

General Specifications

Electrical Capacity (Resistive Load)

Logic Level: 0.4VA maximum @ 48V AC/DC maximum
(Applicable Range 0.1mA ~ 0.1A @ 20mV ~ 48V)
Note: Find additional explanation of operating range in Supplement section.

Other Ratings

Contact Resistance: 50 milliohms maximum
Insulation Resistance: 1,000 megohms minimum @ 500V DC
Dielectric Strength: 1,000V AC minimum between contacts for 1 minute minimum;
1,500V AC minimum between contacts & case for 1 minute minimum
Mechanical Life: 100,000 operations minimum for bat lever models
50,000 operations minimum for locking lever models
Electrical Life: 50,000 operations minimum
Contact Timing: Nonshorting (break-before-make)
Angle of Throw: 24°

Materials & Finishes

Toggle/Lever: Brass with chrome plating
Bushing: Brass with nickel plating
Support Bracket: Straight PC: phosphor bronze with tin plating; right angle & vertical: brass with tin plating
Housing: Polybutylene terephthalate (PBT) (UL94V-0)
Base: 1- and 2-pole GFR polyamide (UL94V-0); 4-pole liquid crystal polymer (LCP) (UL94V-0)
Movable Contacts: Phosphor bronze with gold plating
Stationary Contacts: Brass with gold plating
Terminals: Brass with gold plating

Environmental Data

Operating Temp Range: -10°C through +70°C (+14°F through +158°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: 50G (490m/s²) acceleration (tested in 6 right angled directions, with 5 shocks in each direction)

PCB Processing

Soldering: Wave Soldering recommended. See Profile A in Supplement section.
Manual Soldering: 1- & 2-pole: 3 seconds maximum @ 350°C maximum;
4-pole: 4 seconds maximum @ 410°C maximum
Cleaning: Hand clean locally using alcohol based solution.
See Cleaning specifications in Supplement section.

Standards & Certifications

Flammability Standards: UL94V-0 rated housing & base
The D2 Series toggles have not been tested for UL recognition or CSA certification.
These switches are designed for use in a low-current, logic level circuit.
When used as intended in a logic level circuit, the results do not produce hazardous energy.

Distinctive Characteristics

Base of heat resistant resin meets UL94V-0 flammability rating.

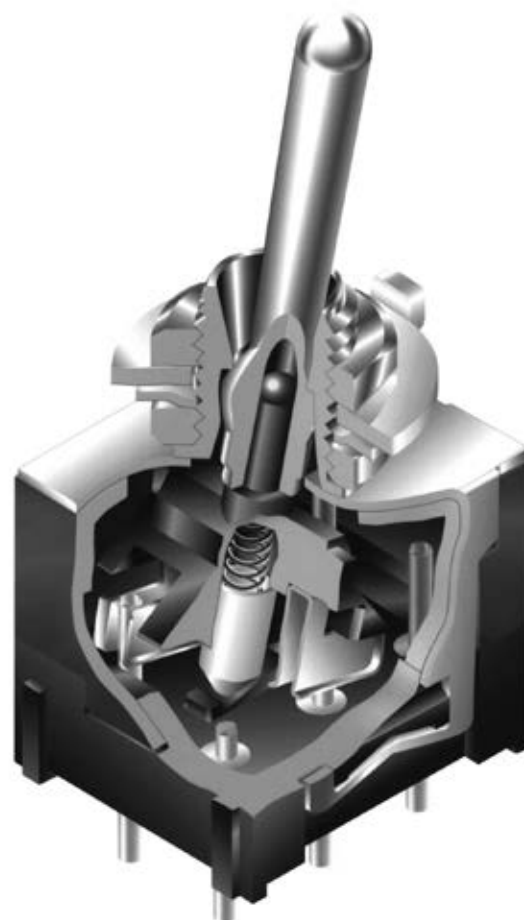
Maximized voltage capability of 48V allows use in medium source applications and increases operating life.

Award-winning STC contact mechanism with benefits unavailable in conventional mechanisms: smoother positive detent actuation, increased contact stability, and unparalleled reliability. (Additional STC details under Terms and Acronyms in the Supplement section.)

