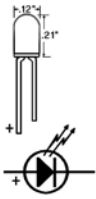


# T1 RED LED

Item #532



**SPECIFICATIONS:**

200 millicandella @ 20ma.  
 30 milliamps max.  
 1.85 Vfwd drop  
 60° viewing angle  
 typical values shown.



When used with the RL-ADJ, a 68 ohm resistor needs to be placed in series with each LED.

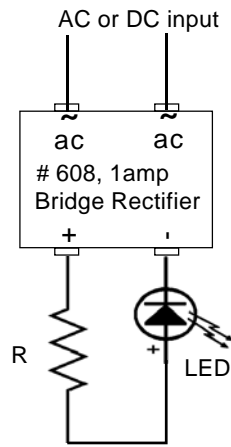
Various wiring and limiting resistor suggestions are shown on the back side of this insert.

All LED's require a limiting resistor. Do not simply apply a fixed voltage to them or you will destroy them.



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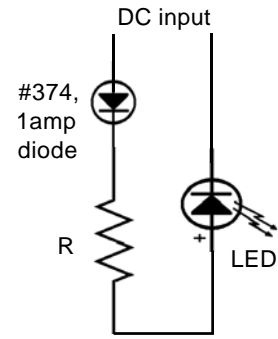
## Non-Directional LED wiring



input Vmax	R	Item#
4	68	541
10	390	535
22	1k	558

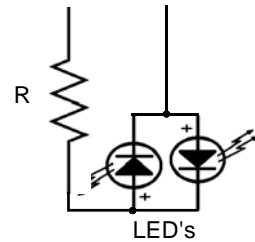
Values shown for limiting resistors are typical for the range of input voltages shown. Lower resistor values will yield brighter LED's, make sure they can take the current flow. A basic formula to use:  $R (\text{Resistor Value}) = (V_{in} (\text{input Voltage}) - V_{fwdLED}) / I (\text{led current})$ .  $V_{fwdLED}$  is typically 1.85 volts.

## Directional LED wiring



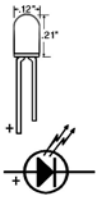
## dual LED wiring

AC input = Non-Directional  
 DC input = directional LED's



# T1 YELLOW LED

Item #533



**SPECIFICATIONS:**

- 250 millicandella @ 20ma.
- 20 milliamps max.
- 2 V<sub>fwd</sub> drop
- 40° viewing angle
- typical values shown.



When used with the RL-ADJ, a 68 ohm resistor needs to be placed in series with each LED.

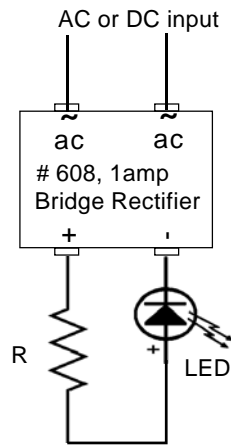
Various wiring and limiting resistor suggestions are shown on the back side of this insert.

All LED's require a limiting resistor. Do not simply apply a fixed voltage to them or you will destroy them.



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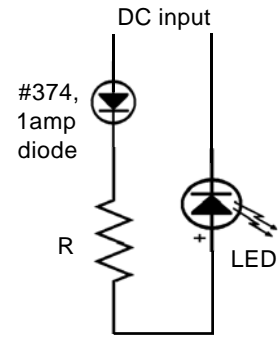
## Non-Directional LED wiring



input Vmax	R	Item#
4	68	541
10	390	535
22	1k	558

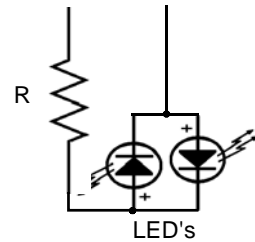
Values shown for limiting resistors are typical for the range of input voltages shown. Lower resistor values will yield brighter LED's, make sure they can take the current flow. A basic formula to use:  $R (\text{Resistor Value}) = (V_{in} (\text{input Voltage}) - V_{fwdLED}) / I (\text{led current})$ .  $V_{fwdLED}$  is typically 2.1 volts.

## Directional LED wiring



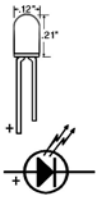
## dual LED wiring

AC input = Non-Directional  
DC input = directional LED's



# T1 GREEN LED

Item #534



**SPECIFICATIONS:**

- 40 millicandella @ 20ma.
- 20 milliamps max.
- 2.2 Vfwd drop
- 40° viewing angle
- typical values shown.



When used with the RL-ADJ, a 68 ohm resistor needs to be placed in series with each LED.

