

36 CHANNELS LED DRIVER EVALUATION BOARD GUIDE

DESCRIPTION

IS31FL3246 is comprised of 36 constant current channels each with independent PWM control, designed for driving LEDs. The output current of each channel can be set at up to 25mA (Max.)

Proprietary programmable technology is used to minimize audible noise caused by MLCC decoupling capacitors. All registers can be programmed via a high speed I2C (1MHz).

FEATURES

- 2.7V to 5.5V supply
- Pin to pin with IS31FL3236A/IS31FL3237 (QFN-44, 5mm×5mm)
- I2C with register address automatic increment
- Four selectable I2C addresses
- SDB rising edge reset I2C module
- Accurate color rendition
 - Each channel 8-bit/10-bit PWM at 32kHz/64K/128K
 - Each channel 8-bit PWM at 122Hz/244Hz/488Hz
 - 3 8-bit global current adjust for 3 color LED
- Group dimming for reduce coding for RGB
- EMI Reduction Technology
 - Spread spectrum
 - Selectable 6 Phase Delay
 - Selectable 180 degree Clock Phase
- -40°C to +125°C temperature range

QUICK START



Figure 1: Photo of IS31FL3246 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 IS31FL3246 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) Connect the ground terminal of the power supply to the GND and the positive terminal to the VCC. Or connect the DC power to the connector (TP1&TP4).
- 2) Turn on the power supply and pay attention to the supply current. If the current exceeds 1.2A, please check for circuit fault.
- 3) Enter the desired mode of display by toggling the MODE button.

EVALUATION BOARD OPERATION

The IS31FL3246 evaluation board has six display modes. Toggling the MODE button (K1) can switch the modes.

- 1) (Default mode) The 12 RGB LEDs in the middle of the board show a color changing light bar moving pattern.
- 2) Two groups of blue LED on above display a tailing effect move from right to left.
- 3) Two groups of blue LED on above display a tailing effect move in opposite directions.
- 4) Blue LED on above perform timer display.
- 5) Two groups of blue LED on above flash together from two sides to middle and then turn off slowly from both sides to middle.
- 6) The blue LEDs on above are put into four '8' digits and to show a twist effect.

Note: IS31FL3246 solely controls the FxLED function on the evaluation board.

ORDERING INFORMATION

Part No.	Temperature Range	Package
IS31FL3246-QFLS4-EB	-40°C to +125°C (Industrial)	QFN-44, 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.

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SOFTWARE SUPPORT

JP1 default setting is shorted. If it is set to open, the SDA, SCL and SDB pin are set to high impedance and the on-board MCU will be idle. External I2C and SDB signals can be connected to TP4 to control the IS31FL3246 LED driver. During external control mode, toggling the MODE button (K1) can switch the power of single blue color LED and power of RGB LED.

