

# General Specifications

## B Electrical Capacity (Resistive Load)

**Power Level (silver):** 6A @ 125V AC & 3A @ 250V AC  
4A @ 30V DC for On-None-On; 3A @ 30V DC for all other circuits

**Logic Level (gold):** 0.4VA maximum @ 28V AC/DC maximum  
(Applicable Range 0.1mA ~ 0.1A @ 20mV ~ 28V)

**Logic/Power Level (gold over silver):** Combines silver & gold ratings  
Note: Find additional explanation of dual rating & 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:** 50,000 operations minimum  
**Electrical Life:** 25,000 operations minimum for silver; 50,000 operations minimum for gold;  
50,000 operations minimum for silver at 3A @ 125V AC  
**Angle of Throw:** 25°

## Materials & Finishes

**Actuator Clip & Mounting Frame:** Stainless Steel  
**Body Frame:** Stainless steel  
**Case:** Diallyl phthalate resin (UL94V-0)  
**Movable Contactor:** Phosphor bronze with silver or gold plating  
**Movable Contacts:** Silver alloy (code W); copper with gold plating (code G); or silver alloy with gold plating (code A)  
**Stationary Contacts:** Silver with silver plating (code W); copper or brass with gold plating (code G);  
or silver with gold plating (code A)  
**Terminals:** Copper or brass with silver plating; or copper or brass with gold plating

## Environmental Data

**Operating Temp Range:** -30°C through +85°C (-22°F through +185°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<sup>2</sup>) acceleration (tested in 6 right angled directions, with 5 shocks in each direction)

## Processing

**Soldering:** Wave Soldering (PC version) for Gold: See Profile A in Supplement section.  
Manual Soldering for Gold: See Profile A in Supplement section.  
Wave Soldering (PC version) for Silver: See Profile B in Supplement section.  
Manual Soldering for Silver: See Profile B in Supplement section.  
Note: Actuator must be in OFF (center) position while soldering.  
**Cleaning:** These devices are not process sealed. Hand clean locally using alcohol based solution.

## Standards & Certifications

**Flammability Standards:** UL94V-0 for case  
**UL:** **File No. E44145 - Recognized only when ordered with marking on switch.**  
Add "/U" before first dash in part number to order UL recognized switch.  
All models recognized at 6A @ 125V AC, 3A @ 250V AC or 0.4VA maximum @ 28V DC maximum.  
**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.  
All models certified at 6A @ 125V AC or 3A @ 250V AC or 0.4VA maximum @ 28V maximum.

# Distinctive Characteristics

Three methods of panel mounting: flat frame for flush with face or subpanel, snap-in, and PCB.

High insulating barriers increase isolation of circuits in multipole devices and provide added protection to contact points.

The molded diallyl phthalate case has a UL 94V-0 flammability rating.

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

Prominent external insulating barriers increase insulation resistance and dielectric strength.

Bias guard prevents misalignment of contacts; interlocking of actuator block with rocker and internal guide does not allow transmission of diagonal force on rocker to reach contact mechanism.

Clinching of the frame to the case well above the base and terminals provides 1,500V dielectric strength.



Actual Size



Snap-in Mount

Page B64



Bracket PC Mount

Page B72



Flat Frame Mount

Page B83

TYPICAL SWITCH

ORDERING EXAMPLE

M20

1

3

TX

G

| Poles |                                                                   |
|-------|-------------------------------------------------------------------|
| 1     | SPDT                                                              |
| 2     | DPDT<br>SP3T                                                      |
| 3     | 3PDT (used only with terminal codes 30 & 41 & frame code TX)      |
| 4     | 4PDT<br>DP3T<br>(used only with terminal code 41 & frame code TX) |

| Circuits |      |      |      |
|----------|------|------|------|
| 2        | ON   | NONE | ON   |
| 3        | ON   | OFF  | ON   |
| 5        | ON   | NONE | (ON) |
| 8        | (ON) | OFF  | (ON) |
| 9        | ON   | OFF  | (ON) |
| *4       | ON   | ON   | ON   |
| *6       | (ON) | ON   | (ON) |
| *7       | ON   | ON   | (ON) |

