



A

Pushbutton

# Pushbuttons

## Product Selection Guide

<b>Pushbutton</b>									
<b>Series</b>	<b>ELUM</b>	<b>EP</b>	<b>TP</b>	<b>E020</b>	<b>8020</b>	<b>E010</b>	<b>8060</b>	<b>8500</b>	<b>KM</b>
<b>Switch Type</b>	Mom./Latching	Tiny	Tiny	Snap-acting Mom.	Snap-acting Mom.	Miniature	Alternate Action	Sub-miniature	Sub-miniature
<b>Poles/Throws</b>	SPDT	SPST, SPDT, DPST	SPST, SPDT, DPST	SPDT, DPDT	SPDT, DPDT, 3PDT, 4PDT	SPDT	SPDT, DPDT	SPST	SPST, SPDT
<b>Max. Current</b>	3.5 VA	1 Amp	1 Amp	1 Amp	1 Amp	4 Amps	6 Amps	3 Amps	1 Amp
<b>Process Sealed</b>		•		•		•			
<b>Illuminated</b>	•				•		•	•	
<b>PCB Mount Options</b>									
Thru-hole	•	•	•	•	•	•	•	•	•
Vertical		•	•	•	•	•	•	•	•
Right Angle	•	•	•	•	•	•	•	•	•
Surface Mount	•	•							
<b>Panel Mount</b>			•		•	•	•	•	•
<b>Page No.</b>	A-3	A-9	A-15	A-21	A-29	A-46	A-52	A-62	A-67

<b>Pushbutton</b>							
<b>Series</b>	<b>8600</b>	<b>8700</b>	<b>GP</b>	<b>PN</b>	<b>PHA</b>	<b>F</b>	<b>NE-18</b>
<b>Switch Type</b>	Micro-miniature	Over Travel	Ultra-miniature	Alternate & Mom. Action	Short Stroke	Alternate & Mom. Action	Mains / Power
<b>Poles/Throws</b>	SPST	SPST	SPST, SPDT	SPDT, DPDT, 4PDT	DPDT, 4PDT, 6PDT	DPDT, 4PDT, 6PDT, 8PDT, 10PDT	DPST, DPDT Varied
<b>Max. Current</b>	500 mA	1 Amp	0.4 V	200 mA	100 mA	500 mA	6 A
<b>Process Sealed</b>			•				
<b>PCB Mount Options</b>							
Thru-hole	•	•	•	•	•	•	•
Vertical	•	•	•				
Right Angle			•	•	•	•	•
Surface Mount			•				
<b>Panel Mount</b>	•	•				•	•
<b>Page No.</b>	A-71	A-74	A-77	A-81	A-84	A-88	A-98



Dimensions are shown: Inches (mm)  
Specifications and dimensions subject to change

# TP Series Tiny Pushbutton Switches



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## Features/Benefits

- **Subminiature size**—capable of switching 1 AMP
- **Vertical & right angle terminations**
- **PC & panel mount models**
- **Snap-in front panel mounting available**
- **Epoxy terminal seal-compatible with bottom wash cleaning**
- **RoHS compliant models available**

## Typical Applications

- **Telecommunications and networking equipment**
- **Computers and peripherals**
- **Instrumentation and controls**



Models Available

## Specifications

**CONTACT RATING:** B contact material: 0.4 VA max. @ 20 V AC or DC max. Q contact material: 1 AMP @ 120 V AC or 28 V DC. See page A-19 for additional ratings.

**ELECTRICAL LIFE:** TP11, TP21 MODELS: 60,000 make-and-break cycles at full load. TP12 MODELS: 30,000 cycles.

**CONTACT RESISTANCE:** Below 20 mΩ typ. initial @ 2-4 V DC, 100 mA, for both silver and gold plated contacts.

**INSULATION RESISTANCE:** 10<sup>9</sup>Ω min.

**DIELECTRIC STRENGTH:** 1000 Vrms min. @ sea level.

**OPERATING TEMPERATURE:** -30°C to 85°C.

**SOLDERABILITY:** Per MIL-STD-202F method 208D, or EIA RS-186E method 9 (1 hour steam aging).

**NOTE:** Any models supplied with Q, B, P, R or G contact material are RoHS compliant.

**NOTE:** Specifications and materials listed above are for switches with standard options. For information on specific and custom switches, consult Customer Service Center.

