

# Distinctive Characteristics

Industry's first LED illumination at tip of toggle and paddle switches.

Single color LEDs of red, yellow, and green, plus bicolor red/green, to meet varied design requirements.

LEDs can operate independently from or synchronously with switching operation.

Antijamming feature to protect contacts from damage due to excessive downward force on the toggle.

High torque bushing prevents the bushing from rotating or separating from the metal frame during installation.

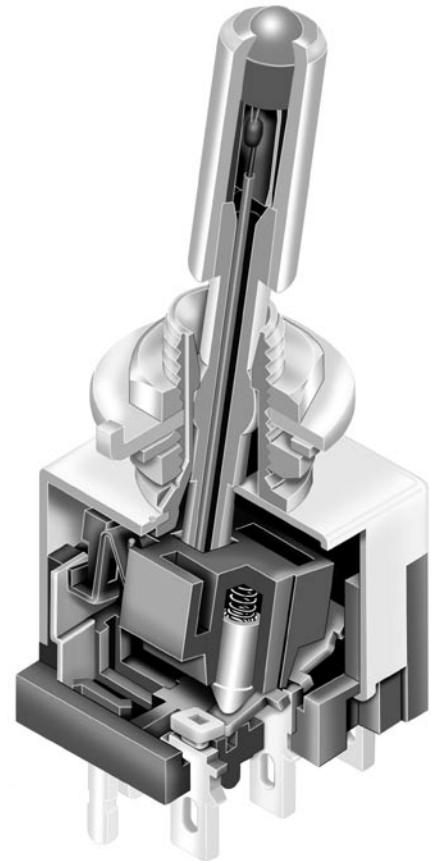
Stainless steel frame resists corrosion.

Silver contacts are of specially composed alloy for hardness.

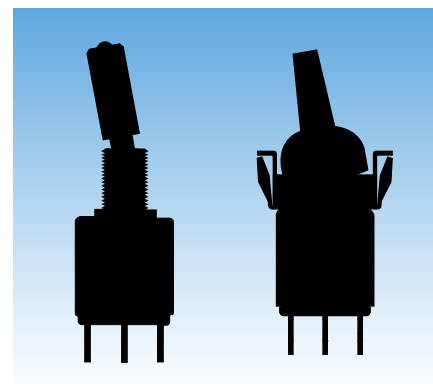
High insulating barriers protect against crossover in double pole devices.

Terminals are molded in and epoxy sealed to lock out flux, dust, and other contaminants.

1,500V dielectric strength between switch contacts and case is accomplished by clinching the frame away from the terminals.



Actual Size



## General Specifications

### Electrical Capacity (Resistive Load)

**Power Level (code W):** 6A @ 125V AC or 3A @ 250V AC or 3A @ 30V DC  
**Logic Level (code G):** 0.4VA maximum @ 28V AC/DC maximum  
 (Applicable Range 0.1mA ~ 0.1A @ 20mV ~ 28V)  
 Note: Find additional explanation of operating range in Supplement section.

### Other Ratings

**Contact Resistance:** 10 milliohms maximum for silver; 20 milliohms maximum for gold  
**Insulation Resistance:** 1,000 megohms minimum @ 500V DC  
**Dielectric Strength:** 1,000V AC minimum between contacts for 1 minute minimum;  
 1,500V AC minimum between contacts & case for 1 minute minimum  
**Mechanical Life:** 50,000 operations minimum  
**Electrical Life:** 25,000 operations minimum  
**Nominal Operating Force:**

		On-to-On Position	Off-to-On Position
Toggles & Paddles	Single Pole	3.19N	3.92N
	Double Pole	4.41N	7.06N
Rockers	Single Pole	6.37N	9.80N
	Double Pole	13.73N	17.65N

**Angle of Throw:** 20°

### Materials & Finishes

**Bushing:** Brass with nickel plating  
**Housing:** Stainless steel  
**Mounting Bracket:** Steel with tin plating  
**Movable Contacts:** Silver alloy or silver alloy with gold plating  
**Stationary Contacts:** Silver with silver plating or copper or brass with gold plating  
**Lamp Contacts:** Phosphor bronze  
**Base:** Diallyl phthalate (UL94V-0)  
**Switch Terminals:** Copper with silver or gold plating  
**Lamp Terminals:** Brass with silver or gold plating