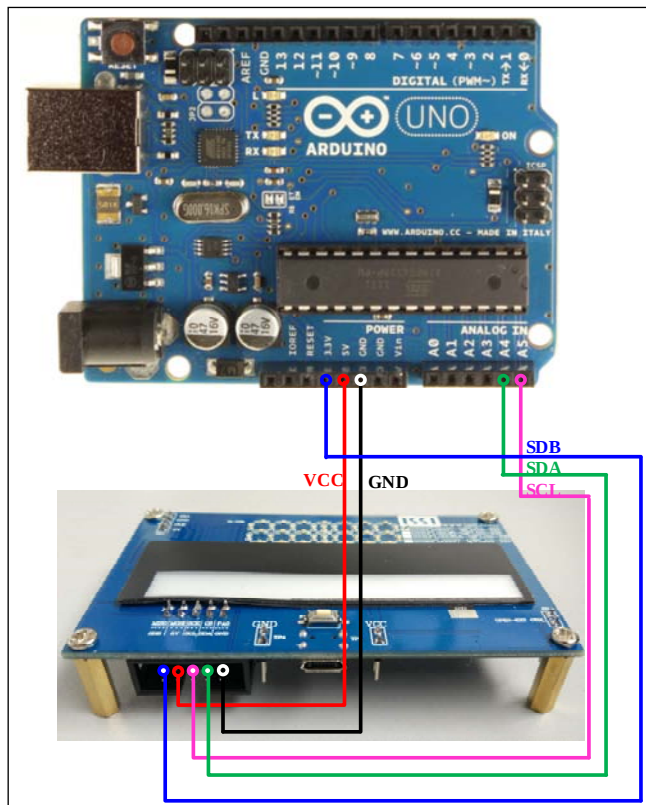


Figure 2: Photo of Arduino UNO connected to Evaluation Board

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

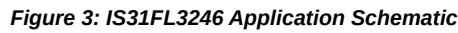
The Arduino hardware consists of an Atmel microcontroller with a bootloader allowing quick firmware updates. First download the latest Arduino Integrated Development Environment IDE (1.6.12 or greater) from www.arduino.cc/en/Main/Software. Also download the Wire.h library from www.arduino.cc/en/reference/wire and verify that pgmspace.h is in the directory ...program Files(x86)/Arduino/hardware/tools/avr/avr/include/avr/. Then download the latest Arduino IS31FL3246 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 IS31FL3246 EVB:
 - a) Arduino 5V pin to IS31FL3246 EVB VCC.
 - b) Arduino GND to IS31FL3246 EVB GND.
 - c) Arduino SDA (A4) to IS31FL3246 EVB SDA.
 - d) Arduino SCL (A5) to IS31FL3246 EVB SCL.
 - e) If Arduino uses 3.3V MCU VCC, connect 3.3V to IS31FL3246 EVB SDB, if Arduino uses 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 II or download the test firmware (sketch) from the Lumissil website, and copy the code to Arduino IDE, compile and upload to Arduino.
- 4) Run the Arduino code for desired mode setting by Arduino code.
- 5) During external control mode, toggling the MODE button (K1) can switch the power of single color LEDs and power of RGB LEDs.

Please refer to the datasheet to get more information about IS31FL3246.

Lumissil Microsystems – www.lumissil.com
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BILL OF MATERIALS

Name	Symbol	Description	Qty	Supplier	Part No.
LED Driver	U1	36CH FxLED Driver	1	Lumissil	IS31FL3246
LDO	U2	Low-dropout Regulator	1	PAM	PAM3101
MCU	U3	Microcontroller	1	STM	STM32F103C8T6
PMOS	U4	Dual PMOS	1	ANPEC	APM4953
Crystal	Y1	Crystal, 8MHz	1	JB	HC-49S
LED	D1~D39	Diode, LED Blue, SMD	39	Everlight	19-217/BHC-ZL1M2RY/3T
LED	D40~D51	Diode, LED RGB, SMD	12	Everlight	99-235/RGBC/TR8
Diode	DS1, DS2	Diode, SMD	2	DIODES	DFLS240
Resistor	R1	RES,3.3k,1/10W,±5%,SMD	1	Yageo	RC0603JR-073K3L
Resistor	R2~R3	RES,4.7k,1/10W,±5%,SMD	2	Yageo	RC0603JR-074K7L
Resistor	R4~R8	RES,100k,1/10W,±5%,SMD	5	Yageo	RC0603JR-07100KL
Resistor	R9	RES,1k,1/10W,±5%,SMD	1	Yageo	RC0603JR-071KL
Resistor	R10, R11	RES,22R,1/10W,±5%,SMD	1	Yageo	RC0603JR-0722RL
Resistor	R12	RES,1.5k,1/10W,±5%,SMD	1	Yageo	RC0603JR-071K5L
Capacitor	C1,C2	CAP,100nF,16V,±20%,SMD	2	Yageo	CC0603MRX7R7BB104
Capacitor	C3, C5	CAP, 1µF,16V,±10%,SMD	2	Yageo	AC0805KKX7R7BB105
Capacitor	C4	CAP,10nF,16V,±10%,SMD	1	Yageo	CC0603KRX7R7BB103
Capacitor	C7, C8	CAP,33pF,50V,±5%,SMD	2	Yageo	CQ0603JRNPO9BN360
Capacitor	C9	CAP,10µF,16V,±20%,SMD	1	Yageo	CC0805KKX5R7BB106
Button	K1	Button SMD	1		

Bill of Materials, refer to Figure 3 above.