( ) = Momentary  
\* 3-ON circuits

| Mounting Frames |                                 |
|-----------------|---------------------------------|
| TX              | Narrow Frame for Small Actuator |
| TZ              | Wide Frame for Large Actuator   |

| Contact Materials & Ratings |                                                                  |
|-----------------------------|------------------------------------------------------------------|
| W                           | Silver; Rated 6A @ 125V AC & 3A @ 250V AC                        |
| G                           | Gold; Rated 0.4VA max @ 28V AC/DC max                            |
| A                           | Gold over Silver; Rated 6A @ 125V AC & 0.4VA max @ 28V AC/DC max |

41

D

C

| Terminals For TX & TZ Frames                        |                                                         |
|-----------------------------------------------------|---------------------------------------------------------|
| Straight PC with Bracket (1-2 Pole only)            |                                                         |
| 13                                                  | .250" (6.35mm) Straight PC with .465" (11.8mm) Bracket  |
| 15                                                  | .425" (10.8mm) Straight PC with .630" (16.0mm) Bracket  |
| 17                                                  | .964" (24.5mm) Straight PC with 1.150" (29.2mm) Bracket |
| Straight PC with Reinforced Bracket (1-2 Pole only) |                                                         |
| 23                                                  | .250" (6.35mm) Straight PC with .465" (11.8mm) Bracket  |
| 25                                                  | .425" (10.8mm) Straight PC with .630" (16.0mm) Bracket  |
| 26                                                  | .750" (19.05mm) Straight PC with .953" (24.2mm) Bracket |
| Terminals For TX Frame Only                         |                                                         |
| Right Angle PC with Support (1-3 Pole only)         |                                                         |
| 30                                                  | .150" (3.81mm) Right Angle PC                           |
| Vertical PC with Support (1-4 Pole)                 |                                                         |
| 41                                                  | .150" (3.81mm) Vertical PC                              |

| Rockers & Paddles          |                             |
|----------------------------|-----------------------------|
| Small Actuators (TX Frame) |                             |
| D                          | .365" (9.27mm) Wide Rocker  |
| E                          | .365" (9.27mm) Wide Paddle  |
| F                          | .450" (11.43mm) Wide Rocker |
| G                          | .450" (11.43mm) Wide Paddle |
| Large Actuators (TZ Frame) |                             |
| J                          | .595" (15.11mm) Wide Rocker |
| H                          | .595" (15.11mm) Wide Paddle |

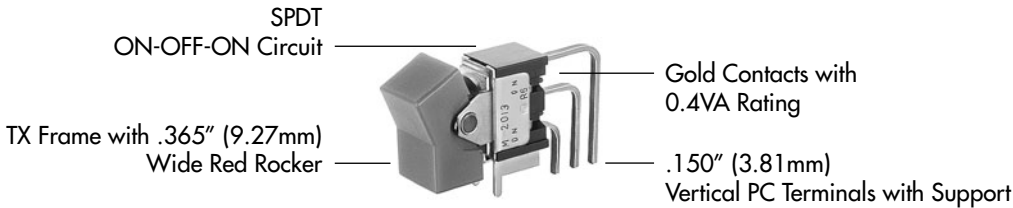
| Rocker & Paddle Colors |        |
|------------------------|--------|
| A                      | Black  |
| B                      | White  |
| C                      | Red    |
| E                      | Yellow |
| F                      | Green  |
| G                      | Blue   |
| H         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

!

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

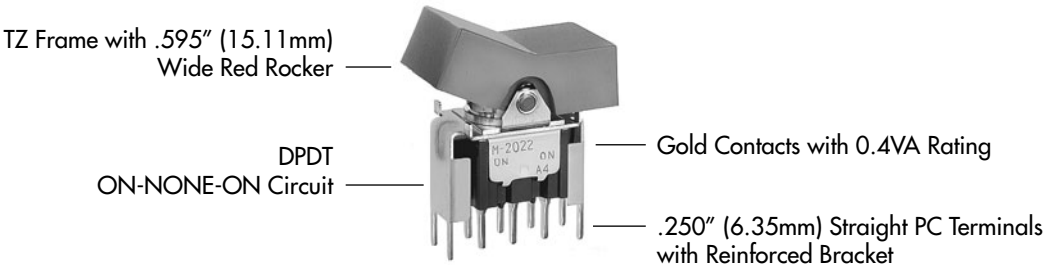
DESCRIPTION FOR TYPICAL ORDERING EXAMPLE

