

LLIA30 30 LED Illuminator Array



The LLIA30 is a high-quality, multi-purpose LED illuminator array. It has a built-in regulator and a photocell control circuit for automatic LED array on/off during the day and night. The LEDs are current regulated to maintain best performance and to prevent thermal runaway from excess heat and voltage. Multiple arrays can be externally triggered on/off for multi-coloured illumination using red, green and blue arrays. The LLIA30 PCB is designed for high-performance LED illumination applications using thick copper pads on a double-sided and through-hole design for high reliability, good LED cooling and performance. The multi-purpose design allows it to be used as an LED illumination unit for décor lighting or landscape lighting. It is also configurable as a stand alone LED array.

Features:

- 30 LED illumination array, 5mm LEDs
- 2 banks of 3-series by 5-parallel pattern or 6x10 pattern
- Adjustable current regulator
- Compact, integrated design
- 5-25VDC input operation
- Auto day-night photocell or external on/off
- High performance design for LED applications
- Large copper pads for heat dissipation

Benefits:

- Maximise and maintains peak LED performance
- Extends LED life
- Efficient and low cost illumination

Applications:

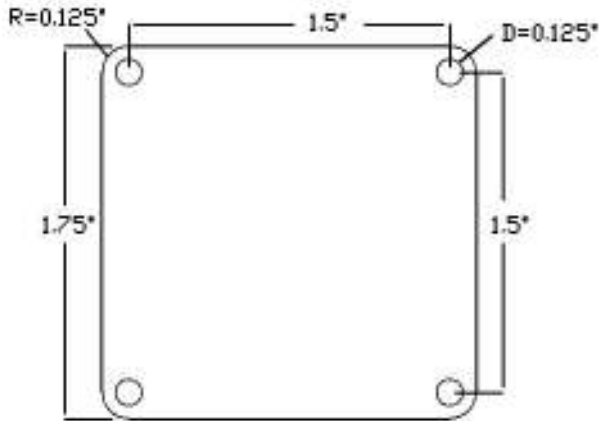
- Landscape and area lighting
- Décor or night lighting
- Replace light bulb lighting
- Configurable for external LED/electronic uses
- High-brightness indicator light



LLIA30 LED array mounted inside a cabinet for décor lighting. The power supply can be connected to a power switch for manual on/off operation.

Dimensions:

All holes are 1/8" diameter at 1.5" square.



Note: Do not use in wet locations.
 Do not exceed the specifications of the unit.

Technical Specifications:

Printed circuit board:

Thickness:	1/16"
Material:	FR4 glass fibre
Plating:	2 oz copper
Layers:	Double-sided
Finish:	Gold flash coating
Soldermask:	Green both sides
Silkscreen:	White on component side
Routing:	Tabbed. 20pcs/pallet
Dimension:	1.75" square
Soldering:	Through-hole plated
Compliance:	ROHS, lead-free

LLIA30 LED array:

Temperature:	-30°C to 50°C
Input voltage:	5-25VDC
LED:	30. 2 banks at 3Sx5P
Maximum current:	1A through regulator
Maximum power:	4W total

Operation:

The DC input goes through the diode then to the LM2941T-ADJ regulator with current shunt and limiting resistor on the feedback pin. A resistors and variable resistor feedback control from the +out sets the current limiting range. The light dependent resistor (LDR) sensor connected to the +dc in and the REG on/off pin with a matched resistor (1.23V) to ground and a delay capacitor controls the photocell operation. The voltage drop from the unregulated DC PSU when the LED is on provides the photocell control hysteresis. R6 and R7 are for 3 LED series pattern. R8 is for 6 series pattern. Do not exceed 4W or put the illuminator inside a sealed plastic box as the LED array will get hot at high currents and high input voltage. See LM2941T data sheet and schematic for more information.