### Environmental Data

**Operating Temp Range:** -10°C through +55°C (+14°F through +131°F) for toggles & rockers  
 -25°C through +70°C (-13°F through +158°F) for paddles  
**Humidity:** 90 ~ 95% humidity for 96 hours @ 40°C (104°F)  
**Vibration:** 10 ~ 55Hz with peak-to-peak amplitude of 1.5mm traversing the frequency range  
 & returning in 1 minute; 3 right angled directions for 2 hours  
**Shock:** 50G (490m/s²) acceleration (tested in 6 right angled directions, with 5 shocks in each direction)

### Installation

**Mounting Torque:** 1.47Nm (13 lb•in) for double nut; .67Nm (6 lb•in) for single nut  
**Soldering Time & Temp:** Wave Soldering (PC version): See Profile B in Supplement section.  
 Manual Soldering: See Profile B in Supplement section.  
 Note: Lever must be in center position while soldering.  
**Cleaning:** PC mountable device is not process sealed. Hand clean locally using alcohol based solution.

### Standards & Certifications

**Flammability Standards:** UL94V-0 base  
**UL Recognized:** Single pole toggles & rockers with synchronous circuits & solder lug or PC recognized at 6A @ 125V AC; UL File No. WOYR2.E44145; add "/U" to end of part number to order UL mark on switch.  
**CSA Certified:** All single pole toggles & rockers with synchronous circuits certified at 6A @ 125V AC; CSA File No. 023535-0-000; add "/C" to end of part number to order CSA mark on switch.



### TYPICAL SWITCH ORDERING EXAMPLE

**M21**

**1**

**2**

**T**

**C**

**W**

**01**

**POLES**

1	SPDT
* 2	DPDT

\* Available only w/ Toggles & Rockers w/Terminals 01, 02, 03

**LED COLORS**

**Single Color**

C	Red
E	Yellow
F	Green

**Bicolor**

CF	Red/Green
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**CONTACT MATERIALS & RATINGS**

W	Silver; Rated 6A @ 125V AC
G	Gold; Rated 0.4VA max @ 28V AC/DC max

**CIRCUITS**

2	ON	NONE	ON
3	ON	OFF	ON

**LED CIRCUITS & ACTUATOR TYPES**

**Toggle**

L	Isolated
T	Synchronous

**Rocker**

R	Isolated
N	Synchronous

**Paddle**

P	Isolated
J	Synchronous

**TERMINALS & MOUNTING TYPES**

01	Solder Lug with Threaded Bushing
02	Quick Connect with Threaded Bushing
03	Straight PC with Threaded Bushing
30	Right Angle PC with Smooth Bushing (available with gold contacts only)

01	Solder Lug with Flat Frame
02	Quick Connect with Flat Frame
03	Straight PC with Flat Frame
13	Straight PC with Bracket Mount

01	Solder Lug with Snap-in Frame
02	Quick Connect with Snap-in Frame
03	Straight PC with Snap-in Frame
13	Straight PC with Bracket Mount

**OPTIONAL BEZEL & COLORS**

**For Snap-in Frame**

A	Black
B	White
C	Red
E	Yellow
F	Green
G	Blue
H	Gray

### DESCRIPTION FOR TYPICAL ORDERING EXAMPLE

**M2112TCW01**






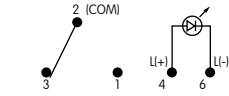
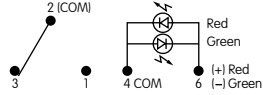
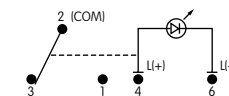
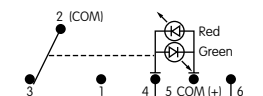
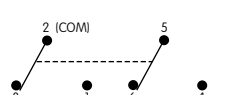
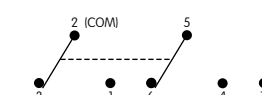
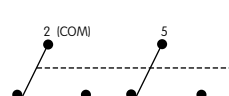
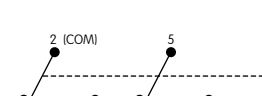
#### IMPORTANT:

Switches are supplied without UL & CSA marking unless specified. Specific models & ratings noted on General Specifications page.