M2013TXG41-DC



DESCRIPTION FOR TYPICAL ORDERING EXAMPLE

M2022TZG23-JC



### POLES & CIRCUITS

| Pole | Model                                       | Rocker Position<br>( ) = Momentary |                                   |                                  | Connected Terminals  |        |                      | Throw & Schematics                                                                                                                              |
|------|---------------------------------------------|------------------------------------|-----------------------------------|----------------------------------|----------------------|--------|----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|
|      |                                             | Down                               | Center                            | Up                               | Down                 | Center | Up                   |                                                                                                                                                 |
| SP   | M2012<br>M2013<br>*M2015<br>M2018<br>*M2019 | ON<br>ON<br>ON<br>(ON)<br>ON       | NONE<br>OFF<br>NONE<br>OFF<br>OFF | ON<br>ON<br>(ON)<br>(ON)<br>(ON) | 2-3                  | OPEN   | 2-1                  | SPDT<br><br>Note: Terminal numbers are not actually on the switch.<br>* Reverse circuits available for vertical mount SP & DP upon request.<br> |
| DP   | M2022<br>M2023<br>*M2025<br>M2028<br>*M2029 | ON<br>ON<br>ON<br>(ON)<br>ON       | NONE<br>OFF<br>NONE<br>OFF<br>OFF | ON<br>ON<br>(ON)<br>(ON)<br>(ON) | 2-3 5-6              | OPEN   | 2-1 5-4              | DPDT<br>                                                                                                                                        |
| 3P   | M2022<br>M2023<br>*M2025<br>M2028<br>*M2029 | ON<br>ON<br>ON<br>(ON)<br>ON       | NONE<br>OFF<br>NONE<br>OFF<br>OFF | ON<br>ON<br>(ON)<br>(ON)<br>(ON) | 2-3 5-6<br>8-9       | OPEN   | 2-1 5-4<br>8-7       | 3PDT<br>                                                                                                                                        |
| 4P   | M2042<br>M2043<br>*M2045<br>M2048<br>*M2049 | ON<br>ON<br>ON<br>(ON)<br>ON       | NONE<br>OFF<br>NONE<br>OFF<br>OFF | ON<br>ON<br>(ON)<br>(ON)<br>(ON) | 2-3 5-6<br>8-9 11-12 | OPEN   | 2-1 5-4<br>8-7 11-10 | 4PDT<br>                                                                                                                                        |

For 3 Throw (3-On)

### Connected Terminals & Schematics

| Pole | Model                   | Down             | Center         | Up                 | Down                     | Center                   | Up                       |
|------|-------------------------|------------------|----------------|--------------------|--------------------------|--------------------------|--------------------------|
| SP   | M2024<br>M2026<br>M2027 | ON<br>(ON)<br>ON | ON<br>ON<br>ON | ON<br>(ON)<br>(ON) | <br>2-3 5-6              | <br>2-3 5-4              | <br>2-1 5-4              |
| DP   | M2044<br>M2046<br>M2047 | ON<br>(ON)<br>ON | ON<br>ON<br>ON | ON<br>(ON)<br>(ON) | <br>2-3 5-6<br>8-9 11-12 | <br>2-3 5-4<br>8-9 11-10 | <br>2-1 5-4<br>8-7 11-10 |

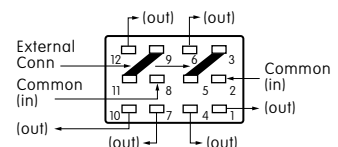
The SP3T model utilizes a double pole base.

External connection must be made during field installation.



The DP3T model utilizes a four pole base.

External connection must be made during field installation.



MOUNTING FRAMES

Toggles

B  
Rockers

Pushbuttons

Illuminated PB

Programmable

Keylocks

Rotaries

Slides

Tactiles

Tilt

Touch

Indicators

Accessories

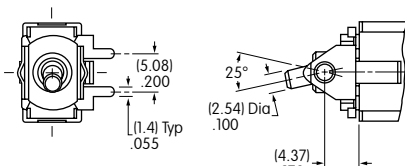
Supplement

**TX** Narrow Mounting Frame for Small Actuators with Straight PC Terminals (codes 13, 15, 17, 23, 25, & 26) or with Angle PC Terminals (codes 30 & 41)

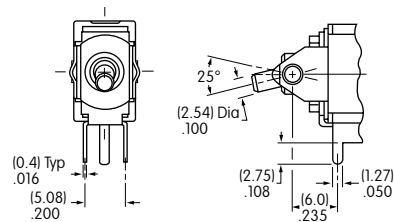
Straight PC Mounting



Right Angle PC Mounting

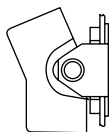


Vertical PC Mounting

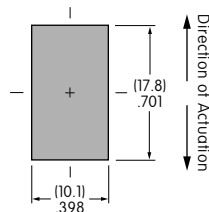
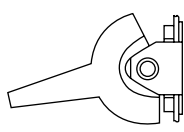


