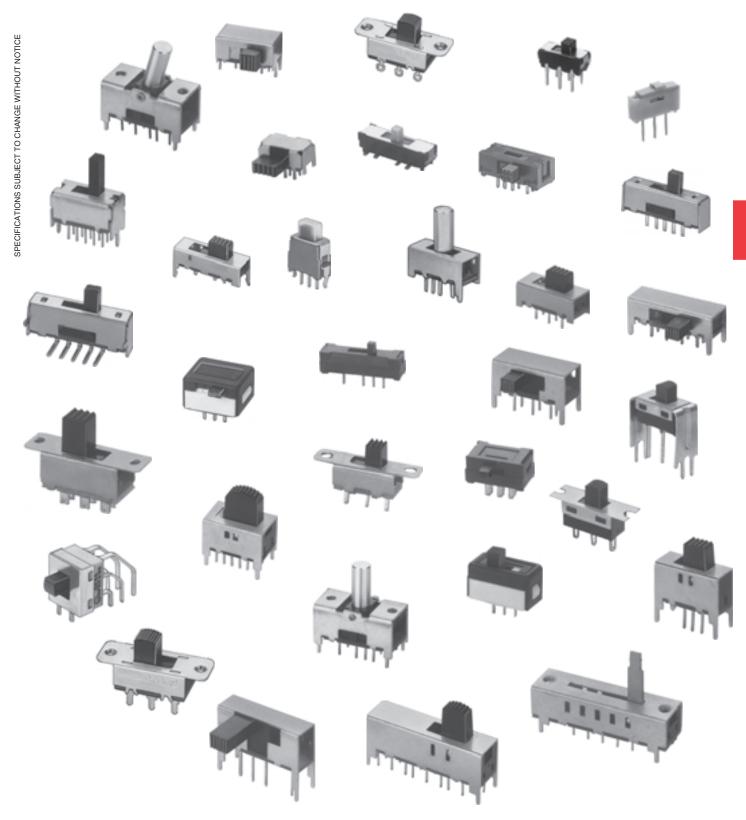
SLIDE SWITCHES

SEE PUSHBUTTON SWITCH SELECTION GUIDE ON NEXT PAGE



SLIDE SWITCHES

SLIDE SWITCH SELECTION GUIDE: This catalog contains an extensive variety of slide switches with numerous options and accessories. To facilitate easy selection of the desired switch for your application, the guide on pages E2 & E3 lists the various Series with some key selection parameters.

			MICROMINIA	ATURE SL	IDE SWIT	CHES		
SERIES	POLES	POS- ITIONS	RATINGS	WASH- ABLE	LIFE CYCLES	MOUNTING	ACTUATION	PAGE(S)
TG (SMT)	1	2&3	0.4 VA @ 20V	Yes	60,000	Surface	Vertical	E4-E7
MJS	1&2	2&3	100 ma @ 12VDC	No	10,000	P.C. thru-hole	Vert. & rt. angle	E8-E9
MSSA & MSSB	2	2	100 ma @ 30VDC or 125VAC & dry circuit	No	10,000	P.C. thru-hole	Vert. & rt. angle	E10
MA	1	2&3	300 ma @ 4VDC	No	10,000	Surface	Rt. angle	E11
MHSS	1&2	2	300 ma @ 6VDC	No	5000	P.C. thru-hole	Vert. & rt. angle	E12
MS	1,2&4	2&3	300 ma @ 6VDC	No	10,000	P.C. thru-hole & surface	Vert. & rt, angle	E13-E15
MMPS Ne	w! 1	2&3	300 ma @ 4VDC	No	10,000	Surface	Right angle	E15
MMS	1,2,4&6	2&3	300 ma @ 30VDC	No	10,000	P.C. thru-hole	Vert. & rt. angle	E16-E17
TG	1	2&3	500 ma @ 48V (AC or DC) & dry circuit	Some	30,000 & 60,000	P.C. thru-hole	Vert. & rt. angle	E18-E20
NK	1	2	500 ma @ 12V	No	1000	P.C. thru-hole	Vertical	E21
MINIATURE SLIDE SWITCHES								
SERIES	POLES	POS- ITIONS	RATINGS	WASH- ABLE	LIFE CYCLES	MOUNTING	ACTUATION	PAGE(S)
MSTS	1&2	3	300 ma @ 28VDC	Yes	10,000	P.C. thru-hole	Vertical	E22
MHS N	₩ 1&2	2&3	300 ma @ 30VDC	Yes	10,000	P.C. thru-hole	Vertical	E23-E26
SLB	1&2	2,3,4&5	300 ma @ 30VDC or 125 VAC	Yes	10,000	P.C. thru-hole	Vert. & rt. angle	E27-E34
SLC	1&2	2	300 ma @ 30VDC or 125 VAC	Yes	10,000	Panel	Vertical	E35
SLG	1	2	300 ma @ 30VDC or 125 VAC	Yes	10,000	P.C. thru-hole & panel	Vertical	E36
SLA	1&2	2	500 ma @ 125VAC	Yes	10,000	P.C. thru-hole & panel	Vertical	E37-E38
SLE	1&2	2	500 ma @ 125VAC	Yes	10,000	P.C. thru-hole & panel	Vertical	E38-E39
G	1&2	2&3	4 amps @ 125VAC, 2 amps @ 250 VAC or 3 amps @ 30 VDC & dry circuit	No	20,000 - 60,000	P.C. thru-hole & panel	Vert. & rt. angle	E40-E44
25000N	1&2	2&3	4 amps @ 125 VAC, 2 amps @ 250 VAC or 3 amps @ 30 VDC & dry circuit	No	10,000 - 20,000	P.C. thru-hole	Vert. & rt. angle	E45-E49
			STANDARI	SIZE SL	DE SWITC	HES		
SERIES	POLES	POS- ITIONS	RATINGS	WASH- ABLE	LIFE CYCLES	MOUNTING	ACTUATION	PAGE(S)
MSS	1,2&4	2,3&4	300 ma @ 30VDC or 125 VAC & dry circuit	Yes	10,000	P.C. thru-hole	Vert. & rt. angle	E50-E52
M	1,2,4, 6&8	2&3	300 ma @30VDC or 125 VAC	Yes	10,000	P.C. thru-hole	Vert. & rt. angle	E53-E57
PM	1&2	2	6 amps @ 125 VAC or 3 amps @ 250 VAC	Yes	10,000	Panel	Vertical	E58

SLIDE SWITCHES

SLIDE SWITCH SELECTION GUIDE (CONT'D.)

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

MINIATURE PUSHBUTTON STYLE SLIDE SWITCHES									
SERIES	POLES	POS- ITIONS	RATINGS	WASH- ABLE	LIFE CYCLES	MOUNTING	ACTUATION	PAGE(S)	
MPS	PB-1 SL-1	PB-1 SL-3	PB - 0.4 VA @ 20 V max. Slide - 300 ma @ 30VDC/125VAC	No	100,000	P.C. thru-hole	Rt. angle	E59	
SINGLE POLE MULTI-POSITION SLIDE SWITCHES									
SERIES	POLES	POS- ITIONS	RATINGS	WASH- ABLE	LIFE CYCLES	MOUNTING	ACTUATION	PAGE(S)	
MSL	1	3,5&6	200 ma @ 30VDC/125VAC	Yes	10,000	P.C. thru-hole	Vertical	E60	
BATON TOGGLE STYLE SLIDE SWITCHES									
SERIES	POLES	POS- ITIONS	RATINGS	WASH- ABLE	LIFE CYCLES	MOUNTING	ACTUATION	PAGE(S)	
MBT	2,4&6	2,3&4	300 ma @ 30VDC/125VAC	Yes	10,000	P.C. thru-hole	Toggle	E61-E63	

ALPHA-NUMERIC INDEX BY SERIES

SERIES	Page (s)	SERIES	Page (s)
G	E40 - E44	MSSA	E10
M	E53 - E57	MSSB	E10
MA	E11	MSTS	E22
MBT	E61 - E63	NK	E21
MHS	E23 - E26	PM	E58
MHSS	E12	SLA	E37 - E38
MMPS	E15	SLB	E27 - E34
MJS	E8 - E9	SLC	E35
MMS	E16 - E17	SLE	E38 - E39
MPS	E59	SLG	E36
MS	E13 - E15	25000N	E45 - E49
MSL	E60	TG	E18 - E20
MSS	E50 - E52	TG (SMT)	E4 - E7

DESIGNED EXCLUSIVELY FOR SURFACE MOUNTING

SMT TG Series switches incorporate many desireable features that include:

Tape & reel packaging

This type of packaging is recommended for:

economy

Е

- · suitability for automated placement
- handling of large quantities of components per packaging unit
- positive component positioning
- protection of terminals against damage during handling
- high static resistance

Reflow solderable

- High temperature plastic materials
- Tin plated grounding brackets
- Tin-lead alloy over nickel terminal plating
- Terminals turned outward to prevent the shadow effect in infrared soldering and to permit visual inspection of the solder joints
- .021" (0.55mm) air gap between p.c. board and switch case
- End stackable with .400" (10.16mm) pitch
- Available with positioning pins to assure correct switch orientation during the reflow process and provide additional mechanical integrity

Washable

Switches are designed to withstand cleaning processes, including hot water under pressure.

Surface mount devices (SMD) are subject to more stringent constraints of temperature, solderability, sealing and space savings than through-hole components.

To meet these requirements, APEM has designed a family of tiny surface mount switches that include TL Series toggle switches, TP Series pushbutton switches, TR Series rocker switches & TG Series slide switches. See toggle, pushbutton & rocker switch sections of catalog for TL, TP & TR Series respectively.



ELECTRICAL SPECIFICATIONS

Contact ratings (resistive lds.): 0.4 VA at 20 V max. (AC or DC)

Minimum load: 10 mA at 50 mV or 10µA at 5 VD

Initial contact resistance: 20 milliohms maximum 1000 M Ω min. at 500 VDC Insulation resistance:

Dielectric strength: 1000 V rms between terminals &

frame. 500 V rms between terminals

Electrical life (at full load): 2 position switches: 60,000 cycles

3 position switches: 30,000 cycles

Static resistance: 10 KV (Schaffner equipment)

GENERAL SPECIFICATIONS

Travel: .102" (2.60mm) -40°C to +85°C Operating temperature range:

Moisture resistance: 21 days per IEC 512-6 test 11c

Vibration resistance: 10-500 Hz/10g per IEC 512-4 test 6d

Shock resistance: 50 g per IEC 512-4 test 6c

MATERIALS

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

Case: High temperature plastic UL94V-0 Actuator: High temperature plastic UL94V-0 Grounding brackets: Tin plated steel (includes positioning

pins)

Contacts: Gold plated brass

Terminals: Brass with tin-lead alloy over nickel

plate

Terminal seal: **Epoxy**

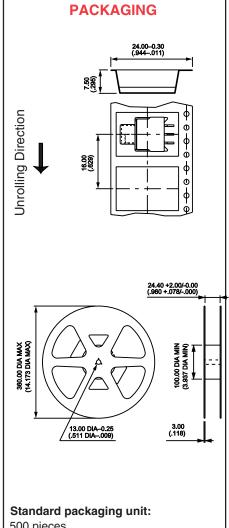
SOLDERING AND CLEANING

Reflow soldering: Infrared, vapor phase and infrared

convection

Washable: Per IEA-RS448-2: water and detergent -

preferred. Solvents.



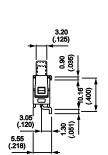
500 pieces

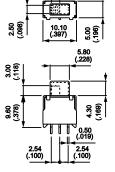
Tape meeting international standard IEC Publication 286-3 (EIA481A) Start leader: 15.7" (400mm) min.

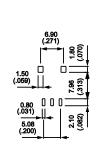
Single pole slide switches



| MODEL NO. | CIRCUIT | TG36WS80050 | ON - ON | TG39WS80050 | ON OFF ON |







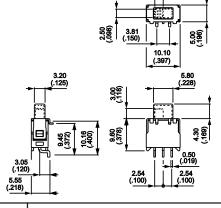
Single pole slide switches with positioning pins



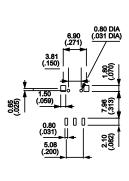
 MODEL NO.
 CIRCUIT

 TG36WS80065
 ON - ON

 TG39WS80065
 ON OFF ON

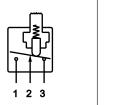


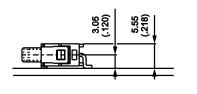
2.50 (.098)



SWITCH ACTION

P.C. BOARD DIMENSIONS





LED INDICATOR IN TINY PACKAGE

ELECTRICAL SPECIFICATIONS

Forward voltage: Red;

3.0 volts at 10 milliamps (2V typical)

Green;

3.0 volts at 20 milliamps (2.2V typical)

Yellow;

3.0 volts at 10 milliamps (2.1V typical)

Reverse voltage: 5.0 volts minimum

Viewing angle (total): 90°

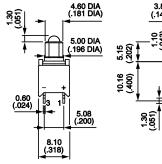
Wavelength: Red; 635 nm

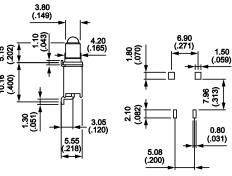
Green; 565 nm Yellow; 585 nm

PACKAGING Tape & reel



MODEL NO. COLOR
TV01WS00100 Red
TV02WS00100 Green
TV03WS00100 Yellow





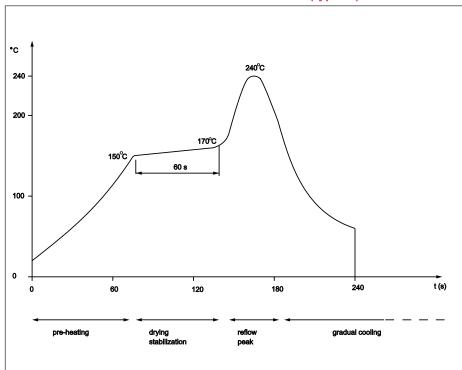
REFLOW SOLDERING - STANDARD PROFILE

The printed circuit board, carried by a conveyor belt, travels through the reflow soldering oven and experiences the following programmed cycles:

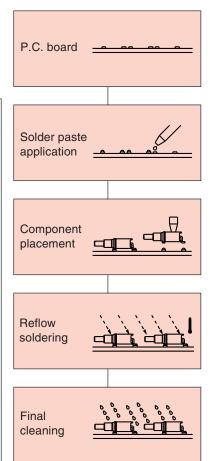
- a. pre-heat to a maximum of 200°C for 30 seconds
- b. reflow at a maximum of 245°C for 10 seconds
- c. final cleaning

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

TEMPERATURE/TIME PROFILE (typical)

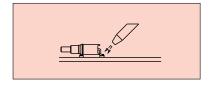


PROCESSING STEPS



P.C. BOARD REWORK RECOMMENDATIONS

Hot air reflow technique is preferred. Avoid the use of a soldering iron.



Caution: Excessive and/or repeated high temperature exposure may affect switch performance & reliability.

MJS Series

Microminiature Slide Switches

SPECIFICATIONS

Contact rating: 100 mA at 12 VDC

Initial contact resistance: 20 milliohms max.

Insulation resistance: 100 megohms min. at 500 VDC

Dielectric strength: 500 volts RMS at sea level

Electrical life: 10,000 cycles min.

Operating temperature range: -10°C to +60°C

Actuation force: 225g (average)

Solder heat resistance: 260°C max. for 5 seconds

Washing not recommended

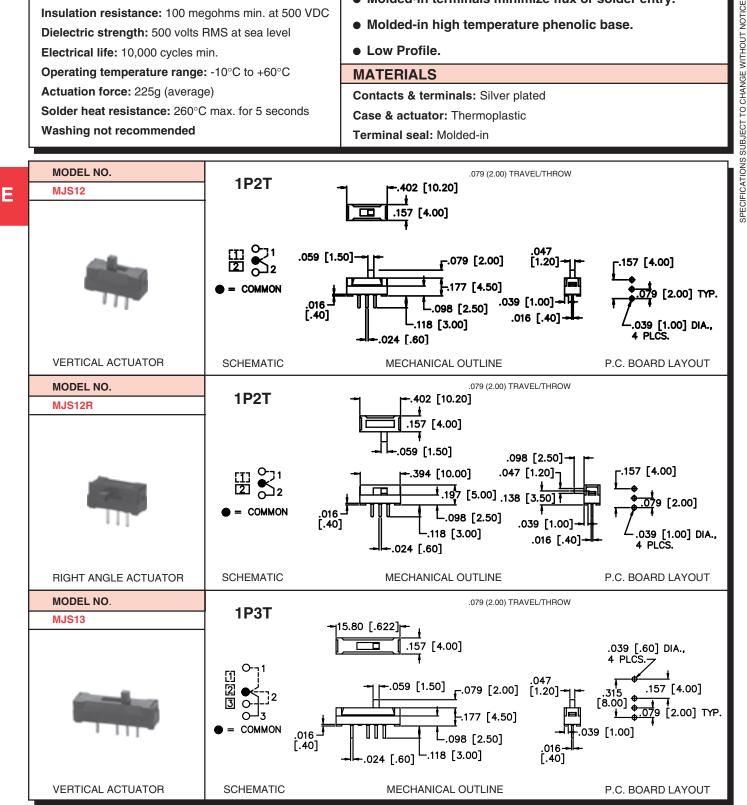
FEATURES

- Bifurcated wiping contact design.
- Molded-in terminals minimize flux or solder entry.
- Molded-in high temperature phenolic base.
- Low Profile.