## Materials

**CASE:** Glass filled nylon 6/6, flame retardant, heat stabilized or diallyl phthalate (DAP), (UL 94V-0).

**PLUNGER:** Thermoplastic polyester (UL 94V-0).

**CAP & FRAME:** Nylon, black standard.

**BUSHING:** Brass, nickel plated.

**HOUSING:** Stainless steel.

**SWITCH SUPPORT:** Brass, matte-tin plated.

**END CONTACTS:** B contact material: Copper alloy, with gold plate over nickel plate. Q contact material: Coin silver, silver plated. See page A-19 for additional contact materials.

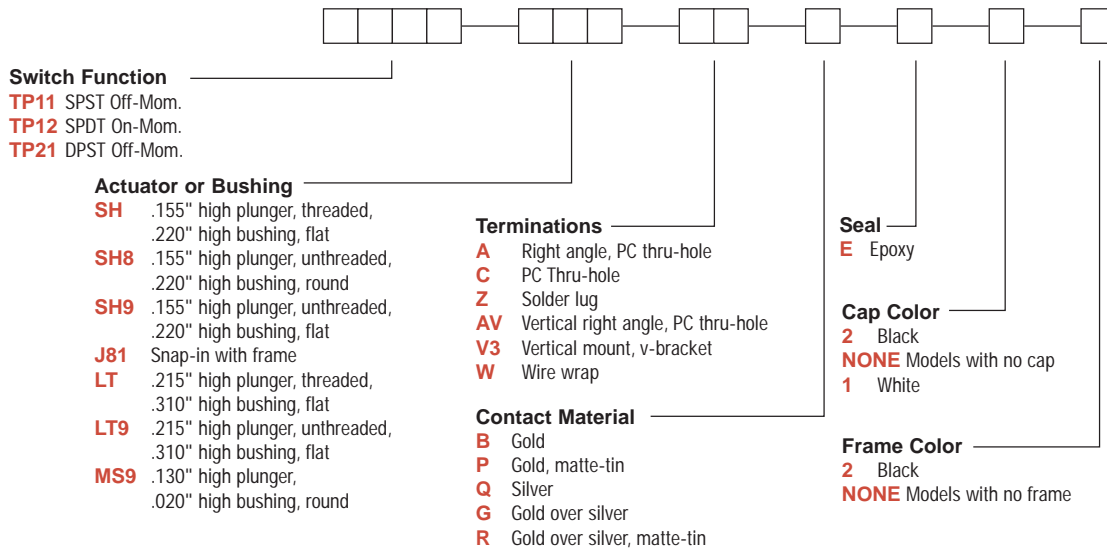
**CENTER CONTACT & ALL TERMINALS:** B contact material: Copper alloy, with gold plate over nickel plate. Q contact material: Copper alloy, silver plated. See page A-19 for additional contact materials.

**TERMINAL SEAL:** Epoxy. Refer to soldering and cleaning in Technical Data Chapter

**HARDWARE:** Nut & Locking Ring: Brass nickel plated. Lockwasher: Steel, nickel plated.

## Build-A-Switch

To order, simply select desired option from each category and place in the appropriate box. Available options are shown and described on pages A-16 thru A-20. For additional options not shown in catalog, consult Customer Service Center. All models have epoxy terminal seal and are compatible with all "bottom-wash" PCB cleaning methods.