Small Actuators & Panel Cutouts for TX Frame (actuator details on the following pages)

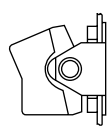
AT4148



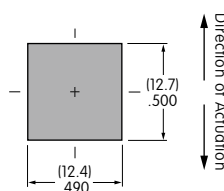
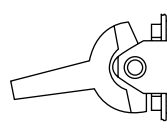
AT4149



AT4150



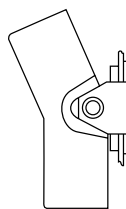
AT4151



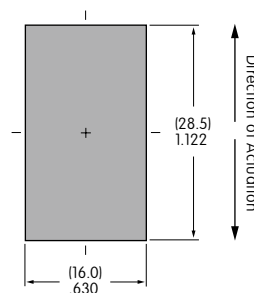
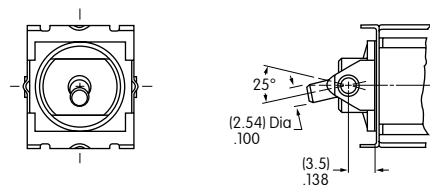
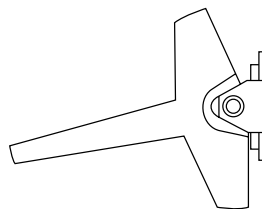
**TZ** Wide Mounting Frame for Large Actuators with Straight PC Terminals (codes 13, 15, 17, 23, 25, & 26)

Large Actuators & Panel Cutouts for TZ Frame (actuator details on the following pages)

AT4156



AT4157



CONTACT MATERIALS & RATINGS

**W** Silver over Silver      Power Level      6A @ 125V AC & 3A @ 250V AC

**G** Gold over Brass or Copper      Logic Level      0.4VA maximum @ 28V AC/DC maximum

Note: See Supplement section to find complete explanation of operating range.

**A** Gold over Silver      Power Level or Logic Level      6A @ 125V AC or 0.4VA maximum @ 28V AC/DC maximum

Note: This dual rated option is suitable when two or more identical switches are used in logic and in power circuits within the same application. See Supplement section to find complete explanation of dual rating and operating range.

### TERMINALS

For TX and TZ 1-2 Pole  
Straight PC Mount with Bracket

For TX and TZ 1-2 Pole  
Straight PC Mount with Reinforced Bracket

**13**

.250" (6.35mm)  
Terminal with  
.465" (11.8mm)  
Bracket

**15**

.425" (10.8mm)  
Terminal with  
.630" (16.0mm)  
Bracket

**17**

.964" (24.5mm)  
Terminal with  
1.150" (29.2mm)  
Bracket

**23**

.250" (6.35mm)  
Terminal with  
.465" (11.8mm)  
Bracket

**25**

.425" (10.8mm)  
Terminal with  
.630" (16.0mm)  
Bracket

**26**

.750" (19.05mm)  
Terminal with  
.953" (24.2mm)  
Bracket



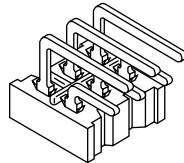
PCB footprints are on the following Typical Switch Dimension pages.

For TX 1-3 Pole Right Angle PC Mount

For TX 1-4 Pole Vertical PC Mount

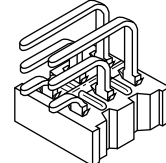
**30**

.150" (3.81mm)  
Right Angle PC



**41**

.150" (3.81mm)  
Vertical PC

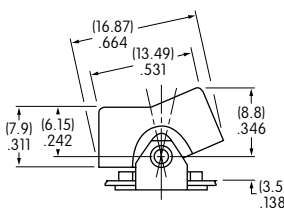


### ROCKERS & PADDLES FOR TX MOUNTING FRAMES

**D**

AT4148 .365" (9.27mm)  
Wide Rocker

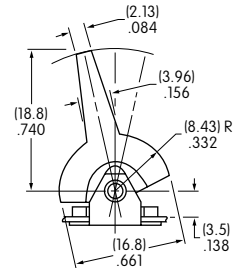
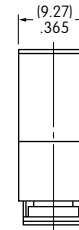
Material: Polyamide  
Finish: Matte