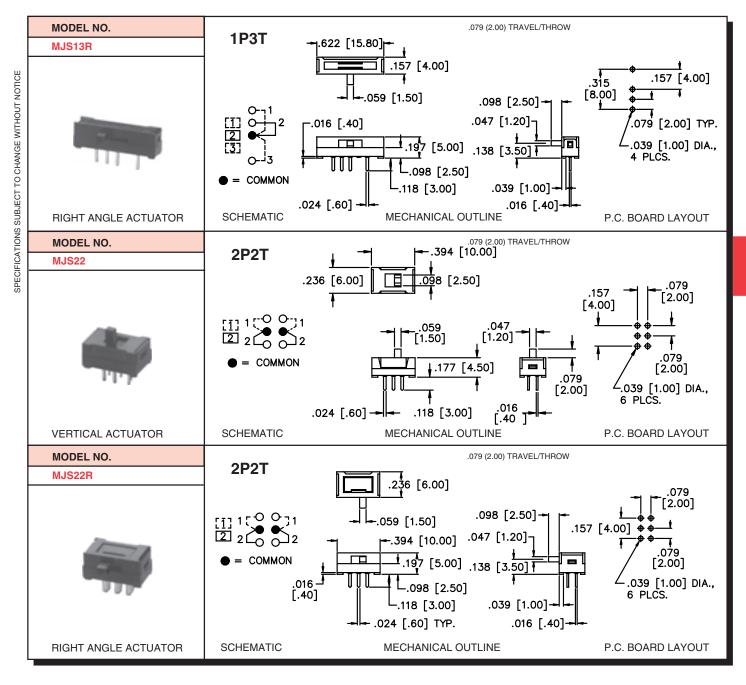
MATERIALS

Contacts & terminals: Silver plated Case & actuator: Thermoplastic

Terminal seal: Molded-in



MJS Series



MSSA & MSSB Series

Microminiature Slide Switches

SPECIFICATIONS **FEATURES** Contact ratings: Gold; 0.4 Volt-Amps (VA) max. at 20 V max. (AC or DC) Low Profile. Silver; 100 mA at 125 VAC or 30 VDC Epoxy sealed terminals. Initial contact resistance: 30 milliohms max. Cosmetic molded case. Insulation resistance: 100 megohms min. at 250 VDC Dielectric strength: 250 volts RMS at sea level Electrical life: 10,000 cycles min. **MATERIALS** Operating temperature range: -10°C to +60°C Contacts & terminals: Gold or silver available (see contact ratings) Actuation force: $250g \pm 150g$ Housing and Actuator: Thermoplastic Solder heat resistance: 260°C max. for 3 seconds Base: High temperature thermoplastic Terminal seal: Epoxy Washing not recommended MODEL NO. **PLATING** .098 (2.50) TRAVEL/THROW --|.354 [9.00]⊦ **2P2T** MSSA22 SILVER MSSA22G GOLD .217 [5.50] .079 [2.00] .098 [2.50] .079 [2.00] .157 [4.00] .197 [5.00] � .079 [2.00] .134 [3.40] П .035 [.90] DIA. .118 [3.00] 6 PLCS



VERTICAL ACTUATOR

Contact ratings: Gold; 0.4 Volt-Amps (VA) max. at 20 V max. (AC or DC)

Silver; 100 mA at 125 VAC or 30 VDC

SCHEMATIC

Initial contact resistance: 20 milliohms max.

Insulation resistance: 100 megohms min. at 250 VDC

Dielectric strength: 250 volts RMS at sea level

Electrical life: 10,000 cycles min.

Operating temperature range: -10°C to +60°C

Actuation force: $200g \pm 150g$

Solder heat resistance: 260°C max. for 3 seconds

Washing not recommended

MECHANICAL OUTLINE

FEATURES

.024 [.60]

• Bifurcated wiping contact design.

.016 [.40]

- Low Profile.
- Epoxy sealed terminals.

MATERIALS

Contacts & terminals: Gold or silver available (see contact ratings)

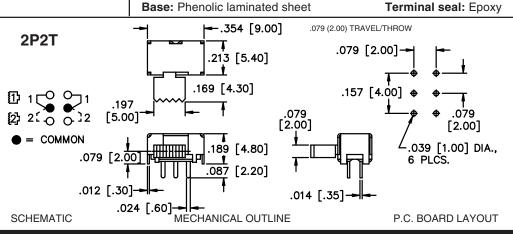
SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

P.C. BOARD LAYOUT

Housing: Tin plated steel Actuator: Thermoplastic

Base: Phenolic laminated sheet





MA Series

Microminiature Memory Card Slide Switches

SPECIFICATIONS FEATURES Contact rating: 300 mA at 4 VDC Ultra-compact size. Initial contact resistance: 70 milliohms max. Low Profile. Insulation resistance: 100 megohms min. at 100 VDC Dielectric strength: 100 VAC for 1 minute Surface mounting with restraining bosses. Electrical life: 10,000 cycles min. Reflow or hand solderable. Operating temperature range: -10°C to +60°C Actuation force: 200g ± 100g **MATERIALS** Solder heat resistance: Reflow - 260°C max. for 1 min. Contacts: Silver plated beryllium copper Manual - iron temperature Terminals: Silver plated brass 305 °C max. for 6 seconds. Base: Liquid crystal polymer Cover: Tin plated steel Washing not recommended Actuator: Liquid crystal polymer MODEL NO. .059 (1.50) TRAVEL/THROW .118 [3.00] **1P2T** MA12R .030 [0.75] .016 [0.40] .059 [1.50] .031 [0.80] 118 [3.00] 2X Ø.035 [0.90] .016 [0.40] .102 [2.60] .030 [0.75] .118 [3.00] -.051 [1.30] 1.50] .043 [1.10] .059 [1.50] COMMON .020 .028 [0.70] .039 [1.00] .055 1.40 .039 [1.00] -.098 [2.50] **-**.035 [0.90] .020 [0.50] .026 ø.031 [0.80] .118 [3.00]-RIGHT ANGLE ACTUATOR **SCHEMATIC** MECHANICAL OUTLINE P.C. BOARD LAYOUT MODEL NO. .059 (1.50) TRAVEL/THROW **1P3T** MA13R .118 [3.00] .031 [0.80] 2X Ø.035 [0.90] .059 [1.50] TYP. New! .016 [0.40] [5.00] [2]0-]2 -.051 [1.30] [11.30] .043 [1.10] .028 [0.70] = COMMON 382 [9.70] .020 039 [0.50] 055 .039 [1.00] .035 [0.90] .020 [0.50] .026 [0.65] ø.031 [0.80] .197 [5.00] MECHANICAL OUTLINE RIGHT ANGLE ACTUATOR SCHEMATIC P.C. BOARD LAYOUT MODEL NO. MA12R/TR 12.99 [330.00] MA13R/TR ø.059 .102 57 [4.00] Same as above models except [ø1.50] [2.60] .069 [1.75] supplied on tape & reel as shown. 0 0 Ò 0 Model No. Dim. A Dim. B Dim. C MA12RTR .630 (16.0) .217 (5.5) .646 (16.4) .315 [8.00] MA13R/TR .945 (24.0) .453 (11.5) .960 (24.4) C.

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

CARRIER TAPE

REEL DIMENSIONS

Microminiature Slide Switches

SPECIFICATIONS FEATURES Excellent tactile feed-back (detent action). Contact ratings: 300 mA at 6 VDC Molded-in terminals minimize flux or solder entry. Initial contact resistance: 60 milliohms max. Insulation resistance: 100 megohms min. at 100 VDC Ultra-compact case size. Dielectric strength: 100 VAC for 1 minute Low profile. Electrical life: 5000 cycles min. **MATERIALS** Operating temperature range: -20°C to +70°C Contacts & terminals: Silver plated Solder heat resistance: 350°C max. for 3 seconds Case: 30% Glass filled nylon, type 6/6, black Washing not recommended Actuator: Nylon, type 6/6, black (blue for MHSS2220 only) MODEL NO. .079 (2.00) TRAVEL/THROW .335 [8.50] **1P2T** MHSS1104 -.079 [2.00] .079 [2.00] .138 [3.50] COMMON .031 [.80] DIA. .118 [3.00] .020 [.50] -.012 [.30] VERTICAL ACTUATOR **SCHEMATIC** MECHANICAL OUTLINE P.C. BOARD LAYOUT .079 (2.00) TRAVEL/THROW MODEL NO. .020 [.50] .335 [8.50] **1P2T** MHSS1105 .138 [3.50] .197 [5.00] .150 [3.80] .020 [.50] .079 079 .031 [.80] DIA., [2.00] [2.00] 3 PLCS. .079 [2.00] .138 [3.50] .012 [.30] RIGHT ANGLE ACTUATOR **SCHEMATIC** MECHANICAL OUTLINE P.C. BOARD LAYOUT .079 (2.00) TRAVEL/THROW MODEL NO. .354 [9.00] **2P2T** MHSS2220 .138 [3.50] .079 [2.00] .059 [1.50] COMMON .138 [3.50] .031 [.80] DIA. 6 PLCS. .118 [3.00]

SCHEMATIC

.024 [0.60]

MECHANICAL OUTLINE

.012 [.30]

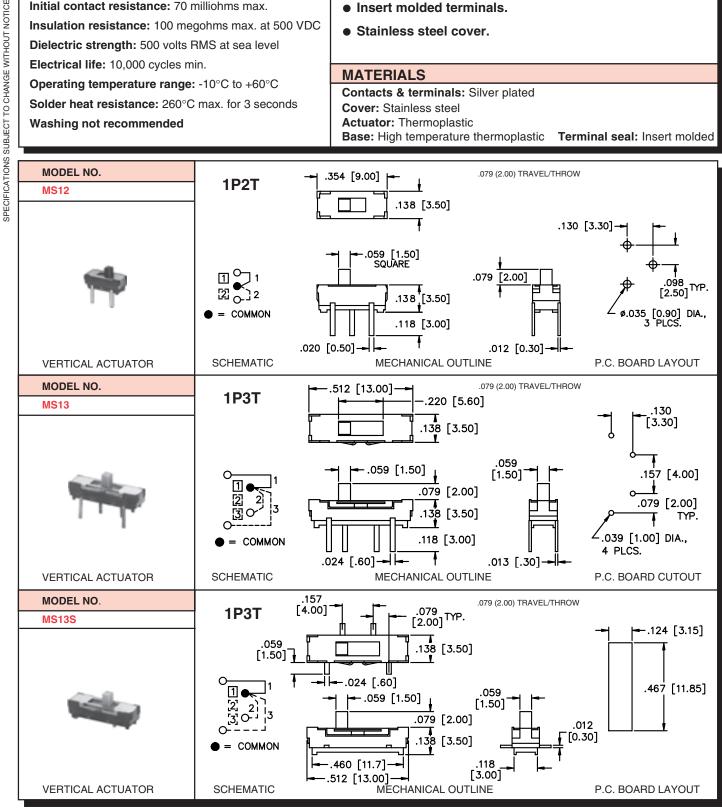
P.C. BOARD LAYOUT

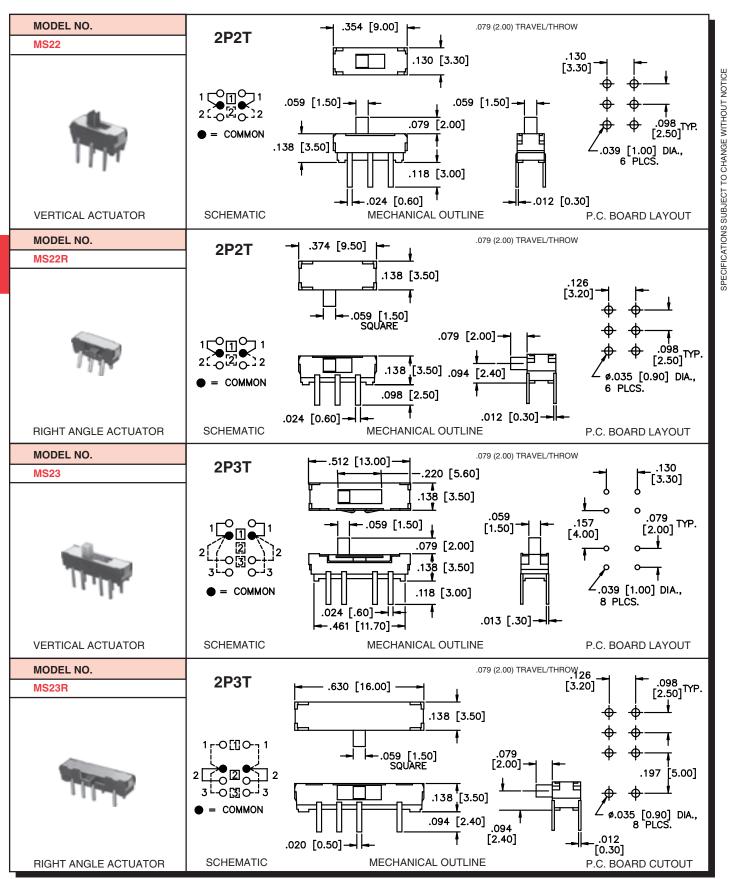
RIGHT ANGLE ACTUATOR

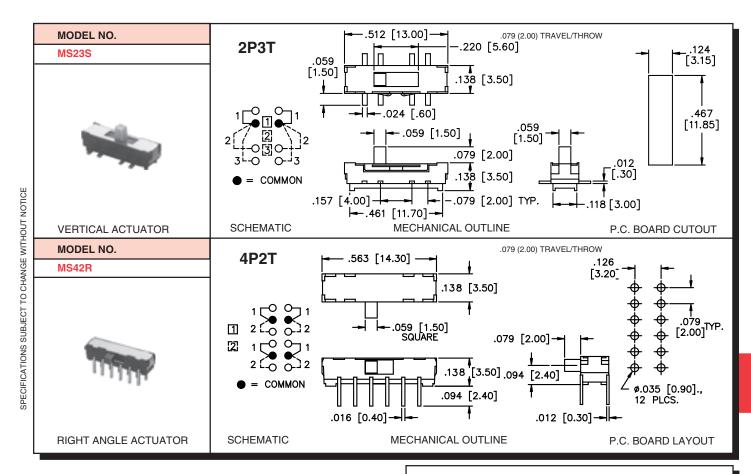
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Microminiature Slide Switches

SPECIFICATIONS FEATURES Contact rating: 300 mA at 6 VDC Low profile. Initial contact resistance: 70 milliohms max. Insert molded terminals. Insulation resistance: 100 megohms max. at 500 VDC Stainless steel cover. Dielectric strength: 500 volts RMS at sea level Electrical life: 10,000 cycles min. **MATERIALS** Operating temperature range: -10°C to +60°C Contacts & terminals: Silver plated Solder heat resistance: 260°C max. for 3 seconds Cover: Stainless steel Washing not recommended Actuator: Thermoplastic



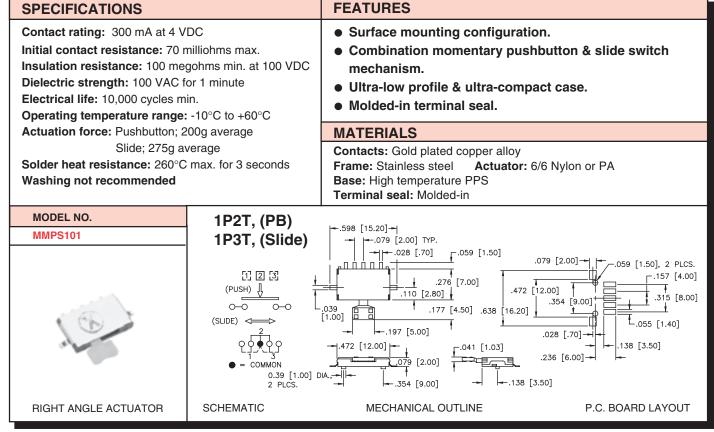




New!

MMPS Series

Microminiature Pushbutton Style Slide Switches



Insulation resistance: 100 megohms min. at 500 VDC

Dielectric strength: 500 volts RMS for 1 minute

Electrical life: 10,000 cycles min.

Operating temperature range: -20°C to +70°C

Solder heat resistance: 255°C max. for 5 seconds max.

Washing not recommended

MMS22R

MMS23R

Е

FEATURES

- Bifurcated wiping contact design.
- Low Profile.
- Epoxy sealed terminals.
- Cosmetic molded case.

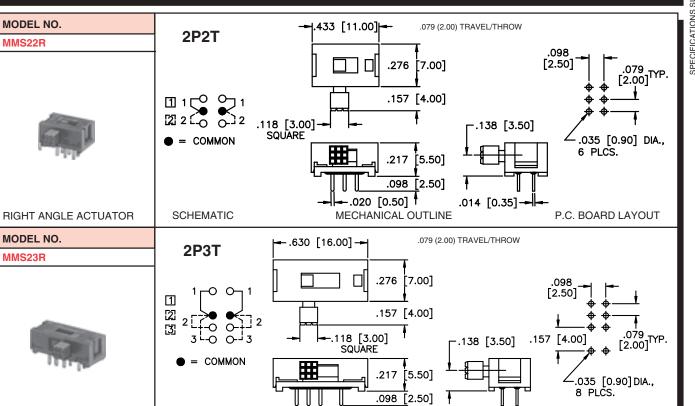
MATERIALS

Contacts & terminals: Silver plated

Case: Polyacetal

Actuator: PBT Base: Glass filled PBT

Terminal seal: Epoxy or phenol resin



RIGHT ANGLE ACTUATOR

MODEL NO.