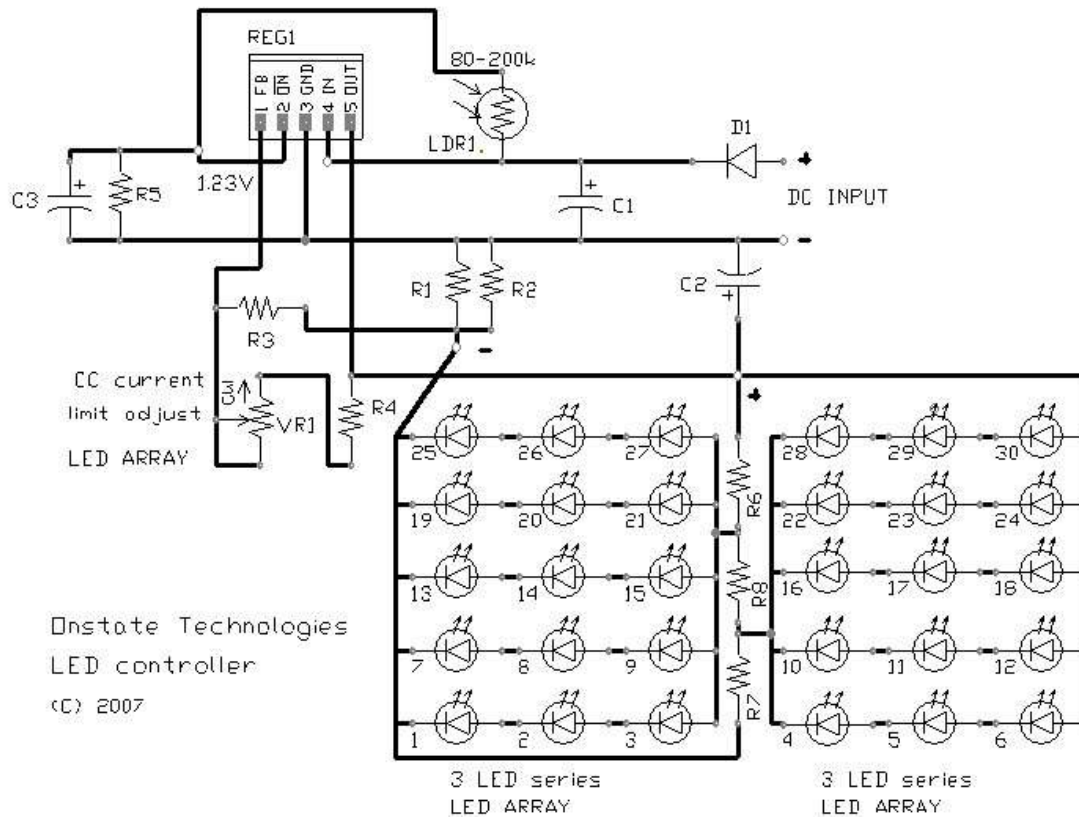
Installation:

Please read the appropriate data sheet prior to installation for best results. The installation should be made by a person knowledgeable in the product and conforms to all appropriate local codes. Onstate Technologies will not be responsible for injuries or damages resulting from the improper installation or use of any products sold by Onstate or its retailers. Install the product within its specification limits.

Maximise airflow to LED array for best performance. The LED array and components get warm during operation. Do not install in an enclosed area or expose to high temperatures. LEDs are sensitive to heat and static. Use proper care during soldering and assembly. Follow the schematic and labels on the circuit board for quick and easy installation.

Product assembly:
Array LLIA30-01: LED array with current controller and photocell.

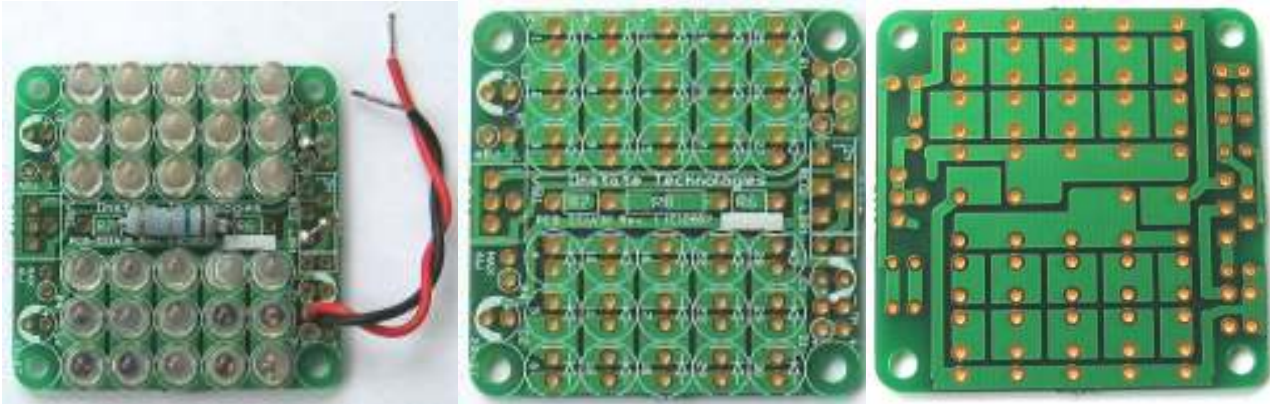
Insert parts as listed on the BOM and schematic. Insert LEDs for LED array pattern required.



