

# General Specifications

## Electrical Capacity (Resistive Load)

**Low Level:** 100mA maximum @ 12V DC

## Other Ratings

**Contact Resistance:** 200 milliohms maximum

**Insulation Resistance:** 100 megohms minimum @ 250V 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:** 5,000,000 operations minimum;

1,000,000 operations minimum for Rectangular Switch/Cap Assembly (at center of cap)

**Electrical Life:** 5,000,000 operations minimum;

1,000,000 operations minimum for Rectangular Switch/Cap Assembly (at center of cap)

**Nominal Operating Force:** **KP01:** 1.9N maximum for Tactile & Nontactile models (at center of cap)

**KP02:** 1.6N maximum for Tactile, Nontactile & Tactile/Audible models (at center of cap)

**Travel:** **KP01:** Pretravel .122" (3.1mm); Overtravel .055" (1.4mm); Total Travel .177" (4.5mm)

**KP02:** Pretravel .091" (2.3mm); Overtravel .047" (1.2mm); Total Travel .138" (3.5mm)

## Materials & Finishes

**Plunger/Upper Housing:** Polyacetal

**Lower Housing:** Glass fiber reinforced PBT (UL94V-0)

**Movable Contact:** Stainless steel with gold plating

**Stationary Contacts:** Gold over copper alloy

**Switch Terminals:** Brass with tin plating

## Environmental Data

**Operating Temperature Range:** -25°C through +50°C (-13°F through +122°F)

**Humidity:** 90-95% humidity for 240 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:** 51G (500m/s<sup>2</sup>) acceleration (tested in 6 right angled directions, with 5 shocks in each direction)

## Installation

**Cap Installation Force:** 50.0N maximum downward force on actuator

## PCB Processing

**Soldering:** **For RGBP 4-pin:** Wave Soldering. Preheat temperature: 140°C @ 60 seconds;

Peak temperature: 270°C @ 11 seconds; Cycles: 2

Manual Soldering. 410°C @ 4 seconds; Cycles: 2

**For all others:** Wave Soldering. Preheat temperature: 110°C @ 40 seconds;

Peak temperature: 270°C @ 6 seconds; Cycles: 2

Manual Soldering. 390°C @ 4 seconds; Cycles: 2

**Cleaning:** These devices are not process sealed. Hand clean locally using alcohol based solution.

## Standards & Certifications

**Flammability Standards:** UL94V-0 lower housing

The KP Series pushbuttons have not been tested for UL recognition or CSA certification.

These switches are designed for use in a low-voltage, low-current, logic-level circuit.

When used as intended in a logic-level circuit, the results do not produce hazardous energy.

# Distinctive Characteristics

KP series offers a complete switch solution for all control panel needs, including home keys and the rectangular switch/cap assembly.

Distinct, long total travel of .177" (4.5mm) for KP01 or shorter stroke of .138" (3.5mm) for KP02.

Available with super bright amber/blue bicolor LED or super bright RGB LED. The RGB LED provides vibrant full color spectrum in unlimited color combinations, and is offered in both 4-pin or 8-pin terminations.

Unique actuation guide gives positive indication of circuit transfer as well as smooth and silent operation.

Choices of tactile, nontactile or tactile/audible actuation.

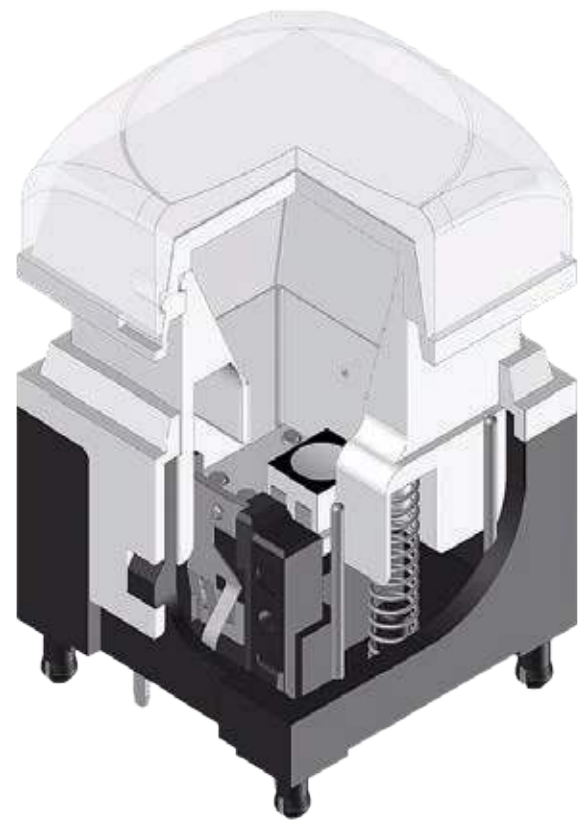
Compact design with height of .906" (23.0mm) from PC board to top of cap (same height as programmable SmartDisplay).

Flat, sculptured or home key square caps in three common sizes for design flexibility in various applications.

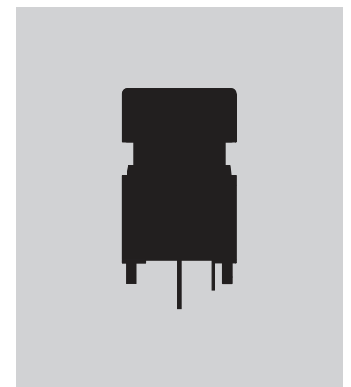
Twin contacts with gold plating assure high reliability and long life of 5,000,000 operations minimum.

Improved profile for soldering specifications (RGBP models).

Standard and custom alternating legends available.