MMS42R



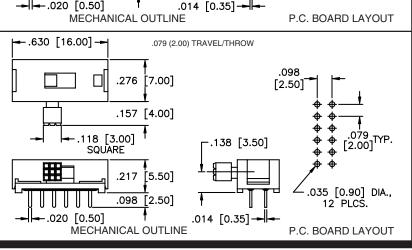
RIGHT ANGLE ACTUATOR

COMMON

SCHEMATIC

4P2T

SCHEMATIC

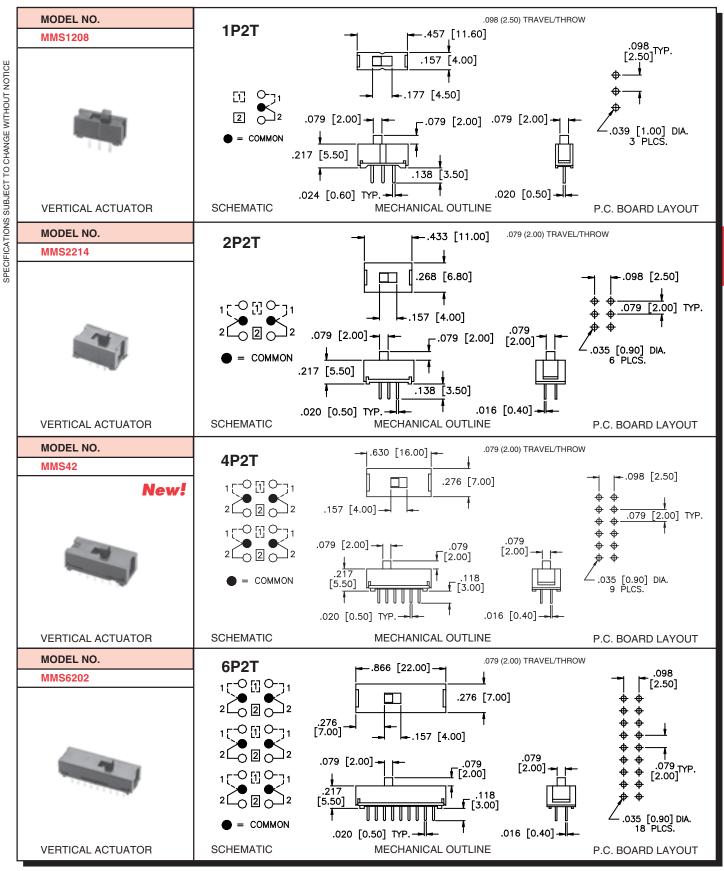


SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

-.020

[0.50]

MMS Series



E

TG Series

Microminiature Slide Switches

SPECIFICATIONS

Contact ratings: Gold; 0.4 Volt-Amps max. at 20 V max.

Silver; 500 mA at 48 V max. (AC or DC) Initial contact resistance: 20 milliohms max.

Insulation resistance: 1000 megohms min. at 500 VDC Dielectric strength: 1000 V rms min. between terms.

and ground plate (and bracket)

Electrical life: 2 position switches-60,000 cycles min.

Washing: Permissible (with model option 50)

3 position switches-30,000 cycles min. Operating temperature range: -30°C to +85°C Solder heat resistance: 260°C for 5 seconds max.

FEATURES

- Ultra-compact case size.
- Washable models.
- SPDT maintained action with long electrical life.
- See additional options on pg. E20.

MATERIALS

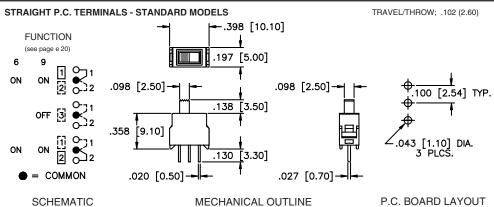
Contacts & terminals: Gold or silver available (see contact ratings)

Actuator: Thermoplastic

Ground plate & bracket: Tin plated steel

Case: Flame retardant thermoplastic Terminal seal: Epoxy Washable seal: Translucent silicone rubber (with model option 50)

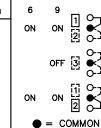




.398 [10.10]





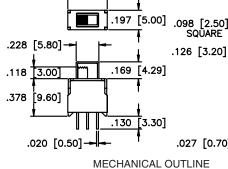


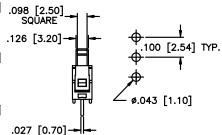
(see page e 20)

SCHEMATIC

FUNCTION

STRAIGHT P.C. TERMINALS - WASHABLE MODELS





TRAVEL/THROW; .102 (2.60)

P.C. BOARD LAYOUT

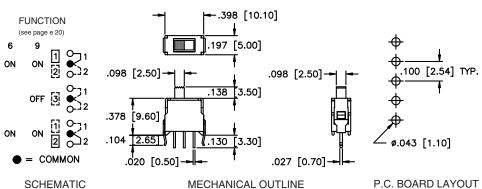
TRAVEL/THROW; .102 (2.60)

PROCESS COMPATIBLE

MODEL NO.	PLATING	ACTION
TG36Y000000	Gold	on - on
TG39Y000000	Gold	on off on
TG36Y010000	Silver	on - on
TG39Y010000	Silver	on off on

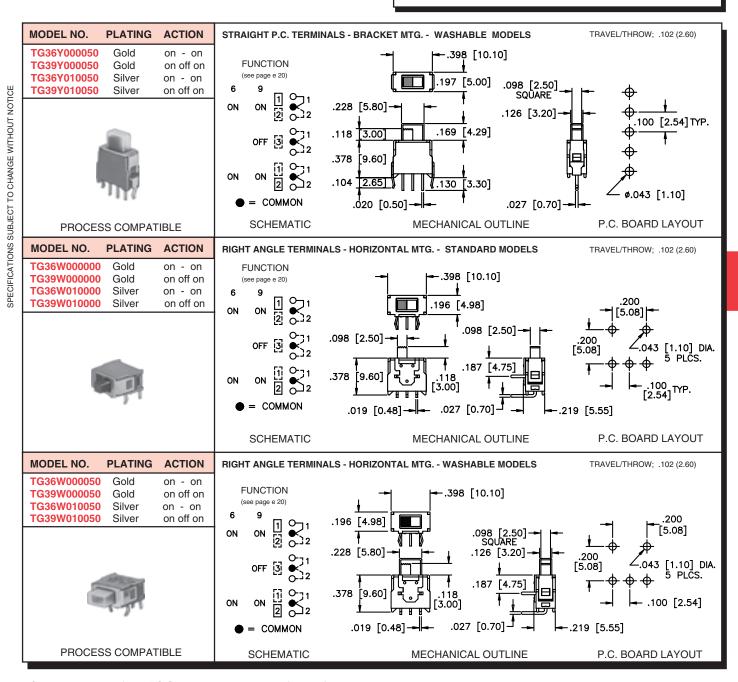


STRAIGHT P.C. TERMINALS - BRACKET MTG. - STANDARD MODELS



TG Series

Microminiature Slide Switches



General tolerances for all TG Series drawings - \pm .012" (0.3 mm)

Ε

TG Series

Microminiature Slide Switches

Additional ordering information: Commonly ordered models are shown on preceeding pages with complete model numbers and specifications. Below is an order format that enables you to 'build your own switch' and specify the correct switch model number by simply selecting from all available options shown and filling in the boxes.

'BUILD YOUR OWN SWITCH' ORDER FORMAT

Fill in boxes shown with options selected from below. Allowable options for each box are shown under each respective box.

	Contact &							
Series	Poles	Function	Terms.	Term. Mat'l.	Actuator	Model		
T G	3	6	P 0	0	0 0	0 0		
		9	Y 0	1	1 0	5 0		
			W 0	3				
			M W	8				
				9				

Poles: 3 = Single Pole

Functions: 6 = ON - ON 9 = ON OFF ON

Terminals: P 0 = Straight printed circuit terminals

Y 0 = Straight printed circuit terminals, bracket mtg.

W 0 = Right angle printed circuit terminals, horizontal mtg. with bracket

M W = Wirewrap terminals

Contact & terminal materials: 0 = Brass, gold plated (standard)

1 = Brass, silver plated

3 = Brass, gold plated (1.27 microns gold)

8 = Brass contacts, gold plated and tin plated terminals

9 = Brass contacts, gold plated (1.27 microns gold) and tin plated terminals

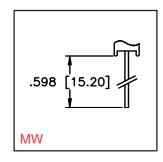
Actuators: 0 0 = High (standard)

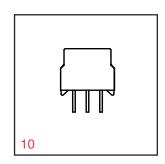
1 0 = Flush

Model: 0 0 = Standard

5 0 = Washable

Options MW (wirewrap terminals) and 10 (flush actuator)







NK Series

Microminiature Slide Switches

SPECIFICATIONS

Contact rating: 500 mA 12V max. - 1mA 10 mV min. Initial contact resistance: 20 milliohms max. Insulation resistance: 10,000 M Ω min. at 500VDC Dielectric strength: 250 Vrms between terminals

2000 Vrms between adjacent poles

placed side by side

Electrical life: 2,000 cycles min.

Operating temperature range: -40°C to +85°C Solder heat resistance: 250°C max. for 5 seconds

Washing not recommended

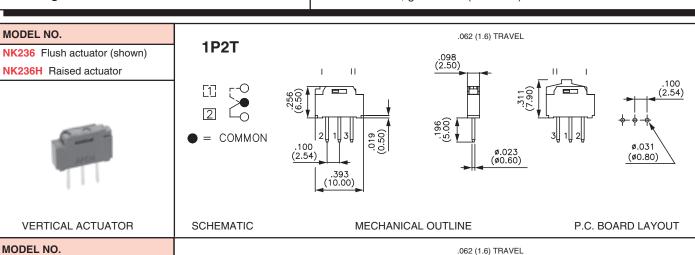
FEATURES

- Cost effective.
- Flush or raised actuator.
- Wave solderable, flux sealed.
- Through-hole round terminals, straight or right angle.
- Stackable in X & Y directions (with straight terminals).

MATERIALS

Contacts & terminals: Gold over nickel plated

Case: PBT, glass filled (UL94V-0) Actuator: PBT, glass filled (UL94V-0)



MODEL NO.

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

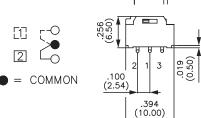
NK236W Flush actuator

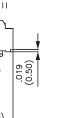
NK236WH Raised actuator (shown)



RIGHT ANGLE TERMINALS

1P2T





.098 (2.50) .146 (3.70)

P.C. BOARD LAYOUT

ø.0.31

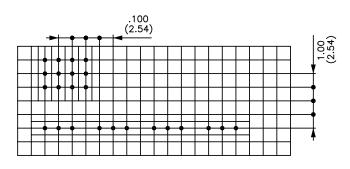
100

(2.54)

EXAMPLE OF PRINTED CIRCUIT BOARD LAYOUT FOR STACKING UNITS

SCHEMATIC

Pitch = .100" (2.54mm)



MECHANICAL OUTLINE

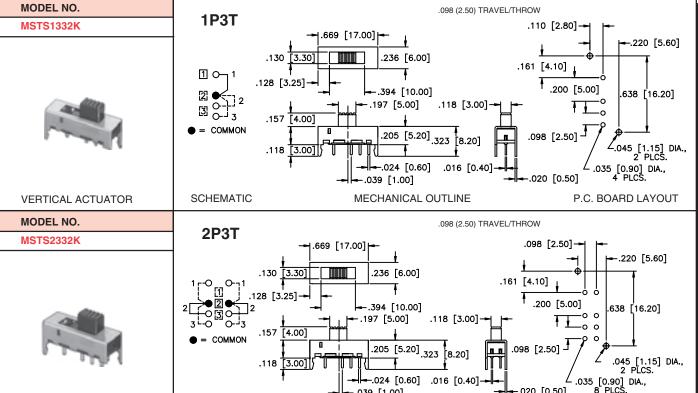
MSTS Series

Miniature Slide Switches

SPECIFICATIONS FEATURES Contact rating: 300 mA at 28 VDC • Miniature compact size. • Wash-through open frame construction. Initial contact resistance: 20 milliohms max. • Snap-in p.c. mounting bracket design. Insulation resistance: 100 megohms min. at 500 VDC Positive spring loaded ball detent mechanism. Dielectric strength: 500 VAC for 1 minute Epoxy sealed terminals. Electrical life: 10,000 cycles min. • Gold plated contacts available - consult factory. Operating temperature range: -20°C to +85°C **MATERIALS** Solder heat resistance: 250°C max. for 5 seconds

Actuation force: 200-600 grams Solvent washing permissible

Contacts & terminals: Silver plated brass Housing: Zinc plated steel **Actuator:** Polyacetal, color black Base: Phenolic laminated sheet Terminal seal: Epoxy .098 (2.50) TRAVEL/THROW **1P3T** .110 [2.80] .669 [17.00] .220 [5.60] .236 [6.00] .130 [3.30] .161 [4.10] .128 [3.25] .200 [5.00] .394 [10.00] .638 [16.20]



Miniature Slide Switches

with aluminum actuator

SPECIFICATIONS

Contact rating: 300 mA at 30 VDC

Initial contact resistance: 20 milliohms max.

Insulation resistance: 100 megohms min. at 500 VDC

Dielectric strength: 500 VAC for 1 minute

Electrical life: 10,000 cycles min.

Operating temperature range: -20°C to +85°C Solder heat resistance: 260°C max. for 3 seconds

Actuation force: 250 ±150 grams Solvent washing permissible

FEATURES

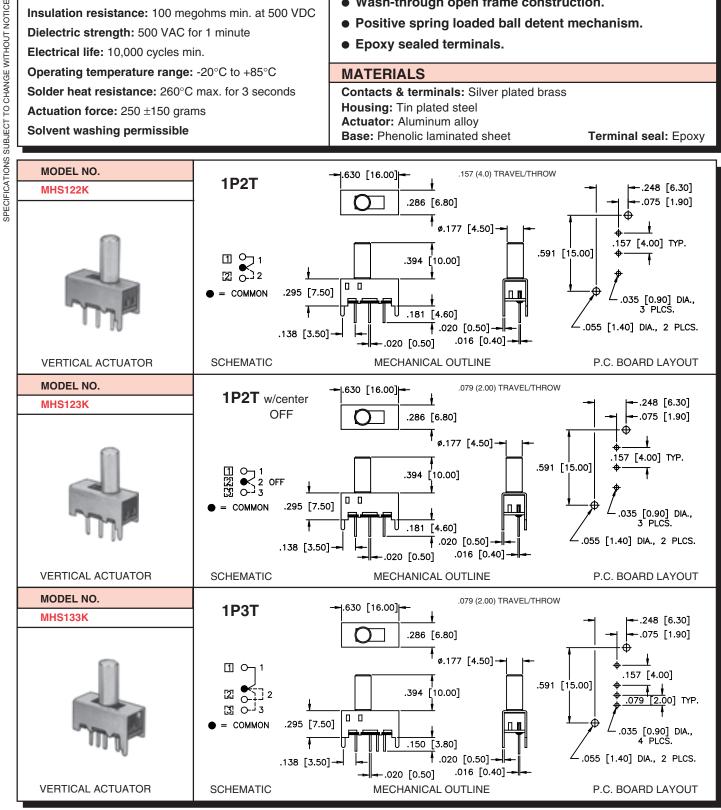
- Miniature compact size.
- Wash-through open frame construction.
- Positive spring loaded ball detent mechanism.
- Epoxy sealed terminals.

MATERIALS

Contacts & terminals: Silver plated brass

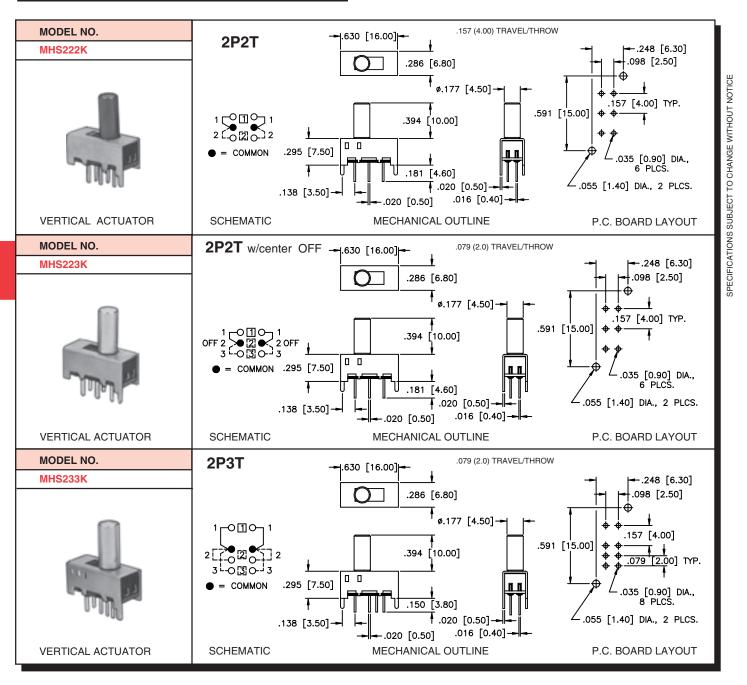
Housing: Tin plated steel Actuator: Aluminum alloy Base: Phenolic laminated sheet

Terminal seal: Epoxy



Miniature Slide Switches

with aluminum actuator





Miniature Slide Switches

FEATURES SPECIFICATIONS

Contact rating: 300 mA at 30 VDC

Initial contact resistance: 20 milliohms max.