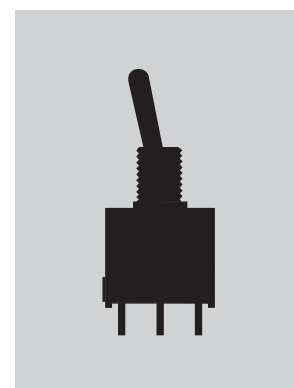
Round .031" (0.8mm) diameter PC terminals for easy PCB assembly.

Terminal spacing conforms to standard .100" (2.54mm) PC board grid spacing.

Molded-in terminals prevent entry of flux, solvents, and other contaminants.



Actual Size



A
Toggles

Rockers

Pushbuttons

Illuminated PB

Programmable

Keylocks

Rotaries

Slides

Tactiles

Tilt

Touch

Indicators

Accessories

Supplement

TYPICAL SWITCH ORDERING EXAMPLE

D220

1

2

P

Poles

1	SPDT
2	DPDT
*4	4PDT

* Combines with ON-NONE-ON circuit only & not available with Right Angle

Actuators

No Code	.413" (10.5mm) Bat Lever
L	.200" (5.1mm) Diameter Locking Lever

Circuits

2	ON	NONE	ON
3	ON	OFF	ON
5	ON	NONE	(ON)
8	(ON)	OFF	(ON)
9	ON	OFF	(ON)

() = Momentary

PC Terminals

P	Straight
*B	Straight with Bracket
*H	Right Angle with Bracket
*V	Vertical with Bracket

*Bracketed models combine with smooth bushings

DESCRIPTION FOR TYPICAL ORDERING EXAMPLE

D22012P

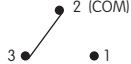
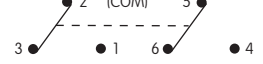
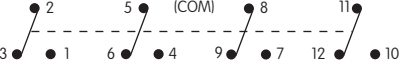
.413" (10.5mm)
Bat Lever



SPDT
ON-NONE-ON Circuit

Straight PC Terminals

POLES & CIRCUITS

Pole	Model	Toggle Position () = Momentary			Connected Terminals			Throw & Schematics
		Down 	Center 	Up 	Down 	Center 	Up 	
SP	D22012	ON	NONE	ON				SPDT 
	D22013	ON	OFF	ON				
	D22015	ON	NONE	(ON)	2-3	OPEN	2-1	
	D22018	(ON)	OFF	(ON)				
	D22019	ON	OFF	(ON)				
DP	D22022	ON	NONE	ON				DPDT 
	D22023	ON	OFF	ON				
	D22025	ON	NONE	(ON)	2-3 5-6	OPEN	2-1 5-4	
	D22028	(ON)	OFF	(ON)				
	D22029	ON	OFF	(ON)				
4P	D22042	ON	NONE	ON	2-3 5-6 8-9 11-12	OPEN	2-1 5-4 8-7 11-10	4PDT 

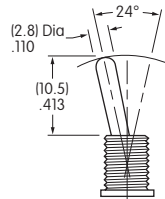
Note: Terminal numbers are not actually on the switch.