**E**

AT4149 .365" (9.27mm)  
Wide Paddle

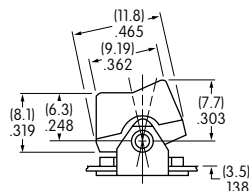
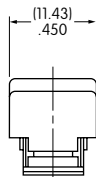
Material: Polyamide  
Finish: Matte



**F**

AT4150 .450" (11.43mm)  
Wide Rocker

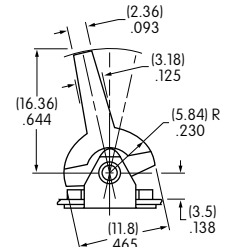
Material: Polyamide  
Finish: Matte



**G**

AT4151 .450" (11.43mm)  
Wide Paddle

Material: Polyamide  
Finish: Matte



Cap Colors  
Available:

**A**

Black

**B**

White

**C**

Red

**E**

Yellow

**F**

Green

**G**

Blue

**H**

Gray

## ROCKERS & PADDLES FOR TZ MOUNTING FRAMES

### **J** AT4156 .595" (15.11mm) Wide Rocker

Material: Polyamide  
Finish: Matte



### **H** AT4157 .595" (15.11mm) Wide Paddle

Material: Polyamide  
Finish: Matte



Cap Colors  
Available:



Black



White



Red



Yellow



Green



Blue



Gray

## OPTIONAL SNAP-IN PANEL FRAMES

Used with AT4148 Rocker and AT4149 Paddle

### AT064-1

Accommodates .047" ~ .090"  
(1.2 ~ 2.3mm) panel thickness

Material: Polyamide  
Finish: Matte  
Color: Black

Mounted separately from switches

Cutout Tolerances:

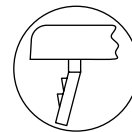
Dimension A:  
.797" ~ .803" (20.24 ~ 20.4mm)

Dimension B:  
.495" ~ .505" (12.57 ~ 12.83mm)

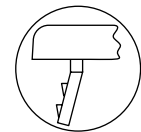


### AT064-2

Accommodates .062" ~ .125"  
(1.57 ~ 3.18mm) panel thickness



AT064-1 Enlarged Detail



Used with AT4150 Rocker and AT4151 Paddle

### AT065-1

Accommodates .047" ~ .090"  
(1.2 ~ 2.3mm) panel thickness

Material: Polyamide  
Finish: Matte  
Color: Black

Mounted separately from switches

Cutout Tolerances:

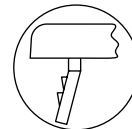
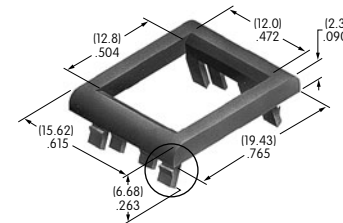
Dimension A:  
.595" ~ .605" (15.11 ~ 15.37mm)

Dimension B:  
.495" ~ .500" (12.57 ~ 12.7mm)

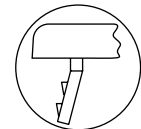


### AT065-2

Accommodates .062" ~ .125"  
(1.57 ~ 3.18mm) panel thickness



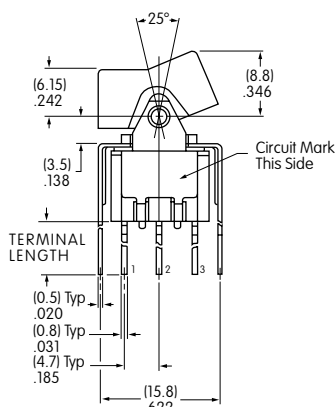
AT065-1 Enlarged Detail



AT065-2 Enlarged Detail

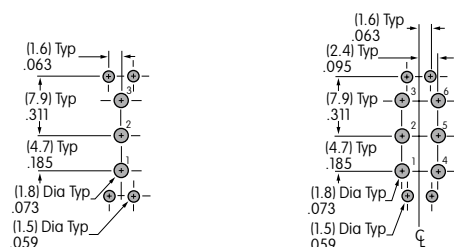
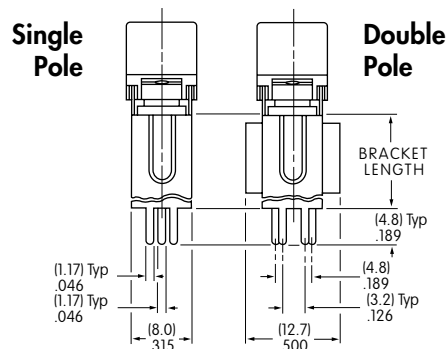
### TYPICAL SWITCH DIMENSIONS

