

SURFACE MOUNT SWITCHES

- Standard DIP Package Outline Includes PIANO-DIP®
- Tactile Feedback, Board Mount Switches

THRU-HOLE DIP SWITCHES

- Consistent High Contact Pressure With Spring and Ball Contact System
- Standard Base Seal; Optional Top Tape Seal
- Large Selection of Types and Styles Includes Military Qualified Switches

| | |
|------------------------------|-------------|
| SELECTION CHART | Page B-3 |
|------------------------------|-------------|

SURFACE MOUNT SWITCHES

| | | |
|--------------------------------|-------------------|------|
| Half-Pitch | Series 97 | B-4 |
| Tactile | Series 95 | B-5 |
| SPST, Low Profile | Series 90HB | B-7 |
| SPDT and DPST | Series 78H | B-9 |
| Side Actuated PIANO-DIP® | Series 76HP | B-10 |

THRU-HOLE DIP SWITCHES

| | | |
|-----------------------------------|--------------------------|------|
| Machine Insertable MIDIP® | Series 90B | B-11 |
| SPST Rocker | Series 76 | B-12 |
| SPST to 4PST Slide | Series 78 | B-13 |
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ROTARY DIP SWITCHES

| | | |
|-------------------------------|------------------|------|
| Binary Coded | Series 94H | B-22 |
| Economical Binary Coded | Series 94R | B-23 |

SURFACE MOUNT SWITCHES

| Circuitry | Description | Type of Actuation | Series | No. of Positions Available | No. of Actuators | Page Number |
|---------------------------|----------------------|------------------------------|--------|----------------------------|------------------|-------------|
| Single Pole, Single Throw | Half-Pitch | Top Actuated, Recessed Slide | 97 | 4, 6 & 8 | 1/Station | B-4 |
| | Tactile | Snap Dome | 95 | 1 | 1 | B-5 |
| | Standard DIP Package | Top Actuated, Recessed Slide | 90 | 2-10 | 1/Station | B-7 |
| | Standard DIP Package | Side Actuated | 76 | 2-10 & 12 | 1/Station | B-10 |
| SPDT, DPST | Standard DIP Package | Side Actuated, Top Actuated | 78 | 2-10 | 1/Station | B-9 |
| Standard, Complement Code | Octal, BCD & Hex | Rotary | 94 | 8, 10 & 16 | 1 | B-22 |

THRU-HOLE DIP SWITCHES

(Also see Series 76, 78 and 90 Surface Mount DIP Switches)

| Circuitry | Description | Type of Actuation | Series | No. of Positions Available | No. of Actuators | Page Number |
|-----------|-------------|-------------------|--------|----------------------------|------------------|-------------|
|-----------|-------------|-------------------|--------|----------------------------|------------------|-------------|

SINGLE THROW SWITCHES

| | | | | | | |
|---------------------------------|----------------------|------------------------------|------|-----------|-----------|------|
| Single Pole, Single Throw | Machine Insertable | Recessed Slide | 90 | 2-10 | 1/Station | B-11 |
| | Standard | Raised Rocker | 76 | 2-10 & 12 | 1/Station | B-12 |
| | | Recessed Rocker | 76 | 2-10 & 12 | 1/Station | B-12 |
| | | Side Actuated | 76 | 2-10 & 12 | 1/Station | B-12 |
| | | Slide* | 78 | 2-10 & 12 | 1/Station | B-13 |
| | | Recessed Slide* | 78 | 2-10 | 1/Station | B-13 |
| | Military Qualified | Raised Rocker (MS83504/01) | 76 | 2-10 & 12 | 1/Station | B-17 |
| | | Recessed Rocker (MS83504/02) | 76 | 2-10 & 12 | 1/Station | B-17 |
| | | Side Actuated (MS83504/11) | 76 | 2-10 & 12 | 1/Station | B-17 |
| | | Slide (MS83504/04) | 78 | 2-10 & 12 | 1/Station | B-17 |
| Machine Insertable (MS83504/12) | | 90 | 2-10 | 1/Station | B-17 | |
| Multiple Pole, Single Throw | 2PST | Slide* | 78 | 1-5 | 1/Station | B-13 |
| | 3PST | Slide* | 78 | 1-3 | 1/Station | B-13 |
| | 4PST | Slide* | 78 | 1 & 2 | 1/Station | B-13 |
| | 5, 6, 7, 8, or 10PST | Slide* | 78 | 1 | 1/Station | B-13 |

MULTIPLE THROW SWITCHES

| | | | | | | |
|-----------------------------|------------------------------|----------------------------|-----|-----------|-----------|------|
| Circuit Selector | 1-of-10 Circuits | Linear Action Slide | 79 | 10 | 1 | B-21 |
| | 1-of-16 Circuits | Linear Action Slide | 79 | 16 | 1 | B-21 |
| Single Pole, Multiple Throw | Standard | Raised Rocker | 76 | 2-4 | 1/Station | B-14 |
| | | Recessed Rocker | 76 | 2-4 | 1/Station | B-14 |
| | | Toggle | 76 | 2-4 | 1/Station | B-14 |
| | | Slide* | 78 | 1-6 | 1/Station | B-14 |
| | Military Qualified | Raised Rocker (MS38504/05) | 76 | 2-4 | 1/Station | B-17 |
| | Recessed Rocker (MS38504/06) | 76 | 2-4 | 1/Station | B-17 | |
| Double Pole, Double Throw | Standard | Raised Rocker | 76 | 1 & 2 | 1/Station | B-15 |
| | | Recessed Rocker | 76 | 1 & 2 | 1/Station | B-15 |
| | | Toggle | 76 | 1 & 2 | 1/Station | B-15 |
| | | Slide* | 78 | 1 & 2 | 1/Station | B-15 |

BINARY CODED OUTPUT SWITCHES

| | | | | | | |
|---------------|--|---------------------|----|------------|---|------|
| Standard Code | BCD & Hexadecimal Octal, BCD, & Hex | Linear Action Slide | 79 | 10 & 16 | 1 | B-18 |
| | | Rotary | 94 | 8, 10 & 16 | 1 | B-22 |
| Complement | Octal, BCD, & Hex | Rotary | 94 | 8, 10 & 16 | 1 | B-22 |

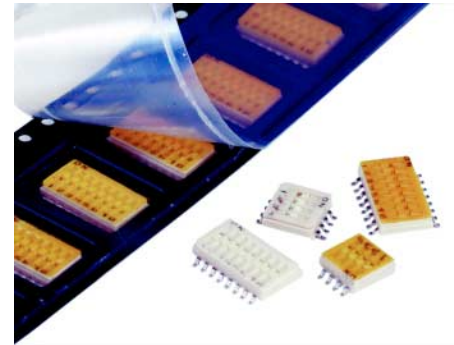
*Switch is also available with right angle termination. See page listed above and page B-20.

Grayhill Series 76 DIP switches are covered by one or more of the following patents pending: 4,031,345, Canada 1,035,820 (1978), and Canada 1,055,551 (1979). Series 79 switches are protected by patent number 4,491,703. Series 90 switches are protected by patent numbers 4,590,344 and 4,670,630.