Insulation resistance: 100 megohms min. at 500 VDC

Dielectric strength: 500 VAC for 1 minute

Electrical life: 10,000 cycles min.

Operating temperature range: -20°C to +85°C Solder heat resistance: 260°C max. for 3 seconds

Actuation force: 250 ±150 grams Solvent washing permissible

Miniature compact size.

Wash-through open frame construction.

• Positive spring loaded ball detent mechanism.

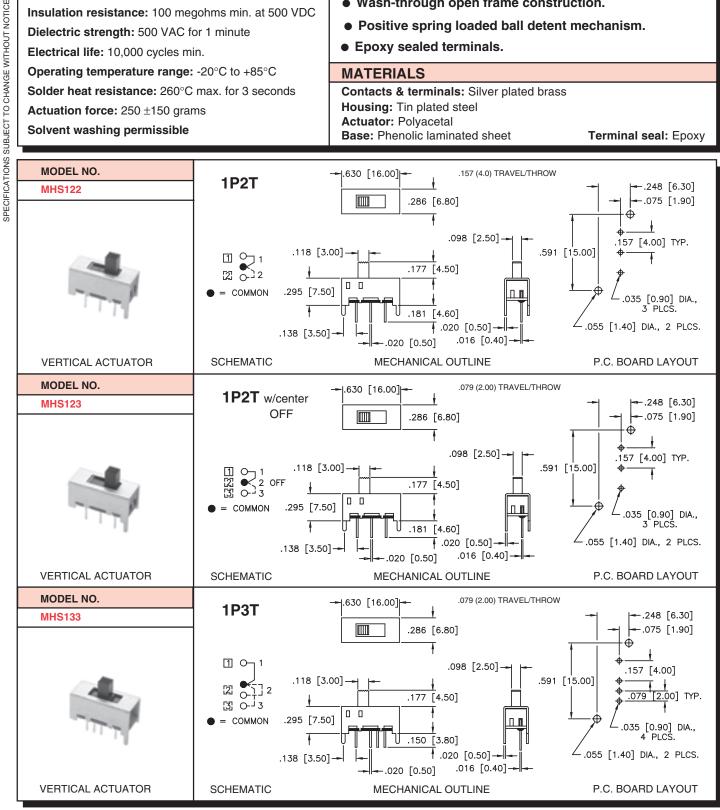
Epoxy sealed terminals.

MATERIALS

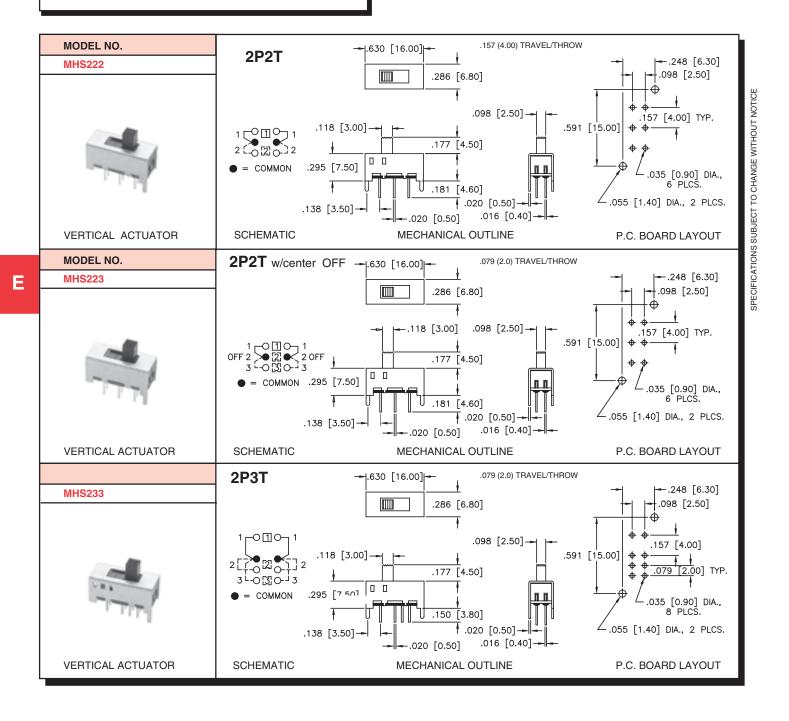
Contacts & terminals: Silver plated brass

Housing: Tin plated steel Actuator: Polyacetal

Base: Phenolic laminated sheet Terminal seal: Epoxy







(with p.c. board stand-off bracket)

Miniature Slide Switches

SPECIFICATIONS

Contact ratings: 300 mA at 125 VAC or 30 VDC Initial contact resistance: 20 milliohms max.

Insulation resistance: 100 megohms min. at 500 VDC

Dielectric strength: 500 volts RMS for 1 minute

Electrical life: 10,000 cycles min.

Operating temperature range: -20°C to +85°C

Actuation force: 220g ± 100g

Solder heat resistance: 260°C max. for 3 seconds

Solvent washing permissible

FEATURES

- Miniature compact size.
- Wash-through open frame construction.
- Positive spring loaded ball detent mechanism.
- Epoxy sealed terminals.

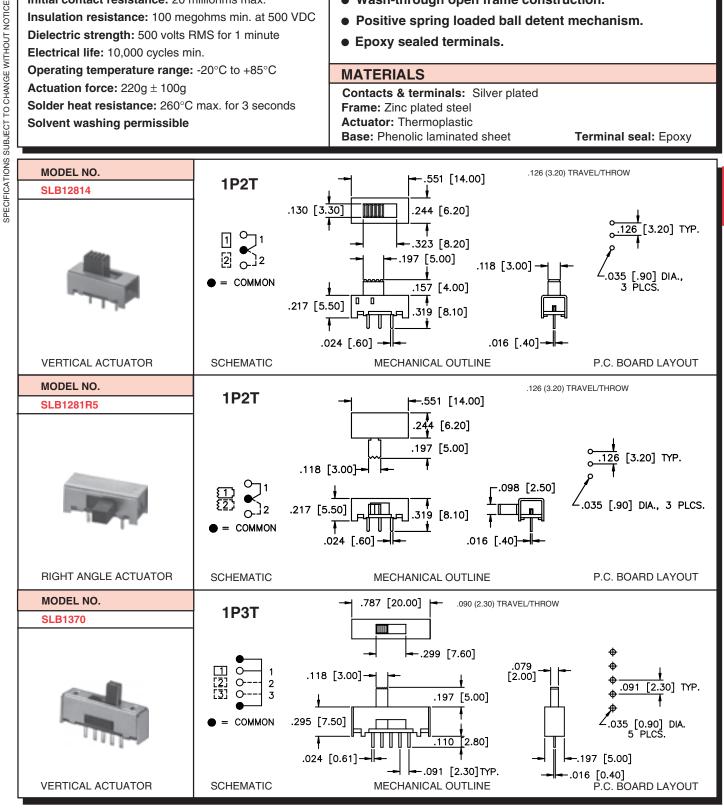
MATERIALS

Contacts & terminals: Silver plated

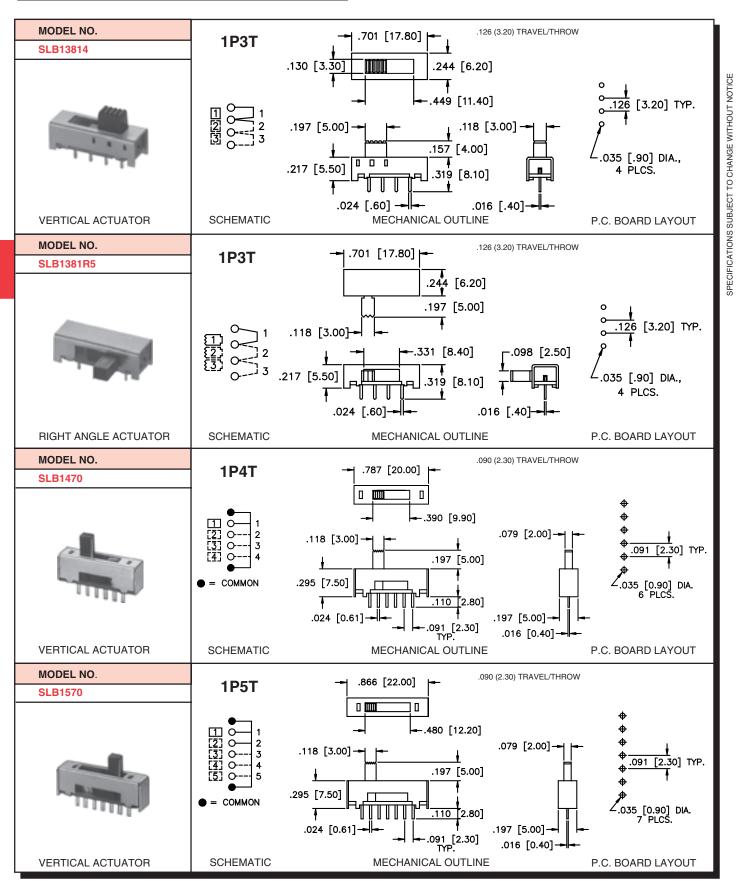
Frame: Zinc plated steel Actuator: Thermoplastic

Base: Phenolic laminated sheet

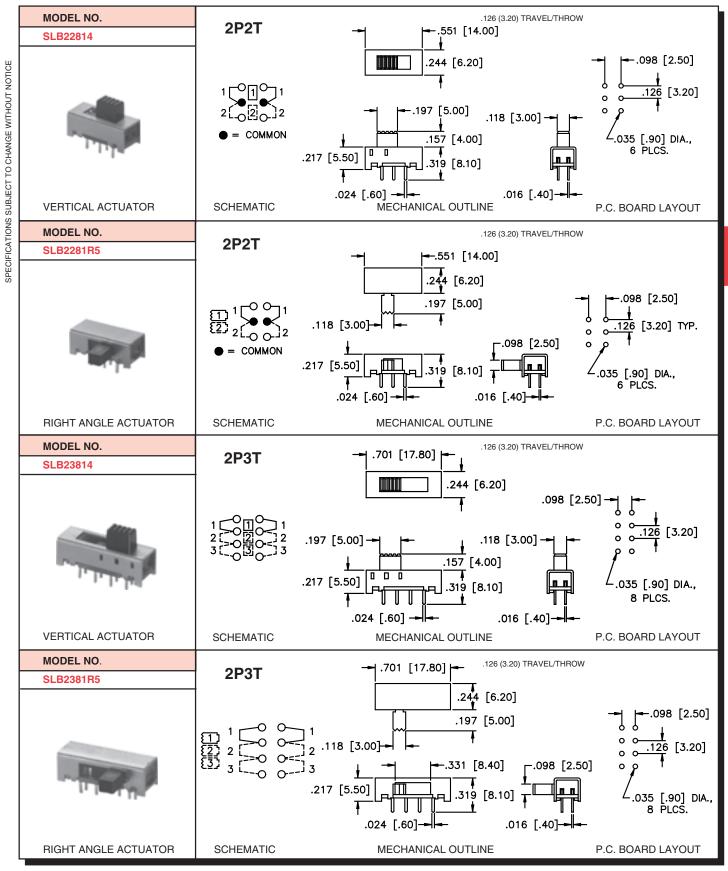
Terminal seal: Epoxy



(with p.c. board stand-off bracket)



(with p.c. board stand-off bracket)



Miniature Slide Switches

SPECIFICATIONS

Contact ratings: 300 mA at 125 VAC or 30 VDC Initial contact resistance: 20 milliohms max.

Insulation resistance: 100 megohms min. at 500 VDC

Dielectric strength: 500 volts RMS for 1 minute

Electrical life: 10,000 cycles min.

Operating temperature range: -20°C to +85°C

Actuation force: $220g \pm 100g$

Solder heat resistance: 260°C max. for 3 seconds

Solvent washing permissible

Е

FEATURES

- Miniature compact size.
- Wash-through open frame construction.
- Positive spring loaded ball detent mechanism.
- Epoxy sealed terminals.

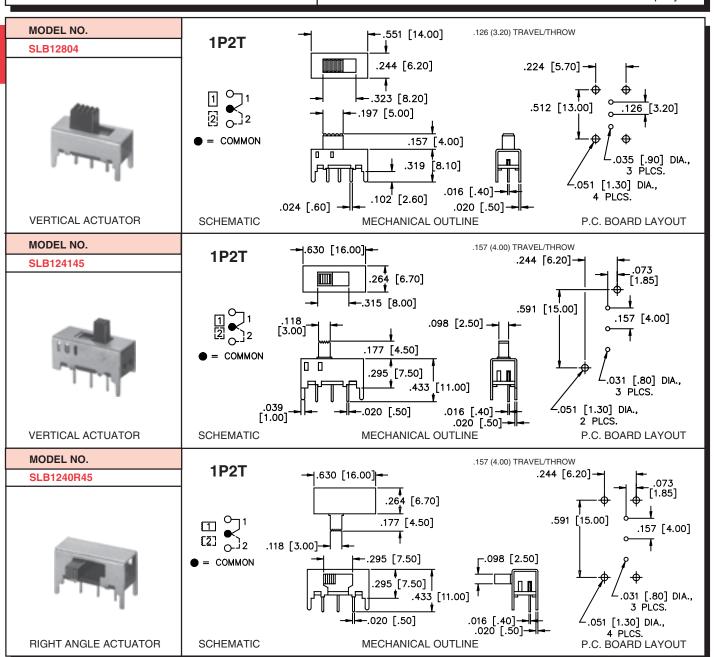
MATERIALS

Contacts & terminals: Silver plated

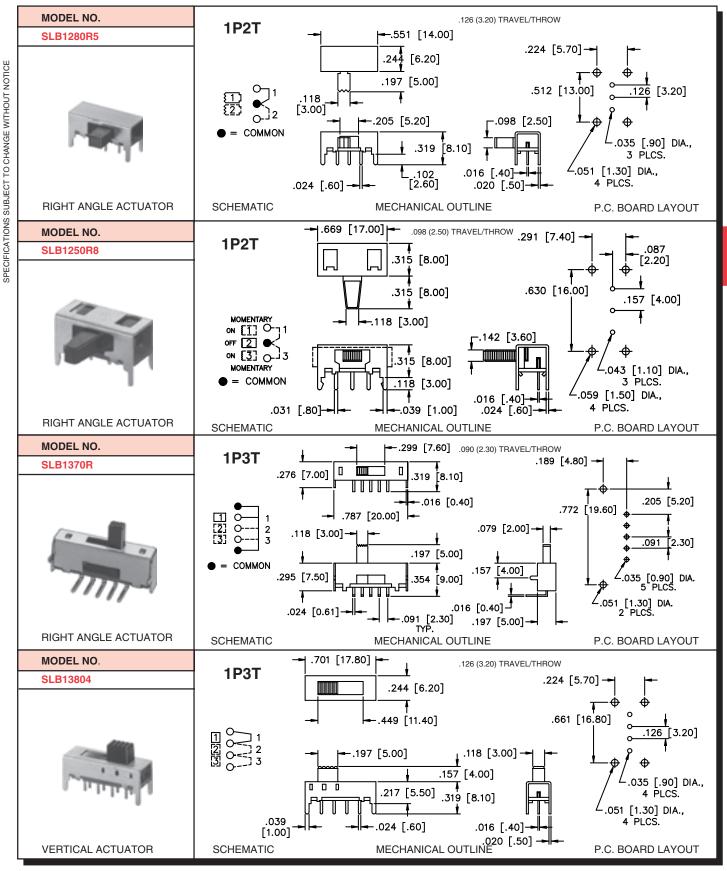
Frame: Zinc plated steel Actuator: Thermoplastic