Dimensions are shown: Inches (mm)  
Specifications and dimensions subject to change



# TP Series Tiny Pushbutton Switches

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## SWITCH FUNCTION

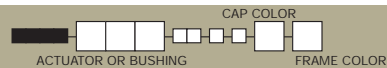


NO. POLES	MODEL NO.	SWITCH FUNCTION		CONNECTED TERMINALS		SCHEMATIC
		POS. 1	POS. 2	POS. 1	POS. 2	
		C&K marking on opposite side		C&K marking on opposite side		
SP	TP11	OFF	MOM.	OPEN	1-3	SPST
	TP12	ON	MOM.	2-1	2-3	SPDT
<b>SPDT</b>  Dimensions: .100 DIA. (2,540), 10-48UNS, .155 (3,94), .220 (5,59), .340 (8,64), .110 (2,79), .160 (4,06), .020 TYP. (0,51), .100 TYP. (2,54), .200 (5,08), .320 (8,13), .060 TYP. (1,52) TERM. WIDTH. Part number shown: TP12SHZQE Terminal Nos. For Reference Only						
DP	TP21	OFF	MOM.	OPEN	1-3,4-6	DPST
<b>DPST</b>  Dimensions: .100 DIA. (2,540), 10-48UNS, .155 (3,94), .220 (5,59), .340 (8,64), .110 (2,79), .160 (4,06), .020 TYP. (0,51), .200 (5,08), .320 (8,13), .060 TYP. (1,52) TERM. WIDTH. Part number shown: TP21SHZQE Terminal Nos. For Reference Only						

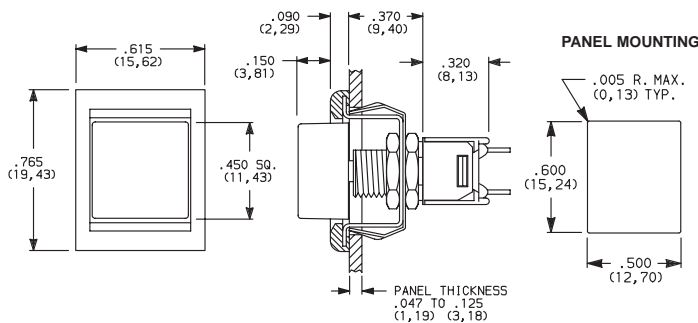
MOM. = Momentary

All models with all options when ordered with G, L, Q or R contact material.

## ACTUATOR—SNAP-IN FRONT MOUNT



### J81 SNAP-IN WITH FRAME



OPTION CODE	CAP COLOR
2	BLACK
1	WHITE

OPTION CODE	FRAME COLOR
2	BLACK
NONE	No Frame Color (J80 option)

Cap and Frame Finish: matte. Other colors available, consult Customer Service Center.

NOTE: Available with Z, C, or W terminations.

NOTE: Caps & frames available separately, see page A-18.



Dimensions are shown: Inches (mm)  
Specifications and dimensions subject to change



# TP Series Tiny Pushbutton Switches



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**SH** .155" HIGH PLUNGER,  
.220" HIGH BUSHING,  
THREADED, FLAT

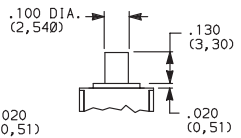
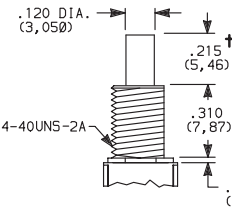
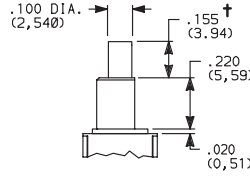
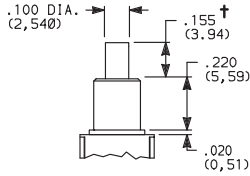
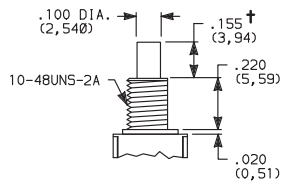
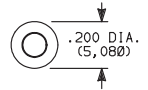
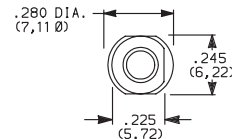
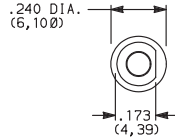
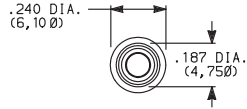
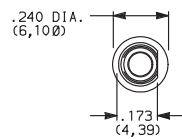
**SH8** .155" HIGH PLUNGER,  
.220" HIGH BUSHING,  
UNTHREADED