#### Straight PC • Bracket

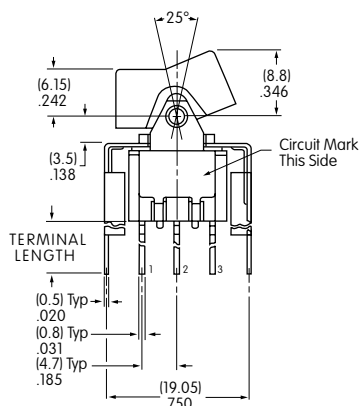


**M2012TXG13-DC**

| Terminal Code: | Terminal Length: | Bracket Length: |
|----------------|------------------|-----------------|
| <b>13</b>      | .250" (6.35mm)   | .465" (11.8mm)  |
| <b>15</b>      | .425" (10.8mm)   | .630" (16.0mm)  |
| <b>17</b>      | .964" (24.5mm)   | 1.150" (29.2mm) |

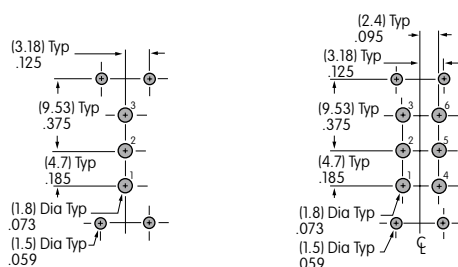
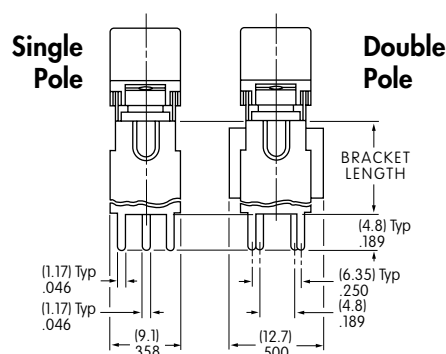


#### Straight PC • Reinforced Bracket



**M2012TXG23-DC**

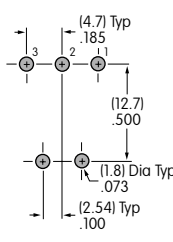
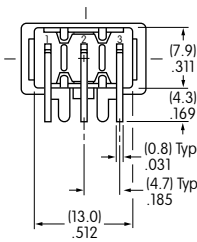
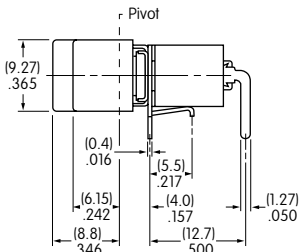
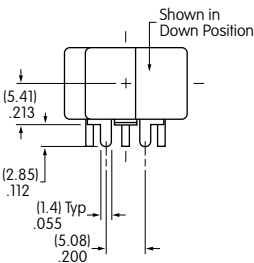
| Terminal Code: | Terminal Length: | Bracket Length: |
|----------------|------------------|-----------------|
| <b>23</b>      | .250" (6.35mm)   | .465" (11.8mm)  |
| <b>25</b>      | .425" (10.8mm)   | .630" (16.0mm)  |
| <b>26</b>      | .750" (19.05mm)  | .953" (24.2mm)  |



TYPICAL SWITCH DIMENSIONS

Single Pole

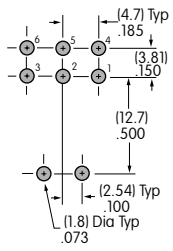
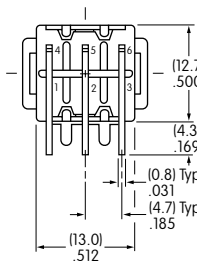
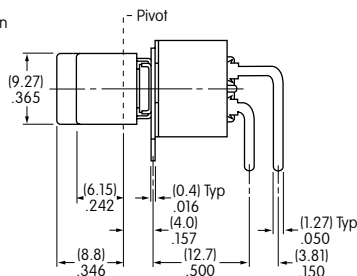
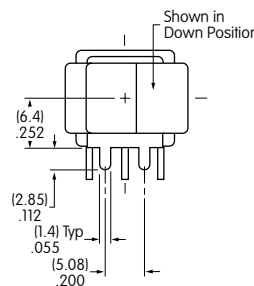
.150" (3.81mm) Right Angle PC