ACTUATORS

No Code

**.413" (10.5mm)
Bat Lever**

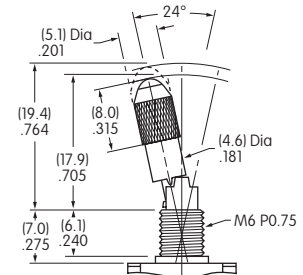
Material:
Chrome over brass



L

**.413" (5.1mm) Diameter
Locking Lever**

Material:
Chrome over brass



PC TERMINALS

P

Straight



B

Straight with Bracket



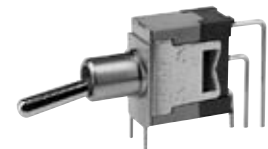
H

Right Angle with Bracket



V

Vertical with Bracket

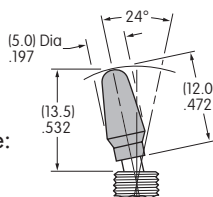


OPTIONAL CAPS & CAP COLORS

**AT415
Bat Lever Cap**

Material:
Polyethylene

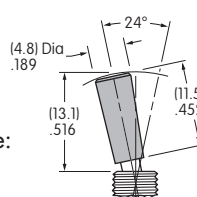
Colors Available:
A B C E F G



**AT444 Bat Lever
Conical Cap**

Material:
Polyethylene

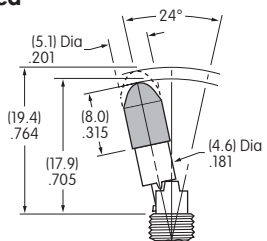
Colors Available:
A B C E F G



**AT427 Cap Supplied
with Locking Lever**

Material:
Anodized Aluminum

Colors Available:
A C G



Colors Codes: A Black B White C Red E Yellow F Green G Blue

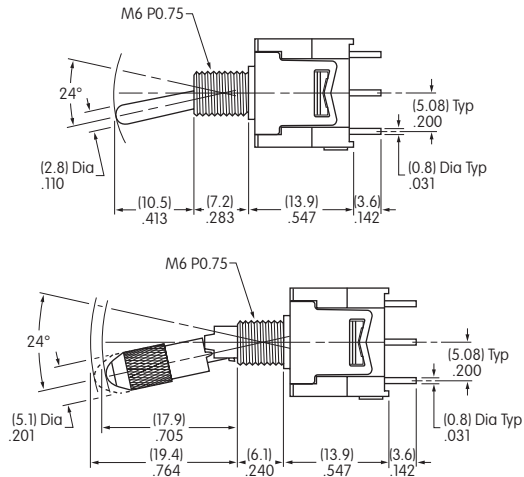
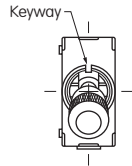
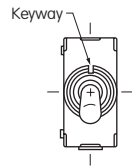
TYPICAL SWITCH DIMENSIONS

Straight PC • Single Pole

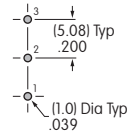
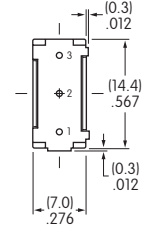


D22012P

D22012LP



Actuator in Down Position

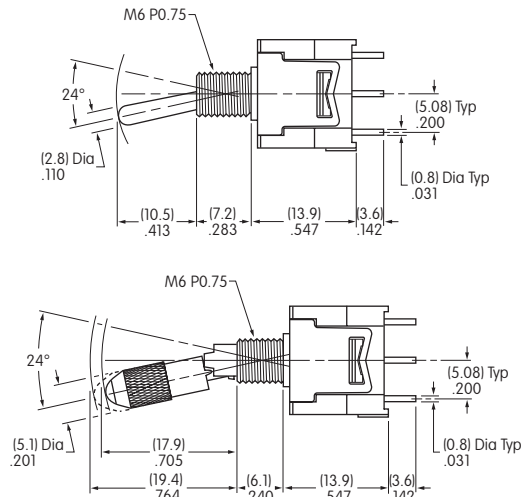
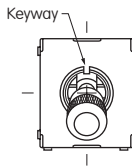
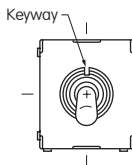


Straight PC • Double Pole

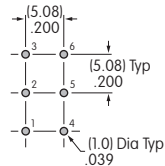
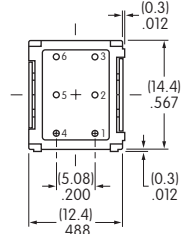