**SH9** .155" HIGH PLUNGER,  
.220" HIGH BUSHING,  
UNTHREADED, FLAT

**LT** .215" HIGH PLUNGER,  
.310" HIGH BUSHING,  
THREADED

**MS9** .130" HIGH  
PLUNGER

**LT9** .215" HIGH PLUNGER,  
.310" HIGH BUSHING,  
UNTHREADED



Standard with Z, C, W terminations.

Standard with A, AV, V3 terminations.

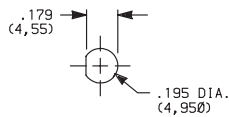
Not available with Z terminations.

† Subtract .016 (0,41) for models with A, AV or V3 terminations.

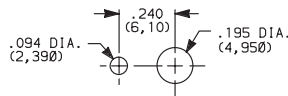
**NOTE:** Caps available for plunger options, see page A-20.

## PANEL MOUNTING

### 10-48 BUSHING

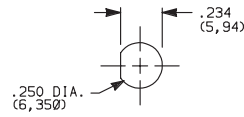


Without locking ring

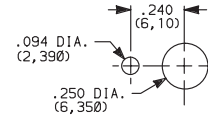


With standard locking ring

### 1/4 IN. BUSHING



Without locking ring

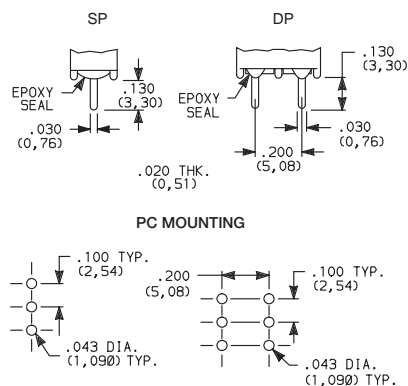


With standard locking ring

**NOTE:** One mounting nut, locking ring and lockwasher supplied standard with 10-48 threaded bushings (two nuts with 1/4-40 bushings).  
Optional mounting nut and locking ring styles and finishes available separately, see section "Technical Data and Additional Hardware".

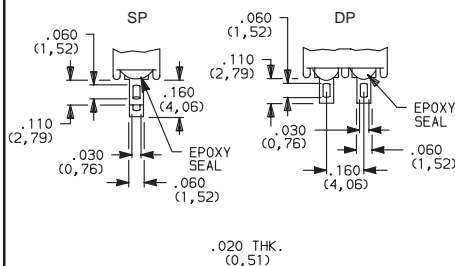
## TERMINATIONS

### C PC THRU-HOLE



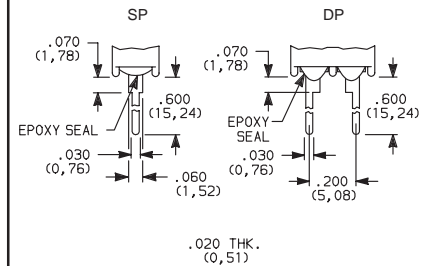
Omit center holes  
for TP11 models

### Z SOLDER LUG



Not available with MS9 bushing or P  
or R contact material.

