# General Specifications

## Electrical Capacity (Resistive Load)

**Power Level (silver):** 3A @ 125V AC for silver contacts
**Logic Level (gold):** 0.4VA maximum @ 28V AC/DC maximum for gold contacts
(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 and case for 1 minute minimum
**Mechanical Life:** 100,000 operations minimum
**Electrical Life:** 25,000 operations minimum for silver;
50,000 operations minimum for gold
**Nominal Operating Force:** Single Pole: 1.75N for Momentary and 2.49N for Alternate Action
Double Pole: 2.30N for Momentary and 3.05N for Alternate Action
**Travel:** Momentary: Pretravel .047" (1.2mm); Overtravel .016" (0.4mm); Total Travel .063" (1.6mm)
Alternate: Pretravel .071" (1.8mm); Overtravel .016" (0.4mm); Total Travel .087" (2.2mm)

## Materials & Finishes

**Plunger:** Brass with nickel plating
**Bushing:** Brass with nickel plating
**Frame:** Stainless steel
**Case:** Melamine phenolic resin (UL94V-0)
**Movable Contacts:** Copper with silver or gold plating
**Stationary Contacts:** Silver & copper with silver or gold plating
**Terminals:** Copper with silver or gold plating

## Environmental Data

**Operating Temp Range:** –10°C through +70°C (+14°F through +158°F)
**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/s$^2$) acceleration (tested in 6 right angled directions, with 5 shocks in each direction)

## Installation

**Mounting Torque:** 1.47Nm (13.0 lb•in) for double nut; 0.68Nm (6.0 lb•in) for single nut
**Cap Installation Force:** 78.5N (17.65 lbf) maximum downward force on actuator
**Soldering Time & Temp:** Wave Solder (Straight PC): See Profile B in Supplement section.
Manual Soldering: See Profile B in Supplement section.
**Cleaning:** These devices are not process sealed. Hand clean locally using alcohol based solution.

## Standards & Certifications

**Flammability Standards:** UL94V-0 case
**UL:** **File No. E44145 - Recognized only when ordered with marking on switch.**
Add "/U" or "/CUL" before first dash in part number to order UL recognized switch.
All single and double pole models recognized at 3A @ 125V AC.
**CSA:** **File No. 023535_0_000 - Certified only when ordered with marking on switch.**
Add "/C" before first dash in part number to order CSA certified switch.
Single pole solder lug and PC models certified at 3A @ 125V AC; double pole PC models certified at 3A @ 125V AC.

# Distinctive Characteristics

Power and logic level capabilities available to suit varying applications.

Bushing and snap-in mount versions available; snap-in models offer many style and color choices to enhance front panel appearance.

Light touch actuation.

High torque bushing prevents rotation and separation from metal frame during installation.

Stainless steel frame resists corrosion.

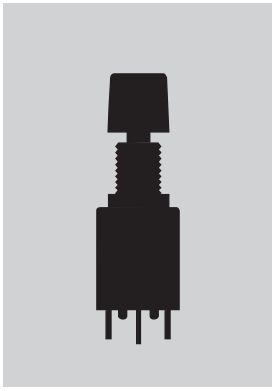
Case of heat resistant resin meets UL 94V-0 flammability rating.

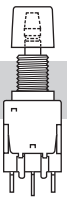
Higher insulating barriers protect against crossover in double pole devices.

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

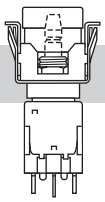
Epoxy sealed terminals prevent entry of solder flux and other contaminants.

Actual Size





Bushing Mount Page C26



Snap-in Mount Page C30

## TYPICAL SWITCH ORDERING EXAMPLE

EB20 **65** **[ ]** — **B** **F**

### Poles & Circuits

| | | | |
|---|---|---|---|
| **11** | SPDT | ON | (ON) |
| **65** | SPDT | ON | ON |
| **61** | DPDT | ON | (ON) |
| **85** | DPDT | ON | ON |

( ) = Momentary

### Caps

| | |
|---|---|
| **B** | .315" (8.0mm) Dia. |
| **C** | .394" (10.0mm) Dia. |

### Contacts, Ratings, & Terminals

| | |
|---|---|
| **No Code** | Silver Contacts; Solder Lug Terminals<br>3A @ 125V AC |
| **G** | Gold Contacts; Solder Lug Terminals<br>0.4VA max @ 28V AC/DC max |
| **P** | Silver Contacts; Straight PC Terminals;<br>3A @ 125V AC |
| **PG** | Gold Contacts; Straight PC Terminals<br>0.4VA max @ 28V AC/DC max |

### Colors

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

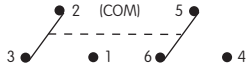
### IMPORTANT:

Switches are supplied without UL, cULus & CSA marking unless specified. **UL, cULus & CSA recognized only when ordered with marking on the switch.** Specific models, ratings, & ordering instructions are noted on the General Specifications page.