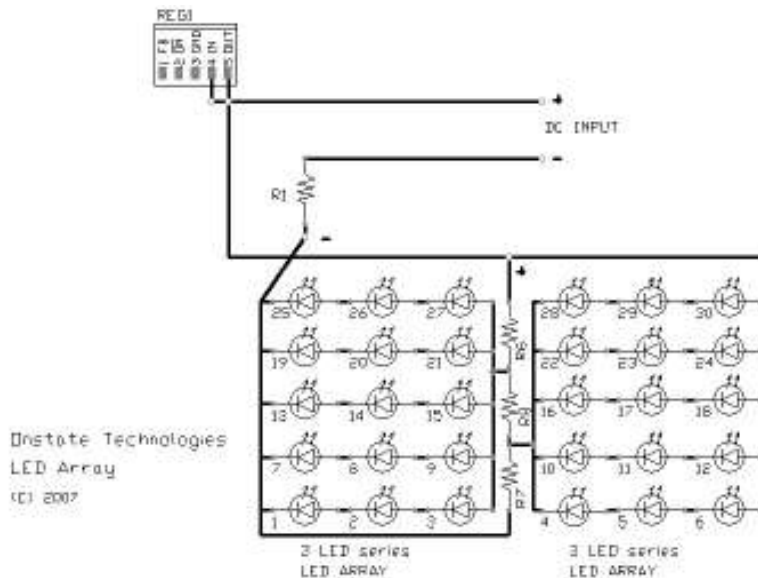
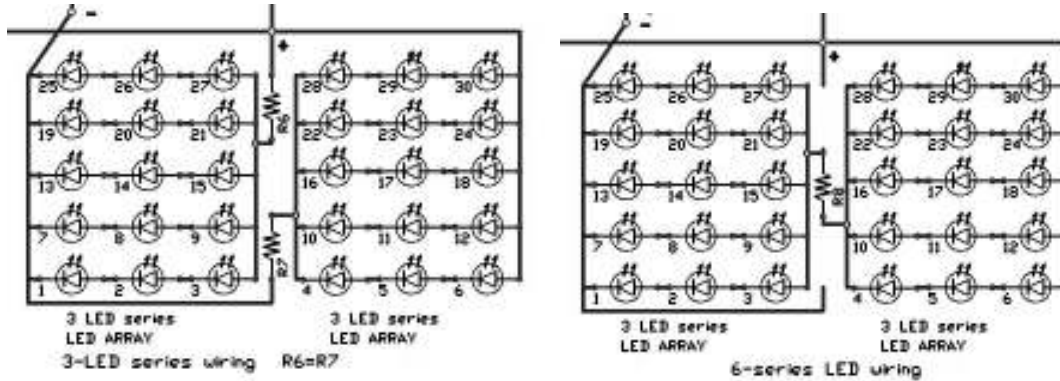
Full version LED array and regulator

Schematic LLIA30-01. LED array with LED current controller.

The array can be externally controlled on/off using REG1 on/off pin (#2) using the following modification. Remove LDR1 and reduce C3 then add external control wire on LDR1 solder pad connecting to REG pin #2. Pulse the array to vary the LED brightness.

Array LLIA30-02: LED array only.


Insert the LEDs in the pattern as on the PCB label. The LEDs are in series of threes with R6 and R7 terminating to + and - for a 3-series array. Use a connecting resistor (R8) for 6 LEDs in series pattern. Insert the LEDs in the quantity required. Match the limiting resistors R6, R7 and R8 for the correct current and voltage operation. Make sure that the power ratings of the resistors and LEDs are not exceeded. An external LED controller is recommended for varying input voltage applications. See schematics below for more information.



LED array and limiting resistor

Layout for LED array illuminator. R1/R2 and REG1 pin 4/5 are wire jumpers. R6, R7 and R8 are load resistors.



