

## 3x4 MATRIX LED DRIVER

### DESCRIPTION

The IS31FL3740 is a general purpose 3x4 LEDs matrix driver with 1/12 cycle rate. The device can be programmed via an I2C compatible interface. Each LED can be dimmed individually with 8-bit x 8 PWM data which allowing 1024 steps of linear dimming.

IS31FL3740 features 3 Auto Breathing Modes which are noted as ABM-1, ABM-2 and ABM-3. For each Auto Breathing Mode, there are 4 timing characters which include current rising / holding / falling / off time and 3 loop characters which include Loop-Beginning / Loop-Ending / Loop-Times. Every LED can be configured to be any Auto Breathing Mode or No-Breathing Mode individually.

### FEATURES

- Up to 12 LEDs (3x4) in dot matrix
- Programmable 3x4 (4RGBs) matrix size with de-ghost function
- Selectable 3 Auto Breath Modes for each dot
- Auto Breath Loop Features interrupt pin inform MCU Auto Breath Loop completed
- Auto Breath offers 128 steps gamma current, interrupt and state lookup registers
- 256 steps Global Current Setting
- Individual 1024 PWM control steps
- Individual Auto Breath Mode select
- Individual open and short error detect function

### QUICK START



Figure 1: Photo of IS31FL3740 Evaluation Board

(V01A board with 12V DC input please refer to appendix I)

### RECOMMENDED EQUIPMENT

- 5.0V, 2A Micro USB
- Arduino IDE, [www.arduino.cc/en/Main/Software](http://www.arduino.cc/en/Main/Software)
- Arduino code download from Lumissil website

### ABSOLUTE MAXIMUM RATINGS

- ≤ 5.5V Micro USB DC power supply

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

### PROCEDURE

The IS31FL3740 evaluation board is fully assembled, tested and comes programmed with evaluation software. 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 5VDC USB power to the Micro USB.
- 2) Press K1 to cycle through a display mode.

### EVALUATION BOARD OPERATION

The IS31FL3740 evaluation board drives 8 RGB LEDs located underneath the light dispersing filter. Every press of the K1 switch will cycle through one of the 8 pre-programmed lighting sequences below:

- 1) Changing color mode 1
- 2) Changing color mode 2
- 3) Pink color
- 4) Yellow color
- 5) Cyan Color
- 6) White color
- 7) Red color
- 8) Blue Color
- 9) Green color

**Note: IS31FL3740 solely controls the FxLED function on the evaluation board.**

### ORDERING INFORMATION

Part No.	Temperature Range	Package
IS31FL3740-QFLS4-EB	-40°C to +125°C (Industrial)	QFN-20, Lead-free

Table 1: Ordering Information

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

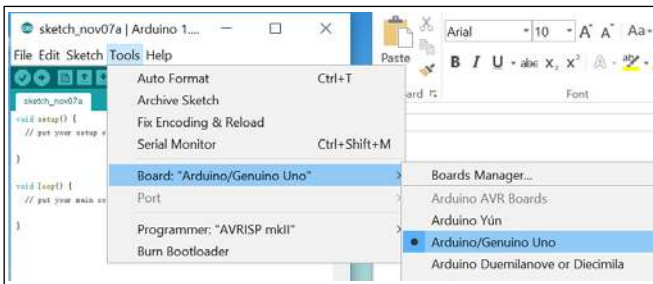
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### SOFTWARE CONTROL

The evaluation board comes with an Arduino compatible microcontroller circuit preloaded with IS31FL3740 demonstration firmware, called a sketch. This allows the functionality of the IS31FL3740 to be verified before starting firmware development.

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](http://www.arduino.cc/en/Main/Software). Then download the latest IS31FL3740 firmware (sketch) from the Lumissil website <http://www.lumissil.com/products/led-driver/fxled>.

When using the Arduino environment, please select **Genuino UNO** as shown below, then select the serial port. Follow the standard procedure to upload the latest IS31FL3740 firmware into the Arduino; then use the IDE to modify it. There is no additional software required to run the eval board.



### EXT-SOFTWARE CONTROL

The IS31FL3740 can also be driven by an external I2C source.

Follow the steps below to configure the eval board for external control.