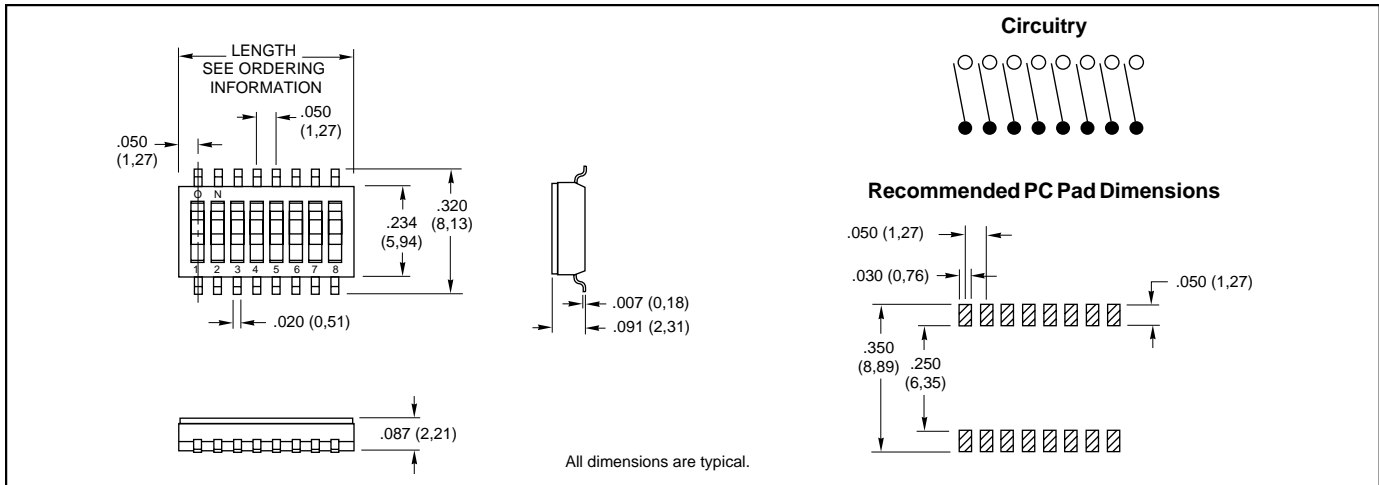
SERIES 97
Half-Pitch

FEATURES

- Requires One-Half the Board Space of a Standard DIP Switch
- Assembly Process Compatible to 260°C
- Available in 4 and 8 Position Lengths
- Tape and Reel Packaging for Surface Mount Assembly



DIMENSIONS In inches (and millimeters)



SPECIFICATIONS

Electrical Ratings

Contact Rating: 100 mA at 50 Vdc non-switching; 25 mA at 24 Vdc, 10 mA at 50 Vdc switching.
Contact Resistance: 100 mohms maximum initially (measured at 10 mA, 50 mVdc). 150 mohms maximum after life.
Insulation Resistance: Minimum at 100 Vdc between adjacent closed contacts and also across open switch contacts.
 Initial: 1,000 Mohms After Life: 200 Mohms
Dielectric Strength: 300 Vac RMS, minimum voltage measured between adjacent closed contacts and also across open switch contacts.
Switch Capacitance: 5 pF at 1 megahertz

Mechanical Ratings

Mechanical Life: 1,000 cycles minimum
Vibration Resistance: Per MIL-STD-202, Method 204, Test Condition A: There shall be no opening of closed contacts or closing of open contacts in excess of 10 microseconds, and there shall be no evidence of broken, loose, deformed or displaced parts.
Mechanical Shock: Per MIL-STD-202, Method 213, Test Condition E: There shall be no opening of closed contacts or closing of open contacts in excess of 10 microseconds, and there shall be no evidence of broken, loose, deformed or displaced parts.
Thermal Shock Resistance: Per MIL-STD-202, Method 107G, there shall be no evidence of physical damage or permanent change in electrical characteristics.

Terminal Strength: Per MIL-STD-202, Method 211A, Test Condition A. There shall be no evidence of mechanical distortion, cracking of the switch body or changes in the electrical characteristics.
Thermal Aging: Per MIL-STD-202, Method 108A. 1000 hours at 125°C.

Environmental Ratings

Operating Temperature: -40°C to +85°C
Storage Temperature Range: -55°C to +85°C
Moisture Resistance: Per MIL-STD-202, Method 106, there shall be no evidence of corrosion and the insulation resistance shall be no less than 10 Mohms.

Soldering Information

Recommended Processing Temperature: 220°C–230°C (1 pass—260°C maximum)
Resistance to Soldering Heat: Reflow or infrared soldering, 260°C for 60 seconds.
Flux Cleaning: Sealed switches withstand aqueous, detergent and isopropyl alcohol washing.

Materials and Finishes

Non-Conductive Parts: Cover, slide and base are a natural colored thermoplastic. (UL94V-O)
Shorting Member: Copper alloy, plated. 10 microinches minimum gold over nickel.
Base Contacts: Brass, plated. 10 microinches minimum gold over nickel.
Terminals: Brass, solder-plated, solderable per MIL-STD-202, Method 208.

Tape and Reel Packaging

Switches will be supplied on 13 inch reels with 2000 switches per reel. The 4 position switches have a tape width of 16mm, while the 8 position switches have a tape width of 24mm. The tape pockets have a 12mm pitch.

Available from your local Grayhill Distributor. For prices and discounts, contact a local Sales office, an authorized local Distributor or Grayhill.

ORDERING INFORMATION* (2000 switches per reel)

| No. of Positions | Length Inches (mm) | Part Number Without Tape Seal | Part Number With Tape Seal |
|------------------|--------------------|-------------------------------|----------------------------|
| 4 | 0.250 (6,35) | 97S04R | 97S04SR |
| 8 | 0.450 (11,43) | 97S08R | 97S08SR |

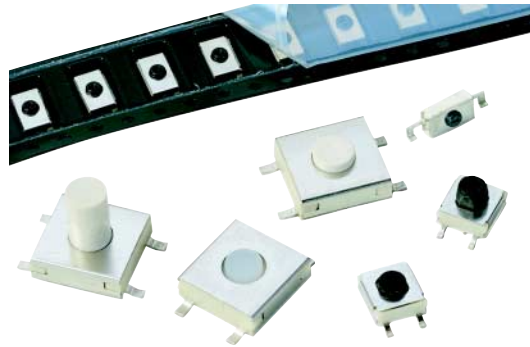
* Consult Grayhill for 2 and 6 position switches.

SERIES 95

Tactile

FEATURES

- Excellent Tactile Feedback
- Compatible with SMT Assembly Including Infrared and Vapor Phase



DIP Switches

DIMENSIONS In inches (and millimeters)