- Red LED
- Synchronous LED Circuit in Toggle Actuator
- SPDT ON-NONE-ON Switch Circuit
- Silver Contacts with 6-amp Rating
- Solder Lug Terminals

## POLES & CIRCUITS & LED ILLUMINATION

Model		Toggle Position & Terminal Numbers			Schematics
		Down Keyway 	Center 	Up 	
<b>M2112</b> <b>SPDT</b>		ON	NONE	ON	Notes: Terminal numbers are not actually on the switch. LEDs require an external power source.  Isolated Single Color LED  Isolated Bicolor LED 
LED Circuit	Isolated LEDs (see schematics) Connected LED Terminals	ON	NONE	ON	
	Synchronous Single Color LED Connected LED Terminals	ON	NONE	OFF	
	Synchronous Bicolor LED Connected LED Terminals	Red	NONE	Green	
<b>M2113</b> <b>SPDT</b>		ON	OFF	ON	Synchronous Single Color LED  Synchronous Bicolor LED 
LED Circuit	Isolated LEDs (see schematics) Connected LED Terminals	ON	ON	ON	
	Synchronous Single Color LED Connected LED Terminals	ON	OFF	ON	
	Synchronous Bicolor LED Connected LED Terminals	Red	OFF	Green	
<b>M2122</b> <b>DPDT</b>		ON	NONE	ON	Isolated Single Color LED  Isolated Bicolor LED 
LED Circuit	Isolated LEDs (see schematics) Connected LED Terminals	ON	NONE	ON	
	Synchronous Single Color LED Connected LED Terminals	ON	NONE	OFF	
	Synchronous Bicolor LED Connected LED Terminals	Red	NONE	Green	
<b>M2123</b> <b>DPDT</b>		ON	OFF	ON	Synchronous Single Color LED  Synchronous Bicolor LED 
LED Circuit	Isolated LEDs (see schematics) Connected LED Terminals	ON	ON	ON	
	Synchronous Single Color LED Connected LED Terminals	ON	OFF	ON	
	Synchronous Bicolor LED Connected LED Terminals	Red	OFF	Green	

## LED COLORS & SPECIFICATIONS

Single Element LED		Toggles & Rockers			Toggles	Rockers	Paddles				Units
LED factory assembled <b>Not available separately</b> Bicolor is white in OFF state.		Single Color			Bicolor	Bicolor	Single Color			Bicolor	
		<div>C</div>	<div>E</div>	<div>F</div>	<div>CF</div>	<div>CF</div>	<div>C</div>	<div>E</div>	<div>F</div>	<div>CF</div>	
Color		Red	Yellow	Green	Red/Green	Red/Green	Red	Yellow	Green	Red/Green	
Forward Peak Current	I <sub>FM</sub>	25	30	30	25	25	10	30	30	30/25	mA
Continuous Forward Current	I <sub>F</sub>	20	20	20	10	20	8	24	24	20/20	mA
Forward Voltage	V <sub>F</sub>	2.1	2.1	2.1	1.9	2.1	1.9	2.0	2.1	2.0/2.2	V
Reverse Peak Voltage	V <sub>RM</sub>	4	4	4	—	—	5	5	5	—	V
Current Reduction Rate Above 25°C	ΔI <sub>F</sub>	0.33	0.40	0.40	0.33/0.33	0.33/0.33	0.13	0.40	0.40	0.43/0.38	mA/°C
Ambient Temperature Range		-10° ~ +55°C					-25° ~ +70°C				

## LED CIRCUIT, TOGGLE, & MOUNTING TYPE COMBINATIONS



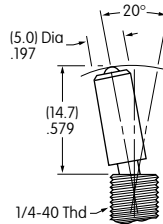
**Toggle with Isolated LED Circuit**



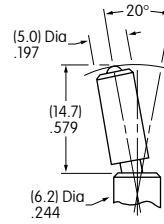
**Toggle with Synchronous LED Circuit**

Finish: Brushed aluminum

Standard Hardware: 2 AT513H Hex Nuts, 1 AT507H Locking Ring, 1 AT509 Lockwasher Standard & optional hardware details in Accessories & Hardware section.