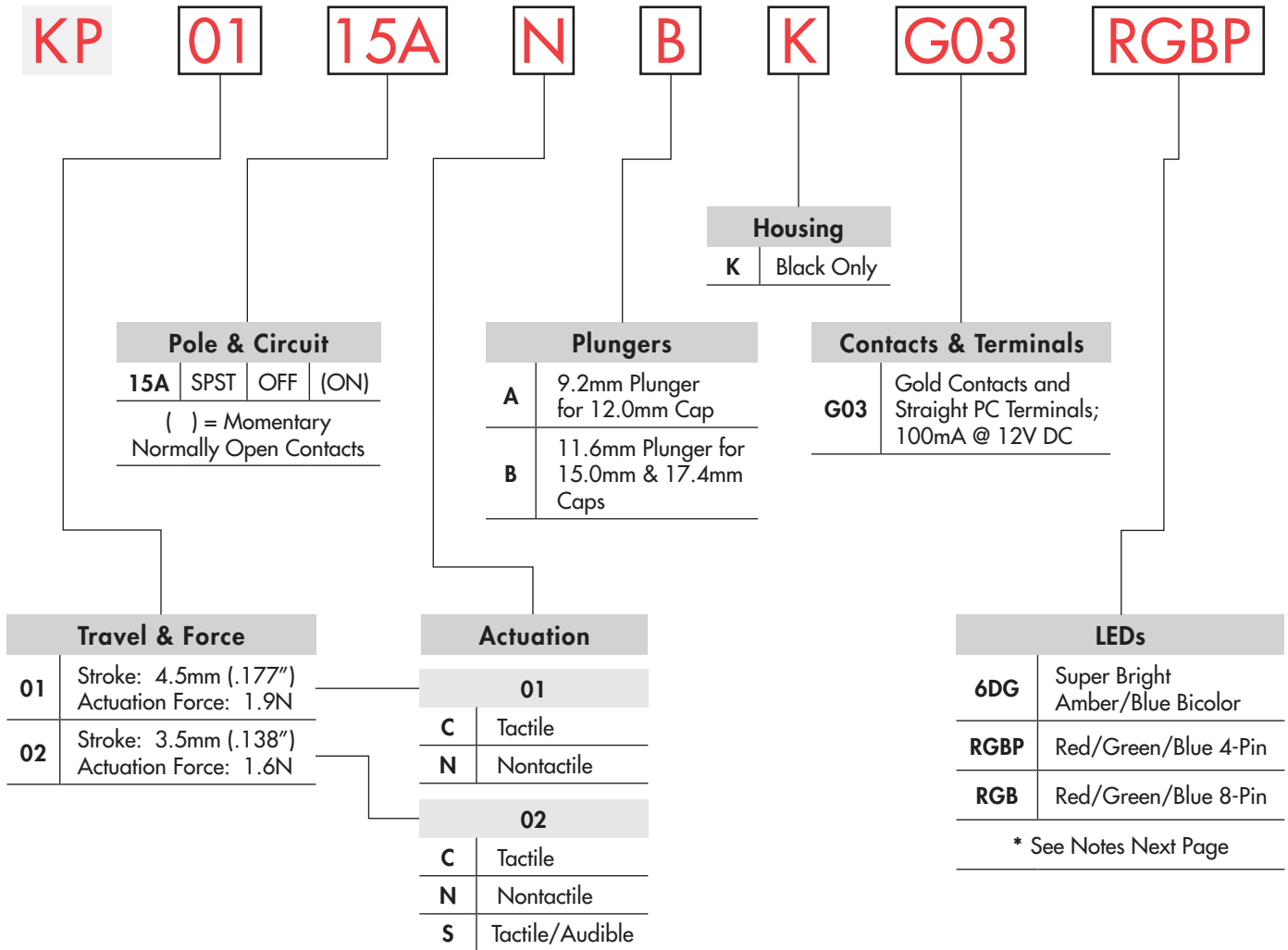


Actual Size



- Toggle
- Rockers
- Pushbuttons
- D Illuminated PB**
- Programmable
- Keylocks
- Rotaries
- Slides
- Tactiles
- Tilt
- Touch
- Indicators
- Accessories
- Supplement

### TYPICAL SWITCH



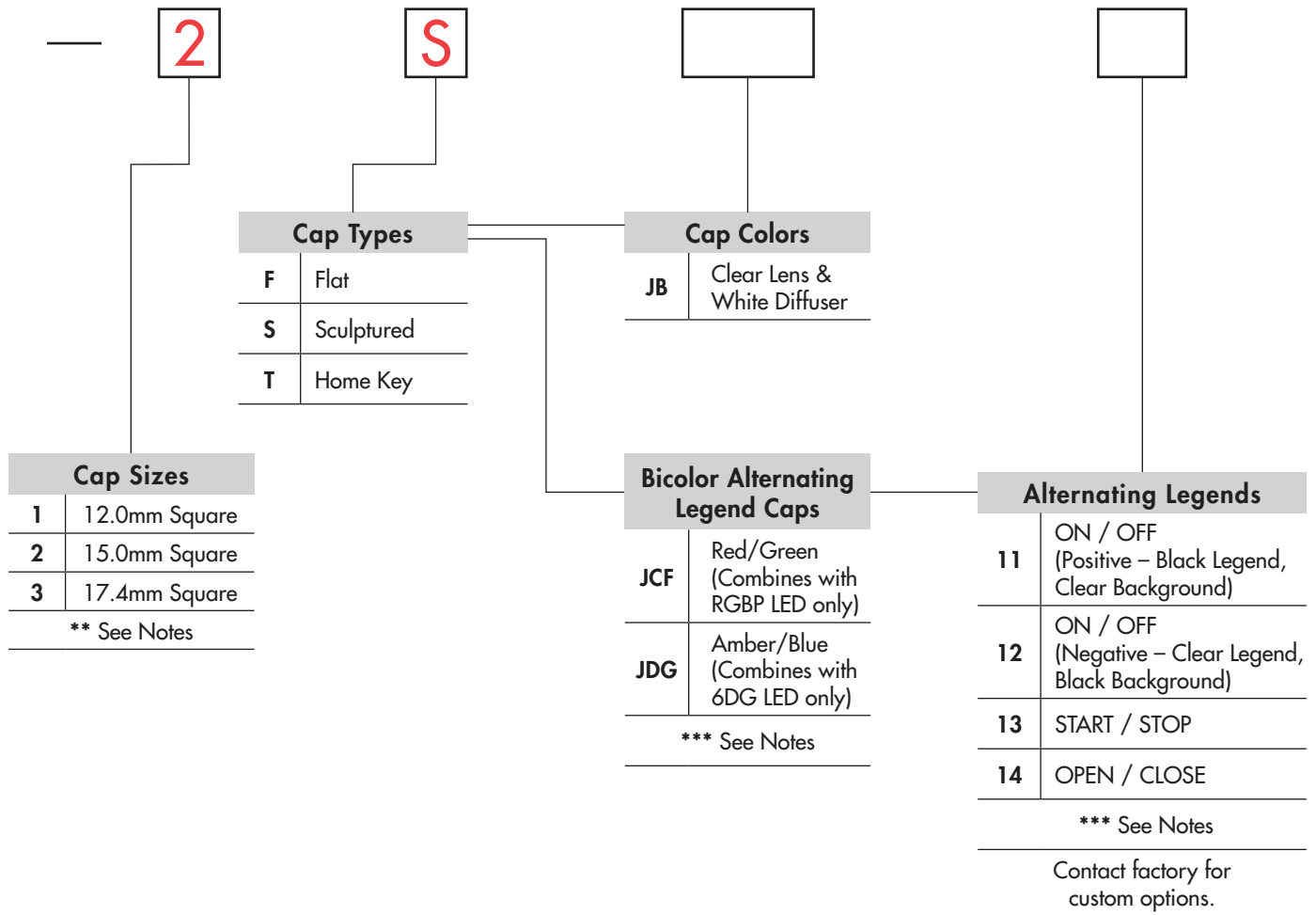
#### DESCRIPTION FOR TYPICAL ORDERING EXAMPLE