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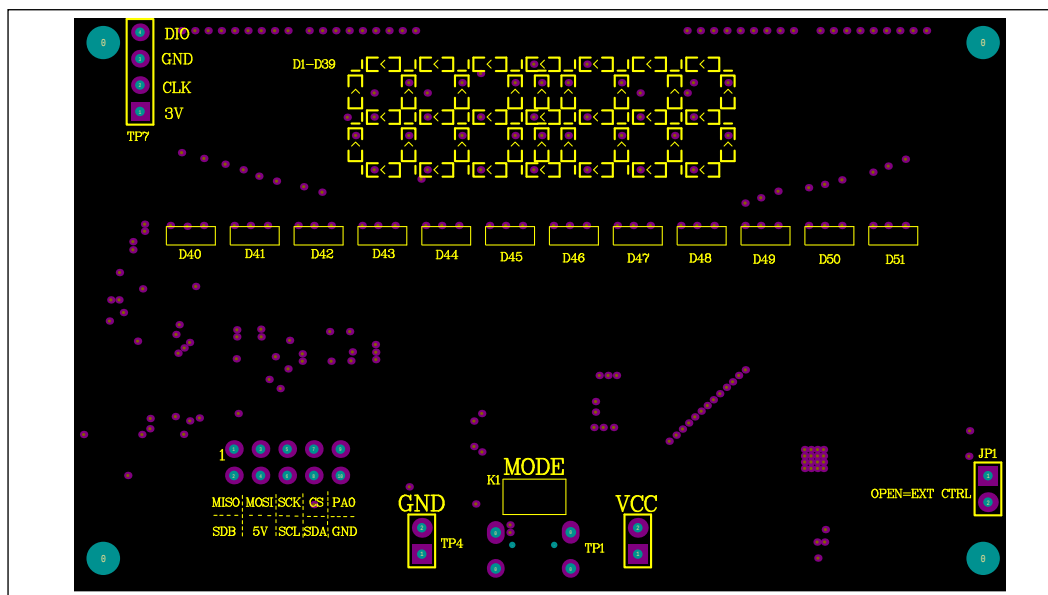


Figure 4: Board Component Placement Guide - Top Layer

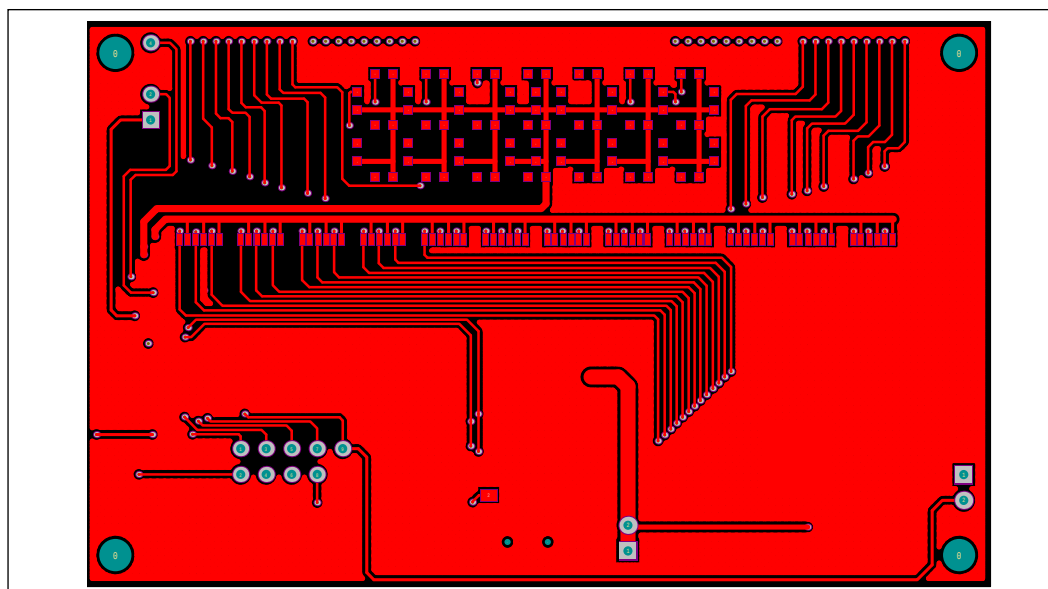
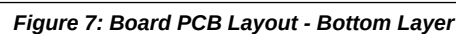


