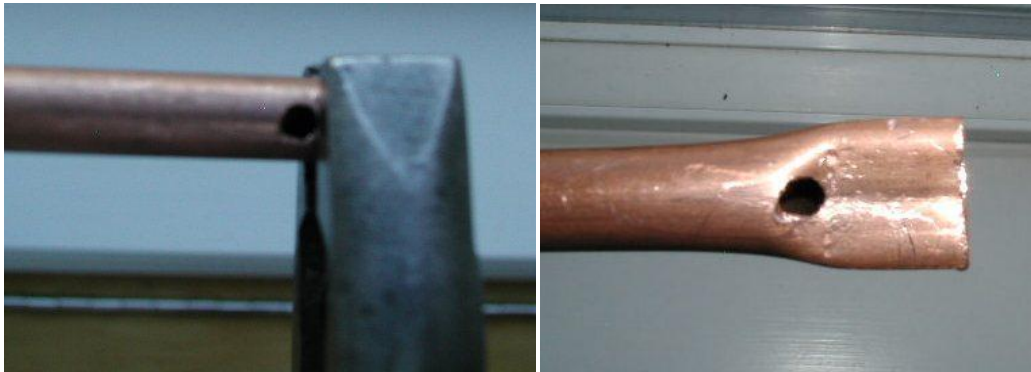


## Mini LED Spotlight



### Cut & Drill tubing Pieces

- ½" EMT Conduit Cut at 12"
- 3/8" OD Copper Hard copper Tubing cut 3-1/2" long.
- Mark and drill a 5/32" hole for wire to pass through 5/8" from end.
- Take a large pair of pliers and position on the last ½" end of the copper with the hole in tube facing up. Squeeze and flatten the end of the tube.



- Take the drill and clean and ream the hole so the wire can pass through.
- Drill a 3/16" hole in the center of the flat portion of the tubing.

### Wire preparation

- Strip off outer jacket of the #22-2 conductor cable 1-3/4" to 2" from end.
- Strip off black insulation 1-1/4" from where the gray insulation was removed.
- Strip off Red insulation ¾" from where the gray insulation was removed.

## Soldering



- Lay out LED, Resistor and wire so that they are 1-3/4" from the striped off gray insulation to the back of the LED (where the leads come out of the LED).
- Trim LED leads, wire and resistor leads so they will all fit in the 1-3/4" space when completed.
- BEFORE SOLDERING Slide the 1" long piece of 1/8" heat shrink over the Black wire.
- Solder the black wire to the negative side of the LED (lead on the flat side of the LED).
- Solder the 1/2Watt 300 ohm resistor to the Red wire and LED.
- Make sure the wires are not touching and test to make sure LED Lights and polarity is correct (+ & -).
- Slide the 1/8" x 1" long heat shrink up the black wire over the bare parts and shrink to insulate the black wire all the way to the base of the LED.



- Slide the 1/4" x 2" long piece of heat shrink over the led onto the wires that were soldered and shrink in place to insulate all bare parts so they cannot contact the copper tube.
- Tie a knot in the wire approximately 2" from the LED.

## Final Assembly

- Push cable into the end of the copper tube and out the hole near the base. With the knot in the wire about 2" from the end this should allow some adjustment for the placement of the LED in the tube. The farther back in the tube the less glare from the light and the narrower the beam. Leave the led flush with the end and the light will spread more.
- Attach the copper tube to the conduit clip with the #8-32 machine screw and nut.

## Tools

- Saw to cut metal tubing, hack saw, jig saw or band saw with metal cutting blade.
- Drill, bits – 5/32" and 3/16"
- Center punch or ice pick (makes drilling on tubing easier).
- Hammer
- Large pliers, channel locks or vise grips.
- Metal file,
- Small side cutters, metal tubing reamer, flat blade screwdriver (removing burrs on tubing).
- Soldering iron, solder and soldier's helper holder.
- Stripers or razor knife.
- Extension cord – splitter
- Optional - Heat Gun, Torch, for heat shrinks. I will have a good heat gun and it only takes a few seconds to shrink the tubing.