D22022P

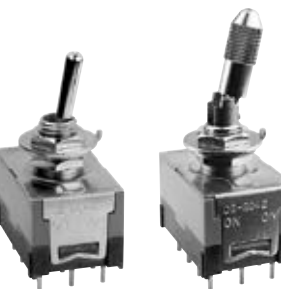
D22022LP



Actuator in Down Position

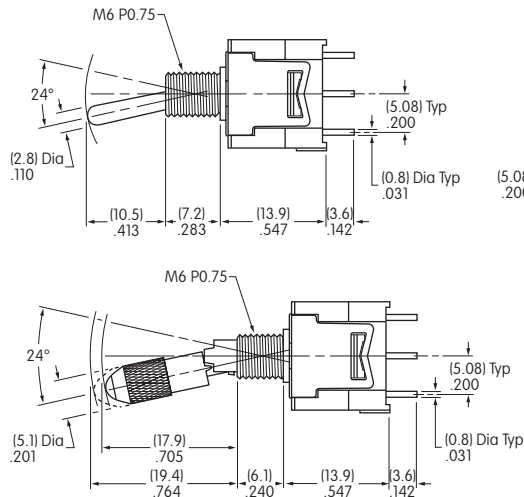
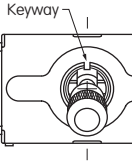
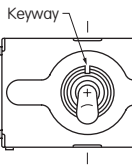


Straight PC • Four Pole

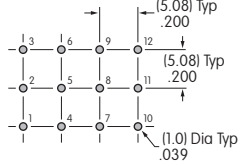
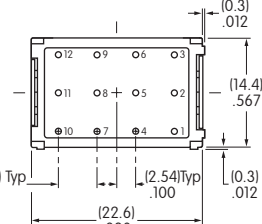


D22042P

D22042LP

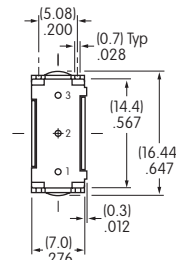
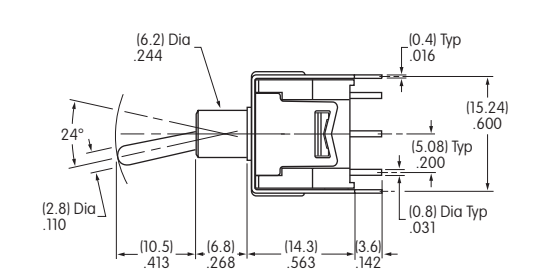
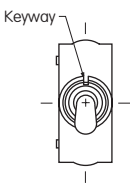


Actuator in Down Position

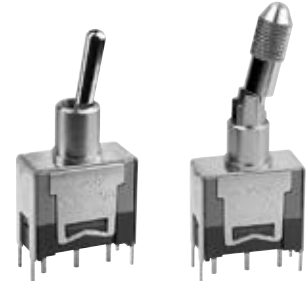


TYPICAL SWITCH DIMENSIONS

A Toggles

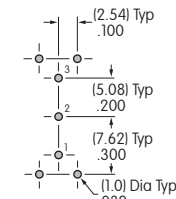
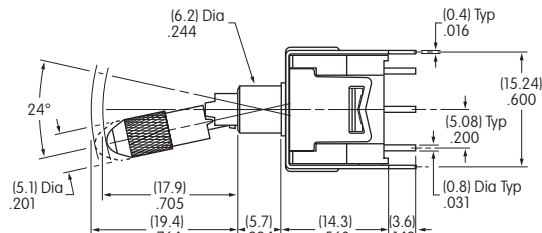
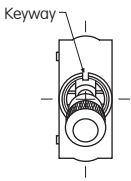


**Straight PC • Bracket
Single Pole**

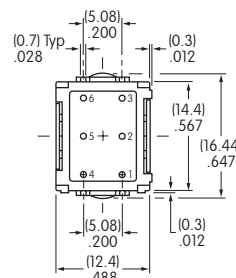
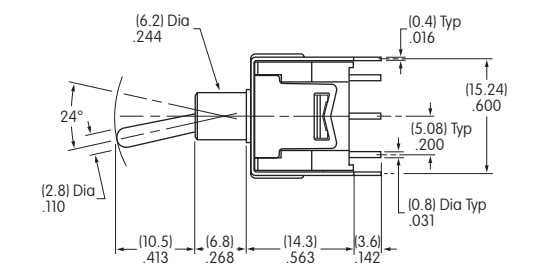
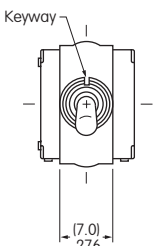