**KP0115ANBK G03 RGBP-2SJB**



Toggles  
 Rockers  
 Pushbuttons  
 Illuminated PB  
 Programmable  
 Keylocks  
 Rotaries  
 Slides  
 Tactiles  
 Tilt  
 Touch  
 Indicators  
 Accessories  
 Supplement

## ORDERING EXAMPLE



| Notes   | Page No. |
|---|----------|
| * Amber/Blue Bicolor                          | D43      |
| * RGBP LED                                    | D44      |
| * RGB LED<br>(not recommended for new design) | D45      |
| ** Rectangular Cap                            | D46      |
| *** Alternating Legends                       | D42      |

Toggles

Rockers

Pushbuttons

Illuminated PB

Programmable

Keylocks

Rotaries

Slides

Tactiles

Tilt






Touch

Indicators

Accessories

Supplement

### POLE & CIRCUIT

|      |                    | Plunger Position<br>( ) = Momentary  |   | Connected Terminals  |   | Throw & Switch Schematic  |
|------|--------------------|--|---|--|---|---|
| Pole | Model              | Normal   | Down  | Normal   | Down  | Note: Switch terminals "1" & "1a" are actually marked on the switch.<br><br> |
| SP   | KP0115A<br>KP0215A | OFF<br> | (ON)<br> | Normally Open<br> | 1-1a<br> |   |

### ACTUATION



**Tactile**  
KP01 or KP02



**Nontactile**  
KP01 or KP02



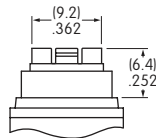
**Tactile/Audible**  
KP02 only

### PLUNGERS



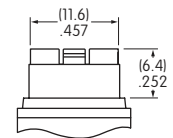
**9.2mm Plunger**  
for 12.0mm Cap

9.2mm Plunger is designed with a narrower neck to hold the 12.0mm Cap.



**11.6mm Plunger**  
for 15.0mm & 17.4mm Caps

11.6mm Plunger is designed with a wider neck to hold both the 15.0mm and 17.4mm Caps.



### HOUSING



**Black Only**

### CONTACTS, TERMINALS, & RATING



**Gold Contacts**

**Straight PC Terminals**

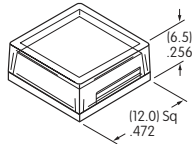
**100mA @ 12V DC**

## CAP TYPES & COLORS

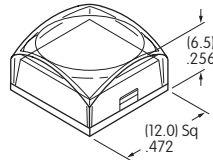
### Caps for Bicolor, RGBP & RGB

**1** **12.0mm Square** Used on A Plunger

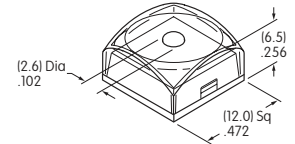
**F** **AT3083 Flat Cap**



**S** **AT3078 Sculptured Cap**

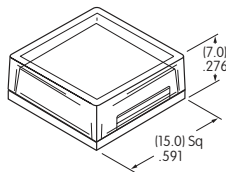


**T** **AT3086 Home Key Cap**

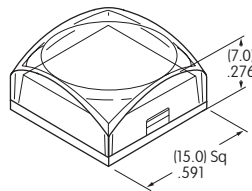


**2** **15.0mm Square** Used on B Plunger

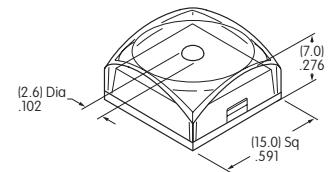
**F** **AT3084 Flat Cap**



**S** **AT3079 Sculptured Cap**

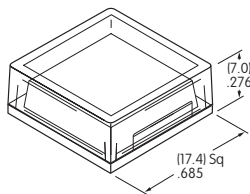


**T** **AT3087 Home Key Cap**

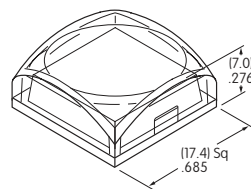


**3** **17.4mm Square** Used on B Plunger

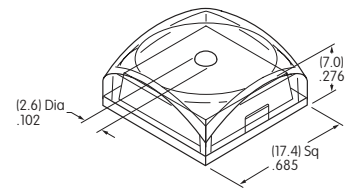
**F** **AT3085 Flat Cap**



**S** **AT3080 Sculptured Cap**



**T** **AT3088 Home Key Cap**



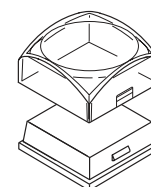
**JB** **Lens & Diffuser Colors Available:**

Clear/White

Materials & Finishes: Lens - Polycarbonate with glossy finish

Diffuser - Polycarbonate with textured finish

Optional Protective Guard AT4170 available; contact factory.