6.9 mm x 3.5 mm Flush Mount Right Angle 95B04 Style

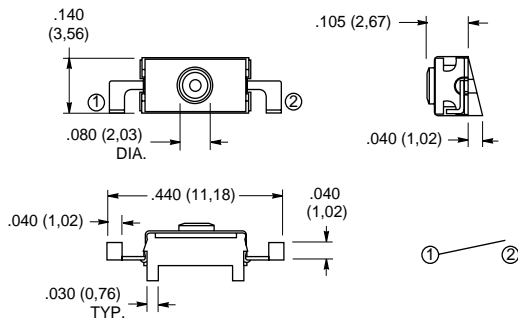


Figure 1

6.0 mm x 6.0 mm Gull Wing 95B06 Style

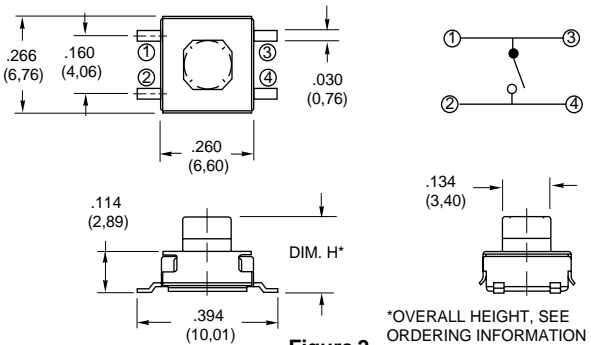


Figure 2

*OVERALL HEIGHT, SEE ORDERING INFORMATION

11.5 mm x 11.5 mm Gull Wing 95B12 Style

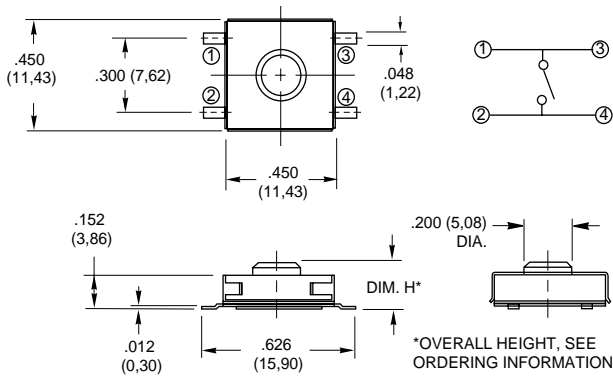
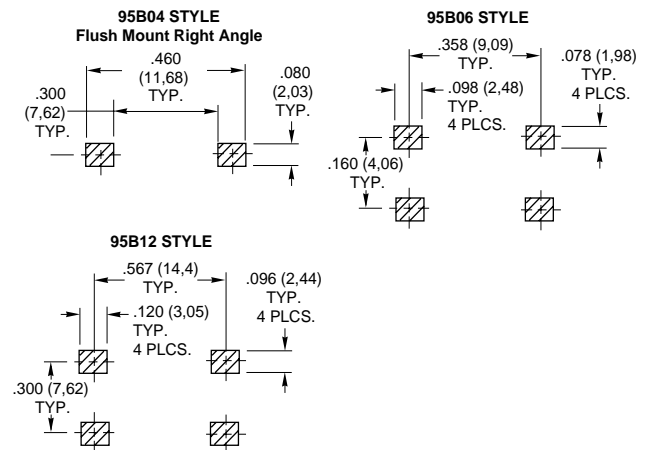


Figure 3

*OVERALL HEIGHT, SEE ORDERING INFORMATION

Recommended Solder Pad Layout



SPECIFICATIONS

Electrical Ratings

Maximum Power: .5 VA
Maximum Voltage: 50 volts
Maximum Current: 100 mA
Insulation Resistance: 5000 mohms after life
Dielectric Strength: ≤ 50 mohms initial, ≤ 100 mohms after life
Contact Resistance: 50 mohms maximum initially (measured at 10 mA, 50 mVdc). 100 mohms maximum after life.
Contact Bounce: less than 10 mS
Contact System:
 B04/B12: Silver on silver;
 B06: Silver on palladium

Mechanical Ratings

Actuation Force: See Ordering Information; dependent on switch style
Mechanical Life: See Ordering Information; dependent on switch style
Button Travel: See Ordering Information; dependent on switch style

Terminal Strength: 5 cycle bends per MIL-STD-202F, Method 211
Vibration Resistance: Pass 10-2000 Hz at 15G, or a 0.060 inch double amplitude test per MIL-STD 204, Condition B.
Mechanical Shock: Pass 50G, 11 mS, half-sine test per MIL-STD 213B, Condition A.
Thermal Shock Resistance: Pass MIL-STD-202F, Method 107G showing no evidence of physical damage or change in electrical characteristics including normal contact resistance after 5 operations.
Thermal Aging: Pass MIL-STD-202F, Method 108A, Test Condition D. Requires operation at 125°C for 1,000 hours. Measurements at 500 and 1,000 hours of exposure showing no more than 50% change in contact resistance for test duration.

Environmental Ratings

Operating Temperature Range: -40°C to +85°C
Storage Temperature Range: -40°C to +85°C

Moisture Resistance: Pass MIL-STD-202F, Method 106 showing no evidence of corrosion and insulation resistance greater than 10 Mohms, 1,000 Mohms at 250 Vac after drying period.
Flammability: Test to IEC Standard 695-2-2 for 30 seconds of exposure
Environmental Life: 50 mohms maximum contact resistance after exposure to a Battelle Class III test per EIA 364, TP 65 (B04 tested only).

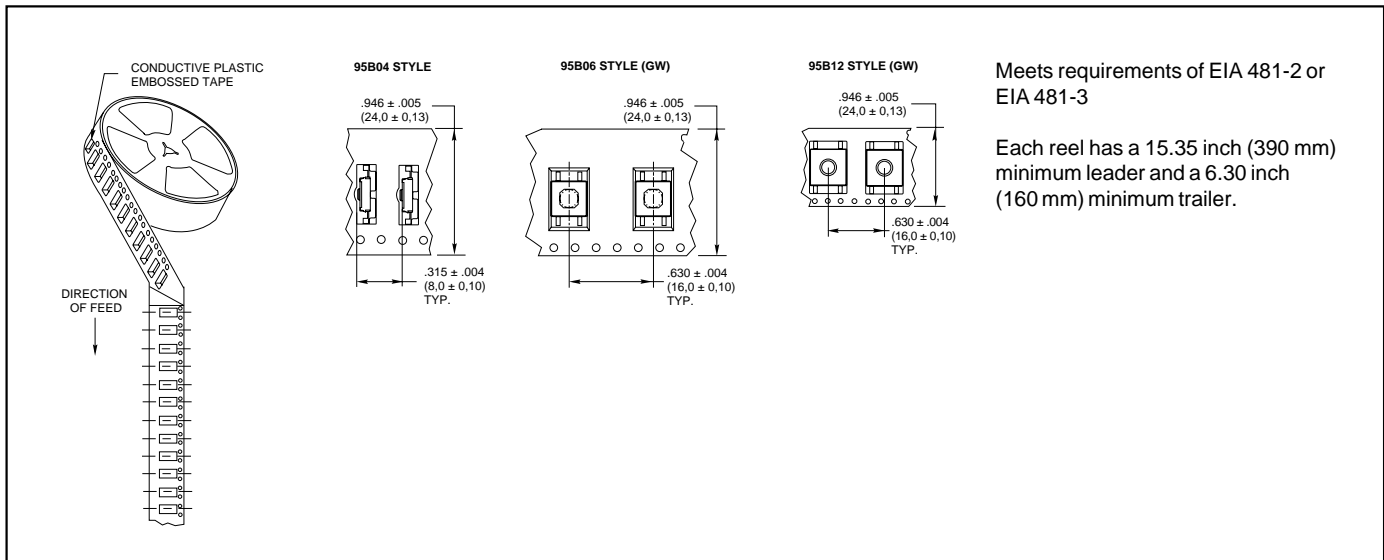
Soldering Information

Soldering Temperature: Infrared or Vapor Phase with 260°C maximum temperature for 95B06 and 95B12 styles, 230° maximum temperature for 95B04 styles.
Cleaning: sealed to withstand cleaning processes.