D22012B

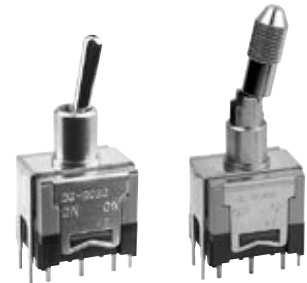
D22012LB



Actuator in Down Position

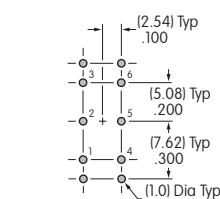
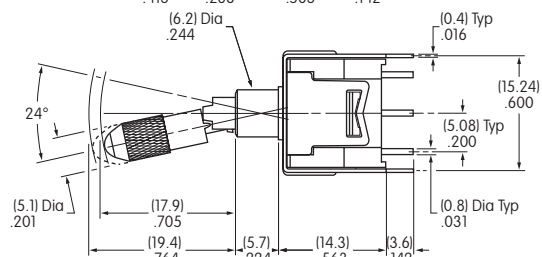
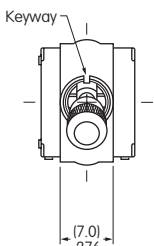


**Straight PC • Bracket
Double Pole**

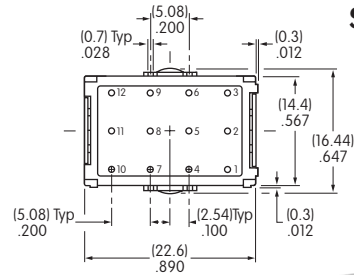
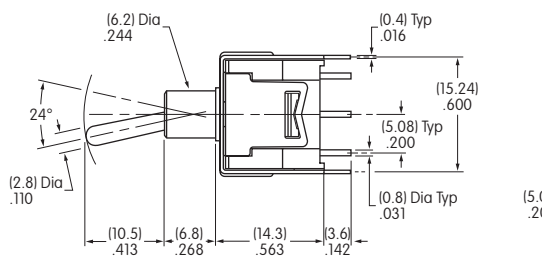
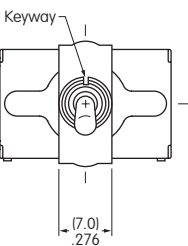


D22022B

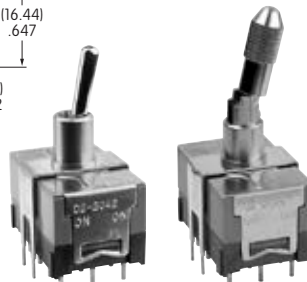
D22022LB



Actuator in Down Position

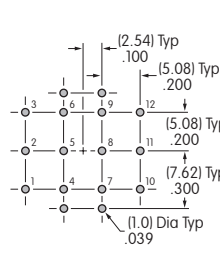
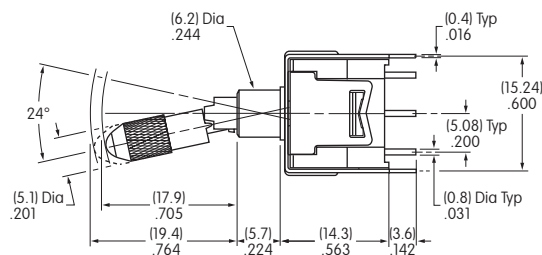
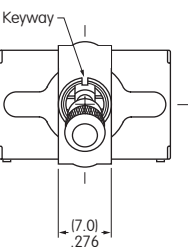


**Straight PC • Bracket
Four Pole**



D22042B

D22042LB



Actuator in Down Position

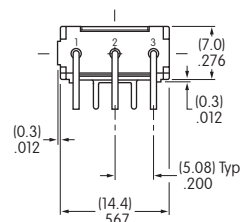
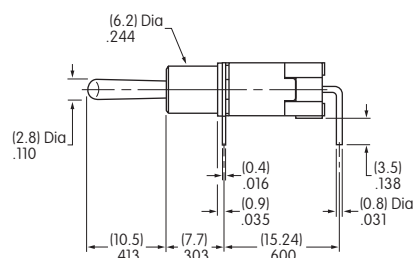
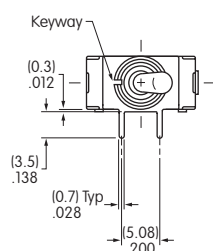
Rockers
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Supplement