Base: Phenolic laminated sheet

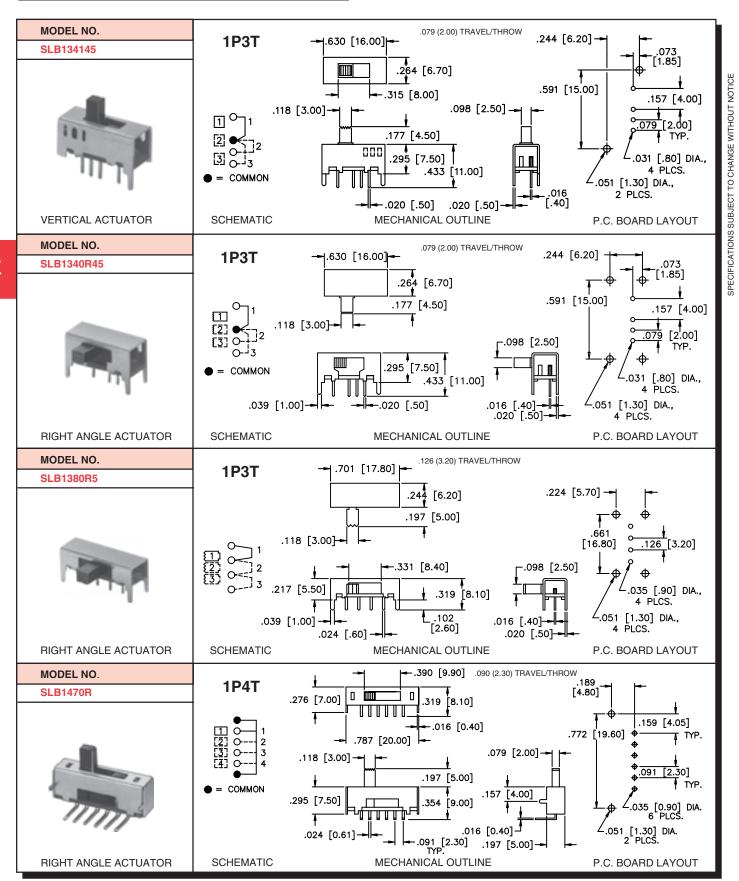
Terminal seal: Epoxy



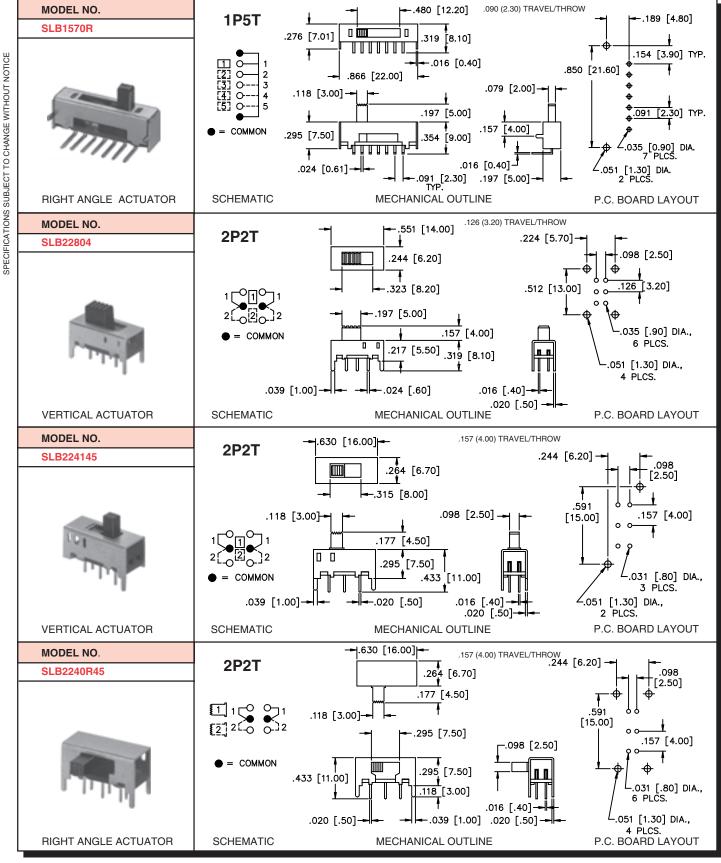
(with thru- p.c. board hole mounting bracket)



(with thru-p.c. board hole mounting bracket)

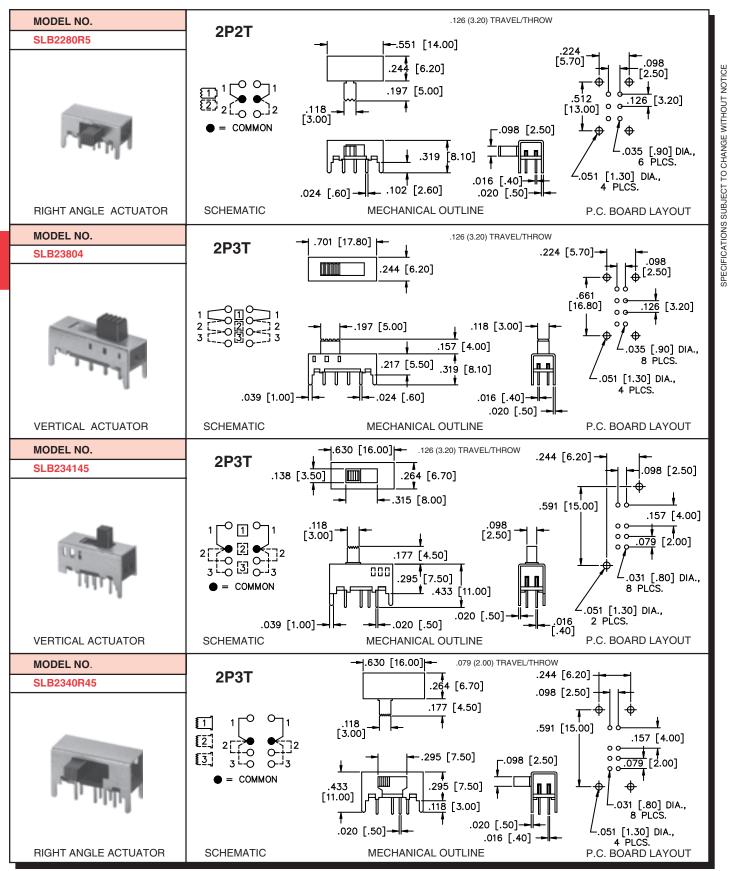


(with thru-p.c. board hole mounting bracket)



(with thru-p.c. board hole mounting bracket)

Miniature Slide Switches



Е

SLC Series

Miniature Slide Switches

SPECIFICATIONS

Contact ratings: 300 mA at 125 VAC or 30 VDC Initial contact resistance: 20 milliohms max.

Insulation resistance: 100 megohms min. at 500 VDC

Dielectric strength: 500 volts RMS for 1 minute

Electrical life: 10,000 cycles min.

Operating temperature range: -20°C to +85°C

Actuation force: 220g ± 100g

Solder heat resistance: 260°C max. for 3 seconds

Solvent washing permissible

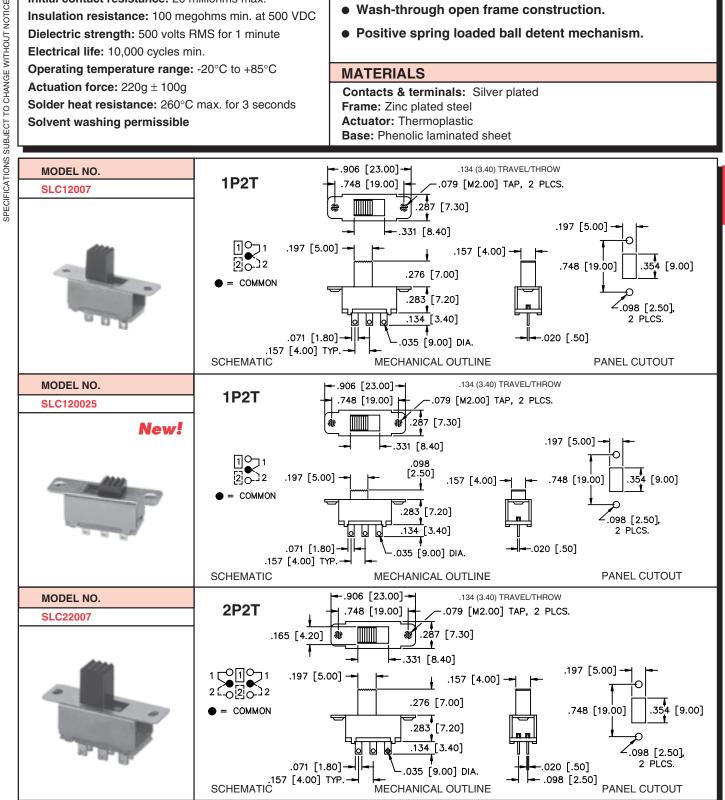
FEATURES

- Panel mounting with solder lug terminals.
- Wash-through open frame construction.
- Positive spring loaded ball detent mechanism.

MATERIALS

Contacts & terminals: Silver plated

Frame: Zinc plated steel Actuator: Thermoplastic Base: Phenolic laminated sheet



SLG Series

Miniature Slide Switches

SPECIFICATIONS

Contact ratings: 300 mA at 125 VAC or 30 VDC **Initial contact resistance:** 20 milliohms max.

Insulation resistance: 100 megohms min. at 500 VDC **Dielectric strength:** 500 volts RMS for 1 minute

Electrical life: 10,000 cycles min.

Operating temperature range: -20°C to +85°C

Actuation force: $200g \pm 75g$

Solder heat resistance: 260°C max. for 3 seconds

Solvent washing permissible

FEATURES

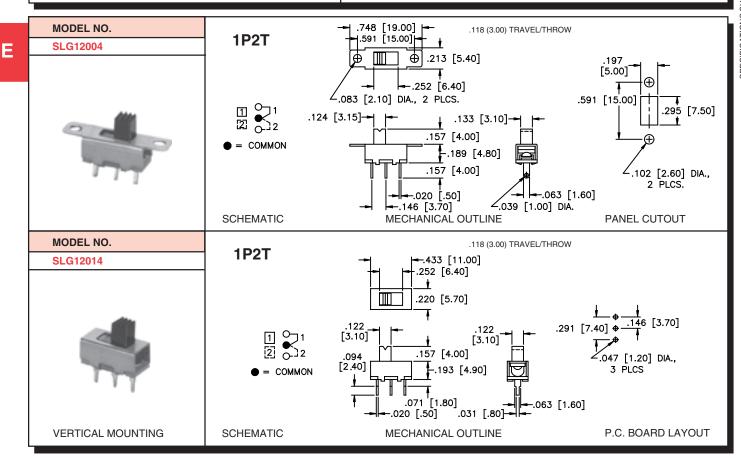
- Wash-through open frame construction.
- Panel and p.c. mounting models.
- Positive spring loaded ball detent mechanism.

MATERIALS

Contacts & terminals: Silver plated

Frame: Zinc plated steel
Actuator: Thermoplastic

Base: Phenolic laminated sheet



SLA Series

Miniature Slide Switches

SPECIFICATIONS FEATURES

Contact ratings: 500 mA at 125 VAC Initial contact resistance: 20 milliohms max.

Insulation resistance: 100 megohms min. at 500 VDC

Dielectric strength: 500 volts RMS for 1 minute

Electrical life: 10,000 cycles min.

Operating temperature range: -20°C to +85°C

Actuation force: $350g \pm 200g$

Solder heat resistance: 260°C max. for 3 seconds

Solvent washing permissible

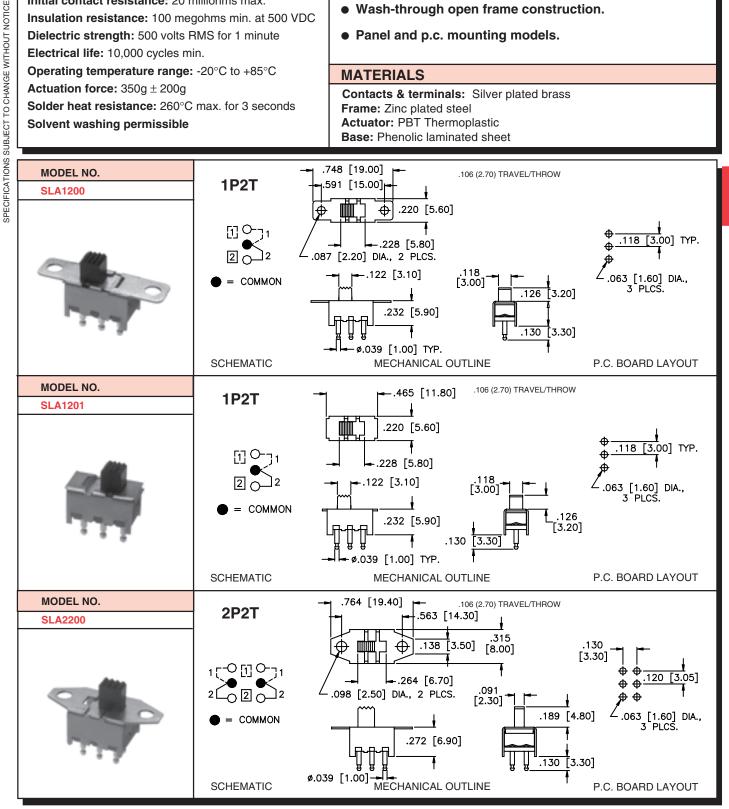
Miniature compact size.

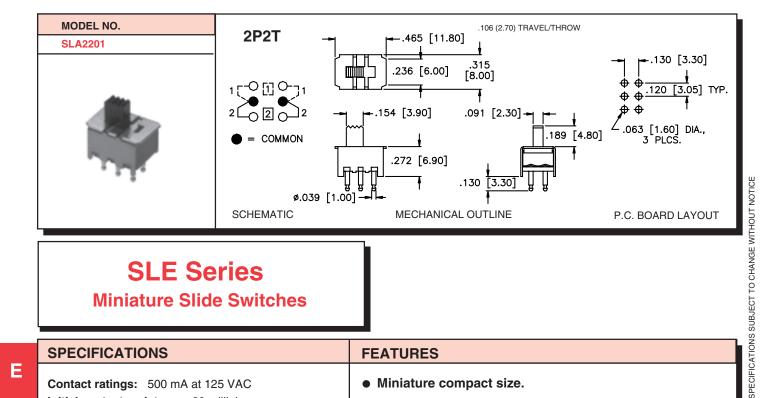
- Wash-through open frame construction.
- Panel and p.c. mounting models.

MATERIALS

Contacts & terminals: Silver plated brass

Frame: Zinc plated steel Actuator: PBT Thermoplastic Base: Phenolic laminated sheet





SLE Series Miniature Slide Switches

SPECIFICATIONS

Contact ratings: 500 mA at 125 VAC Initial contact resistance: 20 milliohms max.

Insulation resistance: 100 megohms min. at 500 VDC

Dielectric strength: 500 volts RMS for 1 minute

Electrical life: 10,000 cycles min.

Operating temperature range: -20°C to +85°C

Actuation force: $350g \pm 200g$

Solder heat resistance: 260°C max. for 3 seconds

Solvent washing permissible

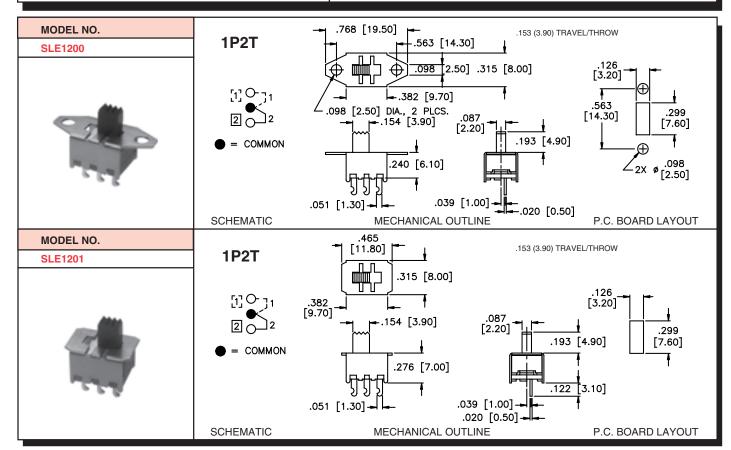
FEATURES

- Miniature compact size.
- Wash-through open frame construction.
- Panel and p.c. mounting models.

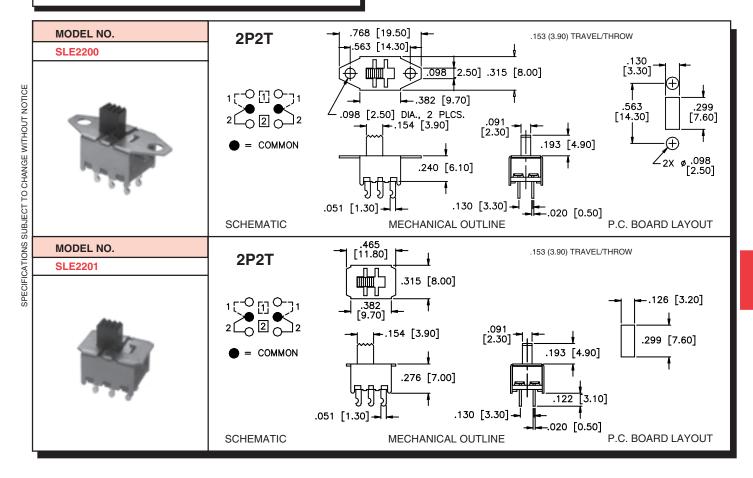
MATERIALS

Contacts & terminals: Silver plated brass

Frame: Zinc plated steel **Actuator:** PBT Thermoplastic Base: Phenolic laminated sheet



SLE Series



Instrument Grade Miniature Slide Switches

SPECIFICATIONS

Contact ratings:

Ε

Gold; 0.4 Volt-Amps (VA) max. at 20 V max. (AC or DC) Silver; 4 A at 125 VAC,2 A at 250 VAC or 3 A at 30 VDC

Initial contact resistance: 10 milliohms max.
Insulation resistance: 1000 megohms min.
Dielectric strength: 1000 V rms min.

Electrical life w/resistive load: Gold; 60,000 cycles min.

Silver; 2 pos. - 40,000 cycles, 3 pos. - 20,000 cycles Operating temperature range: -30°C to +85°C Solder heat resistance: 300°C max. for 5 seconds

Washing not recommended

FEATURES

- Epoxy sealed terminals.
- Break-before-make contact action.
- SPDT and DPDT models with long electrical life.
- Many additional models & options available (see page E44).