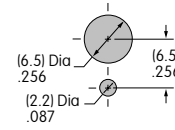


Threaded Bushing combines with Terminal codes 01, 02, & 03.

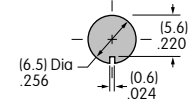


Smooth Bushing combines with Terminal code 30.

Max. Panel Thickness with Standard Hardware .102" (2.6mm)



Max. Panel Thickness without Locking Ring .134" (3.4mm)



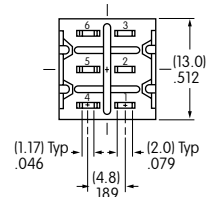
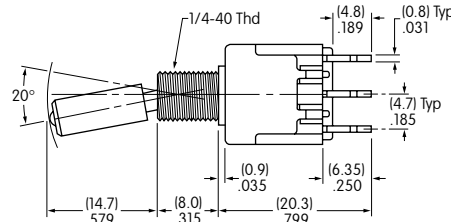
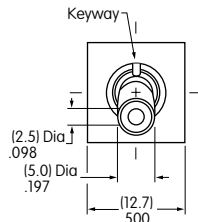
## TYPICAL TOGGLE SWITCH DIMENSIONS

### Solder Lug



M2112TCFW01

### Single Pole



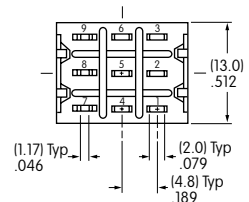
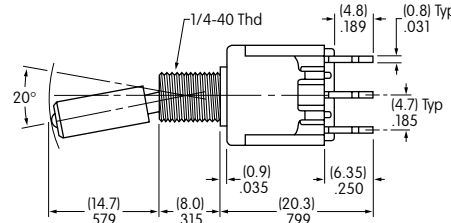
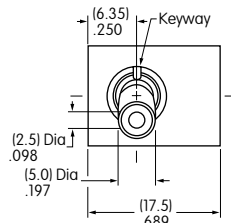
Single color LED switch does not have terminal 5.

### Solder Lug



M2122TCFW01

### Double Pole



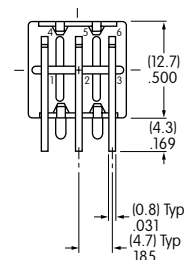
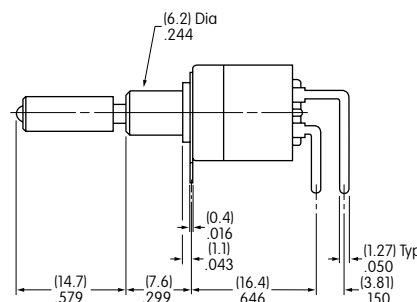
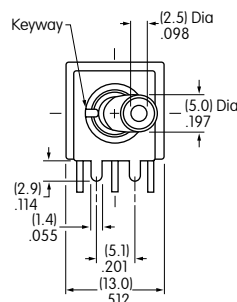
Single color LED switch does not have terminal 8.

### Right Angle PC



M2112TCFG30

### Single Pole Only



Single color LED switch does not have terminal 5.