- 1) Open the two pins of J7 on the right side, to disable the onboard Arduino and enable external control (the SDA SCL and SDB become high impedance).
- 2) Default VIO is 5V, if you use a 3.3V IO, connect 3.3V to VIO pin in J7.
- 3) Connect SDB to VIO or high level IO
- 4) Connect external I2C to the I2C pins of J7
- 5) Start external I2C control.

*Please refer to the datasheet to get more information about IS31FL3740.*

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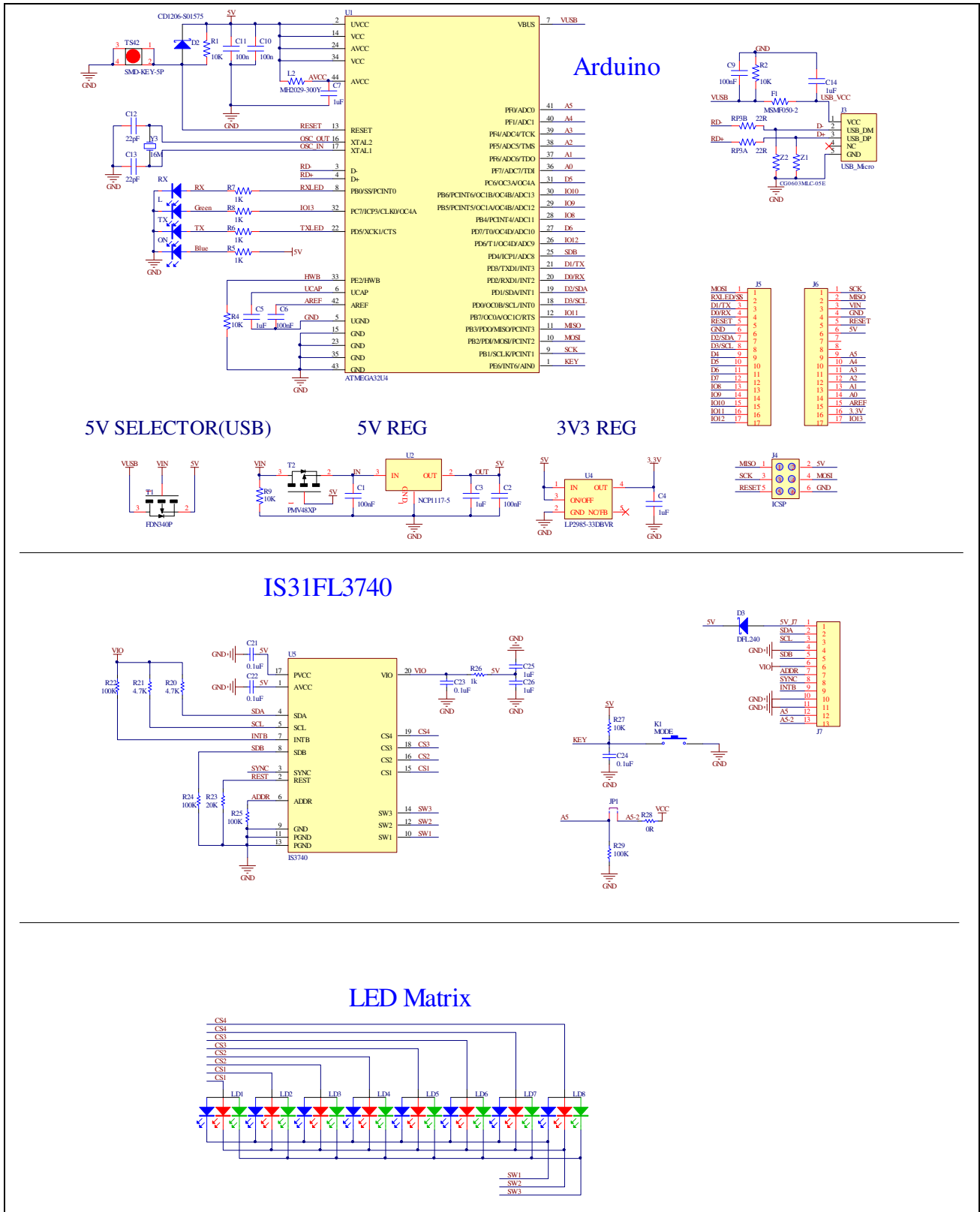