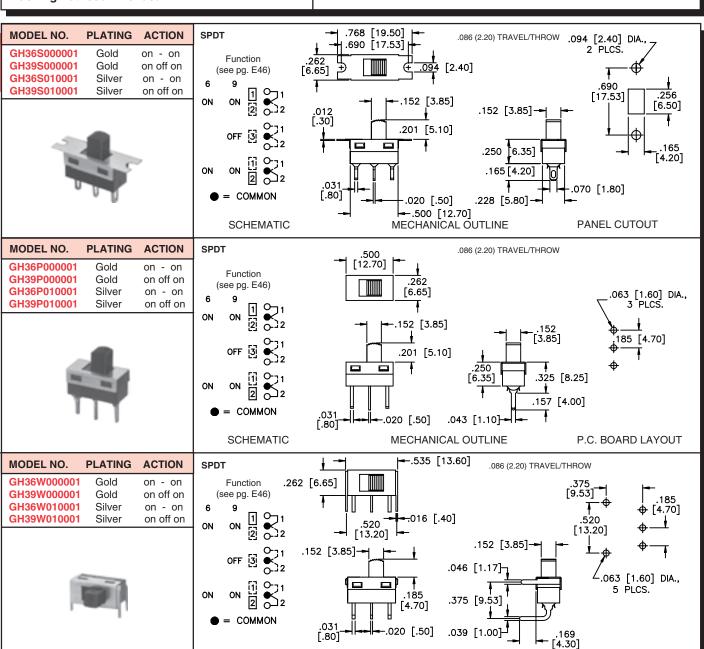
MATERIALS

Contacts & terminals: Gold or silver available (see contact ratings)

Cover: Stainless steel

Actuator: Glass filled polyamide

Case: PES high temp. thermoplastic Terminal seal: Epoxy

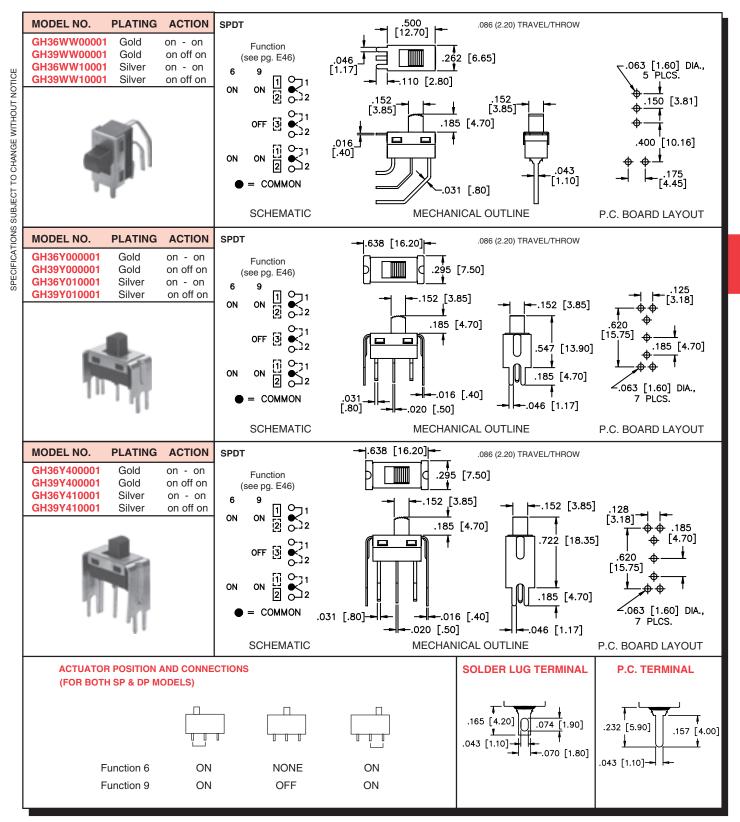


MECHANICAL OUTLINE

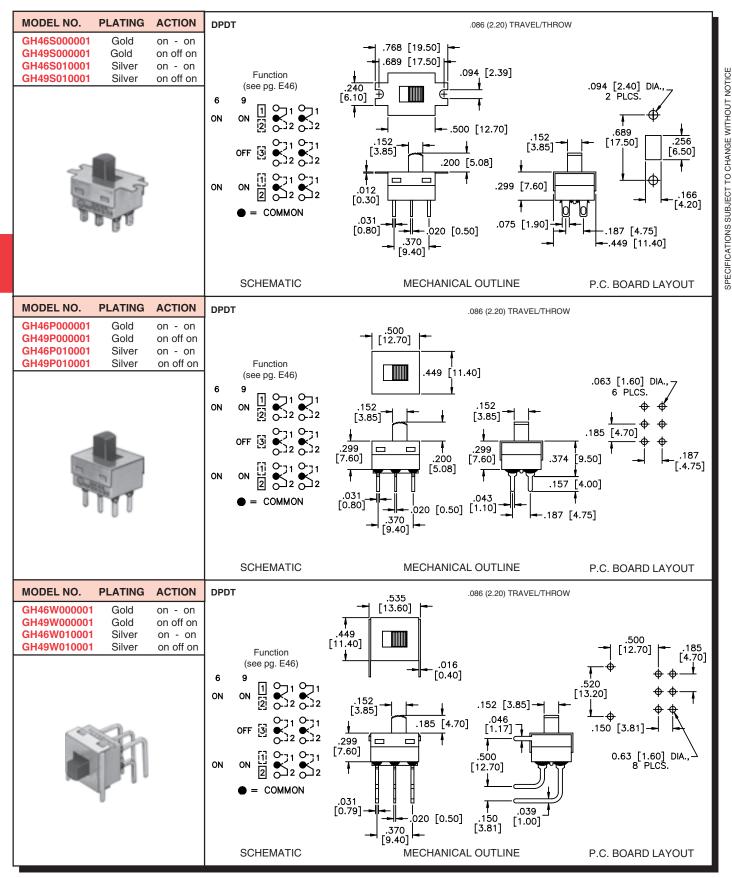
P.C. BOARD LAYOUT

SCHEMATIC

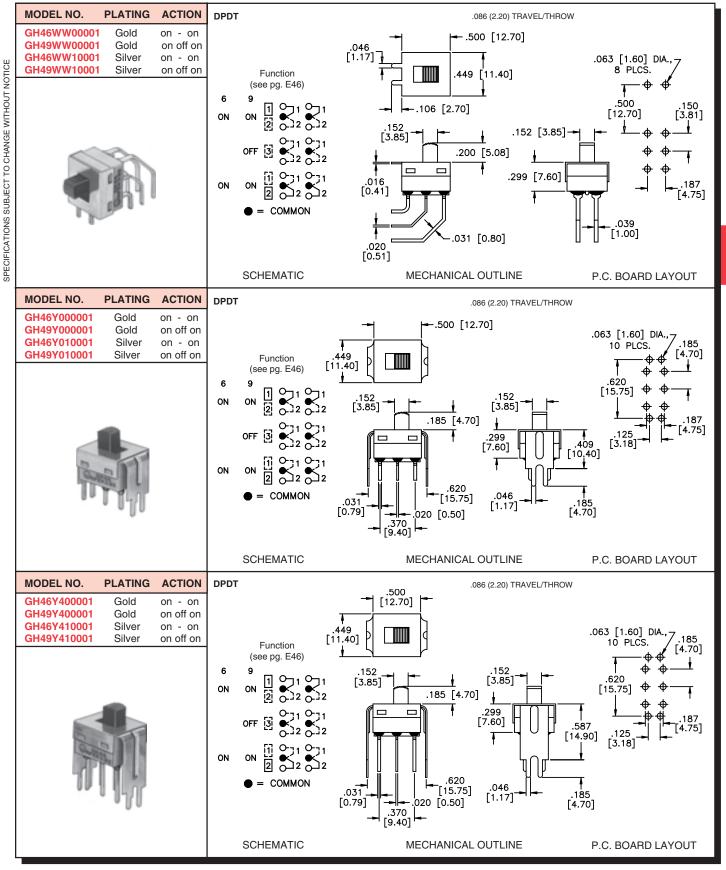
Instrument Grade Miniature Slide Switches



Instrument Grade Miniature Slide Switches



Instrument Grade Miniature Slide Switches



Instrument Grade Miniature Slide Switches

Additional ordering information: Commonly ordered models are shown on pgs. E40 thru E43 with complete specifications. Below is an ordering format that enables you to 'build your own switch' by simply selecting from all available options shown and filling in the boxes.

'BUILD YOUR OWN SWITCH' ORDER FORMAT

Fill in all boxes shown with options selected from below. Allowable options for each box are shown under each respective box.

Series	Actuator Height	Poles	Function	Terminals	Contact & Term. Mat'l.	Special Option 1	Special Option 2
G							_
	В*	3	6	S 0	0	0 0	0 0
	С	4	9	P 0	1	1 0	0 1
	E*			W 0	2	1 1	1 0
	Н			w w	5	1 2	1 1
	L*			Y 0	8		
	N			Y 4			

^{*} indicates Actuator options B, E & L are available for single pole models only .

Actuators heights: Dimensions in inches and millimeters. **H** is standard.

 $\mathbf{B} = .301$ " (7.65mm) $\mathbf{C} = .137$ " (3.50mm) E = .358" (9.10mm)

H = .200" (5.10mm) for S0 & P0 and .185" (4.70mm) for Y,Y4,W0 & WW

L = .251" (6.40mm) N = .374" (9.50mm)

Poles: 3 = Single Pole **4** = Double Pole **Functions: 6** = ON - ON 9 = ON OFF ON

Terminals: See completely specified models in prior section for configurations and dimensions.

S0 = Solder lugs

P0 = .250" (6.35mm) long Printed circuit terminals

W0 = Right angle horizontal p.c. terminals with mounting bracket **WW** = Right angle vertical p.c. terminals with mounting bracket

Y0 = P.C. terminals with short bracket Y4 = P.C. terminals with tall bracket

Contact & terminal materials: See contact ratings under "specifications".

0 = Gold plated brass

1 = Silver

2 = Gold plated silver

5 = Special contact with lower rating

8 = Gold plated brass contacts with tin plated terminals (not available w/SO)

Special options 1: **00** = Standard model

10 = Switch without ground plate

11 = .407" (10.35mm) long printed circuit terminals

12 = Same as 11 except without ground plate

Special options 2: 00 = No epoxy seal (for printed circuit terminals only as

S0 (solder lug) terminals are always sealed)

01 = Epoxy sealed terminals (standard on solder lug models)

10 = Extended terminals for WW models (see figure 1)

11 = Same as 10 above except with epoxy sealed terminals

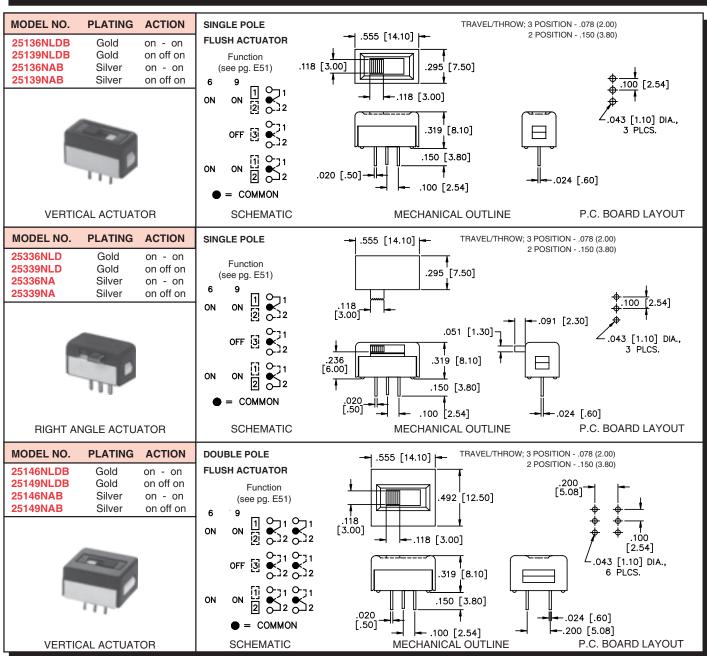


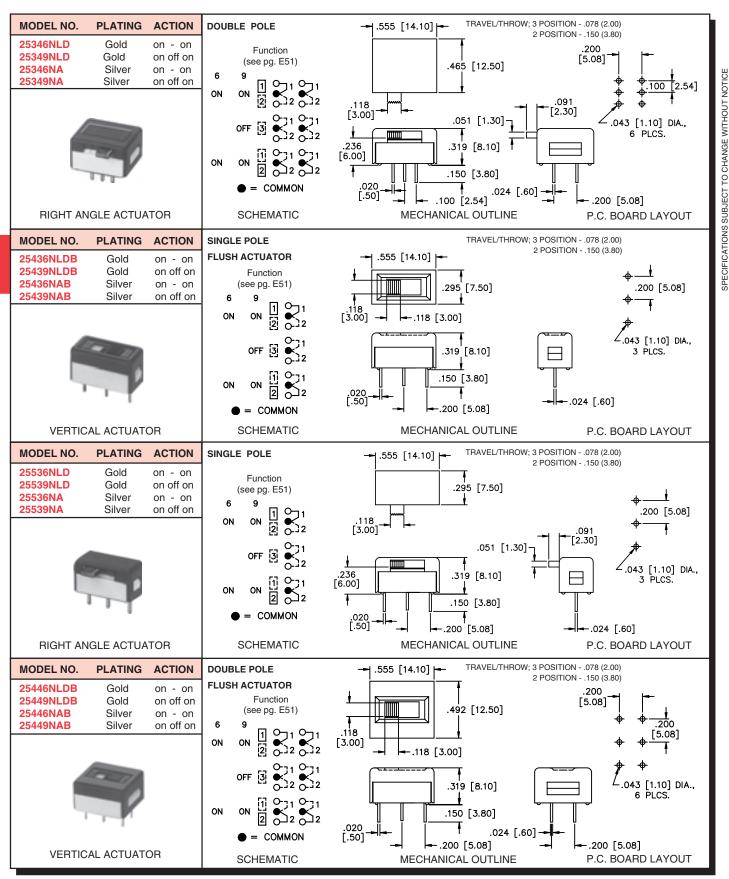
figure 1

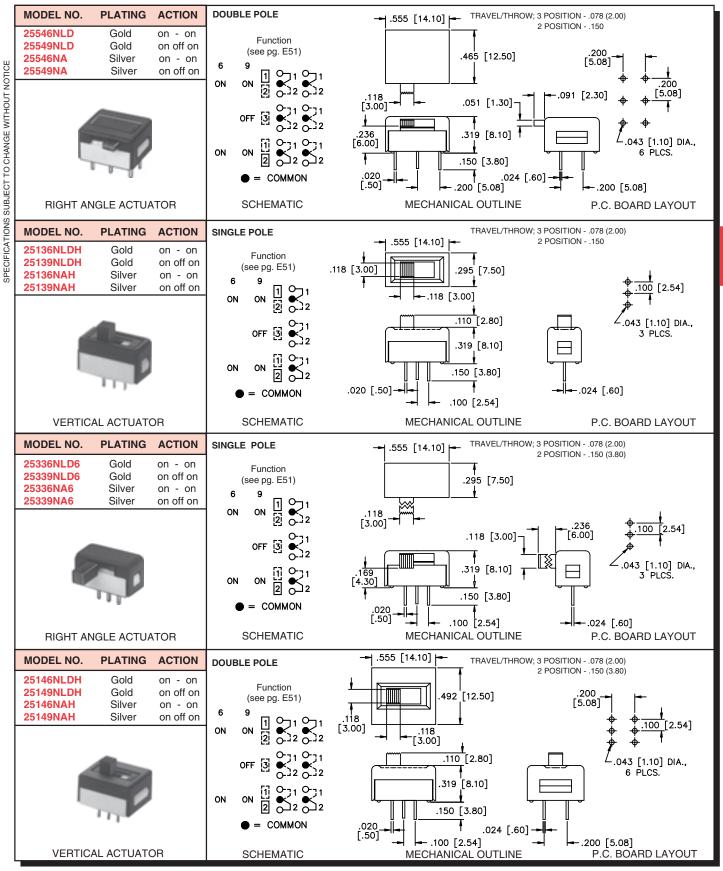
Miniature Slide Switches

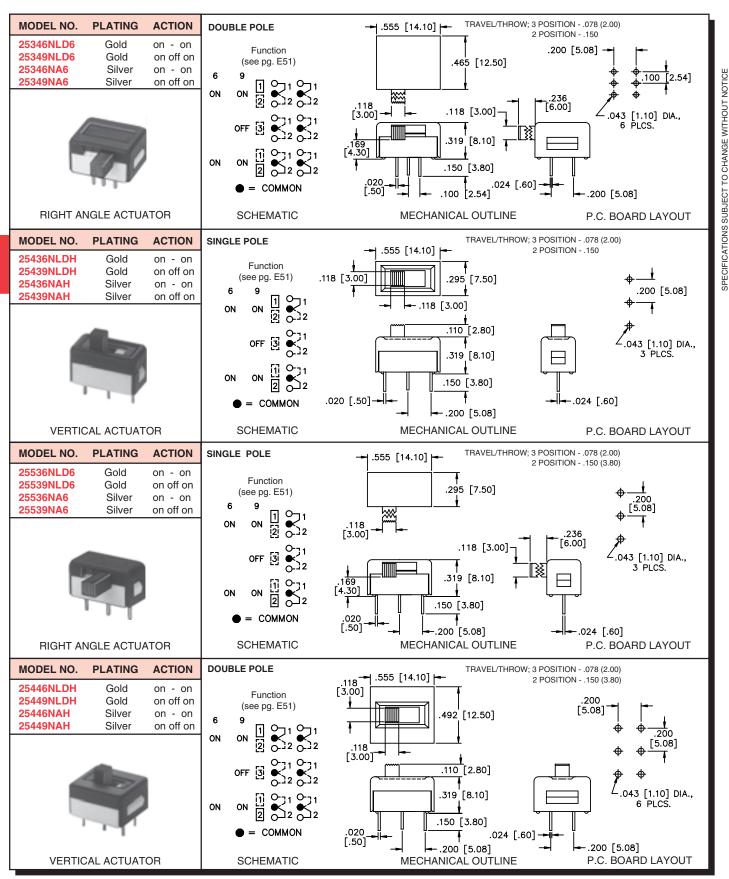
FEATURES SPECIFICATIONS Contact ratings: Molded-in terminals. Gold; 0.4 Volt-Amps (VA) max. at 20 V max. (AC or DC) • .100" (2,54mm) and .200" (5,08mm) terminal spacing. Silver: 4 A at 125 VAC, 2 A at 250 VAC or 3 A at 30 VDC Many additional models & options available Initial contact resistance: Gold; 50 milliohms max. (see page E49). Silver; 10 milliohms max. Insulation resistance: 1000 megohms min. at 500 VDC Optional UL recognized & marked models available. Dielectric strength: 1000 V rms min. between terms. **MATERIALS** Electrical life: Gold; 20,000 cycles, Silver; 10,000 cycles Contacts & terminals: Gold or silver available (see contact ratings) Operating temperature range: -40°C to +85°C Actuator and Cover: Glass filled polyamide Solder heat resistance: 300°C max. for 5 seconds Case: PBT high temp. thermoplastic Terminal seal: Epoxy Washing not recommended. MODEL NO. PLATING **ACTION** SINGLE POLE TRAVEL/THROW; 3 POSITION - .078 (2.00) 2 POSITION - .150 (3.80) .555 [14.10] **FLUSH ACTUATOR** 25136NLDB Gold on - on 25139NLDB on off on Gold Function 25136NAB Silver .118 [3.00] .295 [7.50] on - on (see pg. E51) 25139NAB Silver on off on 6