### DESCRIPTION FOR TYPICAL ORDERING EXAMPLE

**EB2065-BF**

## POLES & CIRCUITS

| Pole | Model | Plunger Position ( ) = Momentary: Normal (Keyway) | Plunger Position ( ) = Momentary: Down | Connected Terminals: Normal (Keyway) | Connected Terminals: Down | Throw & Switch Schematics |
|---|---|---|---|---|---|---|
| SP | **EB2011**<br>**EB2065** | ON<br>ON | (ON)<br>ON | 2-3 | 2-1 | SPDT  |
| DP | **EB2061**<br>**EB2085** | ON<br>ON | (ON)<br>ON | 2-3 5-6 | 2-1 5-4 | DPDT  |

Note: Terminal numbers are not actually on the switch.





## CONTACT MATERIALS, RATINGS, & TERMINALS

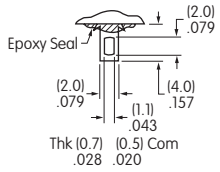
**No Code** — **Solder Lug, Silver Contacts**

**Power Level** — **3A @ 125V AC**

**G** — **Solder Lug, Gold Contacts**

**Logic Level** — **0.4VA max @ 28V AC/DC max**

Complete explanation of operating range in Supplement section.



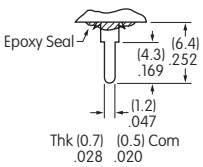

**P** — **Straight PC, Silver Contacts**

**Power Level** — **3A @ 125V AC**

**PG** — **Straight PC, Gold Contacts**

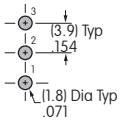
**Logic Level** — **0.4VA max @ 28V AC/DC max**

Complete explanation of operating range in Supplement section.

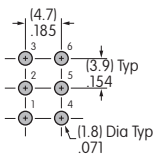



**PCB Footprints**

Single Pole




Double Pole

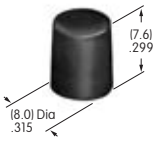


## CAPS & COLORS

**B** **AT443**
**.315" (8.0mm) Diameter Snap-on Cap**

**Cap Colors Available:**

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

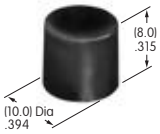



Cap Material: Polycarbonate Finish: Glossy

**C** **AT442**
**.394" (10.0mm) Diameter Snap-on Cap**

**Cap Colors Available:**

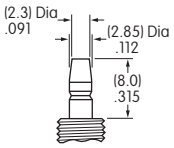
| | | | |
|---|---|---|---|
| A | Black | F | Green |
| B | White | G | Blue |
| C | Red | H | Gray |
| E | Yellow | | |



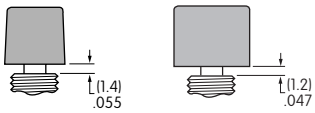

Cap Material: Polycarbonate Finish: Glossy

**Plunger Extension**

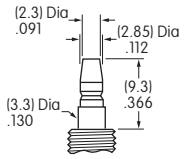
Due to a difference in plunger lengths on the momentary and alternate action models, cap distance from top of bushing varies.