M2012TXG30-DC

Double Pole

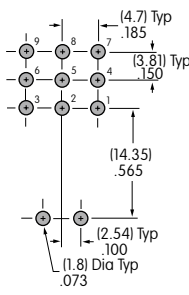
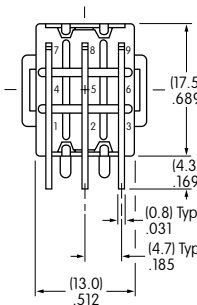
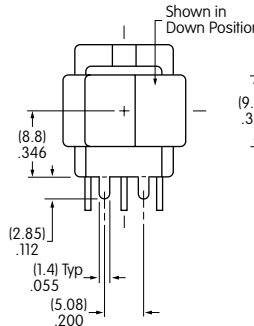
.150" (3.81mm) Right Angle PC



M2022TXG30-DC

Three Pole

.150" (3.81mm) Right Angle PC



M2032TXG30-DC

### TYPICAL SWITCH DIMENSIONS

#### .150" (3.81mm) Vertical PC

#### Single Pole



M2012TXG41-DC

#### .150" (3.81mm) Vertical PC

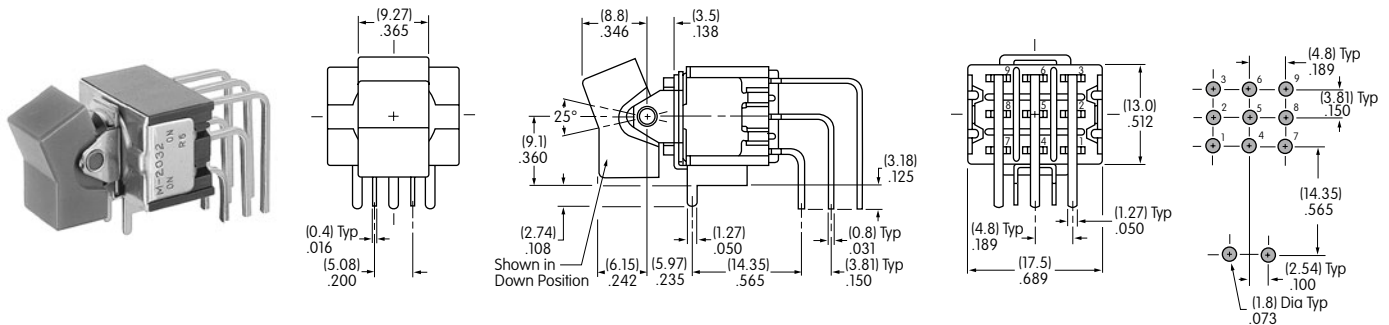
#### Double Pole



M2022TXG41-DC

#### .150" (3.81mm) Vertical PC

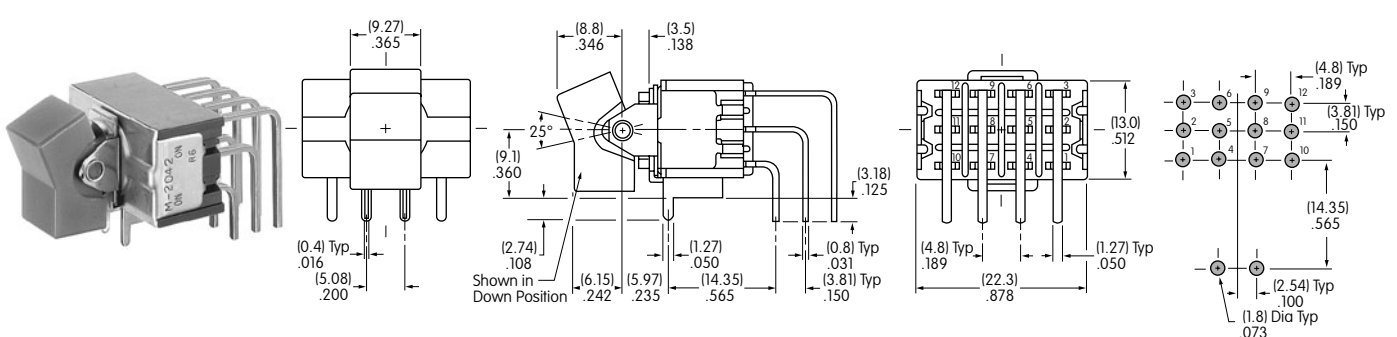
#### Three Pole



M2032TXG41-DC

#### .150" (3.81mm) Vertical PC

#### Four Pole



M2042TXG41-DC

TYPICAL SWITCH DIMENSIONS

Straight PC • Bracket

Toggles

**B** Rockers

Pushbuttons

Illuminated PB

Programmable

Keylocks

Rotaries

Slides

Tactiles

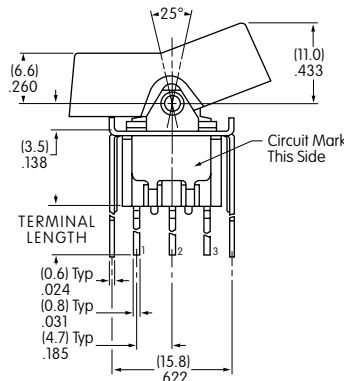
Tilt

Touch

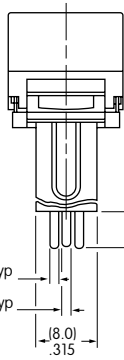
Indicators

Accessories

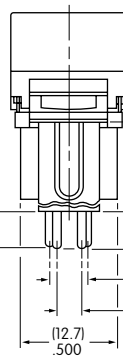
Supplement



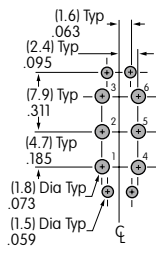
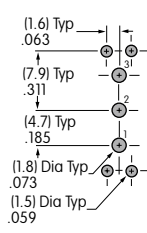
Single Pole



Double Pole

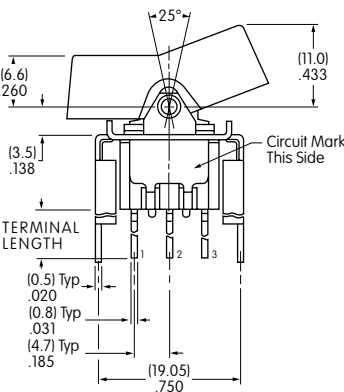


M2012TZG13-JC

