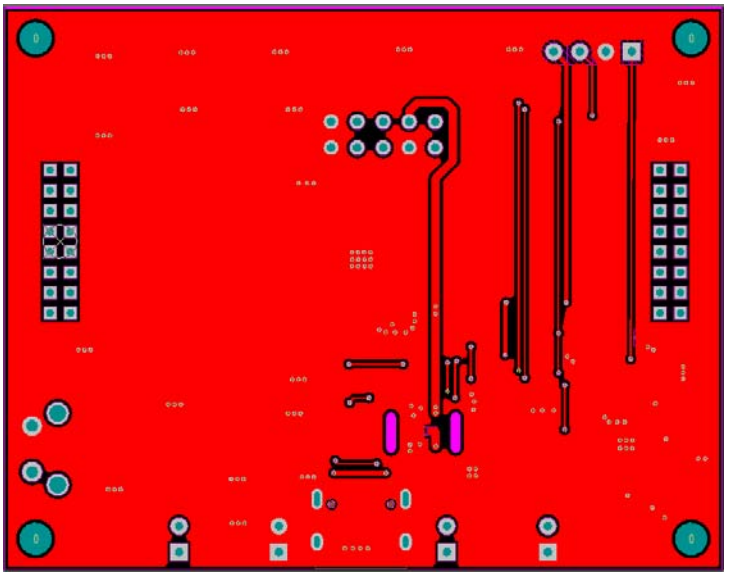


Figure 6 Board PCB Layout - Top Layer

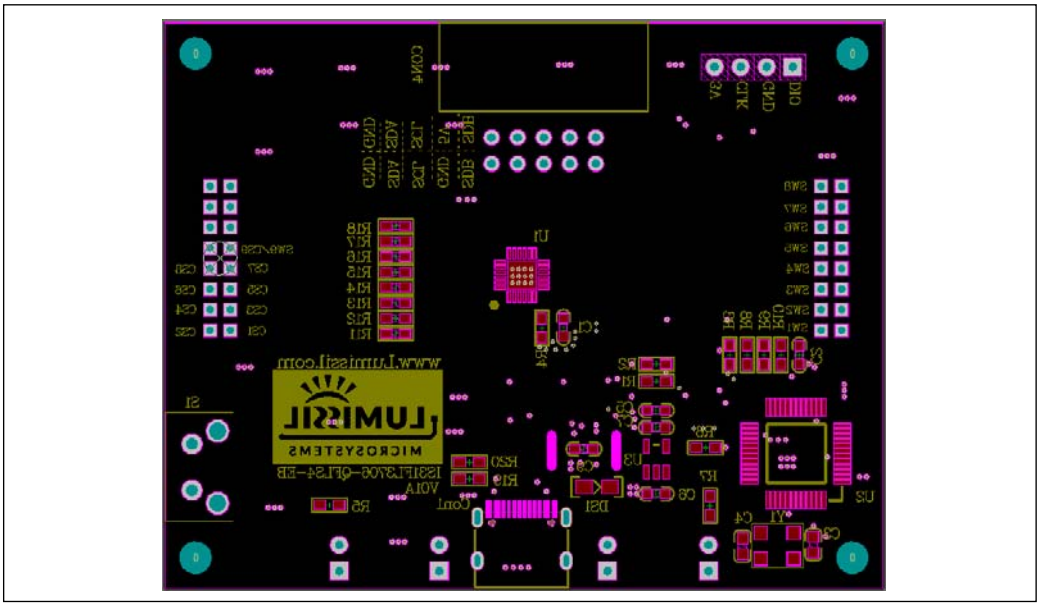


Figure 7 Board Component Placement Guide - Bottom Layer

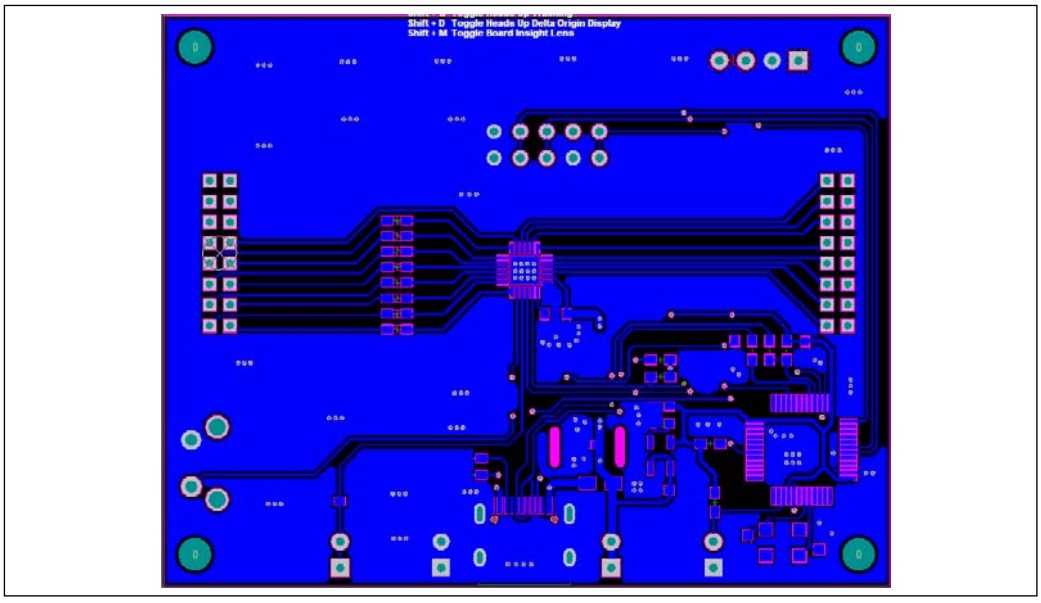


Figure 8 Board PCB Layout - Bottom Layer

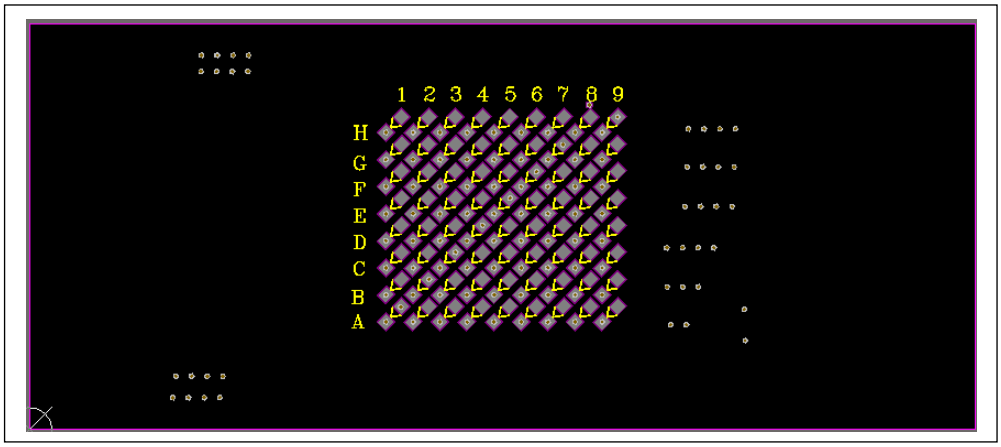