Tape and Reel Packaging

Standard Tape and Reel Packaging per EIA-481-2
 Switches per reel: See Ordering Information

TAPE AND REEL PACKAGING



ORDERING INFORMATION

| Description | Figure | Actuator Type | Overall Height | Actuation Force | Life (Cycles) | Switches/ Reel | Switch Part Number |
|--|--------|---------------|----------------|-----------------|---------------|----------------|--------------------|
| Flush Mount Right Angle | 1 | Standard | .105" | 240± 60g | 25,000 | 2000 | 95B04A2RAR |
| Perpendicular mnt. w/gull wing terminals | 2 | Standard | .213" | 140 ± 50g | 500,000 | 1000 | 95B06C1GWR |
| Perpendicular mnt. w/gull wing terminals | 2 | Standard | .213" | 275 ± 60g | 100,000 | 1000 | 95B06C3GWR |
| Perpendicular mnt. w/gull wing terminals | 2 | Soft/rubber | .159" | 140 ± 50g | 500,000 | 1000 | 95S06A1GWR |
| Perpendicular mnt. w/gull wing terminals | 2 | Soft/rubber | .159" | 275 ± 60g | 100,000 | 1000 | 95S06A3GWR |
| Perpendicular mnt. w/gull wing terminals | 3 | Standard | .172" | 300 ± 75g | 1,000,000 | 750 | 95B12A3GWR |
| Perpendicular mnt. w/gull wing terminals | 3 | Standard | .205" | 300 ± 75g | 1,000,000 | 750 | 95B12B3GWR |
| Perpendicular mnt. w/gull wing terminals | 3 | Standard | .445" | 300 ± 75g | 1,000,000 | 750 | 95B12C3GWR |

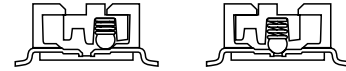
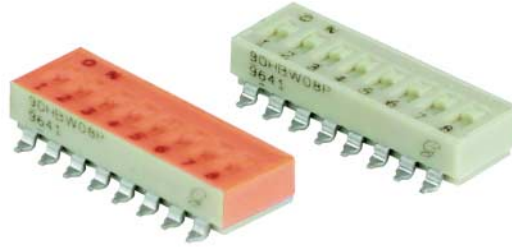
Available from your local Grayhill Distributor.
 For prices and discounts, contact a local Sales Office, an authorized local Distributor or Grayhill.

DIP Switches

SERIES 90HB SPST, Low Profile

FEATURES

- Now Available with Polyimide Tape Seal that Easily Removes After Processing
- Compatible with SMT Assembly, Including Infrared Reflow and Vapor-Phase
- Top Seal Withstands High Pressure Aqueous Cleaning
- Reliable Spring and Ball Contact

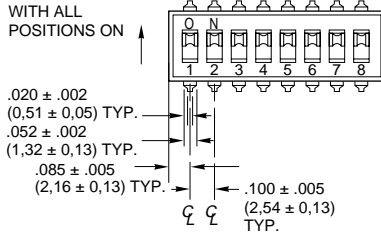


DIP Switches

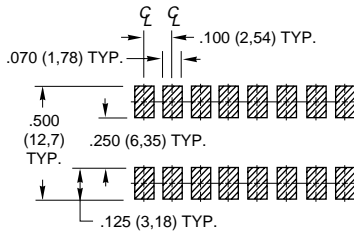
DIMENSIONS In inches (and millimeters)

Top View—Gull Wing

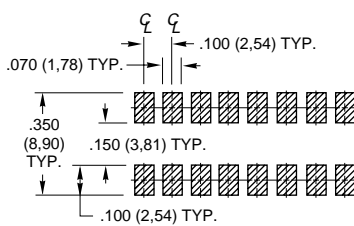
SWITCH IS PACKAGED AS SHOWN HERE WITH ALL POSITIONS ON



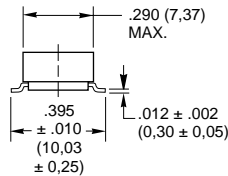
Recommended PC Pad Dimensions—Gull Wing



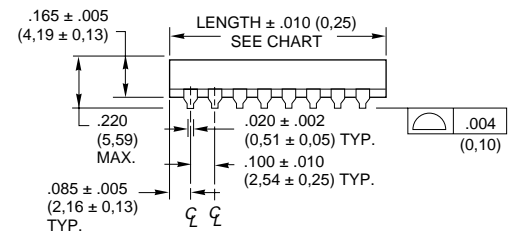
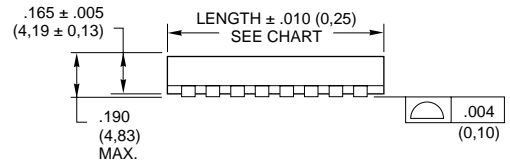
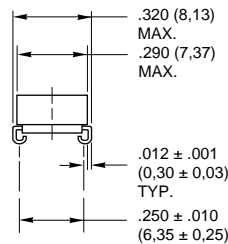
Recommended PC Pad Dimensions—J-Bend



Gull Wing

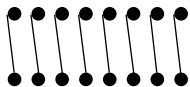


J-Bend



CIRCUITRY

As viewed from the top of the switch in the positions shown in the drawing.



SPECIFICATIONS

Electrical Ratings

Make-and-break Current Rating: 2,000 operations per switch position at these resistive loads: 10 mA, 30 Vdc; or 10 mA, 50 mVdc; 10 mA, 50 mVdc; or 25 mA, 24 Vdc; or 100 mA, 6 Vdc.
Contact Resistance: (measured at 10 mA, 50 mVdc). Initial: 20 mohms maximum, After Life: 100 mohms maximum
Insulation Resistance: Minimum, at 100 Vdc between adjacent closed contacts and also across open switch contacts.
 Initial (Mohms): 5,000, After Life (Mohms): 1,000
Dielectric Strength: Minimum voltage (AC RMS) measured between adjacent closed contacts and also across open switch contacts.
 Initial: 500 volts, After Life: 500 volts
Current Carry Rating: 3A maximum rise of 20°C
Switch Capacitance: 2 pF at 1 megahertz

Mechanical Ratings

Where Grayhill performance is superior, the MIL spec is listed in parentheses.
Mechanical Life: 5,000 operations per switch position
Vibration Resistance: Per Method 204, Test Condition B, 1mS opening (10 mS allowed)
Mechanical Shock: Per Method 213, Test Condition A. 1mS opening (10 mS allowed)
Thermal Shock Resistance: Per specification; no failures; passes contact resistance.
Terminal Strength: Per specification
Thermal Aging: 1,000 hours at 85°C; no failures.

Environmental Ratings

Meets all requirements of MIL- S-83504.
Operating Temperature Range: -40°C to +85°C
Storage Temperature Range: -40°C to +85°C
Moisture Resistance: Per specification, Method 106.

Soldering Information

Solderability: Per MIL-STD-202, Method 208
Soldering Heat Resistance: Per MIL-S-83504, six second test.
Recommended Processing Temperature: 220°C–230°C (1 pass—260°C maximum)
Processing Position: Switch is to be processed with all actuators in the closed (on) position as shipped.
Fluxing: Per EIA RS-448-2 with flux touching switch body.
Cleaning: Passes immersion test using water/detergent. Acceptable solutions include 1-1-1 trichlorethane, freon, (TF, TE, or TMS), isopropyl alcohol, detergent (140°F maximum). Terpene acceptable for Series 90 only. Solutions which are not recommended include acetone, methylene chloride, freon TMC.

Materials and Finishes

Shorting Member (Ball): Brass, gold-plated 10 microinches minimum over nickel barrier.
Base Contacts: Copper alloy, gold-plated 10 microinches minimum over nickel barrier.
Terminals: Copper alloy, solder-plated over nickel barrier.
Non-Conductive Parts: Thermoplastic (UL94V-O)

Tape and Reel Packaging

Tape Seal Integrity: Passes gross leak test using 125°C flourinert for 20 seconds minimum. Reference MIL-STD-202, Method 112
Tape Seal: Polyimide film