### W WIRE WRAP



Dimensions are shown: Inches (mm)  
Specifications and dimensions subject to change





# TP Series Tiny Pushbutton Switches

## TERMINATIONS



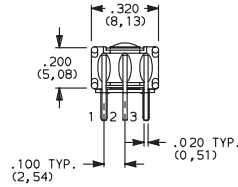
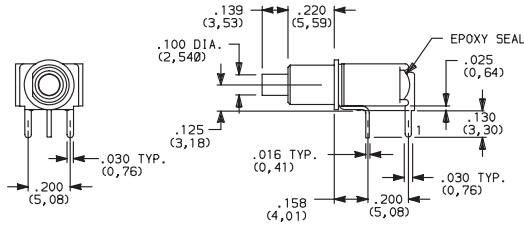
Pushbutton

A

### A RIGHT ANGLE, PC THRU-HOLE

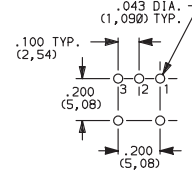


TP12SH9ABE  
SPDT



TP11 Models:  
omit terminal 2.

### PC MOUNTING

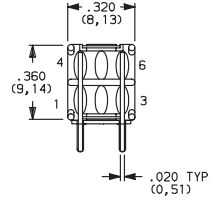
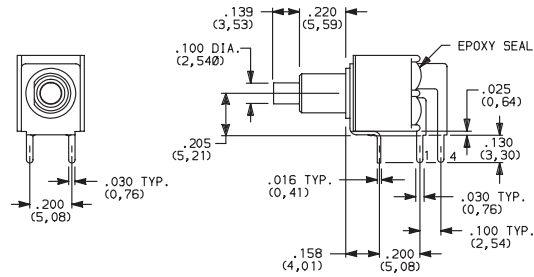


TP11 Models:  
omit hole 2.

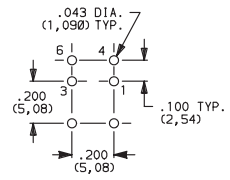
### A RIGHT ANGLE, PC THRU-HOLE



TP21SH9ABE  
DPST



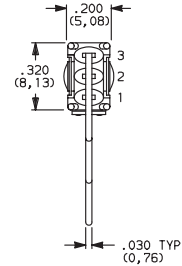
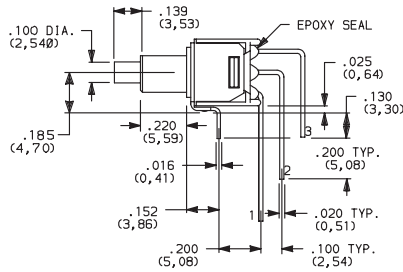
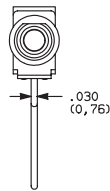
### PC MOUNTING



### AV VERTICAL RIGHT ANGLE, PC THRU-HOLE

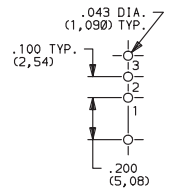


TP12SH9AVBE  
SPDT



TP11 Models:  
omit terminal 2.

### PC MOUNTING



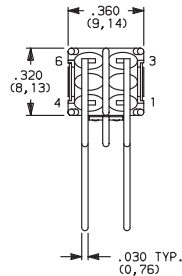
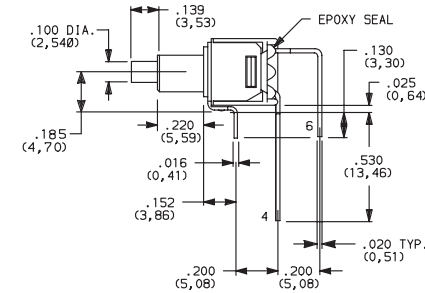
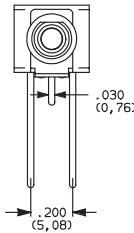
TP11 Models:  
omit hole 2.

NOTE: Terminal bend radii and lead-in manufacturing option.

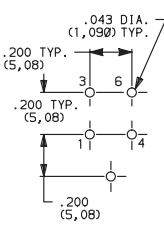
### AV VERTICAL RIGHT ANGLE, PC THRU-HOLE



TP21SH9AVBE  
DPST



### PC MOUNTING



NOTE: Terminal bend radii and lead-in manufacturing option.