TYPICAL SWITCH DIMENSIONS

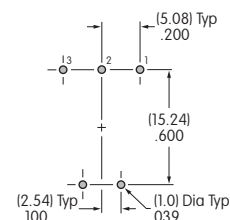
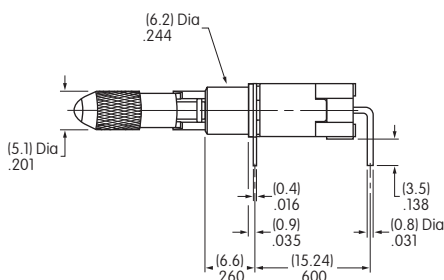
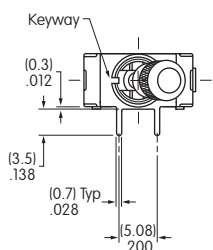
Right Angle PC • Single Pole



D22012H



D22012LH

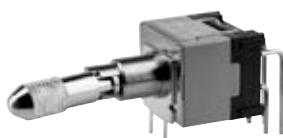
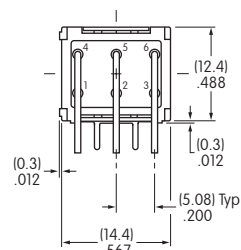
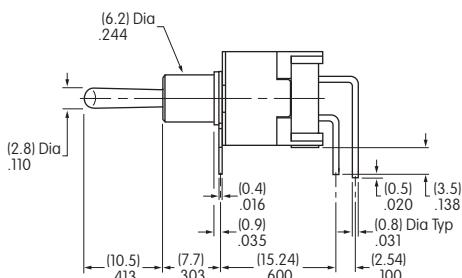
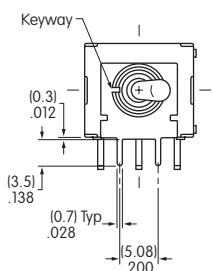


Actuator in Down Position

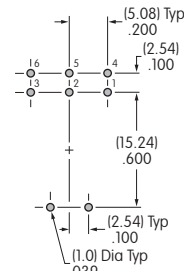
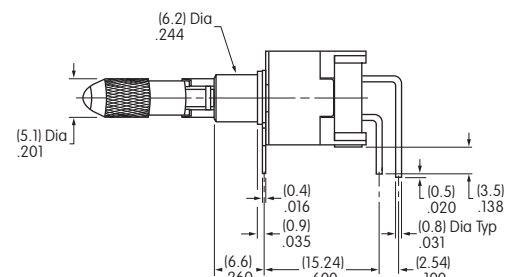
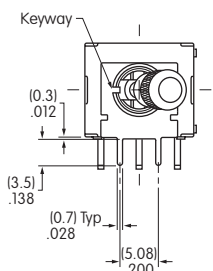
Right Angle PC • Double Pole



D22022H



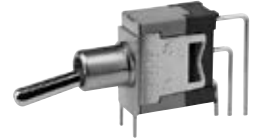
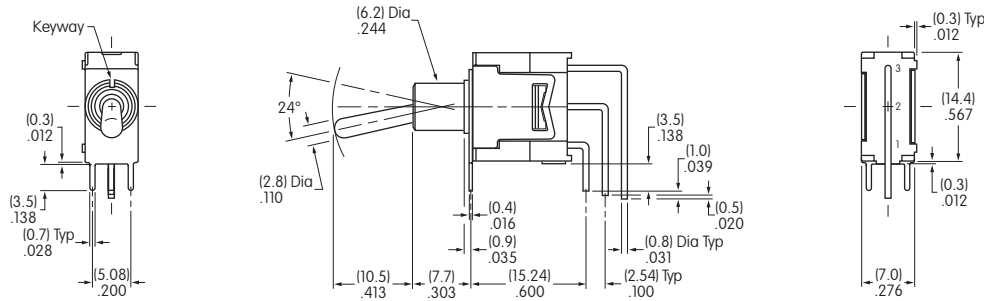
D22022LH