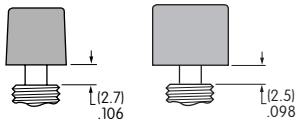

Momentary Plunger Length




Momentary Cap Location




Alternate Plunger Length

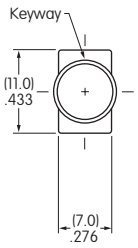



Alternate Cap Location

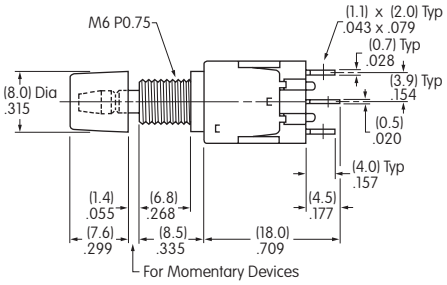
## TYPICAL SWITCH DIMENSIONS

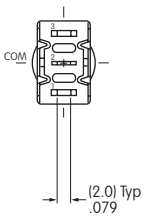
### Solder Lug

EB2011-BA



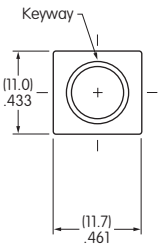

### Single Pole



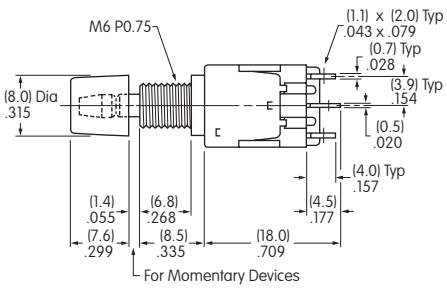



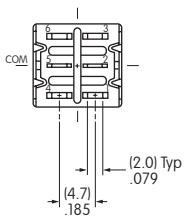

### Solder Lug

EB2061-BA




### Double Pole

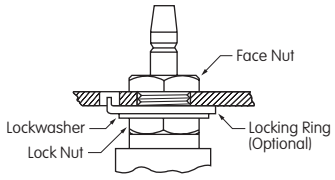


## HARDWARE

### Installation/Assembly

**2 AT513M Metric Hexagon Nuts**
**1 AT509 Internal Tooth Lockwasher**



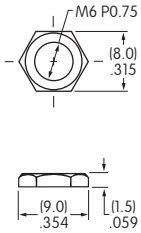

Optional Hardware:
AT507M Metric Locking Ring

Note: Cap must be snapped on after the switch is mounted into the panel.

### Standard Hardware

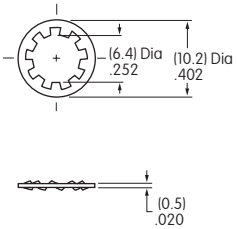
**AT513M**
**Metric Hexagon Nut**

Material:
Brass with
Nickel Plating




**AT509**
**Lockwasher**

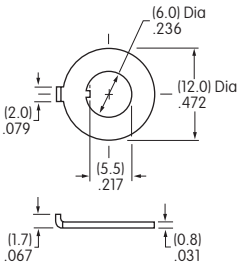
Material:
Steel with
Zinc/Chromate




### Optional Hardware

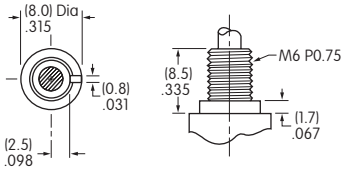
**AT507M**
**Metric Locking Ring**

Material:
Steel with
Zinc/Chromate

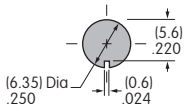



## PANEL CUTOUTS & THICKNESSES

### Metric Bushing

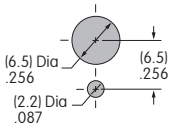



### With Standard Hardware



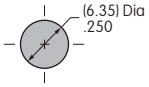

Maximum Effective
Panel Thickness:
.118" (3.0mm)

### With Standard Hardware & Optional Locking Ring




Maximum Effective
Panel Thickness:
.055" (1.4mm)

### Without Bottom Hex Nut




Maximum Effective
Panel Thickness:
.185" (4.7mm)

See Accessories & Hardware section for optional Conical Nuts:
AT512M used with cap AT443 and AT512CM used with cap AT442.

## TYPICAL SWITCH

EB20 [11] [ ] — [B] — [J23]

### Poles & Circuits

| | | | |
|---|---|---|---|
| **11** | SPDT | ON | (ON) |
| **65** | SPDT | ON | ON |
| **61** | DPDT | ON | (ON) |
| **85** | DPDT | ON | ON |

( ) = Momentary

### Contacts, Ratings, & Terminals

| | |
|---|---|
| **No Code** | Silver Contacts; Solder Lug Terminals 3A @ 125V AC |
| **G** | Gold Contacts; Solder Lug Terminals 0.4VA max @ 28V AC/DC max |
| **P** | Silver Contacts; Straight PC Terminals; 3A @ 125V AC |
| **PG** | Gold Contacts; Straight PC Terminals 0.4VA max @ 28V AC/DC max |

### Cap Colors

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

### Cap Extensions & Bezel Types

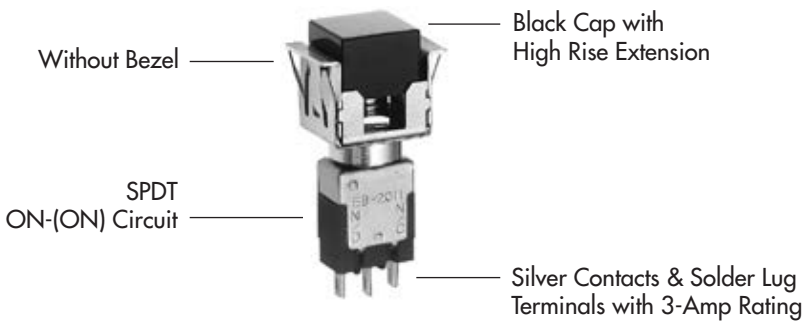
| Low Rise | | High Rise | | |
|---|---|---|---|---|
| Momentary | Alternate | Momentary | Alternate | Description |
| **J20** | **J30** | **J40** | **J50** | Without Bezel |
| **J21** | **J31** | **J41** | **J51** | Bezel without LED |
| **J22** | **J32** | **J42** | **J52** | Bezel with 1 Round LED |
| **J23** | **J33** | **J43** | **J53** | Bezel with 2 Round LEDs |
| **J24** | **J34** | **J44** | **J54** | Bezel with 2 Rectangular LEDs |