Third Angle  
Projection

Dimensions are shown: Inches (mm)  
Specifications and dimensions subject to change



# TP Series Tiny Pushbutton Switches



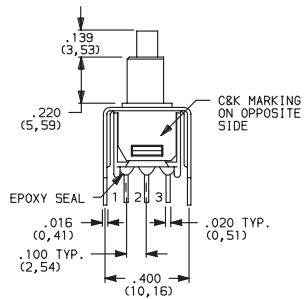
A

Pushbutton

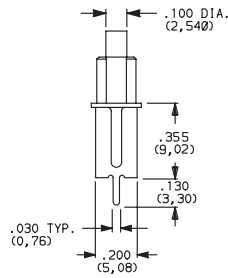
## TERMINATIONS



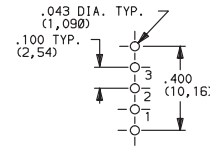
### V3 VERTICAL MOUNT, V-BRACKET



TP11 Models:  
omit terminal 2.



#### PC MOUNTING

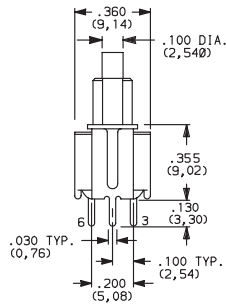
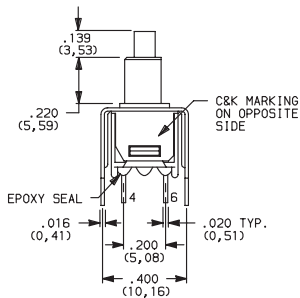


TP11 Models:  
omit hole 2.

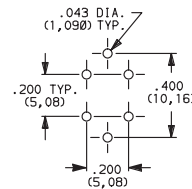


TP12SH9V3BE  
SPDT

### V3 VERTICAL MOUNT, V-BRACKET



#### PC MOUNTING



TP21SH9V3BE  
DPST

## CONTACT MATERIAL



OPTION CODE	CONTACT MATERIAL	TERMINAL PLATING	RATINGS	
B	GOLD <sup>1</sup>	GOLD <sup>1</sup>	LOW LEVEL/DRY CIRCUIT	0.4 VA MAX. @ 20 V AC OR DC MAX.
P		MATTE-TIN <sup>6</sup>		
Q	SILVER <sup>4,5</sup>	SILVER <sup>5</sup>	POWER	1 AMP @ 120 V AC OR 28 V DC.
G	GOLD OVER SILVER <sup>2,3</sup>	GOLD <sup>3</sup>	LOW LEVEL/DRY CIRCUIT OR POWER	0.4 VA MAX @ 20 V AC OR DC MAX. OR 1 AMP @ 120 V AC OR 28 V DC.
R		MATTE-TIN <sup>6</sup>		

\* Note: See Technical Data section of this catalog for RoHS compliant and compatible definitions and specifications.

<sup>1</sup> CONTACTS & TERMINALS: Copper alloy, with gold plate over nickel plate.

<sup>2</sup> END CONTACTS: Coin silver, with gold plate over nickel plate.

<sup>3</sup> CENTER CONTACTS & ALL TERMINALS: Copper alloy, with gold plate over nickel plate.

<sup>4</sup> END CONTACTS: Coin silver, silver plated.

<sup>5</sup> CENTER CONTACT & ALL TERMINALS: Copper alloy, silver plated.

<sup>6</sup> TERMINALS: Copper alloy, with matte-tin over nickel plate.

**NOTE:** Any models supplied with P, R, Q, B or G contact material are RoHS compliant.

All models with all options when ordered with R, G, L or Q contact material.

B contact material standard with A, AV, V3 & W terminations.

Q contact material standard with C & Z terminations

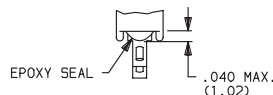
P, R contact materials not available with Z terminations.

K, L and M options represent Non RoHS tin lead product and are not recommended for new designs. For additional information please contact Customer Service.

## SEAL



### E EPOXY SEAL



Third Angle  
Projection  
Dimensions are shown: Inches (mm)  
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