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

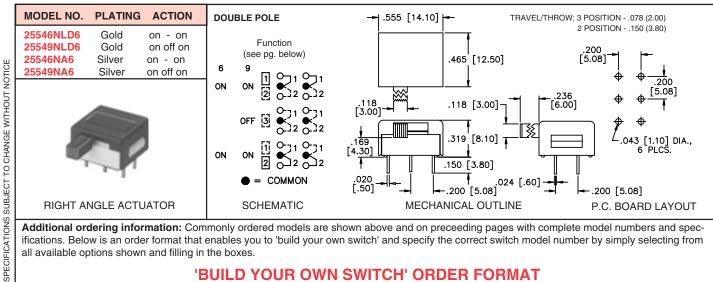








Miniature Slide Switches



Additional ordering information: Commonly ordered models are shown above and on preceeding pages with complete model numbers and specifications. Below is an order format that enables you to 'build your own switch' and specify the correct switch model number by simply selecting from all available options shown and filling in the boxes.

'BUILD YOUR OWN SWITCH' ORDER FORMAT

Fill in boxes shown with options selected from below. Allowable options for each box are shown under each respective box.

Actu	ator/				*Contact &				
Series Term. S	pacing P	oles F	unctions	Version	Term. Mat'l.	*Actuators	Approvals		
2 5									
1		3	6	N	Α	В	(NONE)		
4		4	9		L D	H	X 6 9 3 U L		
3 5	. 11 4 3111				e Contact & Term.	H 6			
Actuator/Terminal spacing: Dimensions in inches and millimeters.									
1 = Vertical actuator and .100" (2.54mm) terminal spacing									
4 = Vertical actuator and .200" (5.08mm) terminal spacing									
3 = Side actuator and .100" (2.54mm) terminal spacing									
		5 = S	ide actuato	or and .200'	' (5.08mm) term	inal spacing			
Poles:		3 = Si	ngle Pole	4	= Double Pole				
Functions:		6 = O	N - ON	9	= ON OFF ON	I			
Version:		N = V	ersion spe	cification (S	specify for all mo	odels)			
Contact & termin	al materials	s: See c	See contact ratings under "specifications".						
Actuators:		Dimer	nsions in in	ches and n	nillimeters.				
B = Flush vertical actuator									
H = Vertical actuator .110" (2.80mm) high									
H6 = Vertical actuator .236" (6.00mm) high									
6 = Side actuator .236" (6.00mm) long									
Note: If Actuator boxes are not used, a side actuator									
		.090"	(2.30mm)	long will be	supplied.				
Approvals:		X693	UL = Switc	hes recogn	ized and marke	d UL - silver (A)	contacts only.		

MSS Series

Standard Size Slide Switches

SPECIFICATIONS

Contact ratings: Gold; 0.4 Volt-Amps (VA) max. at

20 V max. (AC or DC)

Silver; 300 mA at 125 VAC or 30 VDC

Initial contact resistance: 20 milliohms max.

Insulation resistance: 100 megohms min. at 500 VDC

Dielectric strength: 500 volts RMS at sea level

Electrical life: 10,000 cycles min.

Operating temperature range: -10°C to +60°C Solder heat resistance: 260°C max. for 3 seconds

Solvent washing permissible

Ε

FEATURES

- Bifurcated wiping contact design.
- Epoxy sealed terminals.
- Wash-through open frame construction.
- Reinforcing mounting legs.

MATERIALS

Contacts & terminals: Gold or silver available (see contact ratings)

Housing: Tin/lead plated steel
Base: Phenolic laminated sheet

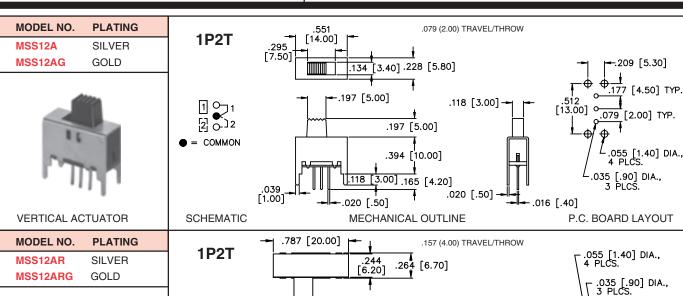
Actuator: Thermoplastic Terminal seal: Epoxy

.157 [4.00] TYP.

217 [5.50] TYP.

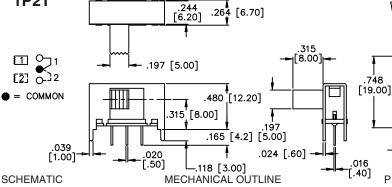
P.C. BOARD LAYOUT

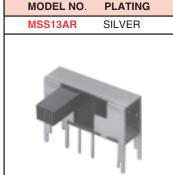
-.220 [5.60]