### IMPORTANT:

Switches are supplied without UL, cULus & CSA marking unless specified.
**UL, cULus & CSA recognized only when ordered with marking on the switch.**
Specific models, ratings, & ordering instructions are noted on the General Specifications page.

### DESCRIPTION FOR TYPICAL ORDERING EXAMPLE WITHOUT BEZEL

**EB2011-A-J40**



## ORDERING EXAMPLES



### Bezel Colors

| Bezel without LEDs | | | |
|---|---|---|---|
| **A** | Black | **F** | Green |
| **B** | White | **G** | Blue |
| **C** | Red | **H** | Gray |
| **E** | Yellow | | |

| Bezel with 1 Round LED | |
|---|---|
| **A** | Black |

| Bezel with 2 Round or Rectangular LEDs | |
|---|---|
| **A** | Black |

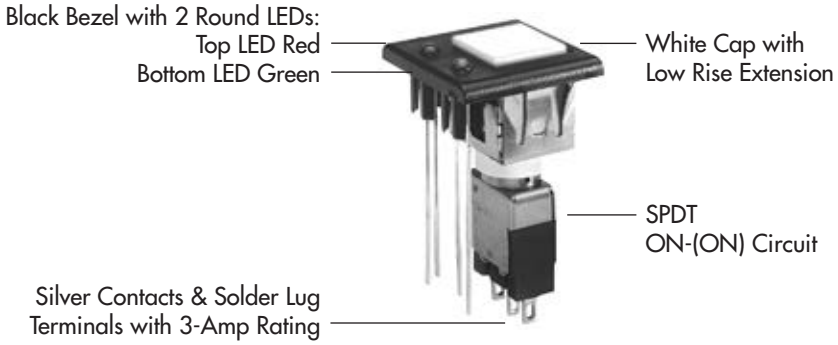
### Led Colors

| 1 LED | |
|---|---|
| **C** | Red |
| **F** | Green |

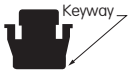
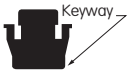
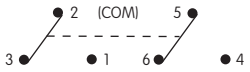
| 2 LEDs | | | |
|---|---|---|---|
| Top LED | | Bottom LED | |
| **C** | Red | **C** | Red |
| **E** | Yellow | **E** | Yellow |
| **F** | Green | **F** | Green |

### DESCRIPTION FOR TYPICAL ORDERING EXAMPLE WITH BEZEL

**EB2011-B-J23ACF**



## POLES & CIRCUITS

| Pole | Model | Plunger Position ( ) = Momentary: Normal | Plunger Position ( ) = Momentary: Down | Connected Terminals: Normal | Connected Terminals: Down | Throw & Switch Schematics |
|---|---|---|---|---|---|---|
| | |   |  |   |  | Note: Terminal numbers are not actually on the switch. |
| SP | **EB2011**<br>**EB2065** | ON<br>ON | (ON)<br>ON | 2-3 | 2-1 | SPDT   |
| DP | **EB2061**<br>**EB2085** | ON<br>ON | (ON)<br>ON | 2-3 5-6 | 2-1 5-4 | DPDT   |

## CONTACT MATERIALS, RATINGS, & TERMINALS

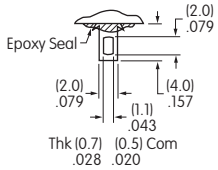
**No Code** — **Solder Lug, Silver Contacts**

**Power Level** — **3A @ 125V AC**

**G** — **Solder Lug, Gold Contacts**

**Logic Level** — **0.4VA maximum @ 28V AC/DC maximum**

Complete explanation of operating range in Supplement section.



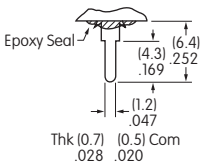

**P** — **Straight PC, Silver Contacts**

**Power Level** — **3A @ 125V AC**

**PG** — **Straight PC, Gold Contacts**

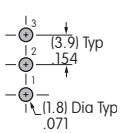
**Logic Level** — **0.4VA maximum @ 28V AC/DC maximum**

Complete explanation of operating range in Supplement section.