Clear Lens

White Diffuser

Toggles

Rockers

Pushbuttons

Programmable Illuminated PB

Keylocks

Rotaries

Slides

Tactiles

Tilt

Touch

Indicators

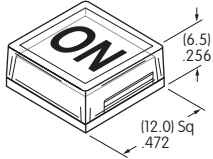
Accessories

Supplement

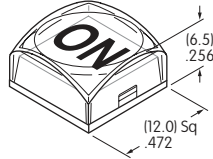
### Caps for Alternating Legends

**1** 12.0mm Square Used on A Plunger

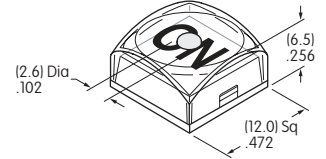
**F** AT3093 Flat Cap



**S** AT3090 Sculptured Cap

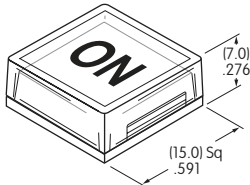


**T** AT3096 Home Key Cap

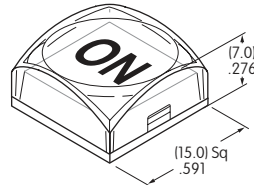


**2** 15.0mm Square Used on B Plunger

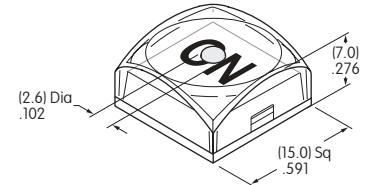
**F** AT3094 Flat Cap



**S** AT3091 Sculptured Cap

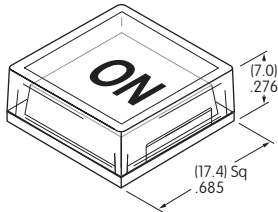


**T** AT3097 Home Key Cap

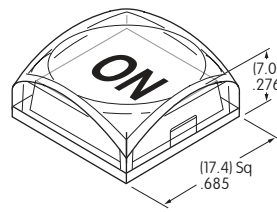


**3** 17.4mm Square Used on B Plunger

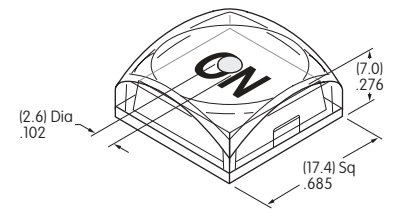
**F** AT3095 Flat Cap



**S** AT3092 Sculptured Cap



**T** AT3098 Home Key Cap



### Standard Alternating Legend Pairs



Green/Red or Blue/Amber



Green/Red or Blue/Amber



Green/Red or Blue/Amber



Green/Red or Blue/Amber

Cap illumination is alternating Green/Red or Blue/Amber; legend text is black.

Contact factory for other Alternating Legends.

Legend illustrations are approximate representations of the actual characters on the filters.

### Part Numbers for Alternating Legends

| Color      | Cap Size      | Flat Cap                  | Sculptured Cap            | Home Key Cap              |
|------------|---------------|---------------------------|---------------------------|---------------------------|
|            |               | Part Number               | Part Number               | Part Number               |
| Red/Green  | 12mm Square   | AT3093JCF11 ~ AT3093JCF14 | AT3090JCF11 ~ AT3090JCF14 | AT3096JCF11 ~ AT3096JCF14 |
|            | 15mm Square   | AT3094JCF11 ~ AT3094JCF14 | AT3091JCF11 ~ AT3091JCF14 | AT3097JCF11 ~ AT3097JCF14 |
|            | 17.4mm Square | AT3095JCF11 ~ AT3095JCF14 | AT3092JCF11 ~ AT3092JCF14 | AT3098JCF11 ~ AT3098JCF14 |
| Amber/Blue | 12mm Square   | AT3093JDG11 ~ AT3093JDG14 | AT3090JDG11 ~ AT3090JDG14 | AT3096JDG11 ~ AT3096JDG14 |
|            | 15mm Square   | AT3094JDG11 ~ AT3094JDG14 | AT3091JDG11 ~ AT3091JDG14 | AT3097JDG11 ~ AT3097JDG14 |
|            | 17.4mm Square | AT3095JDG11 ~ AT3095JDG14 | AT3092JDG11 ~ AT3092JDG14 | AT3098JDG11 ~ AT3098JDG14 |

See Ordering Table for Alternating Legend that corresponds with last 2 digits of part number.

## SUPER BRIGHT BICOLOR LED SPECIFICATIONS



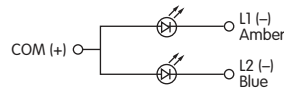
The electrical specifications shown are determined at a basic temperature of 25°C.

LEDs are an integral part of the switch and are not available separately.

LED circuit is isolated and requires an external power source.

If the source voltage exceeds the rated voltage, a ballast resistor is required.

The resistor value can be calculated by using the formula in the Supplement Section.