Figure 2: IS31FL3740 Application Schematic

### 3x4 MATRIX LED DRIVER

#### BILL OF MATERIALS - Arduino

Name	Symbol	Description	Qty	Supplier	Part No.
MCU	U1	Microcontroller	1	ATM	ATMEGA32U4
LDO	U2	Reduced voltage	1	ON	NCP1117-5
LDO	U4	Reduced voltage	1	TI	LP2985-33DBVR
Triode	T1	FET	1	FAIRCHILD	FDN340P
Triode	T2	FET	1	NXP	PMV48XP
Crystal	Y1	Crystal, 16MHz	1	Risym	3225 16MHz
Button	K1	Button SMD	1	MT	SMD-KEY-5P
LED	ON,TX,RX	LED, SMD Blue	3	EVERLIGHT	0603
LED	L	LED, SMD Green	1	EVERLIGHT	0603
F1	F1	SMD Fuse	1	MF	MSMF050-2
Beads	L2	Beads	1	BOURNS	MH2029-300Y
Varistor	Z1,Z2	Varistor	2	BOURNS	CG0603MLC-05E
Resistor	RP3A,PR3B	RES,22R,1/16W,±5%,SMD	2	Yageo	RC0603JR-0722RL
Resistor	R5,R6,R7,R8	RES,1k,1/16W,±5%,SMD	4	Yageo	RC0603JR-071KL
Resistor	R1,R2,R4,R9	RES,10k,1/16W,±5%,SMD	4	Yageo	RC0603JR-0710KL
Capacitor	C12,C13	CAP,22pF,16V,±20%,SMD	2	Yageo	CC0603KKX7R9BB22
Capacitor	C1,C2,C6, C9,C10,C11	CAP,100nF,16V,±20%,SMD	6	Yageo	CC0603KKX7R9BB101
Capacitor	C3,C4,C5,C7,C14	CAP,1µF,16V, ±20%,SMD	5	Yageo	CC0603KKX7R9BB105

#### BILL OF MATERIALS – IS31FL3740

Name	Symbol	Description	Qty	Supplier	Part No.
LED Driver	U5	Matrix LED Driver	1	Lumissil	IS31FL3740
RGB LED	LD1~LD8	RGB LED, SMD	8	ROHM	SMLV56RGB1W1
Diode	D3	Diode, SMD	1	DIODES	DFLS240
Resistor	R20,R21	RES,4.7k,1/16W,±5%,SMD	2	Yageo	RC0603JR-074K7L
Resistor	R22,R24,R25,R29	RES,100k,1/16W,±5%,SMD	4	Yageo	RC0603JR-07100KL
Resistor	R23	RES,20k,1/16W,±5%,SMD	1	Yageo	RC0603JR-0720KL
Resistor	R26	RES,1k,1/16W,±5%,SMD	1	Yageo	RC0603JR-071KL
Resistor	R27	RES,10k,1/16W,±5%,SMD	1	Yageo	RC0603JR-0710KL
Resistor	R28	RES,0k,1/16W,±5%,SMD	1	Yageo	RC0603JR-070KL
Capacitor	C21,C22,C23,C24	CAP,0.1µF,16V,±20%,SMD	4	Yageo	CC0603KKX7R9BB104
Capacitor	C25,C26	CAP,1µF,16V,±20%,SMD	2	Yageo	CC0603KKX7R9BB105
Button	K1 (Bottom)	Button	1		

Bill of Materials, refer to Figure 2 above.

