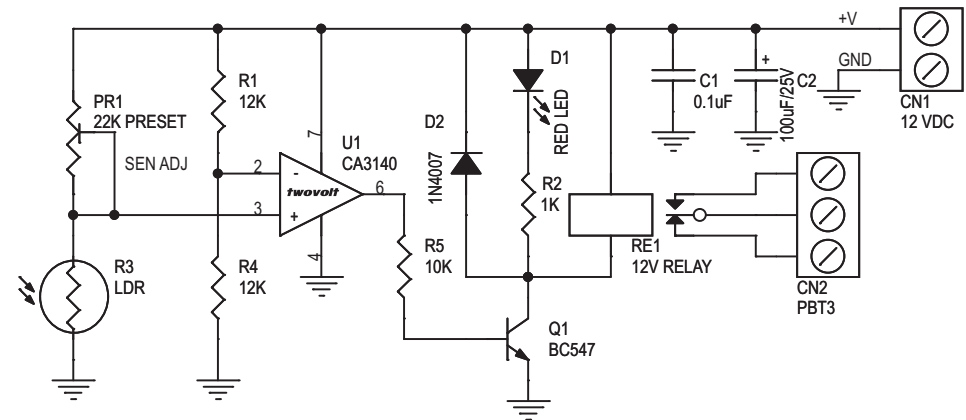
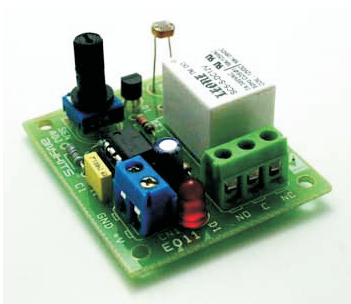


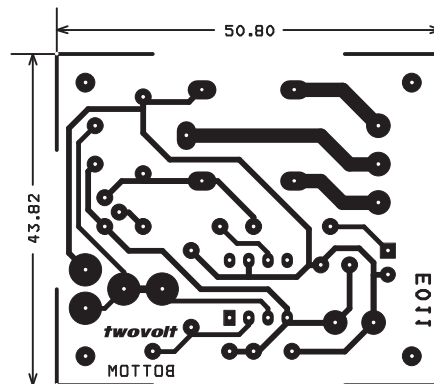
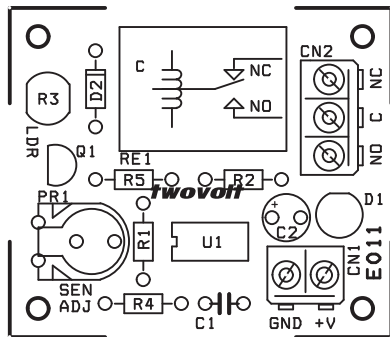
## DARK SENSITIVE SWITCH

Dark Sensitive Switch is a simple project which operates a relay when the light falling on the LDR goes below a set point. This circuit is built using CA3140 Op-amp and can also be considered for use in energy saving application.

- Input : 12 V @ 50 mA
- Relay output SPDT relay
- Onboard preset to set the level
- Relay On LED indicator
- Power Battery Terminal (PBT) for easy relay output connection
- Four mounting holes of 3.2 mm each
- PCB dimensions 44 mm x 51 mm



- CN1 Connector : Supply 12 VDC, 200 mA
- CN2 Connector : Relay Out
- R3 : LDR (Light Dependent Resistor)
- PR1 : Sensitivity Adjust
- D1 : Relay On Indication



SR.	QTY.	REF.	DESCRIPTION
1	1	CN1	2 PIN PBT CONNECTOR
2	1	CN2	3 PIN PBT CONNECTOR
3	1	C1	0.1uF
4	1	C2	100uF/25V
5	1	D1	RED LED
6	1	D2	1N4007
7	1	PR1	22K PRESET
8	1	Q1	BC547
9	1	RE1	12V RELAY
10	2	R1,R4	12K
11	1	R2	1K
12	1	R3	LDR
13	1	R5	10K
14	1	U1	CA3140
15	1	SOCKET	8 PIN DIP IC SOCKET

### APPLICATIONS:

- The kit can be used for providing light during night and also in other projects.



## **METHOD FOR SOLDERING AND ASSEMBLING THE KIT:**

### **☞ While soldering make sure of the following steps:**

- Use a soldering iron and set its temperature range 250-400 °C
- Before using clean the soldering iron with a cloth or a sponge and melt the solder to the tip of it. This is called 'tinning' and it will help the heat to flow from the iron's tip to the joint. The tip should be cleaned for better results.
- Place the components on PCB as shown in the diagram and solder it. Use needle nose pliers to bend the leads of the components carefully.
- Trim the excess wires or leads with the help of a cutter once you are done with your soldering.

### **☞ How to solder:**

- Hold the soldering iron like a pen, touch it onto the joint to be made and feed a little solder to it.
- Make sure that the joint is shiny and looks like a volcano in shape

### **☞ Tips for assembling and mounting components:**

- Try to mount first the small components like registers, diodes, LED's etc. before you mount large components like IC's, relays, transistors, capacitors etc. later, since this makes assembly much easier and will help you in handling the PCB properly while you are soldering.
- Be careful while you solder the components because excess heat may damage them.

## **CIRCUIT DESCRIPTION:**

This kit consists of IC CA3140E, 12V SPDT Relay, LDR, preset, LED, IN4007 diode, BC547 NPN transistor, resistors and capacitors. CN1 connector is for 12 VDC power supply and CN2 connector is for relay out connections.

**SPDT Relay:** Single Pole Double Throw Relay, is an electromagnetic switch. It consists of a coil and 3 terminals; a common mode(C) terminal, Normally Open (NO) mode terminal and Normally Closed (NC) mode terminal. When the coil is at rest or not energized, there is continuity between the common and normally closed terminals and when the coil is energized there is continuity between the common and normally open terminals. Therefore it acts like an ON/OFF switch. The other two terminals are the power supply terminal of a relay and are connected to the diode IN4007.

**BC547:** It is a low current/ voltage NPN transistor used in switching and amplification purpose.

**LDR:** (Light dependent Resistor) is a resistor whose resistance decreases with increasing incident light intensity.

**IN4007:** It is a diode used to prevent from 'BACK EMF'. The silver line on the diode is the cathode of the diode and the other end is its anode. While connecting the diode to the power supply you need to reverse bias it i.e. the cathode to the positive terminal of the power supply and the anode to the negative terminal of the power supply. When connected to the relay the cathode is connected to the positive terminal of the relay and the anode to the negative terminal of the relay.

**LED:** (Light emitting diode), emits light when an electric current is passed through them. It has two terminals; anode and cathode. The cathode is the slight flat on the body of the LED and it is the shortest lead. An LED should not be connected directly to the supply or battery because too much of current will burn it out. Therefore a resistor needs to be connected in series to the anode of the LED in order to limit the current to a safe value.

## **WORKING:**

This kit is a dark sensitive switch board in which a Relay operates when light falling on LDR goes below set point. When LIGHT falls on LDR, the resistance of the LDR falls, due to which a low voltage passes across it. This voltage makes BC547 transistor low and hence the Relay goes OFF. LED goes OFF indicating the OFF stage of the Relay. When it is DARK, the resistance of the LDR goes high which increases the voltage across the LDR. This raises the voltage on the transistor and the transistor will turn ON thus switching the Relay ON. LED will glow indicating the ON stage of the Relay. The level of the LDR sensitivity is adjusted through the Preset. In4007 diode is connected along the Relay which protects it from 'Back EMF'.