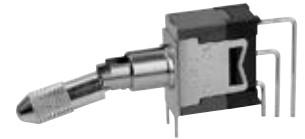
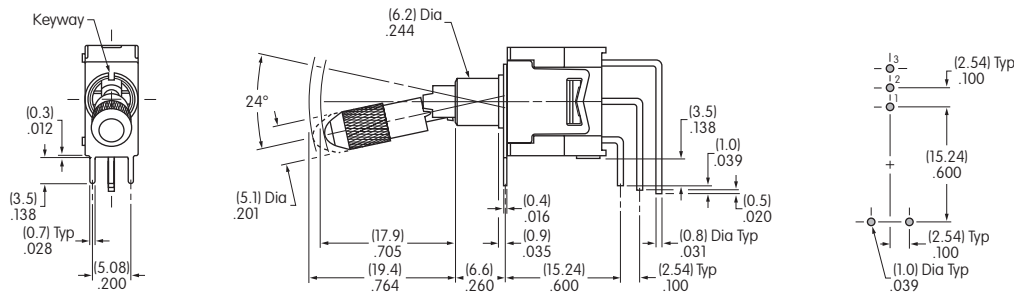
Actuator in Down Position

TYPICAL SWITCH DIMENSIONS

Vertical PC • Single Pole



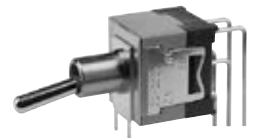
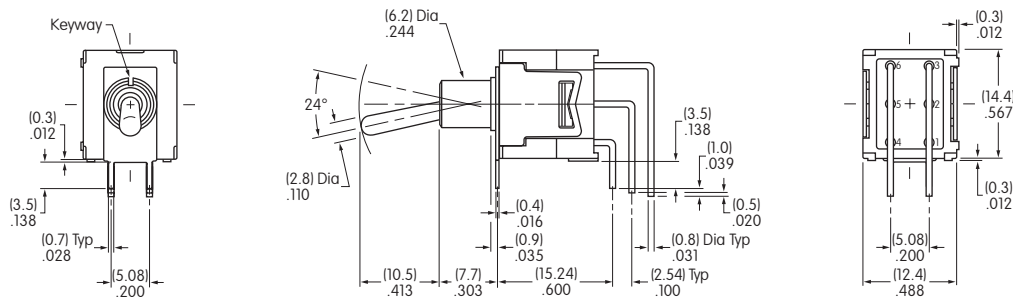
D22012V



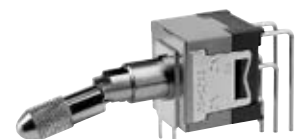
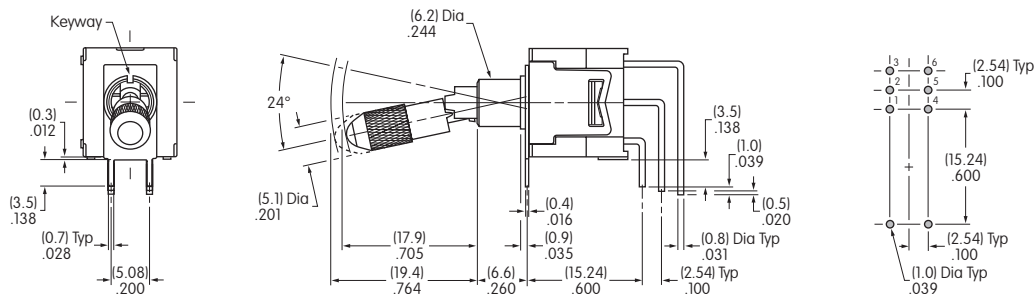
D22012LV