ORDERING INFORMATION

Series
Terminal Style: W = Gull Wing, J = J-Bend

90HBW02PR

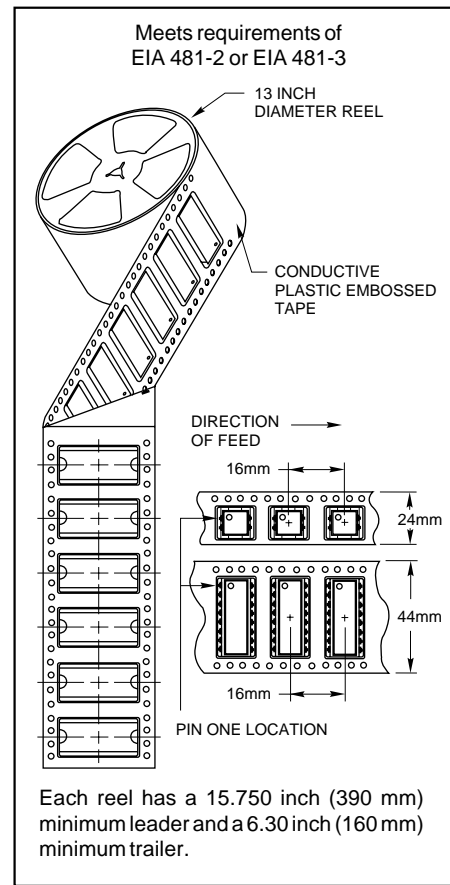
Packaging: R = Tape and reel packaging (750 switches/reel)
 Blank = Tube packaging (each tube is 19.5" long)

Seal: P = Polyimide Seal
 Blank = No Seal

Number of Positions: 02 through 10

| No. of Pos. | Length Inches | Length Metric | No. of Pos. | Length Inches | Length Metric |
|-------------|---------------|---------------|-------------|---------------|---------------|
| 2 | .270" | 6,9 mm | 7 | .770" | 19,56 mm |
| 3 | .370" | 9,4 mm | 8 | .870" | 22,1 mm |
| 4 | .470" | 11,9 mm | 9 | .970" | 24,64 mm |
| 5 | .570" | 14,48 mm | 10 | 1.070" | 27,2 mm |
| 6 | .670" | 17,0 mm | | | |

TAPE AND REEL PACKAGING

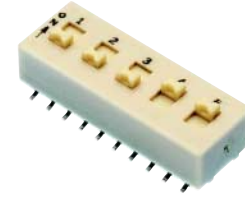


DIP Switches

SERIES 78H SPDT and DPST

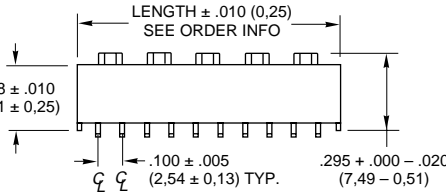
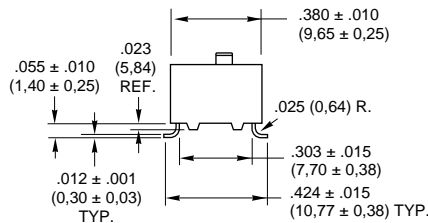
FEATURES

- Compatible with SMT Assembly Including Infrared Reflow and Vapor-Phase
- Circuitry not Offered in any Other Surface Mount Configuration
- Reliable Spring and Ball Contact

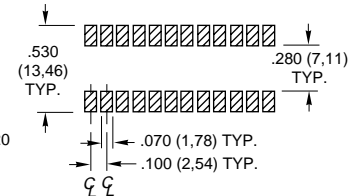


DIMENSIONS In inches (and millimeters)

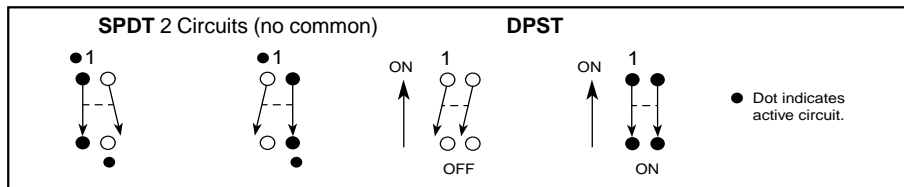
SPDT, DPST, Top Actuated, Slide Operated



Recommended PC Pad Dimensions



CIRCUITRY



SPECIFICATIONS

Electrical Ratings

Make-and-break Current Rating: 10,000 operations per switch position at 1 mA, 5 Vdc; 50 mA, 30 Vdc; or 150 mA, 30 Vdc

Contact Resistance: Initial: 30 mohms max. After Life: 100 mohms max. (10 mA at 50 Vdc, open circuit)

Insulation Resistance: Minimum, at 100 Vdc between adjacent closed contacts and also across open switch contacts. Initial: 2,000 Mohms; After Life: 1,000 Mohms

Dielectric Strength: Minimum voltage (AC, RMS) measured between adjacent closed contacts and also across open switch contacts. Initial: 750 volts; After Life: 500 volts

Current Carry Rating: 4 amps, maximum rise of 20°C

Switch Capacitance: 2 pF at 1megahertz

Mechanical Ratings

Mechanical Life: 20,000 operations per switch position

Vibration Resistance: Per method 204, Test Condition B. 1 mS opening (10 mS allowed)

Mechanical Shock: Per Method 213, Test Condition A. 1 mS opening (10 mS allowed)

ORDERING INFORMATION: Tube Packaging

| No. of Positions | Length (inches) | Length (metric) | Carrier Width Dim. A | Part Number* | |
|------------------|-----------------|-----------------|----------------------|--------------|----------|
| | | | | SPDT | DPST |
| 1 | 0.280" | 7,1 mm | 24 mm | 78HJ01GW | 78HF01GW |
| 2 | 0.480" | 12,2 mm | 24 mm | 78HJ02GW | 78HF02GW |
| 3 | 0.680" | 17,3 mm | 32 mm | 78HJ03GW | 78HF02GW |
| 4 | 0.880" | 22,4 mm | 44 mm | 78HJ04GW | 78HF04GW |
| 5 | 1.080" | 27,4 mm | 44 mm | 78HJ05GW | 78HF05GW |

* Add "R" to the Grayhill part number for tape and reel packaging (500 switches/reel).

Available from your local Grayhill Distributor. For prices and discounts, contact a local Sales Office, an authorized local Distributor or Grayhill.

Materials and Finishes

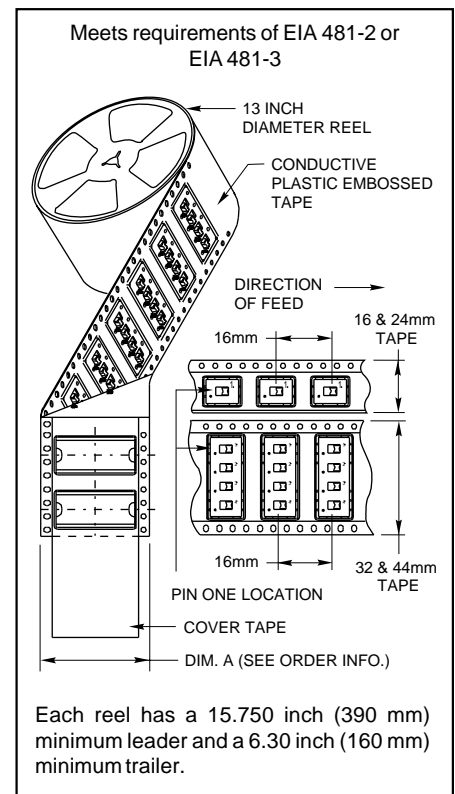
Shorting Member: Brass, gold-plated, 10 microinches minimum over nickel barrier.

Base Contacts: Copper alloy, gold-plated, 10 microinches minimum over nickel barrier.

Terminals: Copper alloy, solder-plated over nickel barrier.