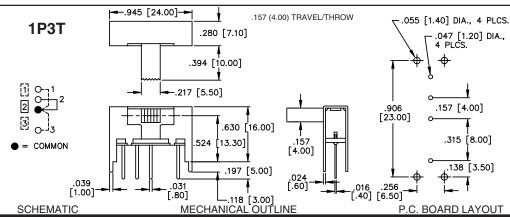




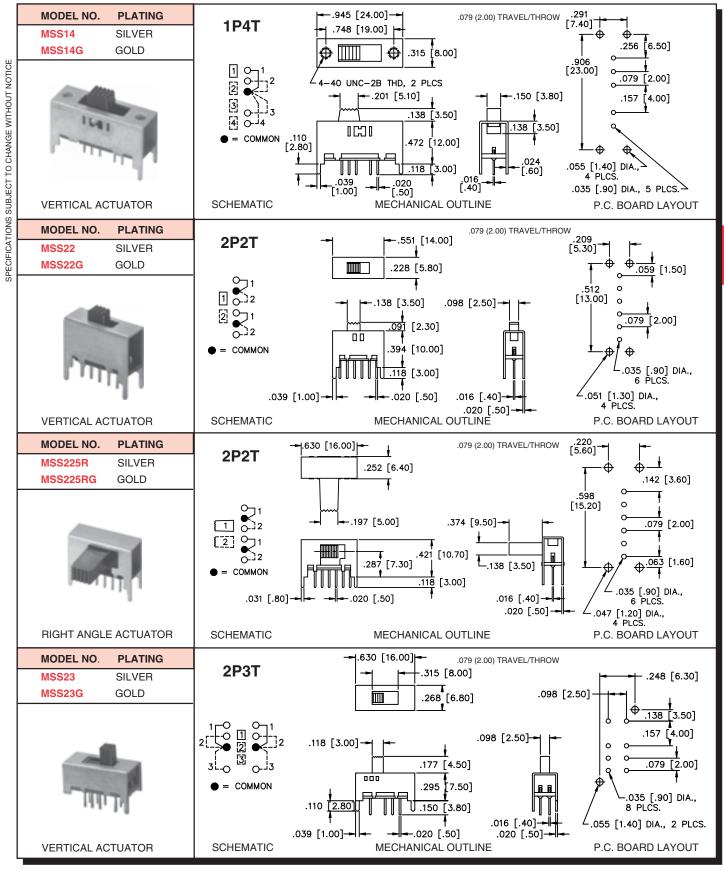




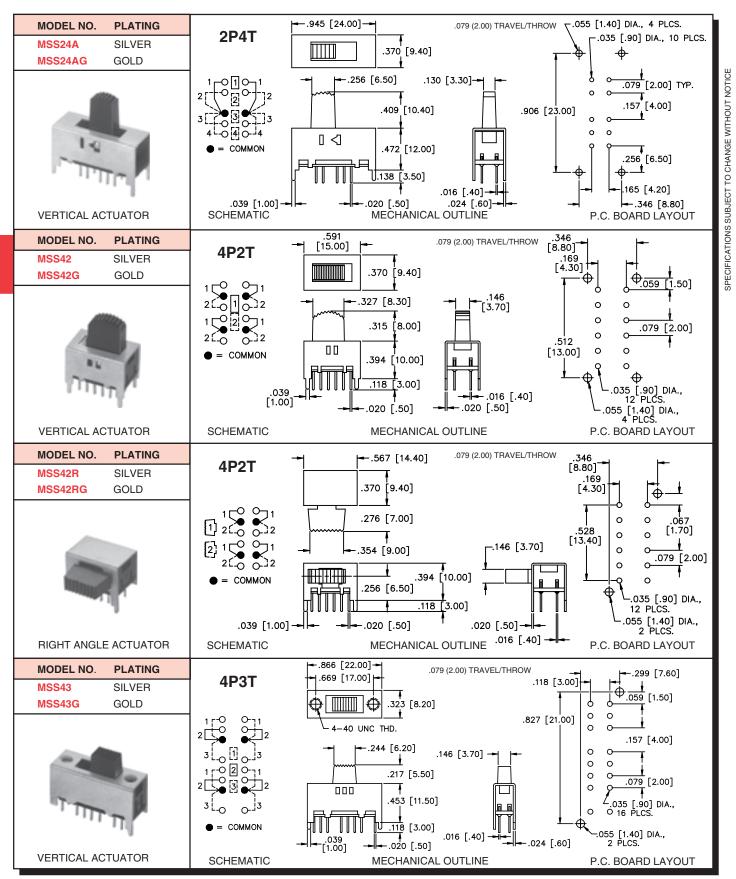
RIGHT ANGLE ACTUATOR



MSS Series

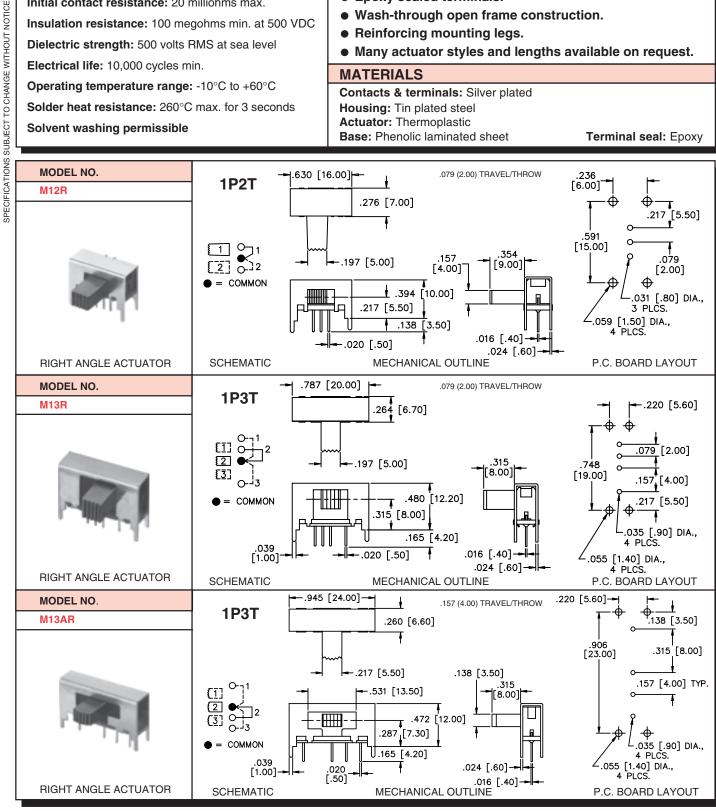


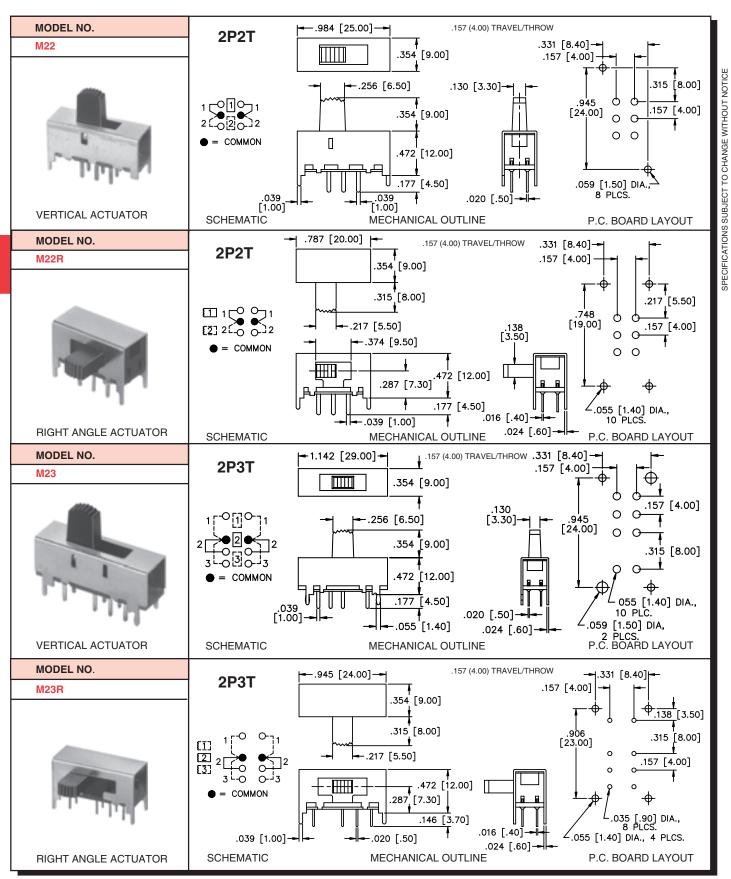
MSS Series

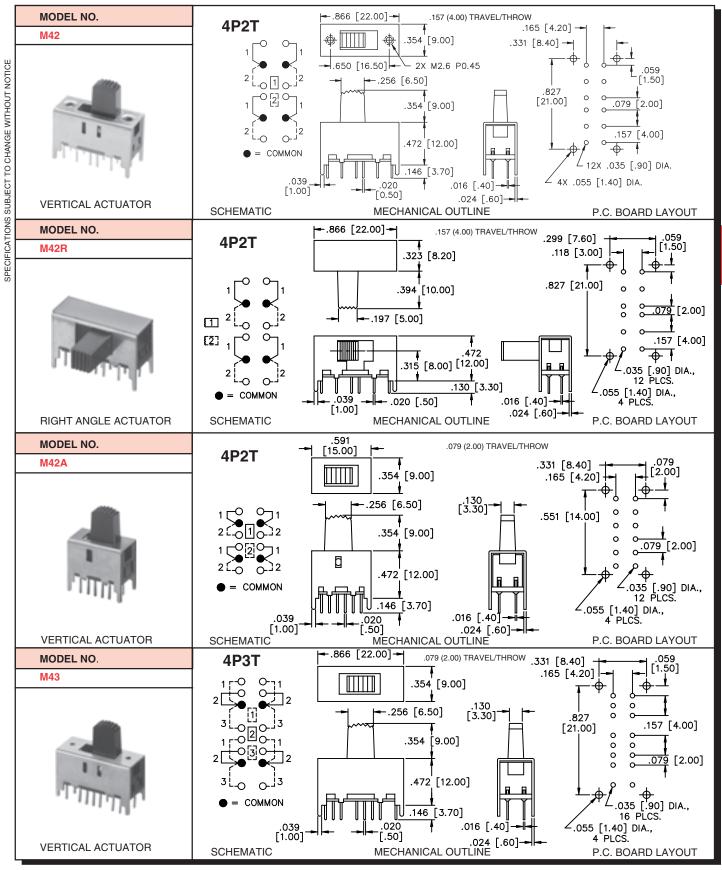


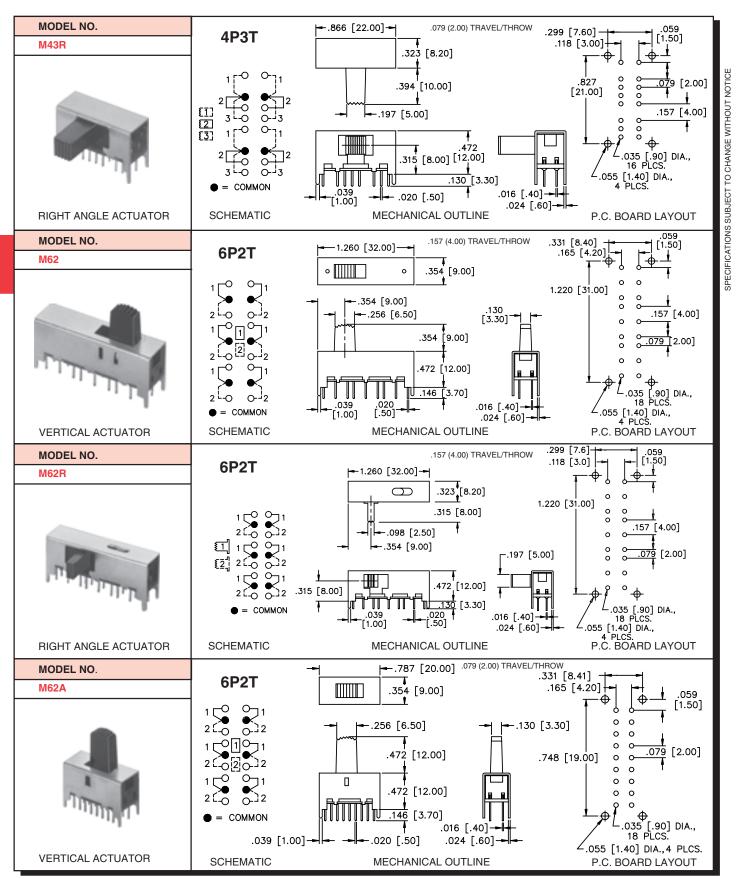
Standard Size Slide Switches

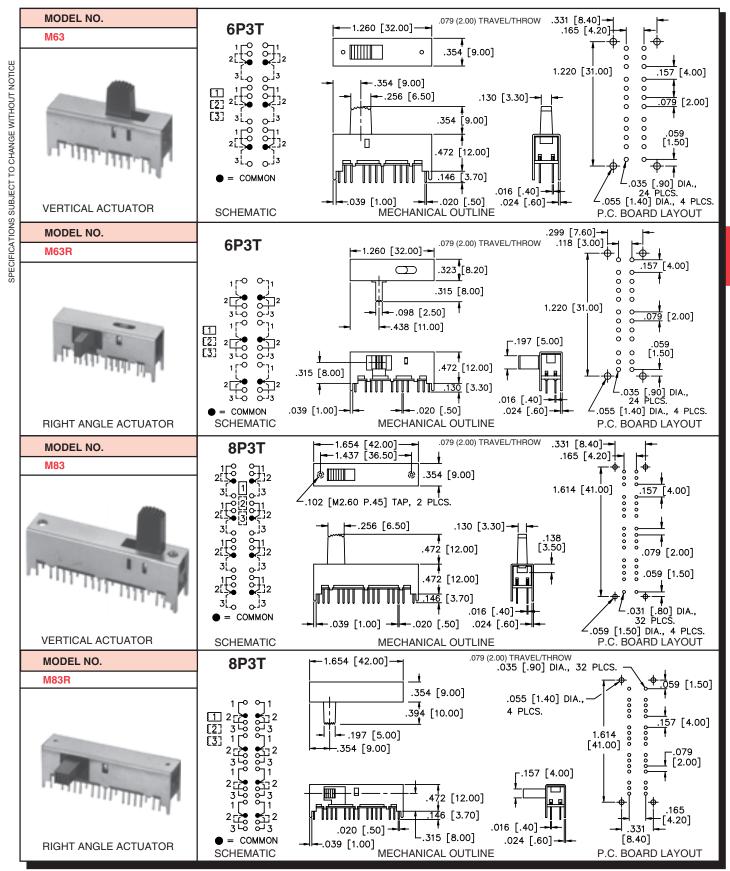
FEATURES SPECIFICATIONS Bifurcated wiping contact design. Contact rating: 300 mA at 125 VAC or 30 VDC **Epoxy sealed terminals.** Initial contact resistance: 20 milliohms max. Wash-through open frame construction. Insulation resistance: 100 megohms min. at 500 VDC Reinforcing mounting legs. Dielectric strength: 500 volts RMS at sea level Many actuator styles and lengths available on request. Electrical life: 10,000 cycles min. **MATERIALS** Operating temperature range: -10°C to +60°C Contacts & terminals: Silver plated Housing: Tin plated steel Solder heat resistance: 260°C max. for 3 seconds Actuator: Thermoplastic Solvent washing permissible





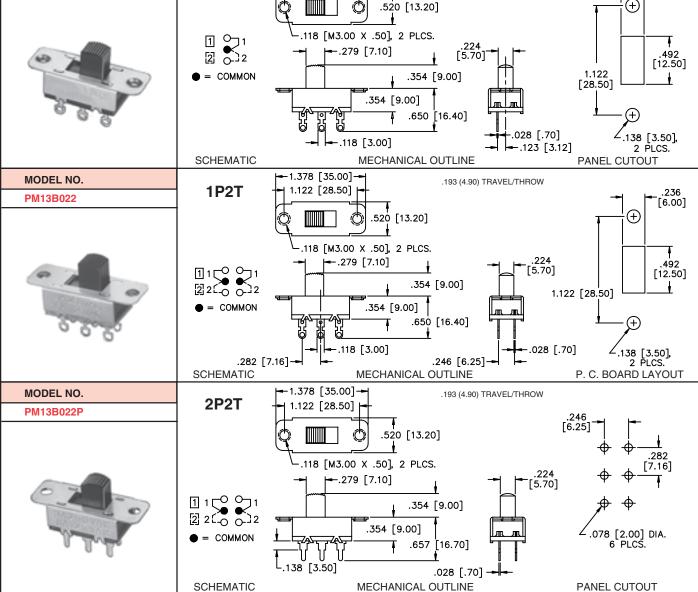






Standard Size Slide Switches

SPECIFICATIONS FEATURES Contact rating: 6 Amps at 125 VAC, 3 Amps at 250 VAC Wash-through open frame construction. Initial contact resistance: 30 milliohms max. UL & CSA recognized. Insulation resistance: 100 megohms min. at 500 VDC • Threaded mounting holes standard - M3X0.5. Dielectric strength: 1000 VAC for 1 minute (min.) Panel mounting. Electrical life: 10,000 cycles min. Operating temperature range: -20°C to +60°C **MATERIALS** Actuation force: 500g ± 200g Contacts: Silver plated phosphor bronze Solder heat resistance: 260°C max. for 3 seconds Terminals: Tin plated brass Actuator: Nylon, type 6/6 Solvent washing permissible Base: Phenolic laminated sheet Frame: Zinc plated steel 1.378 [35.00] MODEL NO. .193 (4.90) TRAVEL/THROW **1P2T** 1.122 [28.50] PM13B012 [6.00] .520 [13.20] .118 [M3.00 X .50], 2 PLCS. $\mathop{\lesssim}^1_2$ 1 -.279 [7.10] 2 1.122 [28.50] = COMMON .354 [9.00] .354 [9.00] .650 [16.40]



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MPS Series

Miniature Pushbutton Style Slide Switches

SPECIFICATIONS

Contact ratings: Pushbutton contacts; 0.4 Volt-Amps

max. at 20 V max. (AC or DC) Slide contacts: 300 mA at 125 VAC

or 30 VDC

Initial contact resistance: 20 milliohms max.

Insulation resistance: 100 megohms max. at 250 VDC

Dielectric strength: 250 volts RMS at sea level Electrical life: 100,000 cycles min.

Operating temperature range: -10°C to +60°C Actuation force: Pushbutton; 200g ± 100g

Slide; 100g to 450g

Solder heat resistance: 260°C max, for 3 seconds

Washing not recommended

FEATURES

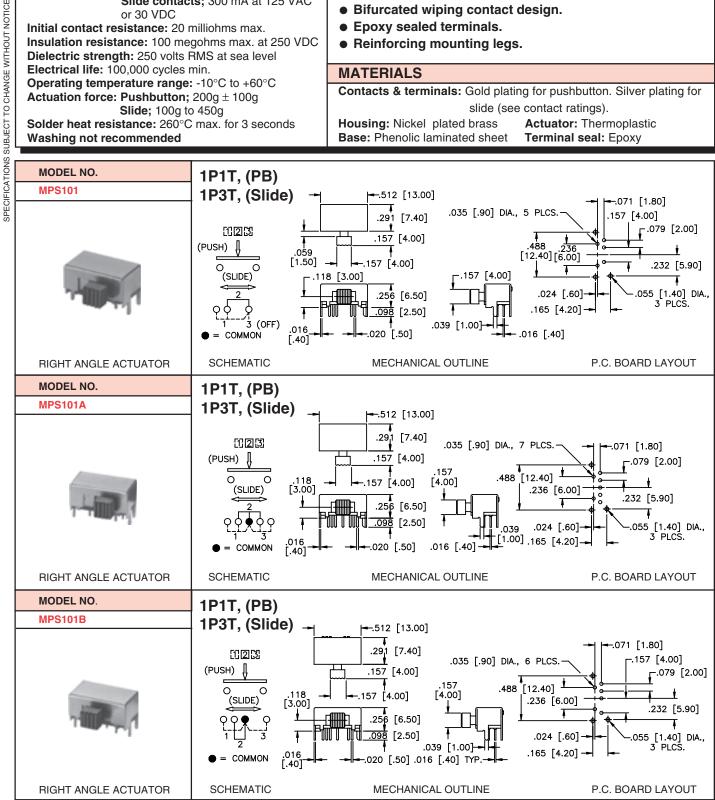
- Combination momentary pushbutton switch and slide switch mechanism.
- Bifurcated wiping contact design.
- Epoxy sealed terminals.
- Reinforcing mounting legs.

MATERIALS

Contacts & terminals: Gold plating for pushbutton. Silver plating for

slide (see contact ratings).

Housing: Nickel plated brass **Actuator:** Thermoplastic Base: Phenolic laminated sheet Terminal seal: Epoxy



MSL Series

Single Pole Multi-Position Slide Switches

Note: up to 10 positions available - contact factory. Minimum quantities may apply. Optional color cap available for these models - see

SPECIFICATIONS

Contact rating: 200 mA at 125 VAC or 30 VDC **Initial contact resistance:** 30 milliohms max.

Contact timing: Non-shorting

Insulation resistance: 100 megohms max. at 500 VDC

Dielectric strength: 500 volts RMS at sea level

Electrical life: 10,000 cycles min.

Operating temperature range: -10°C to +60°C

Actuation force: $250g \pm 100g$

Solder heat resistance: 260°C max. for 3 seconds

Solvent washing permissible

FEATURES

• Bifurcated wiping contact design.

Hardware section.

- Epoxy sealed terminals.
- Wash-through open frame construction.
- Reinforcing mounting legs.
- Threaded mounting holes standard 4-40NC-2B.

MATERIALS

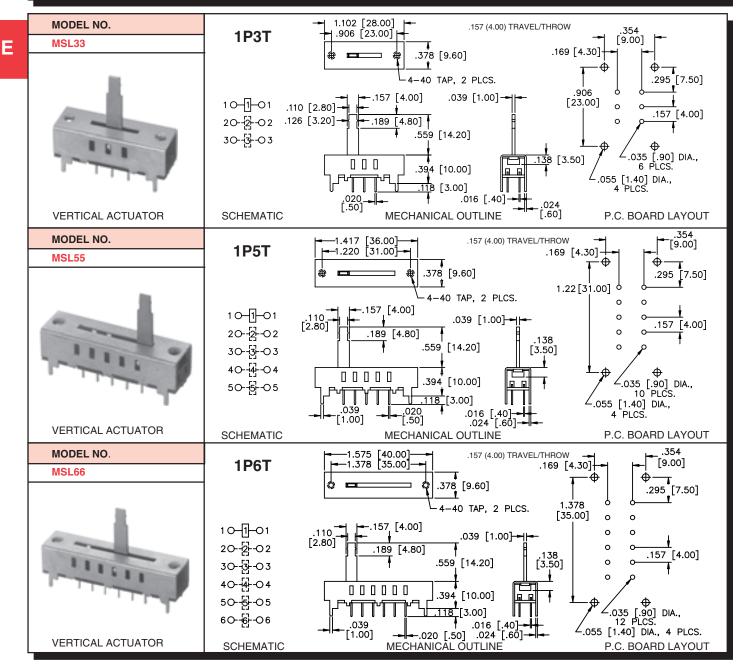
Contacts & terminals: Silver plated

Housing: Tin/lead plated steel

Base: Phenolic laminated sheet **Slider:** High temperature thermoplastic

Actuator: Steel

Terminal seal: Epoxy



MBT Series

Baton Toggle Style Slide Switches

SPECIFICATIONS FEATURES

Contact rating: 300 mA at 125 VAC or 30 VDC

Initial contact resistance: 20 milliohms max.

Insulation resistance: 100 megohms max. at 500 VDC

Dielectric strength: 500 volts RMS at sea level

Electrical life: 10,000 cycles min.

Operating temperature range: -10°C to +60°C

Actuation force: $400g \pm 200g$

Solder heat resistance: 260°C max. for 3 seconds

Solvent washing permissible

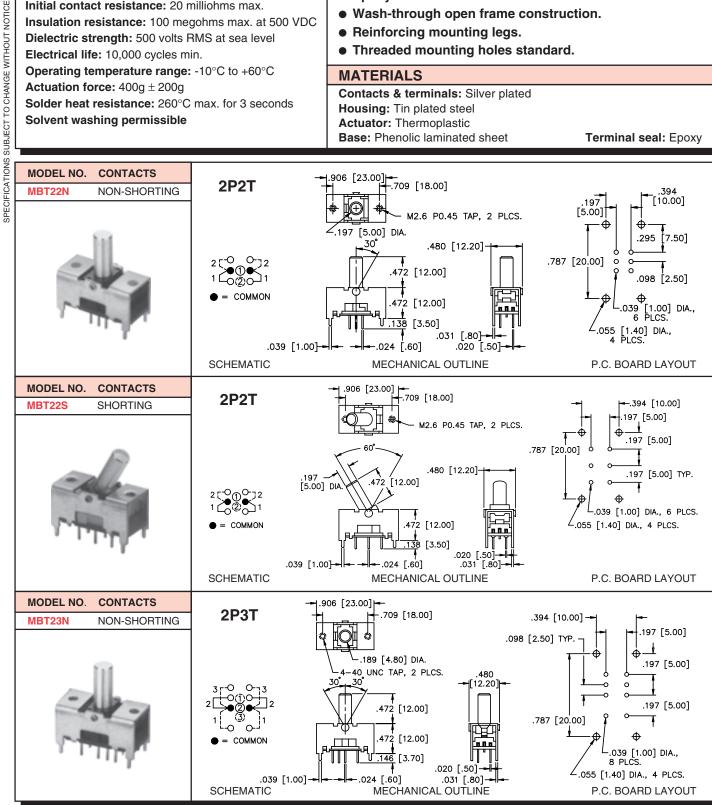
Bifurcated wiping contact design.

- Epoxy sealed terminals.
- Wash-through open frame construction.
- Reinforcing mounting legs.
- Threaded mounting holes standard.

MATERIALS

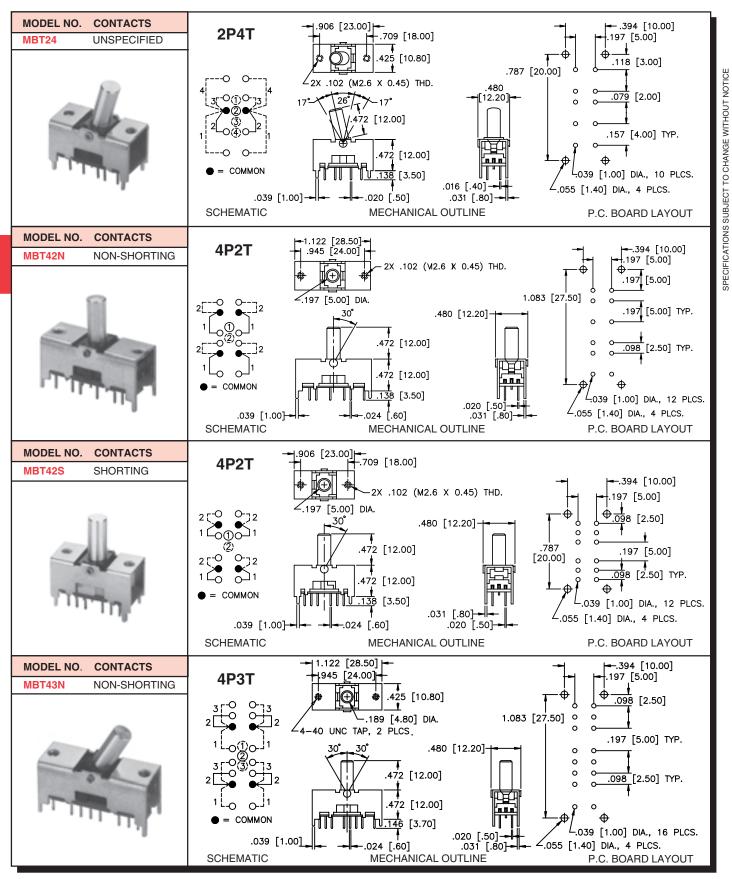
Contacts & terminals: Silver plated

Housing: Tin plated steel **Actuator:** Thermoplastic



MBT Series

Baton Toggle Style Slide Switches



MBT Series

Baton Toggle Style Slide Switches