Figure 9 LED Board Component Placement Guide - Top Layer

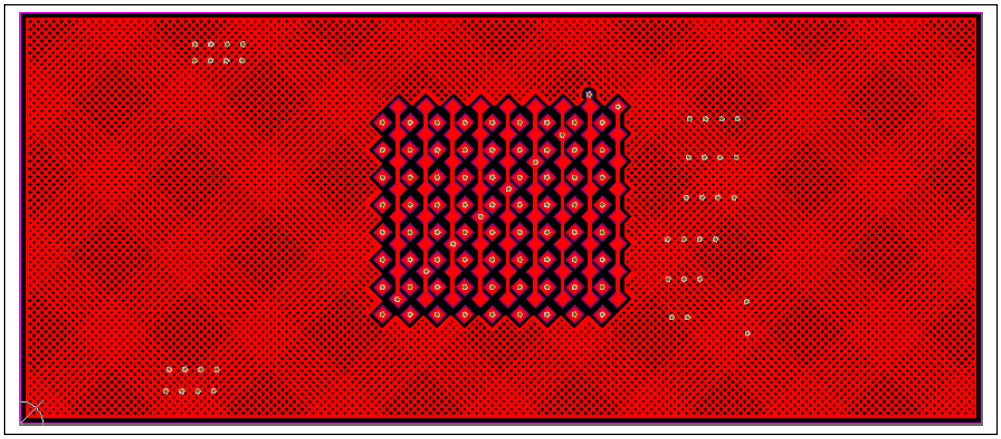


Figure 10 LED Board PCB Layout - Top Layer

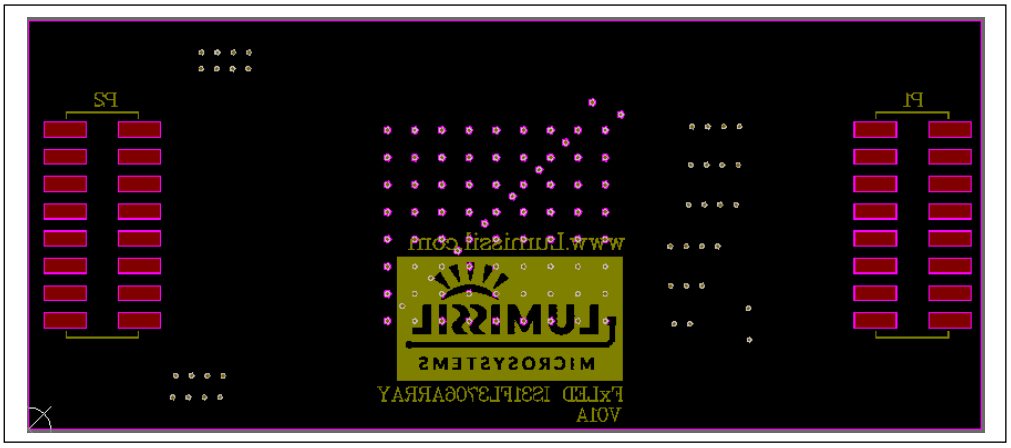


Figure 11 LED Board Component Placement Guide - Bottom Layer

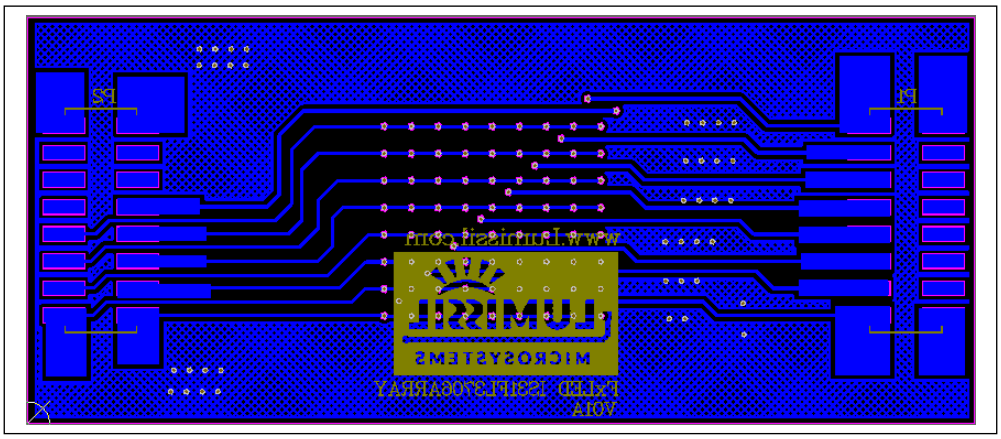


Figure 12 LED Board PCB Layout - Bottom Layer

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a.) the risk of injury or damage has been minimized;
b.) the user assume all such risks; and
c.) potential liability of Lumissil Microsystems is adequately protected under the circumstances