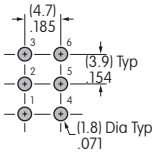



**PCB Footprints**

Single Pole




Double Pole



## CAP COLORS

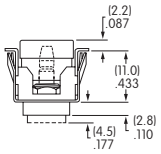
Factory Assembled on the Switch:
Square snap-on cap AT465, snap-in mounter AT529, and optional bezels which follow.

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

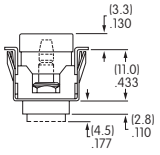
## CAP EXTENSIONS & BEZEL TYPES

**Cap Extension without Bezel**

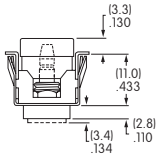
**J20** Low Rise Momentary



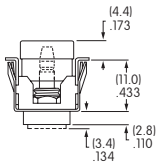

**J30** Low Rise Alternate

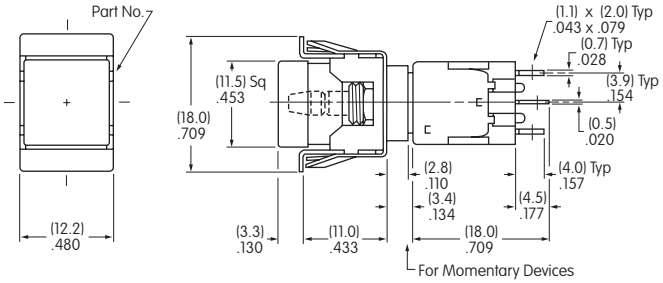


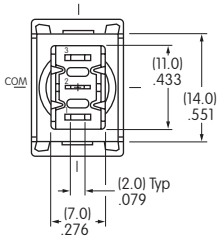

**J40** High Rise Momentary

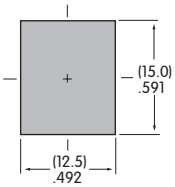



**J50** High Rise Alternate



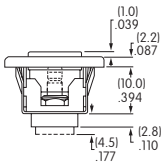

Maximum Panel Thickness
.039" ~ .157" (1.0mm ~ 4.0mm)
Cutout applies to SP & DP

High Rise | Single Pole | **EB2011-A-J40**

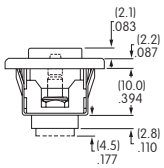
---

**Cap Extension with Bezel**

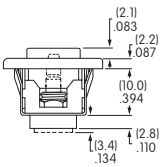
**J21** Low Rise Momentary



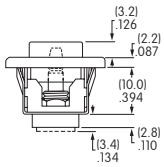

**J31** Low Rise Alternate




**J41** High Rise Momentary




**J51** High Rise Alternate

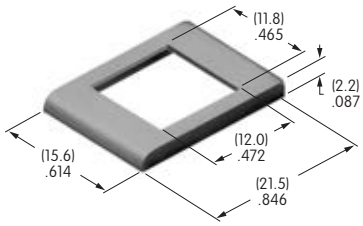


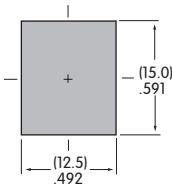

**AT207 Bezel without LED**

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

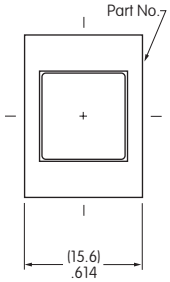
Material: Polycarbonate

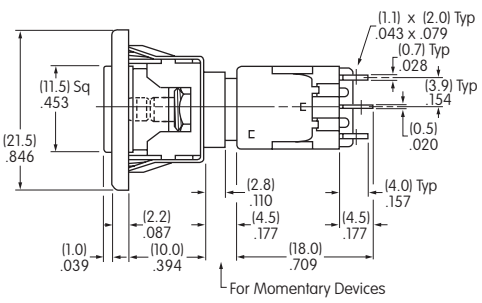
Finish: Glossy

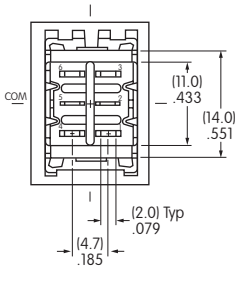



Maximum Panel Thickness
.039" ~ .126" (1.0mm ~ 3.2mm)
Cutout applies to SP & DP



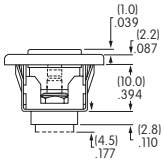