Non-Conductive Parts: Cover is natural color thermoplastic, actuators are white thermoplastic (UL94V-O)

TAPE AND REEL PACKAGING

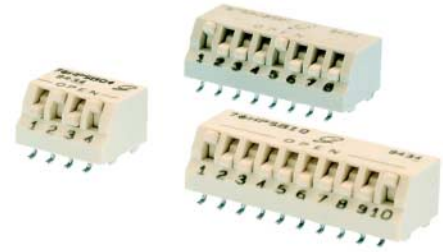


SERIES 76HP

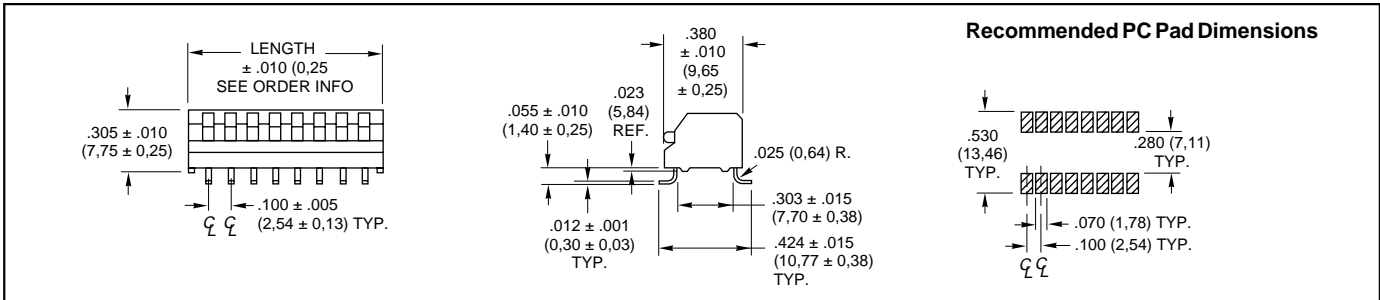
Side Actuated PIANO-DIP®

FEATURES

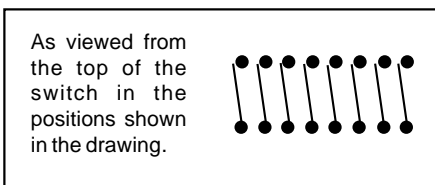
- Compatible with SMT Assembly Including Infrared Reflow and Vapor-Phase
- Easily Accessed when PC Boards are Racked
- Reliable Spring and Ball Contact



DIMENSIONS In inches (and millimeters)



CIRCUITRY



SPECIFICATIONS

Electrical Ratings

Make-and-break Current Rating: 10,000 operations per switch position at 1 mA, 5 Vdc; 50 mA, 30 Vdc; or 150 mA, 30 Vdc

Contact Resistance: Initial: 30 mohms maximum; After Life: 100 mohms maximum (10 mA at 50 Vdc, open circuit)

Insulation Resistance: Minimum, at 100 Vdc between adjacent closed contacts and also across open switch contacts. Initial: 2,000 Mohms

Dielectric Strength: Minimum voltage (AC RMS) measured between adjacent closed contacts and also across open switch contacts. Initial: 750 volts; After Life: 500 volts

Carry Rating: 5 amps, maximum rise of 20°C

Switch Capacitance: 2 pF at 1 megahertz

Mechanical Ratings

Mechanical Life: 20,000 operations per switch position

Vibration Resistance: Per Method 204, Test Condition B. 1 mS opening (10 mS allowed)

Mechanical Shock: Per Method 213, Test Condition A. 1 mS opening (10 mS allowed)

Thermal Shock Resistance: Per specification; no failures; passes contact resistance

Terminal Strength: Per specification

Thermal Aging: 1,000 hours at 85°C; no failures

Environmental Ratings

Meets all requirements of MIL- S-83504. Where Grayhill performance is superior, the MIL spec is listed in parentheses.

Operating Temperature Range: -40°C to +85°C

Storage Temperature Range: -55°C to +85°C

Moisture Resistance: Per specification, Method 106

Soldering Information

Solderability: Per MIL-STD-202, Method 208 Tested to EIA Standard RS-448-2.

Resistance to Soldering Heat: Per MIL-S-83504, six second test

Recommended Processing Temperature: 220°C—230°C (1 pass—260°C maximum)

Processing Position: Switch is to be processed with all actuators in the closed (on) position as shipped.

Materials and Finishes

Shorting Member: Brass, gold-plated, 10 microinches minimum over nickel barrier.

Base Contacts: Copper alloy, gold-plated,

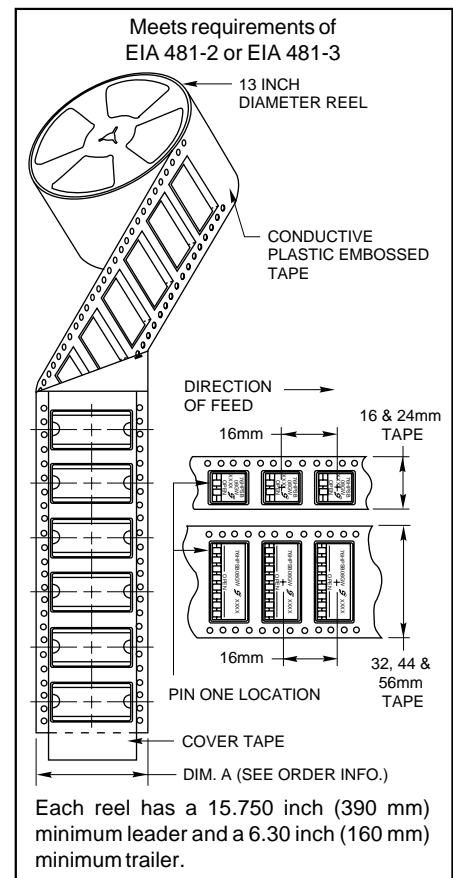
10 microinches minimum over nickel barrier.

Terminals: Copper alloy, solder plated over nickel barrier.

Non-Conductive Parts: Cover is natural color thermoplastic, actuators are white thermoplastic (UL94V-O)

Tape Seal: Provided without tape seal. Contact Grayhill if tape seal is required.

TAPE AND REEL PACKAGING



ORDERING INFORMATION: Tape and Reel Packaging (500 switches per reel)

| No. of Positions* | Length (inches) | Length (metric) | Carrier Width Dim. A | Part Number |
|-------------------|-----------------|-----------------|----------------------|-------------|
| 2 | 0.280" | 7,1 mm | 24 mm | 76HPSB02GWR |
| 4 | 0.480" | 12,2 mm | 24 mm | 76HPSB04GWR |
| 6 | 0.680" | 17,3 mm | 32 mm | 76HPSB06GWR |
| 8 | 0.880" | 22,4 mm | 44 mm | 76HPSB08GWR |
| 10 | 1.080" | 27,4 mm | 44 mm | 76HPSB10GWR |

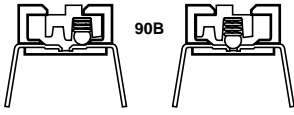
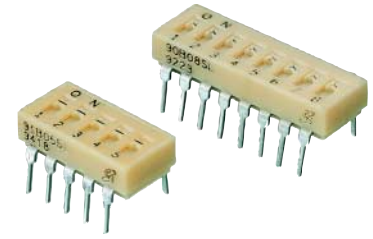
* For other lengths, contact Grayhill, Inc.

Available from your local Grayhill Distributor. For prices and discounts, contact a local Sales Office, an authorized local Distributor or Grayhill.