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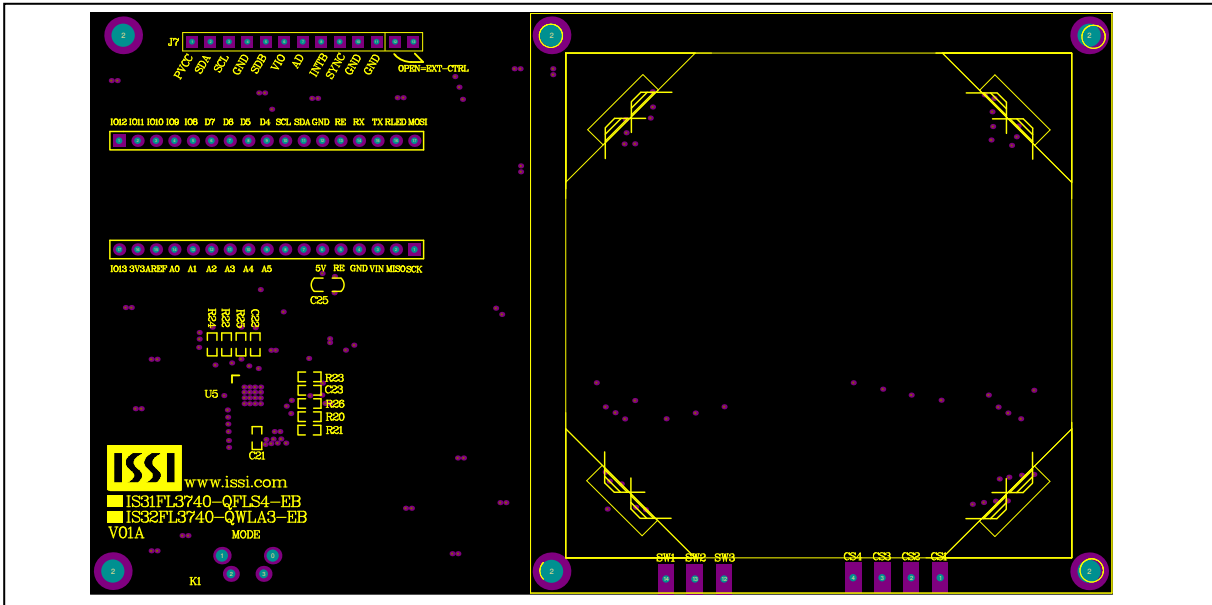