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## NTE30037 thru NTE30043, **NTE30045** Super Bright LED Indicators, 5mm

### Features:

- All Plastic Mold Type w/Water Clear Lens:
  - NTE30037 (Yellow Green, AlGaP/GaAs)
  - NTE30038 (Pure Green, GaInN/GaN)
  - NTE30039 (Yellow, AlInGaP/GaP)
  - NTE30040 (Orange, AlInGaP/GaAs)
  - NTE30041 (Deep Red, GaAlAs/GaAlAs)
  - NTE30042 (Amber, AlGaP/GaAs)
  - NTE30043 (Blue, GaInN/GaN)
  - NTE30045 (White, GaInN/GaN)**

### Absolute Maximum Ratings: (T<sub>A</sub> = +25°C unless otherwise specified)

Reverse Voltage, V <sub>R</sub>		
All devices	.....	5V
Continuous Forward Current, I <sub>F</sub>		
NTE30037, NTE30038, NTE30040, NTE30041, NTE30042	.....	25mA
NTE30039, NTE30043, <b>NTE30045</b>	.....	<b>30mA</b>
Peak Forward Current (1.10 Duty Cycle, 0.1ms Pulse Width), I <sub>FM</sub>		
NTE30037, NTE30040, NTE30041, NTE30042	.....	50mA
NTE30039, NTE30043, <b>NTE30045</b>	.....	<b>100mA</b>
NTE30038	.....	150mA
Power Dissipation, P <sub>D</sub>		
NTE30037, NTE30039, NTE30040, NTE30042	.....	100mW
NTE30041	.....	110mW
NTE30038, NTE30043, <b>NTE30045</b>	.....	<b>120mW</b>
Operating Temperature Range, T <sub>opr</sub>		
NTE30038 <b>Only</b>	.....	-40°C to +100°C
Storage Temperature Range, T <sub>stg</sub>		
NTE30038 <b>Only</b>	.....	-40°C to +100°C
All other devices	.....	-25°C to +100°C
Lead Temperature (During Soldering, .063 (1.6mm) from body, 5sec max), T <sub>L</sub>	.....	+260°C

### Electro-Optical Characteristics: (T<sub>A</sub> = +25°C unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Forward Voltage	V <sub>F</sub>	I <sub>F</sub> = 20mA				
NTE30037			-	2.2	2.4	V
NTE30038			3.0	3.3	3.6	V
NTE30039			-	2.25	2.6	V
NTE30040			-	2.0	2.6	V
NTE30041			-	1.86	2.5	V
NTE30042			-	2.0	2.4	V
NTE30043			-	3.5	4.0	V
<b>NTE30045</b>	<b>-</b>	<b>3.6</b>	<b>4.0</b>	<b>V</b>		

**Electro-Optical Characteristics (Cont'd):** ( $T_A = +25^\circ\text{C}$  unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Reverse Current All Devices	$I_R$	$V_R = 5V$	-	-	10	$\mu\text{A}$
NTE30038			-	-	100	$\mu\text{A}$
NTE30043, NTE30045 <b>Only</b>		$V_R = 4V$			60	$\mu\text{A}$
Luminous Intensity NTE30037	$I_V$	$I_F = 20\text{mA}$ , Note 1	-	2500	-	mcd
NTE30038			-	11000	-	mcd
NTE30039			-	7000	-	mcd
NTE30040			-	2400	-	mcd
NTE30041			-	3500	-	mcd
NTE30042			-	5500	-	mcd
NTE30043			-	3500	-	mcd
<b>NTE30045</b>			-	<b>16000</b>	-	<b>mcd</b>
Peak Emission Wave Length NTE30037	$\lambda_p$	$I_F = 20\text{mA}$	-	575	-	nm
NTE30038			-	523	-	nm
NTE30039			-	592	-	nm
NTE30040			-	620	-	nm
NTE30041			-	660	-	nm
NTE30042			-	607	-	nm
NTE30043			-	465	-	nm
<b>NTE30045</b>			<b>CIE Coordinates, Typ</b>		<b>X: 0.30; Y: 0.31</b>	
Dominate Wave Length (NTE30040 <b>Only</b> )	$\lambda_d$ (HUE)	$I_F = 20\text{mA}$ , Note 2	-	615	-	nm
Spectral Line Half Width NTE30037, NTE30040, NTE30041, NTE30042	$\Delta\lambda$	$I_F = 20\text{mA}$	-	20	-	nm
NTE30038			-	45	-	nm
NTE30039			-	25	-	nm
NTE30043			-	35	-	nm
Viewing Angle All Devices	$2\theta^{1/2}$	$I_F = 20\text{mA}$	-	12	-	deg.
NTE30038 <b>Only</b>			-	15	-	deg.
NTE30040 <b>Only</b>			-	40	-	deg.
<b>NTE30045 Only</b>			-	<b>22</b>	-	<b>deg.</b>
Terminal Capacitance (NTE30040 <b>Only</b> )	$C_t$	$V = 0V$ , $f = 1\text{MHz}$	-	15	-	pF
Response Frequency (NTE30040 <b>Only</b> )	$F_c$		-	4	-	MHz

Note 1. Luminous intensity is measured with an Exeltron 2001.

Note 2. The dominate wavelength,  $\lambda_d$ , is derived from the CIE Chromaticity Diagram and represents the color of the device.