Low Rise | Double Pole | **EB2061-B-J21A**

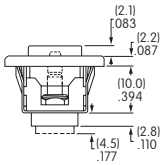
## CAP EXTENSIONS & BEZEL TYPES

**Cap Extension with Bezel**

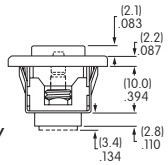
**J22** Low Rise Momentary



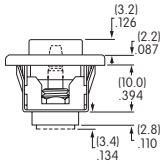

**J32** Low Rise Alternate




**J42** High Rise Momentary



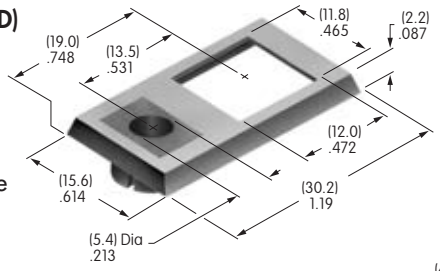

**J52** High Rise Alternate



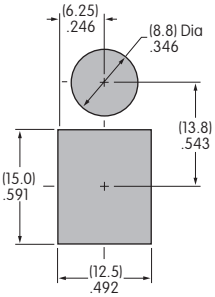

**AT208 Bezel with 1 Round LED (AT070 LED)**

**A** Black

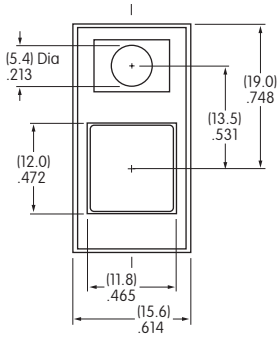
Material: Polycarbonate
Finish: Glossy

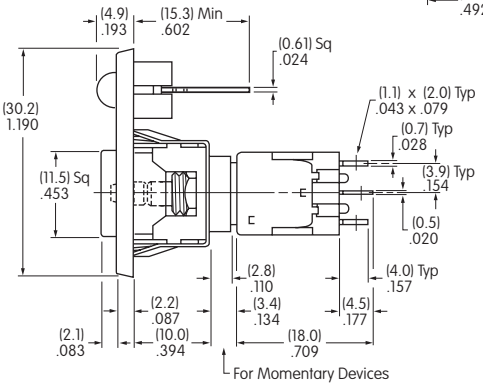


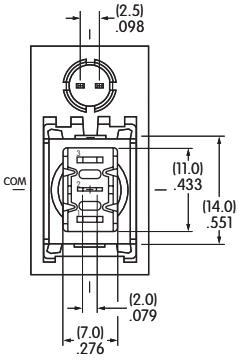

Maximum Panel Thickness
.039" ~ .126"
(1.0mm ~ 3.2mm)
Cutout applies to SP & DP




LED colors and specifications on next to last page of this EB section.




EB2011-B-J42AC

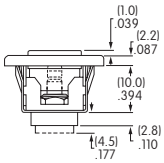
High Rise

Single Pole

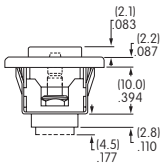
---

**Cap Extension with Bezel**

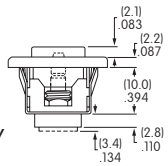
**J23** Low Rise Momentary



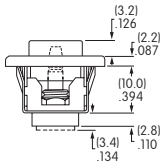

**J33** Low Rise Alternate




**J43** High Rise Momentary



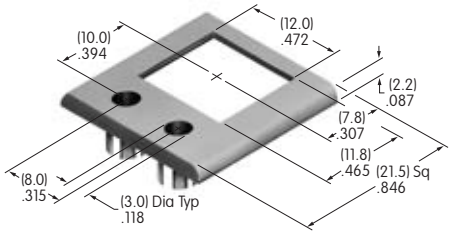

**J53** High Rise Alternate

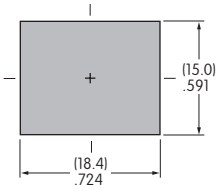



**AT212 Bezel with 2 Round LEDs (AT617 LEDs)**

**A** Black

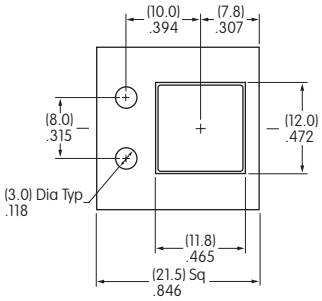
Material: Polycarbonate
Finish: Glossy

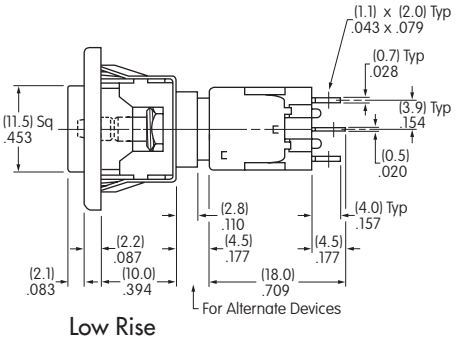


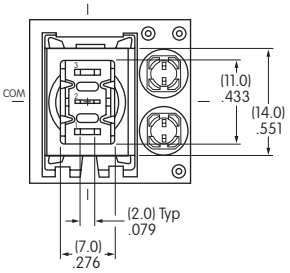




Maximum Panel Thickness
.039" ~ .126" (1.0mm ~ 3.2mm)
Cutout applies to SP & DP

LED colors and specifications on next to last page of this EB section.