Figure 3: Board Component Placement Guide - Top Layer

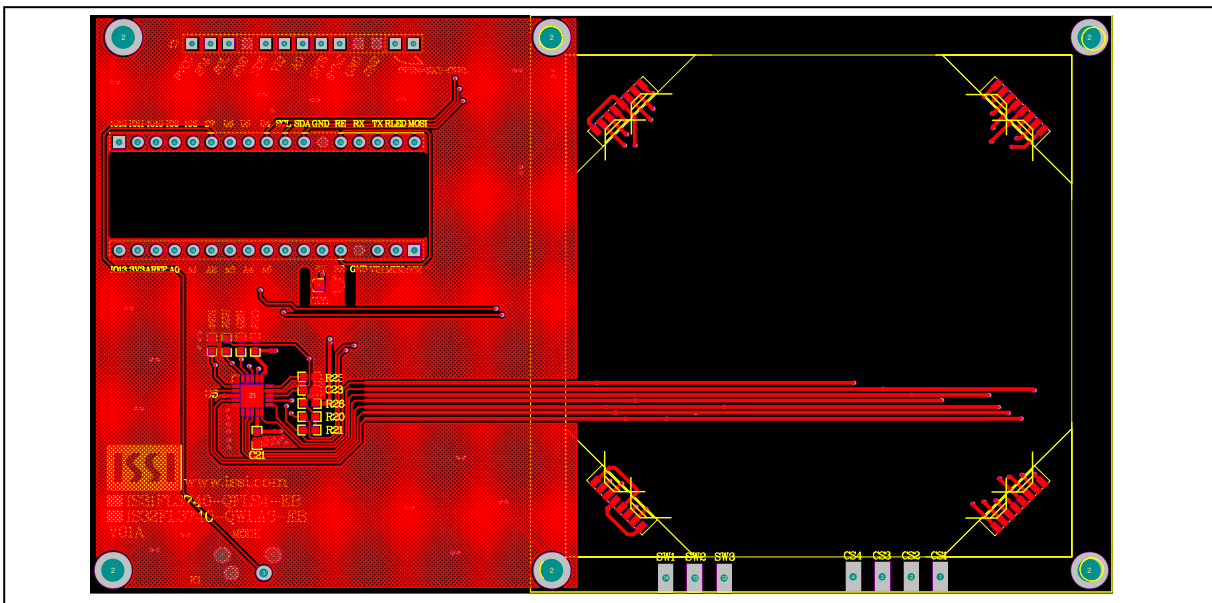
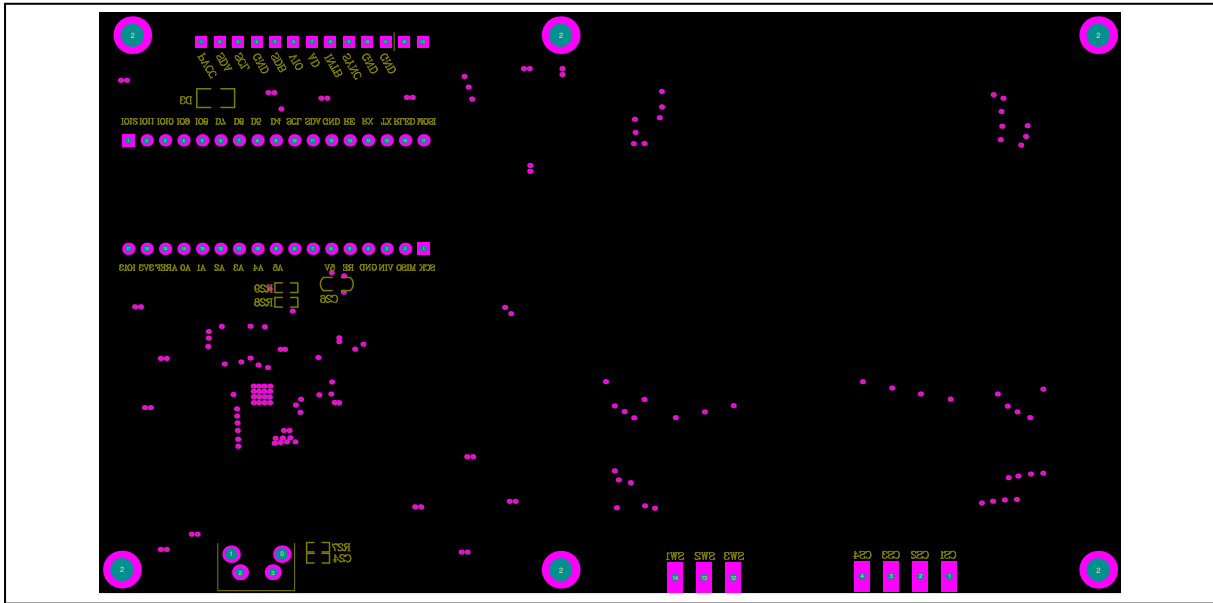
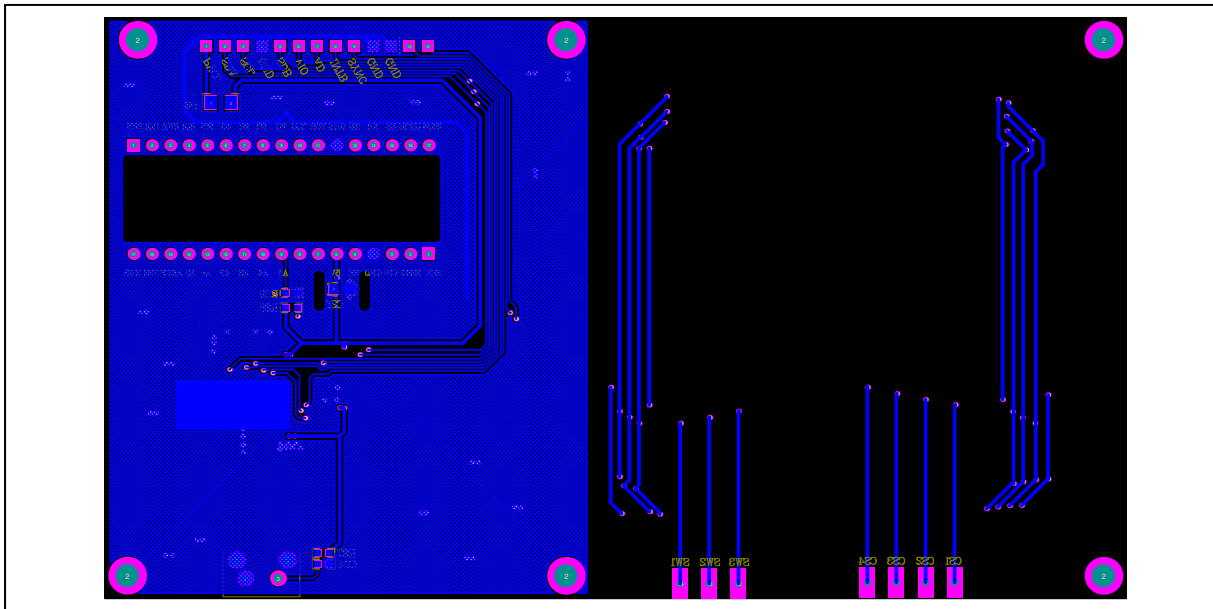