Gold contact material only

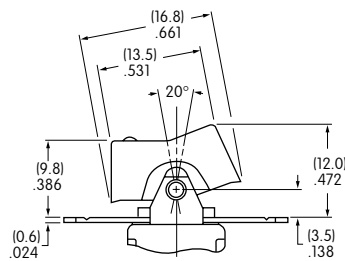
## LED CIRCUIT, ROCKER, & MOUNTING TYPE COMBINATIONS

- R** Rocker with Isolated LED Circuit
- N** Rocker with Synchronous LED Circuit

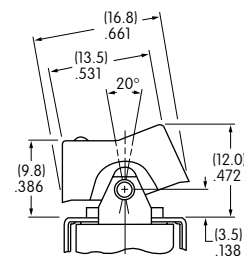
Material: Polyamide

Finish: Matte

Color: Black

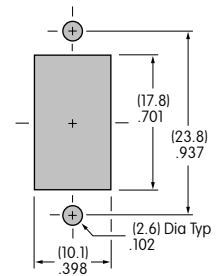


Flat Frame combines with Terminal codes 01, 02, & 03.



Bracket combines with Terminal code 13.

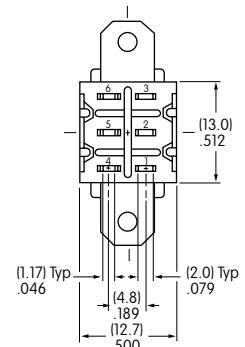
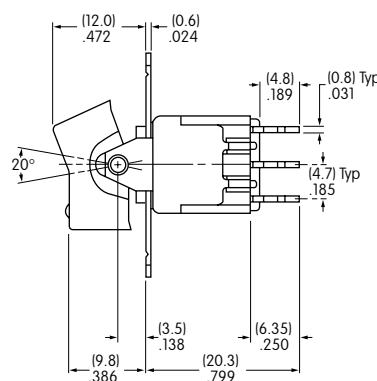
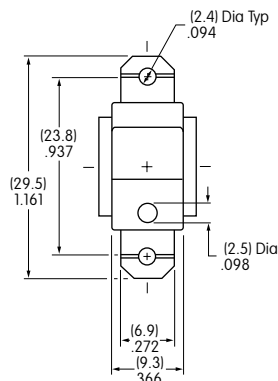
Max. Panel Thickness  
.126" (3.2mm)



## TYPICAL ROCKER SWITCH DIMENSIONS

### Solder Lug

### Single Pole

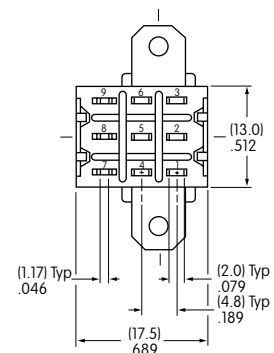
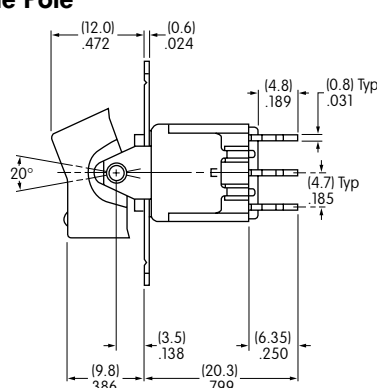
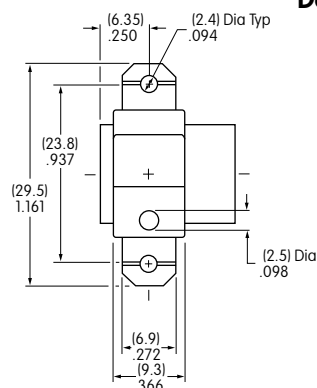


M2112NCFW01

Single color LED switch does not have terminal 5.

### Solder Lug

### Double Pole

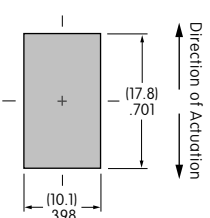
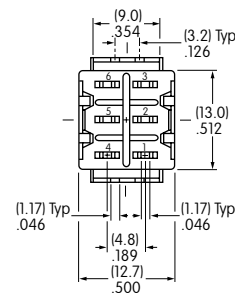
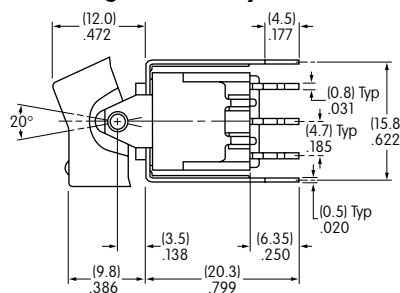
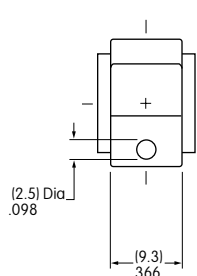


M2122NCFW01

Single color LED switch does not have terminal 8.