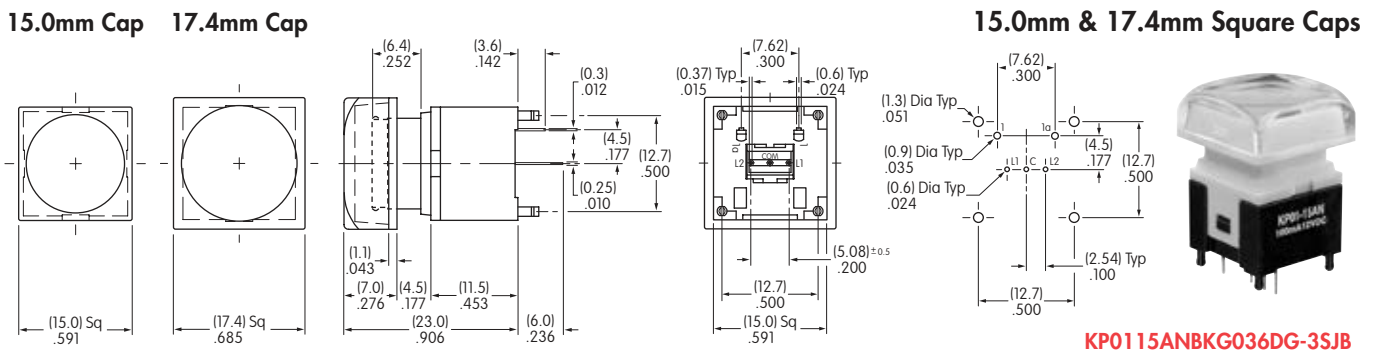
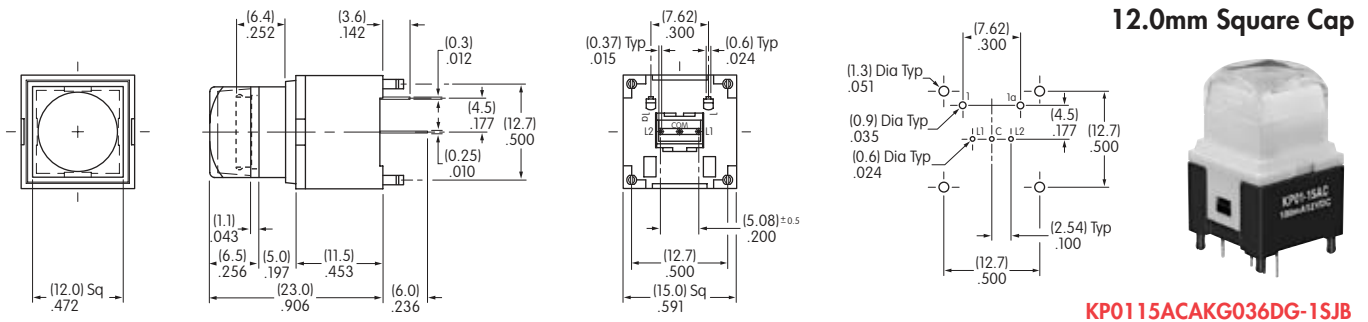


**6DG**

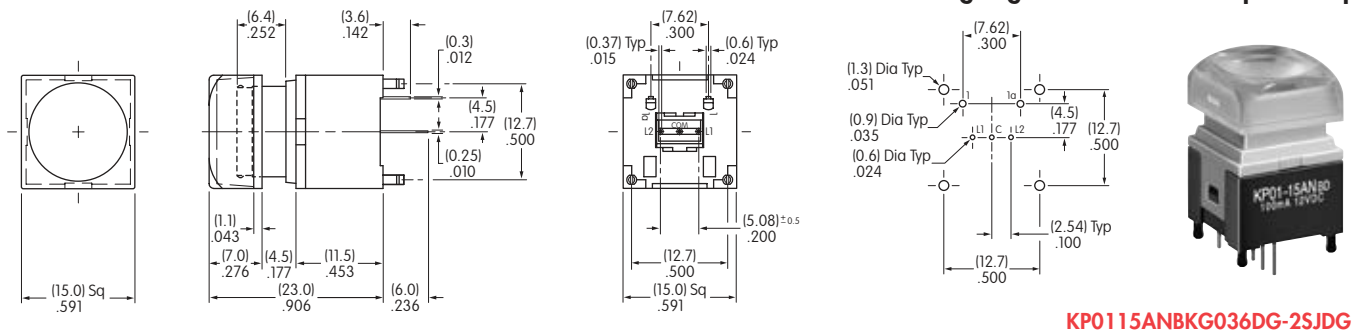
|                                   | Colors       | 6DG       |           | Unit  |
|-----------------------------------|--------------|-----------|-----------|-------|
|                                   |              | Amber     | Blue      |       |
| Minimum Luminous Intensity        | $I_V$        | 204       | 113       | mcd   |
| Standard Luminous Intensity       | $I_V$        | 340       | 188       | mcd   |
| Maximum Forward Current           | $I_{FM}$     | 30        | 25        | mA    |
| Typical Forward Current           | $I_F$        | 20        | 20        | mA    |
| Forward Voltage                   | $V_F$        | 2.1       | 3.2       | V     |
| Power Peak Dissipation            | $P_D$        | 75        | 100       | mW    |
| Maximum Reverse Voltage           | $V_{RM}$     | 4         | 4         | V     |
| Wavelength at Peak Emission       | $\lambda$    | 583 ~ 595 | 464 ~ 476 | nm    |
| Current Reduction Rate Above 25°C | $\Delta I_F$ | 0.40      | 0.33      | mA/°C |
| Ambient Temperature Range         |              | -25 ~ +50 |           | °C    |

Purple can be achieved by simultaneous illumination of Amber & Blue.

## TYPICAL SWITCH DIMENSIONS



## Bicolor Alternating Legend • 15.0mm Square Cap



Toggles  
 Rockers  
 Pushbuttons  
**D** Illuminated PB  
 Programmable  
 Keylocks  
 Rotaries  
 Slides  
 Tactiles  
 Tilt  
 Touch  
 Indicators  
 Accessories  
 Supplement



## LED SPECIFICATIONS • RGBP with 4 Pins

The electrical specifications shown are determined at a basic temperature of 25°C.