Figure 5: Board PCB Layout - Top Layer



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

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REVISION HISTORY

Revision	Detail Information	Data
A	Initial Release	2020.04.04

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APPENDIX II: IS31FL3246 Arduino Test Code V01A

```
#include<Wire.h>
#include<avr/pgmspace.h>
#define Addr_GND 0x60
//7 bit format is 0x3F

byte PWM_Gamma64[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() {
  // put your setup code here, to run once:
  Wire.begin();
  Wire.setClock(400000); //I2C 400kHz
  // pinMode(4,OUTPUT); //SDB
  // digitalWrite(4,HIGH); //SDB_HIGH
  Init_FL3246();
}

void loop() {
  // put your main code here, to run repeatedly:
  IS31FL3246_mode1(); //breath mode
}

void IS_IIC_WriteByte(uint8_t Dev_Add,uint8_t Reg_Add,uint8_t Reg_Dat)
{
  Wire.beginTransmission(Dev_Add/2);
  Wire.write(Reg_Add); // sends regaddress
  Wire.write(Reg_Dat); // sends regaddress
  Wire.endTransmission(); // stop transmitting
}

void Init_FL3246(void)
{
  uint8_t i = 0;
  for(i=0x49;i<=0x6C;i++)
  {
    IS_IIC_WriteByte(Addr_GND,i,0x80); //turn on all LED
  }

  for(i=0x01;i<=0x48;i++)
  {
    IS_IIC_WriteByte(Addr_GND,i,0x00); //write all HPWM set 0x00
  }

  IS_IIC_WriteByte(Addr_GND,0x6D,0x00); //update PWM & congtrrol registers
  IS_IIC_WriteByte(Addr_GND,0x6E,0xFF); //Global current
  IS_IIC_WriteByte(Addr_GND,0x6F,0xFF); //Global current
  IS_IIC_WriteByte(Addr_GND,0x70,0xFF); //Global current
  IS_IIC_WriteByte(Addr_GND,0x00,0x01); //normal operation and set 32k HFPS & 120 LFPS 8bit
  // write 0x11, set 64k HFPS & 240 LFPS 8bit
  // write 0x31, set 128k HFPS & 480 LFPS 8bit
  // write 0x03, set 32k HFPS & 120 LFPS 10bit
}

void IS31FL3246_mode1(void) //white LED
{
  int8_t i = 0;
  int8_t j = 0;

  for(i=1;i<=24;i+=2) //R LED running
  {
    IS_IIC_WriteByte(Addr_GND,(i*3),0xFF); //set HPWM_L
    IS_IIC_WriteByte(Addr_GND,0x6D,0x00); //update PWM & congtrrol registers
  }
}
```


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```

    delay(80); //100ms
}
delay(500); //keep 0.5s

for(i=23;i>0;i-=2)//G LED running
{
    IS_IIC_WriteByte(Addr_GND,(i*3-2),0xFF); //set HPWM_L
    IS_IIC_WriteByte(Addr_GND,0x6D,0x00); //update PWM & congtrol registers
    delay(80); //100ms
}
delay(500); //keep 0.5s

for(i=1;i<=24;i+=2)//B LED running
{
    IS_IIC_WriteByte(Addr_GND,(i*3+2),0xFF); //set HPWM_L
    IS_IIC_WriteByte(Addr_GND,0x6D,0x00); //update PWM & congtrol registers
    delay(80); //100ms
}
delay(500); //keep 0.5s

for (j=63;j>=0;j--)//all LED breath falling
{
    for(i=1;i<=0x48;i+=2)
    {
        IS_IIC_WriteByte(Addr_GND,i,PWM_Gamma64[j]); //set all HPWM_L
    }
    IS_IIC_WriteByte(Addr_GND,0x6D,0x00); //update PWM & congtrol registers
    delay(30); //20ms
}
delay(500); //keep o 0.5s
}

```