EB2065-B-J33ACF

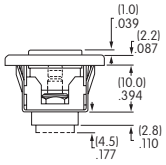
Low Rise

Single Pole

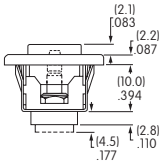
## CAP EXTENSIONS & BEZEL TYPES

**Cap Extension with Bezel**

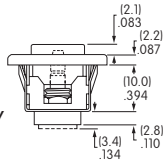
**J24** Low Rise Momentary



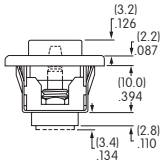

**J34** Low Rise Alternate




**J44** High Rise Momentary



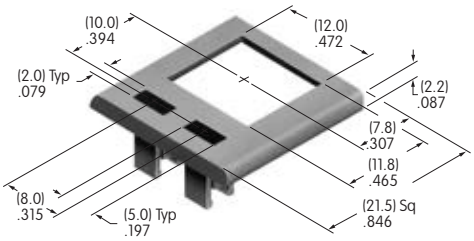

**J54** High Rise Alternate

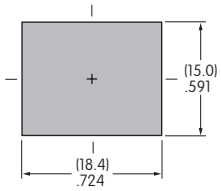



**AT213 Bezel with 2 Rectangular LEDs (AT618 LEDs)**

**A** Black

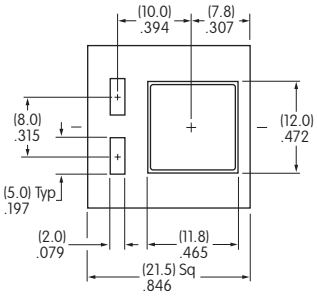
Material: Polycarbonate
Finish: Glossy



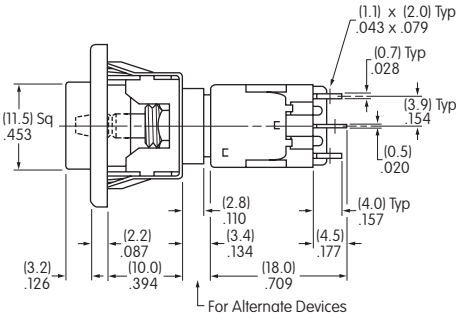



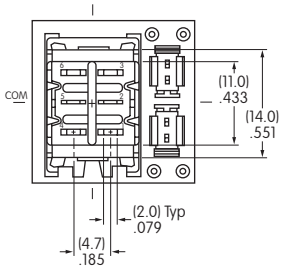

Maximum Panel Thickness
.039" ~ .126" (1.0mm ~ 3.2mm)
Cutout applies to SP & DP

LED colors and specifications on next page of this EB section.




High Rise



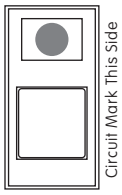

Double Pole

**EB2085-B-J54ACF**

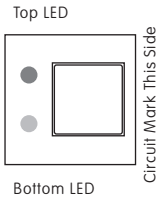
## LED COLORS & SPECIFICATIONS

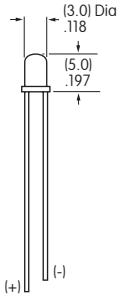
**Bezel Orientation on Switch**

**AT070 LED**
For Bezel AT208
with 1 LED

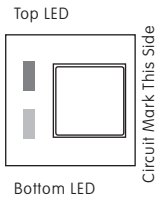



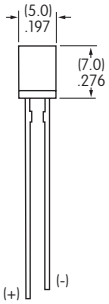

**AT617 LED**
For Bezel AT212
with 2 Round LEDs




**AT618 LED**
For Bezel AT213
with 2 Rectangular LEDs




Note: Lead lengths may differ from manufacturing lot to lot. The longer lead is the anode (+).