Figure 4: Board PCB Layout - Top Layer

### 3x4 MATRIX LED DRIVER



**Figure 5: Board Component Placement Guide - Bottom Layer**



**Figure 6: Board PCB Layout - Bottom Layer**

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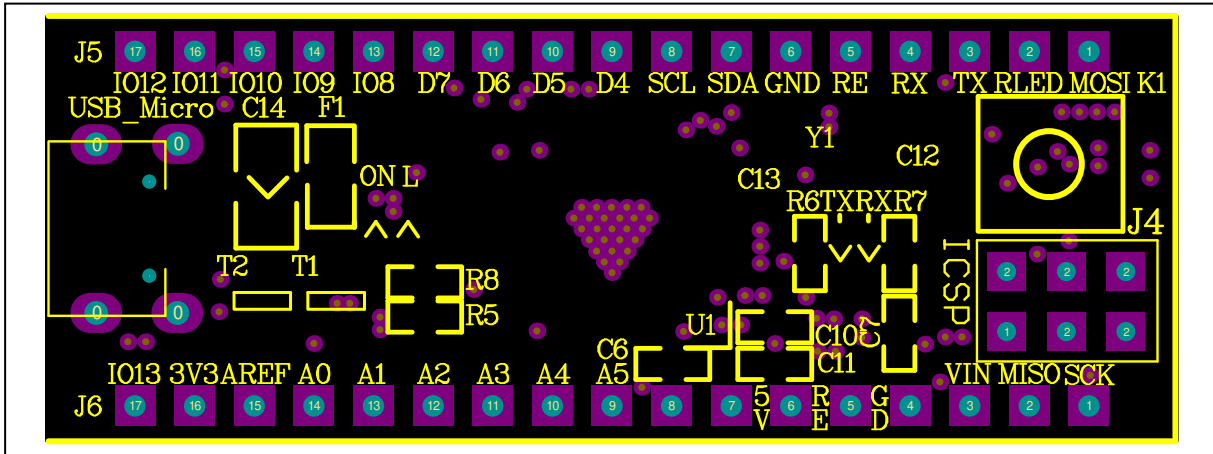