### Straight PC • Bracket

### Single Pole Only



M2112NCFW13

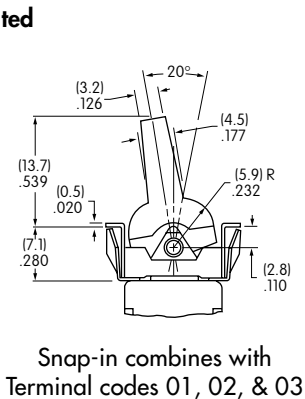
Single color LED switch does not have terminal 5. Silver contact material is standard.

## LED CIRCUIT, PADDLE, & MOUNTING TYPE COMBINATIONS

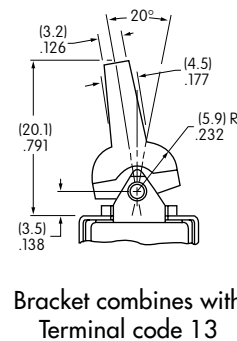
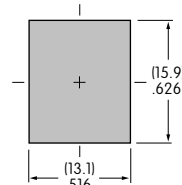
**P** Paddle with Isolated LED Circuit

**J** Paddle with Synchronous LED Circuit

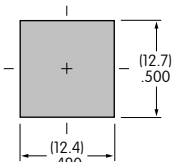
Material: Polyamide  
Finish: Matte  
Color: Black



Maximum Panel Thickness  
.039" ~ .126" (1.0 ~ 3.2mm)  
without Bezel  
.039" ~ .098" (1.0 ~ 2.5mm)  
with Bezel



Maximum Panel Thickness  
.126" (3.2mm)

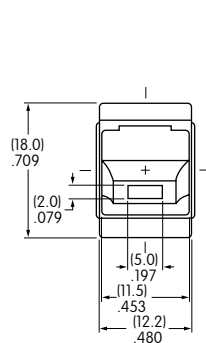


## TYPICAL PADDLE SWITCH DIMENSIONS

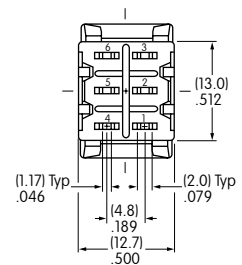
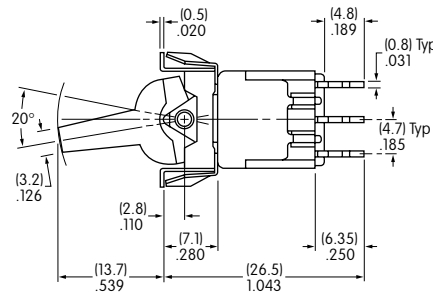
Solder Lug • Snap-in



M2112JCFW01



Single Pole Only

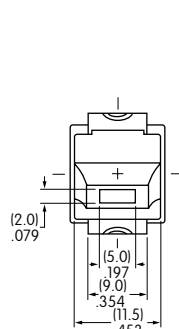


Single color LED switch does not have terminal 5.