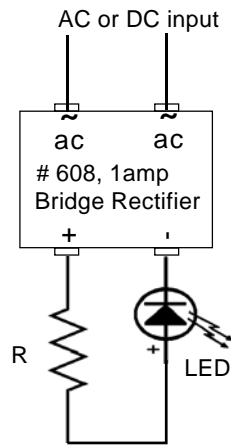
Various wiring and limiting resistor suggestions are shown on the back side of this insert.

All LED's require a limiting resistor. Do not simply apply a fixed voltage to them or you will destroy them.



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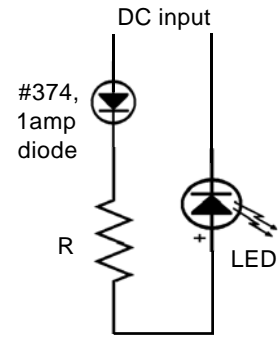
## Non-Directional LED wiring



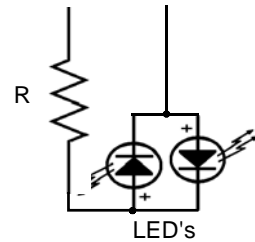
input Vmax	R	Item#
4	68	541
10	390	535
22	1k	558

Values shown for limiting resistors are typical for the range of input voltages shown. Lower resistor values will yield brighter LED's, make sure they can take the current flow. A basic formula to use:  $R (\text{Resistor Value}) = (V_{in} (\text{input Voltage}) - V_{fwdLED} - 0.7) / I$  (led current). VfwdLED is typically 2.2 volts.

## Directional LED wiring



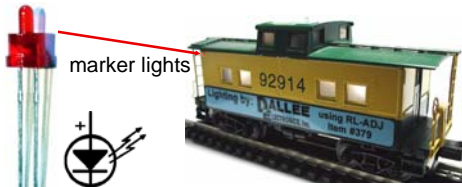
dual LED wiring  
AC input = Non-Directional  
DC input = directional LED's



# T1 RED LED

special shape

Item #542



marker lights

**SPECIFICATIONS:**

- 0.7 millicandella @ 10ma.
- 25 milliamps max.
- 2.25 Vfwd drop
- typical values shown.



Measurements: Front nib 0.079" dia x 0.14" long, main body 0.196" dia x 0.177" long.

When used with the RL-ADJ, a 68 ohm resistor needs to be placed in series with each LED.

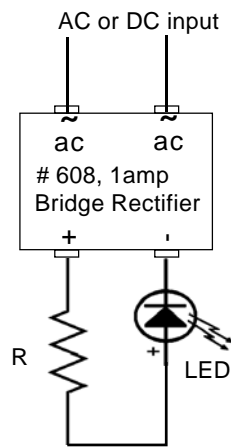
Various wiring and limiting resistor suggestions are shown on the back side of this insert.

All LED's require a limiting resistor. Do not simply apply a fixed voltage to them or you will destroy them.



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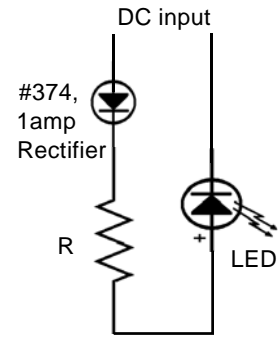
## Non-Directional LED wiring



input V	R	Item#
3 - 5	68	541
12	390	535
16-24	1k	558

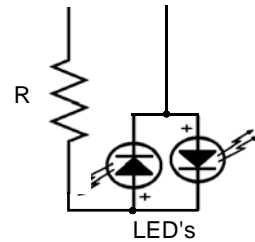
Values shown for limiting resistors are typical for the range of input voltages shown. Higher values will yield brighter LED's, make sure they can take the current flow. A basic formula to use:  
 $R (\text{Resistor Value}) = (V_{in} (\text{input Voltage}) - V_{fwdLED}) / I (\text{led current})$ .  
 $V_{fwdLED}$  is typically 2.25 volts.

## Directional LED wiring



## dual LED wiring

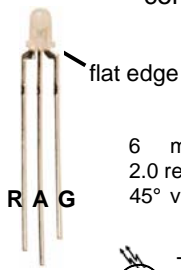
AC input = Non-Directional LED's  
 DC input = directional LED's



# T1 Red/Green LED

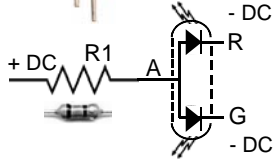
common Anode

Item #593

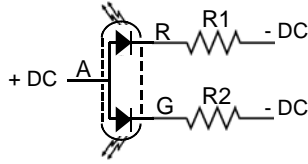


**SPECIFICATIONS:**

6 millicandella @ 20 ma., 30 ma max.  
 2.0 red, 2.1 grn, Vfwd drop  
 45° viewing angle. Typical values shown.