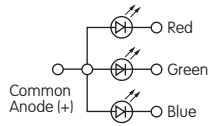
LEDs are an integral part of the switch and are not available separately.

LED circuit is isolated and requires an external power source.

If the source voltage exceeds the rated voltage, a ballast resistor is required.

The resistor value can be calculated by using the formula in the Supplement Section.

Note: For applications that require white illumination, contact factory.



**RGBP**

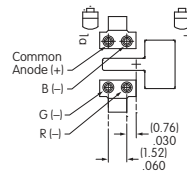
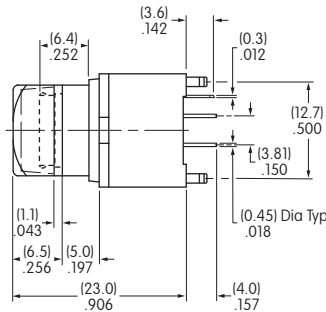
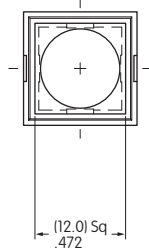
|                                   | Color         | Red       | Green | Blue   | Unit  |
|-----------------------------------|---------------|-----------|-------|--------|-------|
| Maximum Forward Current           | $I_{FM}$      | 50        | 30    | 30     | mA    |
| Typical Forward Current           | $I_F$         | 15        | 16    | 10     | mA    |
| *Forward Voltage                  | $V_F$         | 2.0       | 2.9   | 2.9    | V     |
| Power Peak Dissipation            | $P_D$         | 100       | 80    | 80     | mW    |
| Maximum Reverse Voltage           | $V_{RM}$      | 5         | 5     | 5      | V     |
| Dominant Wavelength               | $\lambda_d$   | 620       | 525   | 467    | nm    |
| Current Reduction Rate Above 25°C | $\Delta_{IF}$ | 0.75      | 0.25  | **0.22 | mA/°C |
| Ambient Temperature Range         |               | -25 ~ +50 |       |        | °C    |

\*Forward Voltage ( $V_F$ ) and Dominant Wavelength ( $\lambda_d$ ) are Typical Value measured by Typical Forward Current ( $I_F$ ).

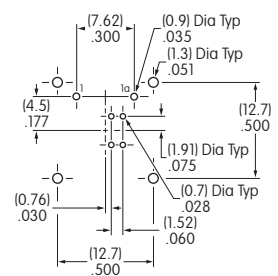
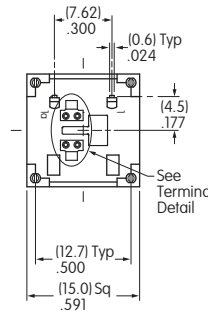
\*\*Current Reduction Rate ( $\Delta_{IF}$ ) Above 40°C

## TYPICAL SWITCH DIMENSIONS

### 12.0mm Square Cap with RGBP LED

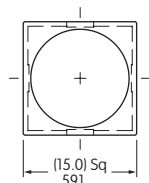


Terminal Detail

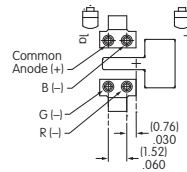
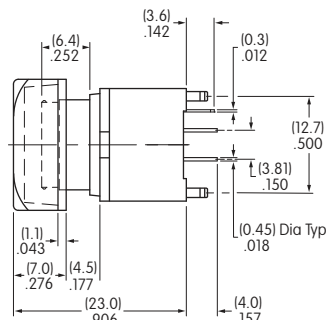


**KP0115ACAKG03RGBP-1SJB**

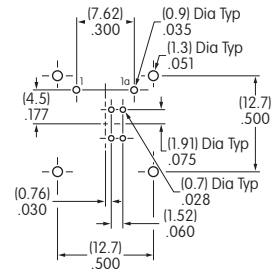
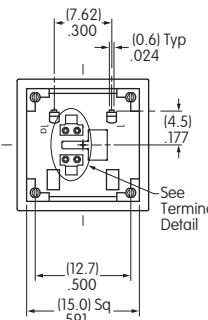
### 15.0mm & 17.4mm Square Caps with RGBP LEDs



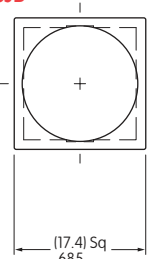
15.0mm Cap



Terminal Detail



**KP0115ANBKG03RGBP-2SJB**



17.4mm Cap



Terminal Detail



**KP0115ANBKG03RGBP-3SJB**

Toggle

Rockers

Pushbuttons

Illuminated PB

Programmable

Keylocks

Rotaries

Slides

Tactiles

Tilt

Touch

Indicators

Accessories

Supplement

## LED SPECIFICATIONS • RGB with 8 Pins

The electrical specifications shown are determined at a basic temperature of 25°C.

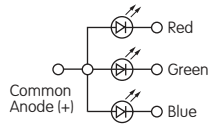
LEDs are an integral part of the switch and are not available separately.

LED circuit is isolated and requires an external power source.

If the source voltage exceeds the rated voltage, a ballast resistor is required.

The resistor value can be calculated by using the formula in the Supplement Section.