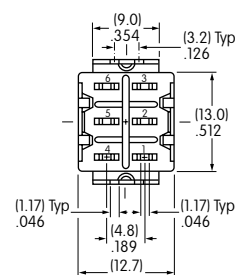
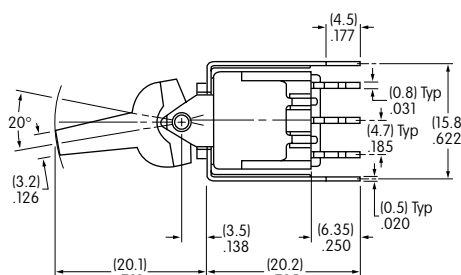
Straight PC • Bracket



M2112JCFW13



Single Pole Only



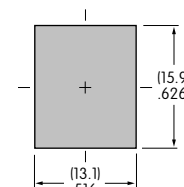
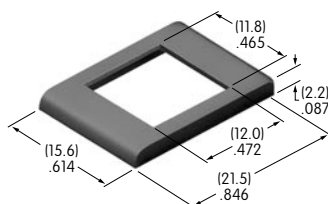
Silver contact material is standard. Single color LED switch does not have terminal 5.

## OPTIONAL BEZEL & COLORS

AT2107 Bezel for Snap-in Panel Frame

Material: Polyamide

Finish: Matte



Colors Available: **A** Black **B** White **C** Red **E** Yellow **F** Green **G** Blue **H** Gray



## CONTACT MATERIALS & RATINGS



Silver over Silver

Power Level

6A @ 125V AC & 3A @ 250V AC



Gold over Brass or Copper

Logic Level

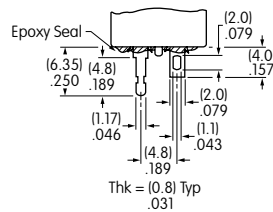
0.4VA maximum @ 28V AC/DC maximum

Complete explanation of operating range in Supplement section.

## TERMINALS

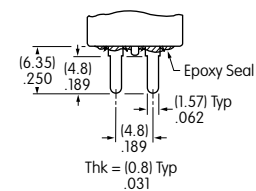
01

**Solder Lug with Turret LED Terminal**



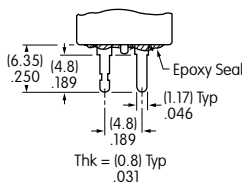
02

**Quick Connect**

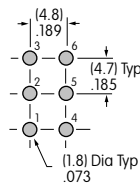


03

**Straight PC with Turret LED Terminal**

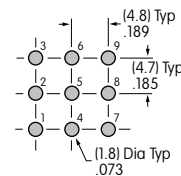


Single Pole



Single color LED switch does not have terminal 5.

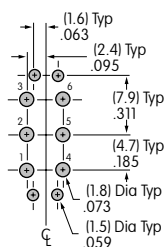
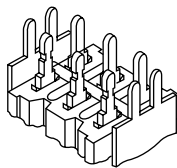
Double Pole



Single color LED switch does not have terminal 8.

13

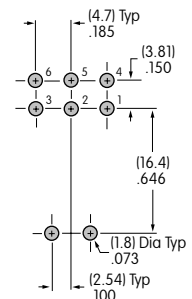
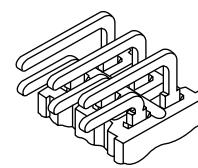
**Straight PC with Bracket & Turret LED Terminal**



Single color LED switch does not have terminal 5.

30

**Right Angle PC**

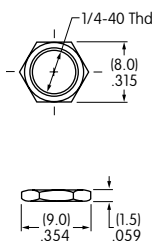


## STANDARD MOUNTING HARDWARE

**AT513H**

Hexagon Nuts (2 per switch)

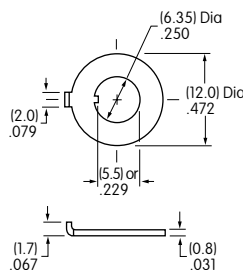
**Material:** Brass with nickel plating



**AT507H**

Locking Ring (1 per switch)

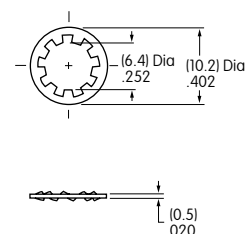
**Material:** Steel with chromate over zinc



**AT509**

Lockwasher (1 per switch)

**Material:** Steel with chromate over zinc



**Optional Hardware:** Knurled nuts, dress nuts, and ON-OFF plates are available; see details in Accessories & Hardware section.