Method 1: using 1 resistor in series with the common Anode.



Method 2: using 2 resistor's in series with each cathode. Required to balance the led's when both are illuminated.

When used with the RL-ADJ (item 378), a 68 ohm resistor needs to be placed in series with the LED's as shown above.

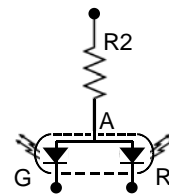
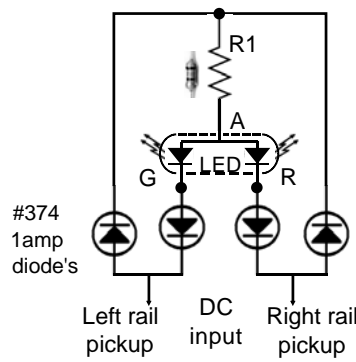
Marker lamp wiring and limiting resistor suggestions are shown on the back.

All LED's require a limiting resistor. Do not simply apply a fixed voltage to them or you will destroy them!



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## Dual color marker light wiring



For the second marker LED, connect second dual LED to the same dot locations to the left. For opposite end LED's, connect another pair in a similar fashion to the dot locations, but reverse the colors.

R1 = R2, select from chart below.  
 Most applications will use 1k, #558

When connecting in this fashion, the Red and Green LED's will operate when the track power reverses itself making dual color marker lights possible.

3rail / AC operators can connect in the same fashion, but instead of connecting to the rail pickup's as shown, connect to the motor brushes. However, the e-unit must be a Dallee 518 or 400 or the existing e-unit must be operating a DC motor.

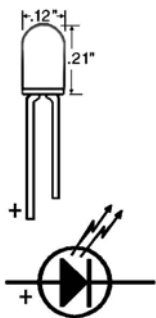
input Vmax	R1	Item#
4	68	541
12	390	535
25	1k	558

Values shown for limiting resistors are typical for the range of input voltages shown. Lower resistor values will yield brighter LED's , make sure they can take the current flow. A basic formula to use:  $R (\text{Resistor Value}) = (V_{in} (\text{input Voltage}) - V_{fwdLED} - 0.7) / I (\text{led current})$ . VfwdLED is typically 2 volts.

# Incandescent White LED

(T1 - 3mm)

Item #536



## SPECIFICATIONS:

<b>3000</b>	<b>millicandella</b>
3000K	color temp
120	milliwatt max
20	milliamps typ.
30	milliamps max.
3.1 - 3.8	Vfwd drop
30°	angle
5	Vpiv

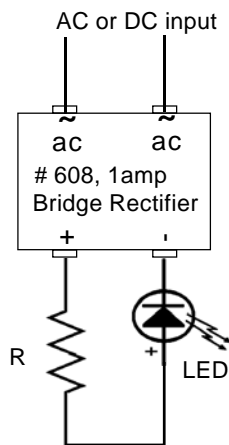
## Suggested Limiting Resistors

input Vmax	R	Item#
5.5	68	541
15	390	535
24	1k	558

This Incandescent White LED represents the color of light bulbs. Input Vmax represents the maximum input voltage. The LED will start to illuminate at a lower voltage but the current rating of the LED will be exceeded if a lower value resistor is selected and a higher voltage is applied.

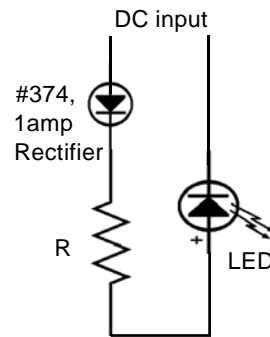
Improper handling or powering the LED will cause permanent damage.

## Non-Directional LED wiring



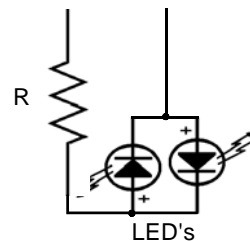
input Vmax	R	Item#
5.5	68	541
15	390	535
24	1k	558

## Directional LED wiring



## dual LED wiring

AC input = Non-Directional LED's  
DC input = directional LED's



Values shown for limiting resistors

are typical for the range of input voltages shown. Lower resistor values will yield brighter LED's, make sure they can take the current flow. A basic formula to use:  
 $R (\text{Resistor Value}) = (V_{in} (\text{input Voltage}) - V_{fwdLED}) / I (\text{led current})$ .  
 $V_{fwdLED}$  is typically 3.45 volts.



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