SERIES 90B Machine Insertable MIDIP®

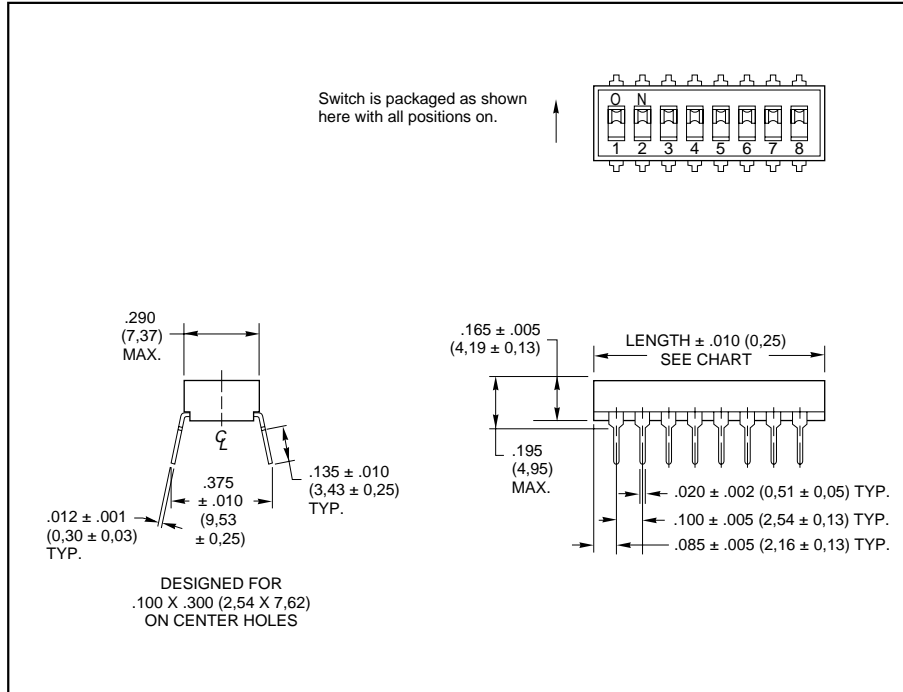
FEATURES

- Tested for TO-116 Equipment
- Up to 10 Positions
- High Pressure, Reliable Contacts
- Molded (Sealed) Base and Optional Top Seal



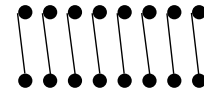
DIP Switches

DIMENSIONS In inches (and millimeters)



CIRCUITRY

As viewed from the top of the switch in the positions shown in the drawing.



ORDERING INFORMATION: Tube Packaging (Each tube is 19.5 inches long)

| No. of Positions | Length Inches | Length Metric | Number Per Tube | Part Number* |
|------------------|---------------|---------------|-----------------|---------------|
| 2 | .270" | 6,9 mm | 60 | 90B02S |
| 3 | .370" | 9,4 mm | 47 | 90B03S |
| 4 | .470" | 11,9 mm | 37 | 90B04S |
| 5 | .570" | 14,5 mm | 31 | 90B05S |
| 6 | .670" | 17,0 mm | 26 | 90B06S |
| 7 | .770" | 19,6 mm | 23 | 90B07S |
| 8 | .870" | 22,1 mm | 20 | 90B08S |
| 9 | .970" | 24,6 mm | 18 | 90B09S |
| 10 | 1.070" | 27,2 mm | 16 | 90B10S |

ADDITIONAL INFORMATION

For Specifications, see page B-16.
For Options and Accessories, see page B-20.

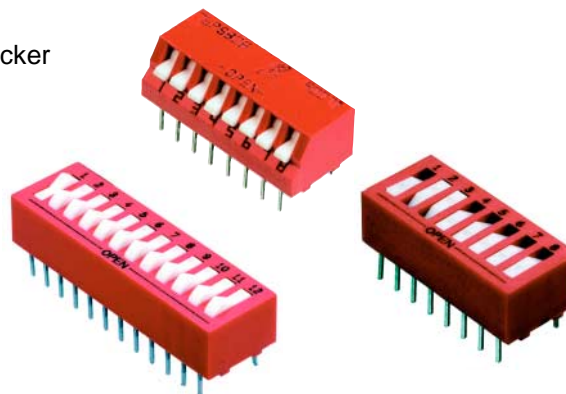
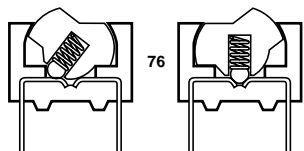
Available from your local Grayhill Distributor.
For prices and discounts, contact a local Sales Office, an authorized local Distributor or Grayhill.

*The "S" at the end of the part number denotes top tape seal versions. To order without top tape seal, leave the "S" off the part number when ordering.

SERIES 76
SPST Rocker

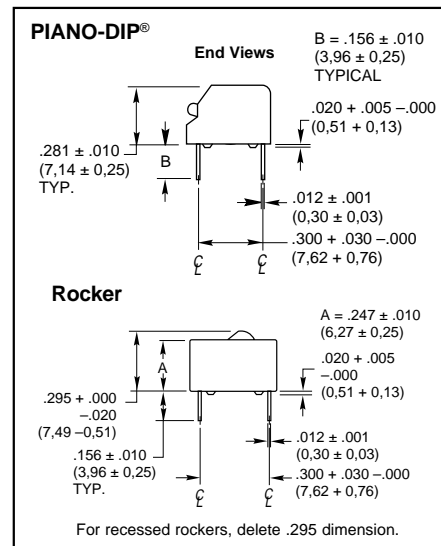
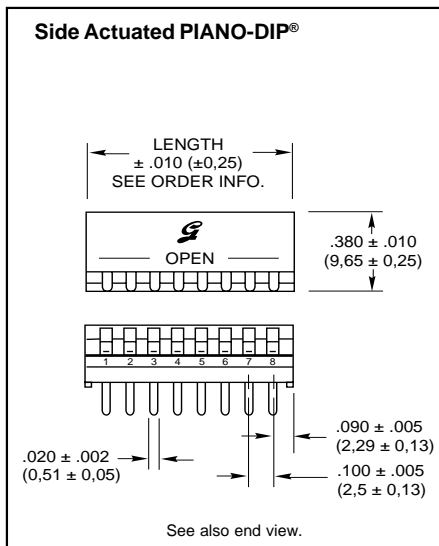
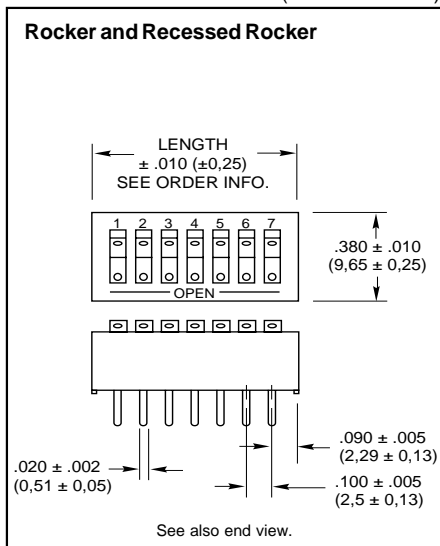
FEATURES

- Raised and Recessed, Rocker and PIANO-DIP® Styles
- Sealed Base Standard
- Spring and Ball Contact
- Top Tape Seal Option

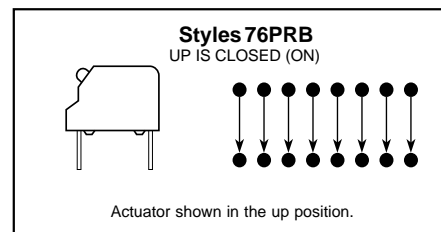
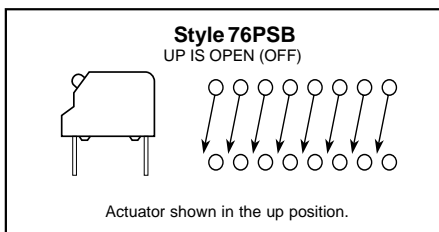
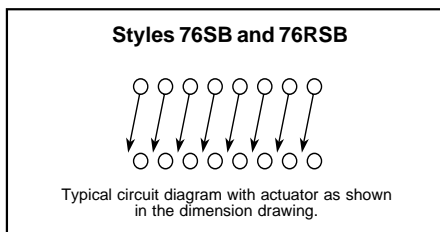