Figure 7: Arduino Board Component Placement Guide - Top Layer

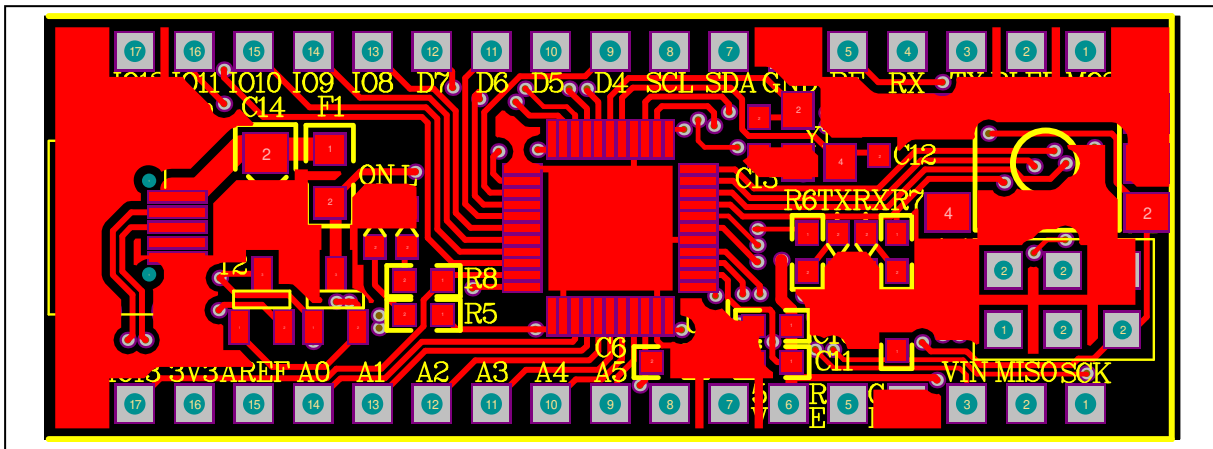


Figure 8: Arduino Board PCB Layout - Top Layer

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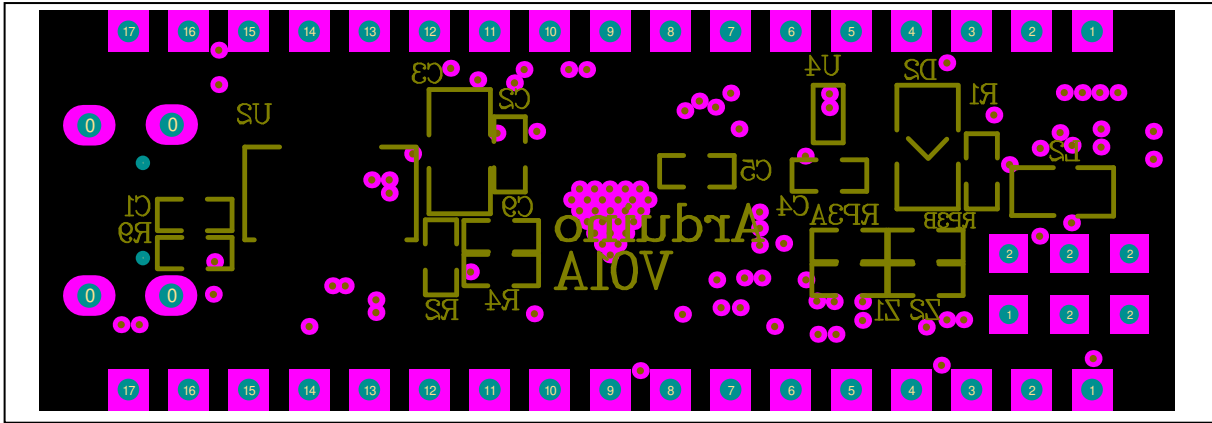


Figure 9: Arduino Board Component Placement Guide - Bottom Layer

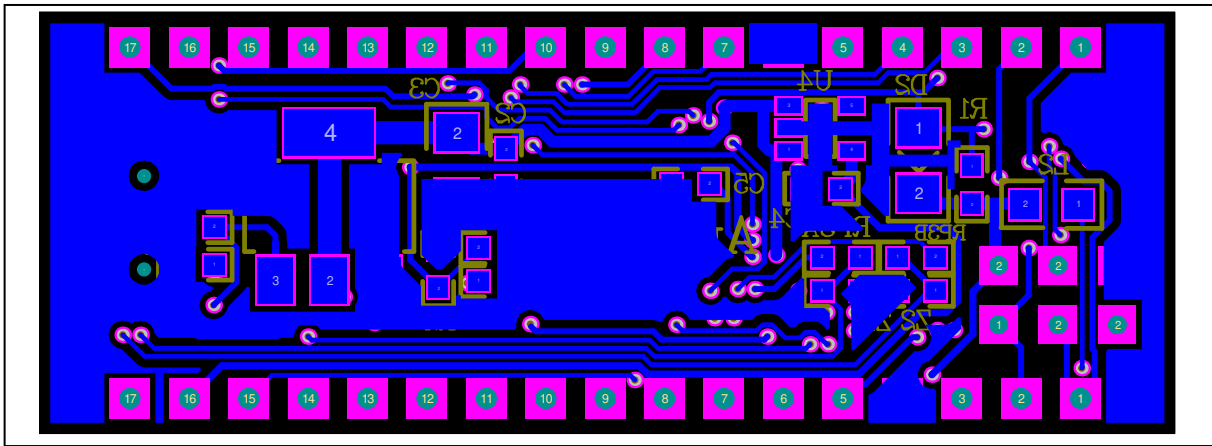


Figure 10: Arduino Board PCB Layout - Bottom Layer

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## REVISION HISTORY

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Revision	Detail Information	Date
A	Initial release	2018.01.17