Note: For applications that require white illumination, contact factory.



|                                   | Color         | Red       | Green | Blue  | Unit  |
|-----------------------------------|---------------|-----------|-------|-------|-------|
| Maximum Forward Current           | $I_{FM}$      | 30        | 30    | 30    | mA    |
| Typical Forward Current           | $I_F$         | 20        | 14    | 9     | mA    |
| *Forward Voltage                  | $V_F$         | 2.0       | 2.9   | 2.9   | V     |
| Power Peak Dissipation            | $P_D$         | 60        | 80    | 80    | mW    |
| Maximum Reverse Voltage           | $V_{RM}$      | 5         | 5     | 5     | V     |
| Dominant Wavelength               | $\lambda_d$   | 621.5     | 522.5 | 472.5 | nm    |
| Current Reduction Rate Above 25°C | $\Delta_{IF}$ | 0.50      | 0.50  | 0.50  | mA/°C |
| Ambient Temperature Range         |               | -25 ~ +50 |       |       | °C    |

\*Forward Voltage ( $V_F$ ) and Dominant Wavelength ( $\lambda_d$ ) are Typical Value measured by Typical Forward Current ( $I_F$ ).

## TYPICAL SWITCH DIMENSIONS

### 12.0mm Square Cap with RGB LED

**KP0115ACAKG03RGB-1SJB**

### 15.0mm & 17.4mm Square Caps with RGB LEDs

**KP0115ANBKG03RGB-2SJB**

**KP0115ANBKG03RGB-3SJB**

Toggles  
 Rockers  
 Pushbuttons  
**D** Illuminated PB  
 Programmable  
 Keylocks  
 Rotaries  
 Slides  
 Tactiles  
 Tilt  
 Touch  
 Indicators  
 Accessories  
 Supplement

Toggle

Rockers

Pushbuttons

Programmable Illuminated PB

Keylocks

Rotaries

Slides

Tactiles

Tilt

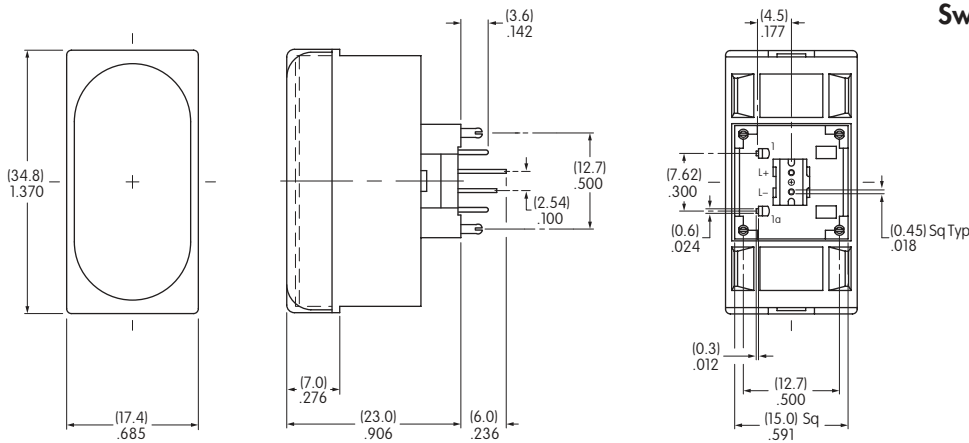
Touch

Indicators

Accessories

Supplement

### RECTANGULAR CAP ASSEMBLY CAP ASSEMBLY DIMENSIONS



### Switch/Rectangular Cap Assembly



KP0115ACBKG03CJB for Tactile  
KP0115ANBKG03CJB for Nontactile

See below for complete assembly of switch, LEDs and LED holders.

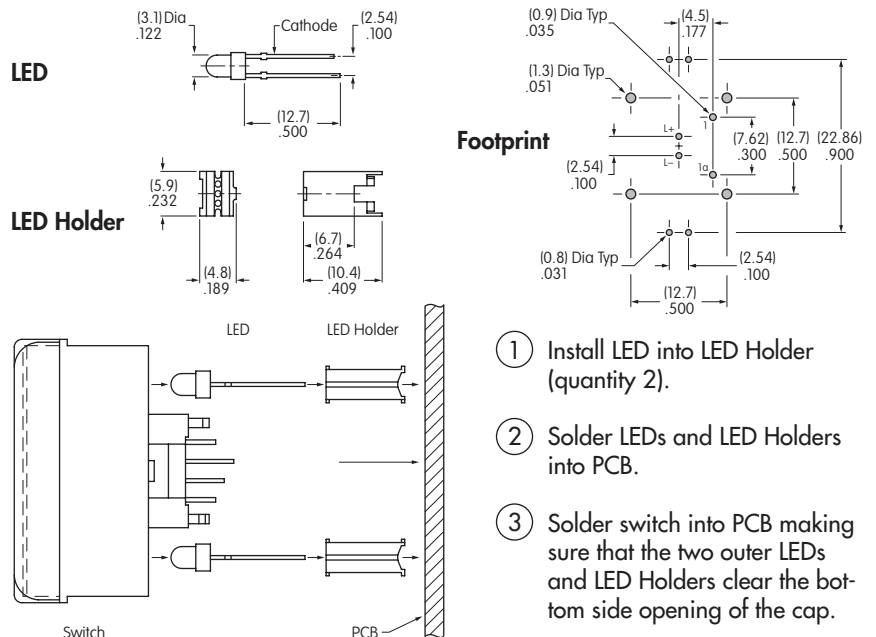
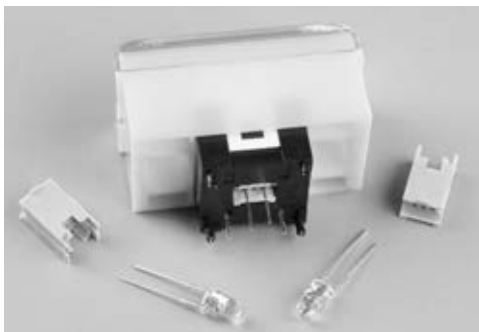
### LED SPECIFICATIONS

The electrical specifications shown are determined at a basic temperature of 25°C. Center LED is an integral part of the switch. LEDs are not sold separately. LED circuits are isolated and require an external power source. If the source voltage exceeds the rated voltage, a ballast resistor is required. The resistor value can be calculated by using the formula in the Supplement Section.

|                                   | Color        | Red       | Unit  |
|-----------------------------------|--------------|-----------|-------|
| Maximum Forward Current           | $I_{FM}$     | 30        | mA    |
| Typical Forward Current           | $I_F$        | 20        | mA    |
| Forward Voltage                   | $V_F$        | 2.0       | V     |
| Maximum Reverse Voltage           | $V_{RM}$     | 4         | V     |
| Dominant Wavelength               | $\lambda_d$  | 623       | nm    |
| Current Reduction Rate Above 25°C | $\Delta I_F$ | 0.32      | mA/°C |
| Ambient Temperature Range         |              | -25 ~ +50 | °C    |

Contact factory for other LED colors.