REVISION HISTORY

Revision	Detail Information	Date
A	Initial release	2026.09.17

APPENDIX Ⅰ: IS31FL3706 Arduino Test Code V01B

```
#include<Wire.h>
#include<avr/pgmspace.h>
#define AD_GND 0x68
#define R 0x80
#define G 0x80
#define B 0x80
uint8_t i,j;
const PROGMEM byte PWM_Gama64[64]=
{
  0x00,0x01,0x02,0x03,0x04,0x05,0x06,0x07,
  0x08,0x09,0x0b,0x0d,0x0f,0x11,0x13,0x16,
  0x1a,0x1c,0x1d,0x1f,0x22,0x25,0x28,0x2e,
  0x34,0x38,0x3c,0x40,0x44,0x48,0x4b,0x4f,
  0x55,0x5a,0x5f,0x64,0x69,0x6d,0x72,0x77,
  0x7d,0x80,0x88,0x8d,0x94,0x9a,0xa0,0xa7,
  0xac,0xb0,0xb9,0xbf,0xc6,0xcb,0xcf,0xd6,
  0xe1,0xe9,0xed,0xf1,0xf6,0xfa,0xfe,0xff
};
void setup()
{
  Wire.begin();
  Wire.setClock(400000);//I2C 400KHz
  Init_3706(R, G, B);
}
void loop()
{
  IS31FL3706_Test_mode1();//breath mode
}
void IS_IIC_WriteByte(uint8_t Dev_Add,uint8_t Reg_Add,uint8_t Reg_Dat)
{
  Wire.beginTransmission(Dev_Add/2); // transmit to device IS31FL373x
  Wire.write(Reg_Add); // sends regaddress
  Wire.write(Reg_Dat); // sends regaddress
  Wire.endTransmission(); // stop transmitting
}
void Init_3706(uint8_t Rdata, uint8_t Gdata, uint8_t Bdata)
{
  // IS_IIC_WriteByte(AD_GND,0xfe,0xc5);//unlock
  // IS_IIC_WriteByte(AD_GND,0xfD,0x02);//write page 2
  for(i=90;i<0x9f;i++)
  {
    IS_IIC_WriteByte(AD_GND,i,Bdata);// LED Scaling
  }
  // IS_IIC_WriteByte(AD_GND,0xfe,0xc5);//unlock
```

```
   // IS_IIC_WriteByte(AD_GND,0xfD,0x00);//write page 0
   for(i=0x01;i<0x8f;i++)
   {
      IS_IIC_WriteByte(AD_GND,i,0x00);//write all PWM set 0x00
   }
   IS_IIC_WriteByte(AD_GND,0xA1,0x40);//global current
   IS_IIC_WriteByte(AD_GND,0xA0,0x01);//normal operation
   }

void IS31FL3706_Test_mode1(void)//
{
   for (j=0;j<64;j++)//all LED ramping up
   {
      for(i=01;i<=0x8F;i++)
   {
      IS_IIC_WriteByte(AD_GND,i,pgm_read_byte_near(&PWM_Gama64[j]));//set all PWM
   }
   delay(10);//10ms
   }
   delay(1000); //keep on 1s
   for (j=63;j>0;j--)//all LED ramping down
   {
      for(i=0x01;i<=0x8F;i++)
      {
         IS_IIC_WriteByte(AD_GND,i,pgm_read_byte_near(&PWM_Gama64[j-1]));//set all PWM
      }
      delay(10);//10ms
   }
   delay(500); //keep off 0.5s
}
```