Control Adjustments:

1. VR1 for adjustable current limiting. ~80mA to 300mA. VR1 sets current range. R4 sets minimum current limit. R1/R2 sets maximum shunt current.
2. Photocell control through REG ON/OFF pin is 1.23V signal.
3. Photocell sensor for light on/off. R5 and photocell resistance at correct lighting for 1.23V trigger signal. Cover photocell sensor for LED on. DO NOT AIM SENSOR AT LEDs.

BOM for LLIA30 LED array

Part	Application	Description	Digi-Key #	Qty.
R1	LED -, regulator current shunt feedback.	Resistor, 5.0 Ohms, 1/4W 5% carbon/metal film		1
R2	LED -, regulator current shunt feedback.	Resistor, 5.0 Ohms, 1/4W 5% carbon/metal film		1
R3	FB limiting resistor to shunt GND offset.	Resistor, 1.0k Ohms, 1/8W 5% carbon film	1.0KEBK-ND	1
R4	+out, current adjustment limiting PC trigger adjustment limiting divider, 1.23V	Resistor, 7.5k Ohms, 1/8W 5% carbon film	7.5KEBK-ND	1
R5		Resistor, 10k Ohms, 1/8W 5% carbon film Wire jumper if using LED regulator. Calculate power if for array use only. 20 ohms, 1/2W at 12VDC in.	10KEBK-ND	1
R6	LED limit, 3 LED series limiter	Wire jumper if using LED regulator. Calculate power if for array use only. 20 ohms, 1/2W at 12VDC in.		1
R7	LED limit, 3 LED series limiter	Resistor, 0.0 Ohms jumper when using regulator. Calculate power if for array use only.		1
R8	LED limit, 6 LED series limiter			1
C1	input capacitor filter	Capacitor, 25V 47uF, electrolytic, 0.1" spacing	P5151-ND	1
C2	output capacitor filter	Capacitor, 25V 47uF, electrolytic, 0.1" spacing	P5151-ND	1
C3	photocell delay cap.	Capacitor, 25V 47uF, electrolytic, 0.1" spacing	P5151-ND	1
D1	input diode protection	Diode, 1N4001, general Si diode, 40V 1A	1N4001	1
REG1	linear current regulator, LDO	REG1, LM2941T-ADJ 1A or equivalent	LM2941T-ND	
VR1	LED current limiting adjustment, 80-300mA	Resistor, 10k variable, 3362U, top adjust, inline	3362U-103LF-ND	1
PC1	LDR photocell, 80-200k @10lux.	photoresistor sensor, 4.2mm, 5M dark	PDV-P9006-ND	1
PCB	LED array board, 2 banks at 3-series and 5-parallel	PCB, LLIA30 LED illuminator array	PCB-SSIA30	1

Application sample:

Décor lighting for cabinet with white LEDs. Also works well as a night-light or outdoor landscape light.

Parts:

1x PCB-SSIA30 board

30x white or other coloured LEDs.

1x plastic project box. Metal box preferred.

1x 2.1mm power jack. Panel mount type.

1x 12VDC 300-500mA AC/DC wall power supply.

Various mounting screws



LLIA30 LED array. All LEDs operating.

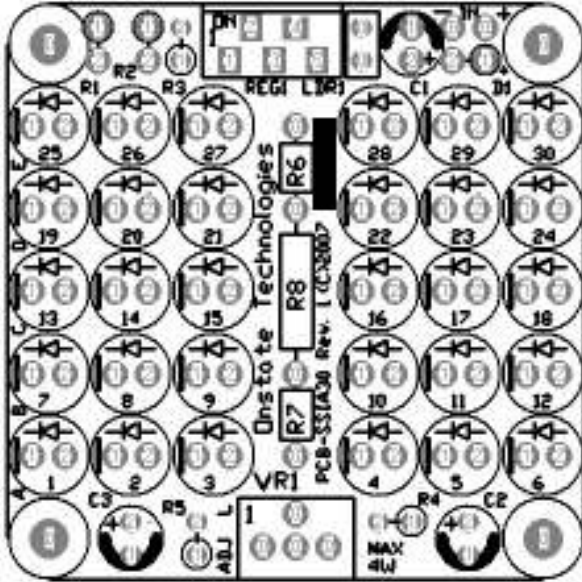


LLIA30 with parts. Drill holes on the side of the box to mount the 2.1mm jack.



LLIA30 LED array mounted inside a cabinet for décor lighting. The power supply can be connected to a power switch for manual on/off operation.

LLIA30 design:



Silkscreen (legend) layer