Actuator in Down Position

Vertical PC • Double Pole



D22022V

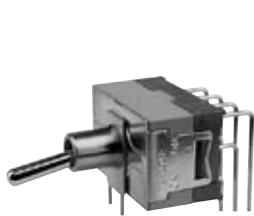


D22022LV

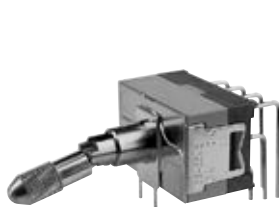
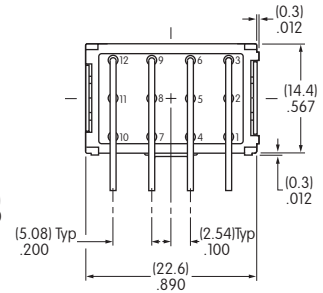
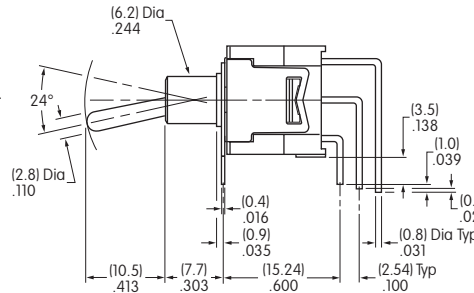
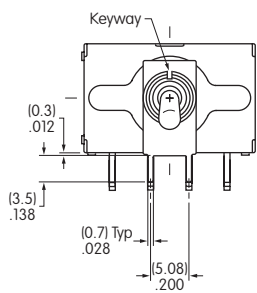
Actuator in Down Position

TYPICAL SWITCH DIMENSIONS

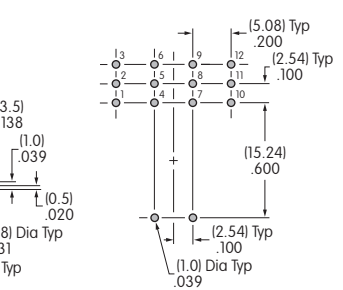
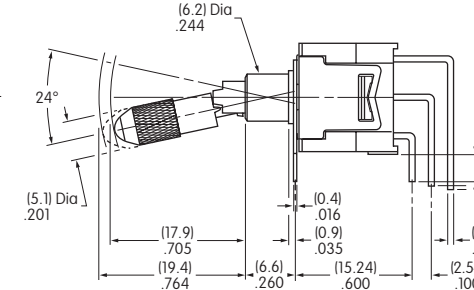
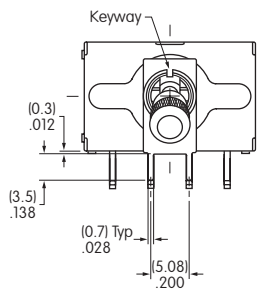
Vertical PC • Four Pole



D22042V



D22042LV



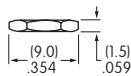
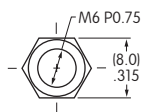
Actuator in Down Position

STANDARD HARDWARE

AT513M

Hex Nut

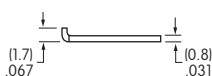
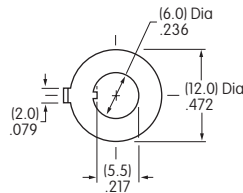
Brass with nickel plating
2 supplied



AT507M

Locking Ring

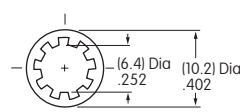
Steel with zinc/chromate
1 supplied



AT509

Lockwasher

Steel with zinc/chromate
1 supplied

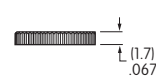
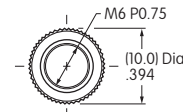


OPTIONAL

AT501M

Knurled Face Nut

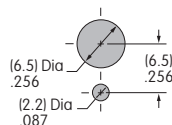
Brass with chrome plating



PANEL CUTOUTS & MAXIMUM PANEL THICKNESS

With Standard Hardware

.087" (2.2mm) for
Standard Lever



.051" (1.3mm) for
Locking Lever

Without Bottom Hex Nut

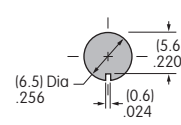
.154" (3.9mm) for
Standard Lever

.110" (2.8mm) for
Locking Lever

Without Locking Ring

.118" (3.0mm) for
Standard Lever

.083" (2.1mm) for
Locking Lever



Without Locking Ring & Bottom Hex Nut

.185" (4.7mm) for
Standard Lever

.142" (3.6mm) for
Locking Lever