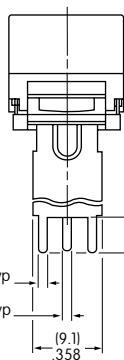


| Terminal Code: | Terminal Length: | Bracket Length: |
|----------------|------------------|-----------------|
| 13             | .250" (6.35mm)   | .465" (11.8mm)  |
| 15             | .425" (10.8mm)   | .630" (16.0mm)  |
| 17             | .964" (24.5mm)   | 1.150" (29.2mm) |

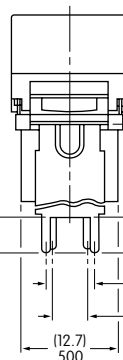
Straight PC • Reinforced Bracket



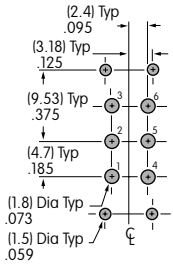
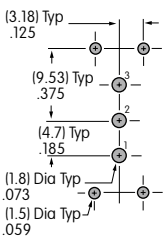
Single Pole



Double Pole



M2012TZG23-JC



| Terminal Code: | Terminal Length: | Bracket Length: |
|----------------|------------------|-----------------|
| 23             | .250" (6.35mm)   | .465" (11.8mm)  |
| 25             | .425" (10.8mm)   | .630" (16.0mm)  |
| 26             | .750" (19.05mm)  | .953" (24.2mm)  |

LEGENDS

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

Suggested Printable Area for Cap

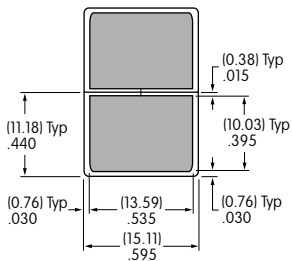
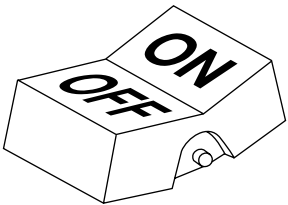
AT4148



AT4150



AT4156



Shaded areas are printable areas.

Recommended Print Method:

Pad Print

Epoxy based ink is recommended.