### ASSEMBLY & INSTALLATION INSTRUCTIONS



Switch/Rectangular Cap assembly has 3 LEDs to achieve bright and even illumination.

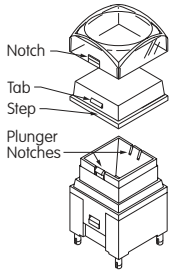
One LED (in center of switch bottom) is an integral part of the switch; the other 2 LEDs and 2 LED Holders are packaged separately.

## ASSEMBLY INSTRUCTIONS FOR SQUARE CAPS



### Cap Orientation

As shown in the accompanying illustration, the cap and plunger are designed with tabs and notches to assure proper orientation of the cap on the switch.

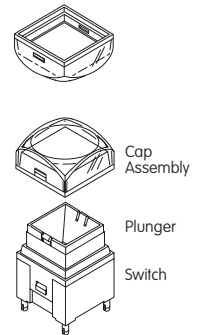


### Removal of Cap Assembly & Separation of Lens & Diffuser

Holding the switch tightly, pull the cap off the switch. Once the cap assembly is released from the plunger, the lens and diffuser can be separated. Pry up the lens with fingernail or flat tip screwdriver inserted at the step on the diffuser.

### Installation or Replacement of Cap

After aligning notches with tabs, join the lens and diffuser. Hold the switch tightly without touching the terminals. Firmly press the cap onto the plunger by applying pressure from one side to the other until both are snapped together.



## LEGENDS

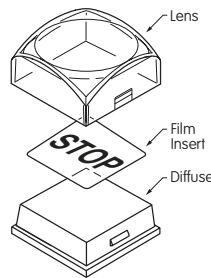
NKK Switches can provide custom legends for caps. Contact factory for more information.

### Suggested Printable Areas for KP Lens

#### Recommended Methods:

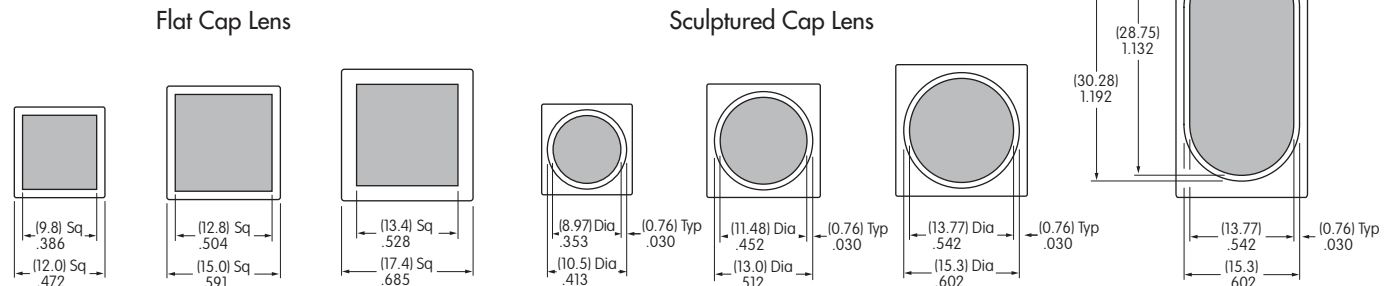
Laser Etch on clear lens, Screen Print, or Pad Print on lens.  
Laser Print on film insert.  
Epoxy based ink is recommended.

Shaded areas are suggested printable areas for Lens.



Printing on Diffuser is not advisable.

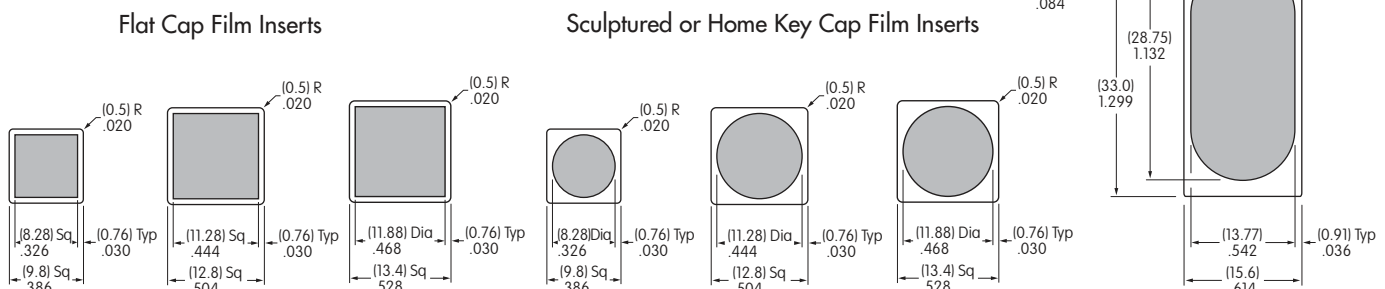
#### Rectangular Cap Lens



### Suggested Printable Areas for KP Film Insert

Shaded areas are suggested printable areas for Film Insert.

#### Rectangular Film Insert



Film Insert Material and Thickness: Clear Polyester; 4 mil (100μ) maximum thickness

Toggles  
Rockers  
Pushbuttons  
Illuminated PB  
Programmable  
Keylocks  
Rotaries  
Slides  
Tactiles  
Tilt  
Touch  
Indicators  
Accessories  
Supplement