|  | | AT070 | | AT617 | | | AT618 | | |
|---|---|---|---|---|---|---|---|---|---|
| | | C | F | C | E | F | C | E | F |
| | Color | Red | Green | Red | Yellow | Green | Red | Yellow | Green |
| Maximum Forward Current | $I_{FM}$ | 25mA | 30mA | 30mA | 30mA | 25mA | 25mA | 30mA | 25mA |
| Typical Forward Current | $I_F$ | 20mA | 20mA | 20mA | 20mA | 20mA | 20mA | 20mA | 20mA |
| Forward Voltage | $V_F$ | 2.8V | 2.1V | 2.0V | 2.1V | 2.25V | 2.25V | 2.1V | 2.2V |
| Maximum Reverse Voltage | $V_{RM}$ | 4V | 5V | 5V | 5V | 5V | 5V | 5V | 5V |
| Current Reduction Rate Above 25°C | $\Delta I_F$ | 0.33 mA/°C | 0.40 mA/°C | 0.40 mA/°C | 0.40 mA/°C | 0.33 mA/°C | 0.33 mA/°C | 0.40 mA/°C | 0.33 mA/°C |
| Ambient Temperature Range (when used with a bezel) | | −10° ~ +70°C | | −15° ~ +70°C | | | −25° ~ +50°C | | |

The electrical specifications shown are determined at a basic temperature of 25°C.
LED circuit is independent of switch operation. LED is colored in OFF state.

If the source voltage is greater than the rated voltage of the LED, a ballast resistor must be connected in series with the lamp.
The ballast resistor calculation and more lamp detail are shown in the Supplement section.

## LEGENDS

NKK Switches can provide custom legends for caps. Contact factory for more information.

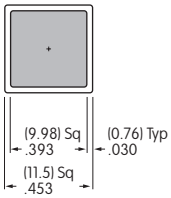


**Recommended Print Method:**

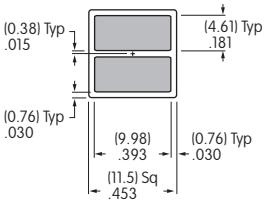
Screen Print or Pad Print

Epoxy based ink is recommended.

**Suggested Printable Area for Cap**




AT465




AT465

Shaded areas are printable areas.

# Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

NKK Switches:

EB2011-A-J40 EB2011-B-J23ACF EB2061-A-J41A EB2011-B-J21B EB2011-B-J21F-RO EB2011-B-J21C-RO EB2011-H-J21H EB2011G-G-J21A EB2065P-A-J21A EB2061G-C-J21A EB2061P-B-J21A EB2085G-B-J51A EB2011P-A-J42AC EB2065-B-J22AF EB2065-B-J32AF EB2065G-B-J32AF EB2011G-A-J23ACF EB2011G-B-J23AFE EB2011G-B-J24AFC EB2011P-A-J43ACF EB2065-F-J33ACF EB2065-A-J34ACF EB2085-B-J33AFF EB2085-B-J34AFF EB2085G-B-J33AEF EB2085G-B-J33AFE EB2085G-B-J33AFF AT529 EB2061G-B-J21A EB2065G-A-J32AF EB2085-A-J52AF EB2061P-H-J21H EB2011-A/1-J24AEF EB2011G-G-J41H EB2085G-C-J52AC EB2085G-F-J51F EB2085G-B-J51C EB2011G-B-J41B EB2085G-H-J51B EB2061-C-J22AF EB2061G-A-J21A EB2061-B-J22AF EB2061G-F-J41A EB2061P-A-J23ACF EB2061G-C-J41A EB2061-C-J23ACC EB2061-G-J23ACF EB2061-E-J21E EB2061-E-J23ACF EB2061-G-J44ACF EB2061P-A-J42AC EB2061-F-J42AF EB2061-B-J21B EB2061-A-J22AF EB2061-C-J42AC EB2061-B-J33ACF EB2061-A-J32AF EB2061G-A-J22AF EB2061-B-J21A EB2061P-B-J24ACC EB2061-G-J21G EB2011G-A-J24ACF EB2011P-B-J23ACF EB2011P-C-J40 EB2011-G-J21A EB2011-F-J21F EB2011P-F-J40 EB2011P-F-J22AC EB2011-C-J21H EB2011-B-J42AC EB2011G-E-J41H EB2011-C-J34AFE EB2011G-G-J23ACF EB2011-F-J41A EB2011G-C-J21A EB2011-B-J41C EB2011-G-J21H EB2011-B-J41A EB2011G-B-J21A EB2011P-B-J21B EB2011-C-J24AFE EB2011-E-J21A EB2011P-H-J24AFE EB2011-C-J21C EB2011P-B-J20 EB2011P-C-J41A EB2011-B-J24AFE EB2011-F-J24AFE EB2011-B-J24AFF EB2011-H-J31H EB2011-F-J22AC EB2011P-C-J22AC EB2011-F-J21A EB2011-F-J42AF EB2011G-F-J21A EB2011-C-J42AF EB2011-H-J24ACC EB2011-H-J24ACF EB2011-H-J40 EB2011P-A-J51A