DIP Switches

DIMENSIONS In inches (and millimeters)



CIRCUITRY



ORDERING INFORMATION

76RSB04S

Series
Switch Style: SB = Raised Rocker
RSB = Recessed Rocker
PSB = Piano-DIP (Up is Off)
PRB = Piano-DIP (Up is On)

Seal*: S = Tape Seal
Blank = No Seal

Number of Positions: 02 through 10, 12

| No. of Pos. | Length (Inches) | Length (Metric) | No./Tube |
|-------------|-----------------|-----------------|----------|
| 2 | 0.280" | 7,1 mm | 35 |
| 3 | 0.380" | 9,7 mm | 27 |
| 4 | 0.480" | 12,2 mm | 21 |
| 5 | 0.580" | 14,7 mm | 18 |
| 6 | 0.680" | 17,3 mm | 15 |
| 7 | 0.780" | 19,8 mm | 13 |
| 8 | 0.880" | 22,4 mm | 12 |
| 9 | 0.980" | 24,9 mm | 10 |
| 10 | 1.080" | 27,4 mm | 9 |
| 12 | 1.280" | 32,5 mm | 8 |

*A top tape seal is required for switches that are machine soldered or heavily cleaned after hand soldering. To order top seal versions, add "S" to the Grayhill part number.

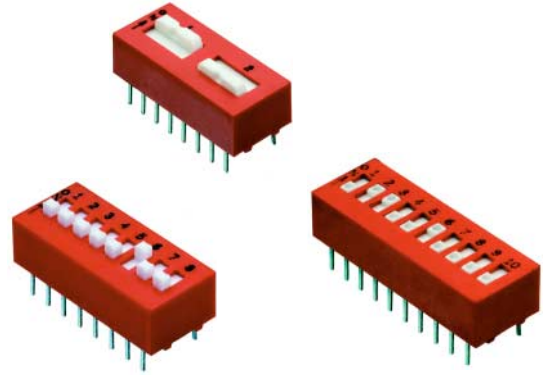
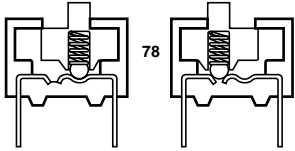
For Specifications, see page B-16.
For Options and Accessories, see page B-20.

Available from your local Grayhill Distributor.
For prices and discounts, contact a local Sales Office, an authorized local Distributor or Grayhill.

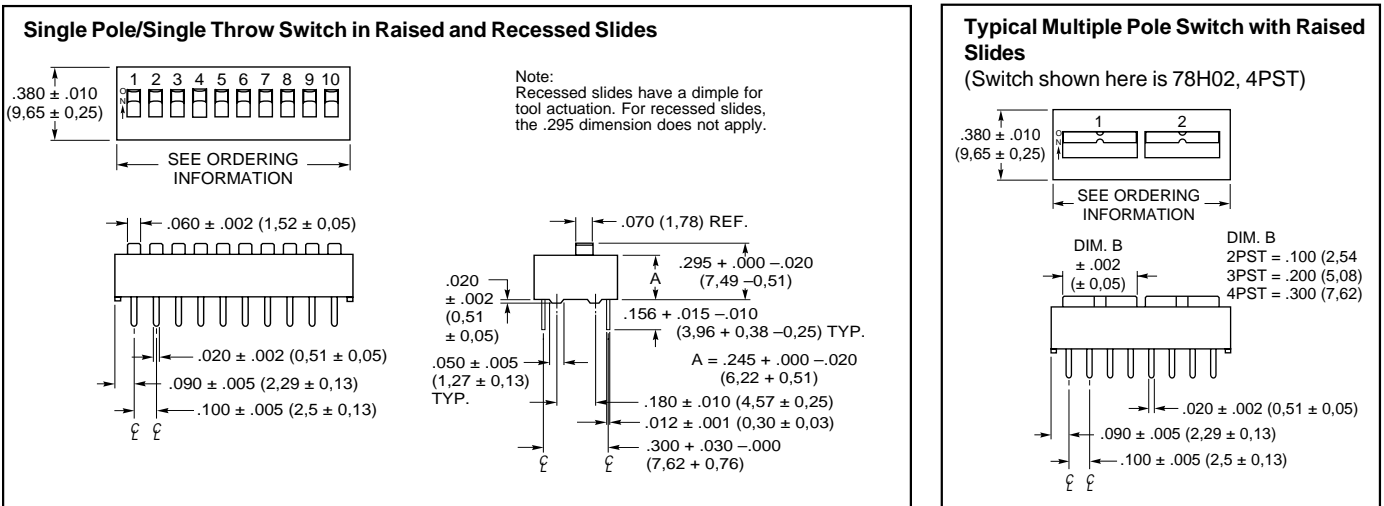
SERIES 78 SPST To 4PST Slide

FEATURES

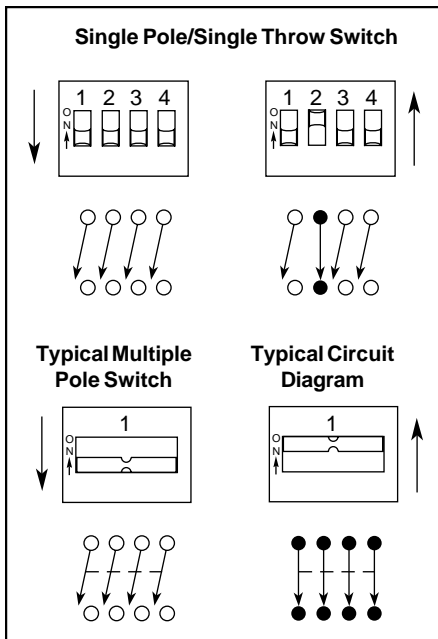
- Raised and Recessed Slides
- SPST, 2PST, 3PST, 4PST
- Sealed Base Standard
- Spring and Ball Contact
- Top Tape Seal Option



DIMENSIONS In inches (and millimeters)



CIRCUITRY



ORDERING INFORMATION

| Circuitry | No. of Positions | Length Inches | Length Metric | No./Tube | Raised Slides* | Recessed Slides* | |
|-----------|------------------|---------------|---------------|----------|----------------|-------------------------------|-------------------------------|
| SPST | 2 | 0.280" | 7,1mm | 35 | 78B02 | 78RB02 | |
| | 3 | 0.380" | 9,7mm | 27 | 78B03 | 78RB03 | |
| | 4 | 0.480" | 12,2mm | 21 | 78B04 | 78RB04 | |
| | 5 | 0.580" | 14,7mm | 18 | 78B05 | 78RB05 | |
| | 6 | 0.680" | 17,3mm | 15 | 78B06 | 78RB06 | |
| | 7 | 0.780" | 19,8mm | 13 | 78B07 | 78RB07 | |
| | 8 | 0.880" | 22,4mm | 12 | 78B08 | 78RB08 | |
| | 9 | 0.980" | 24,9mm | 10 | 78B09 | 78RB09 | |
| | 10 | 1.080" | 27,4mm | 9 | 78B10 | 78RB10 | |
| | 12 | 1.280" | 32,5mm | 8 | 78B12 | 78RB12 | |
| | 2PST | 1 | 0.280" | 7,1mm | 35 | 78F01 | Recessed Slides Not Available |
| | | 2 | 0.480" | 12,2mm | 21 | 78F02 | |
| 3 | | 0.680" | 17,3mm | 15 | 78F03 | | |
| 4 | | 0.880" | 22,4mm | 12 | 78F04 | | |
| 5 | | 1.080" | 27,4mm | 9 | 78F05 | | |
| 6 | | 1.280" | 32,5mm | 8 | 78F06 | | |
| 3PST | 1 | 0.380" | 9,7mm | 27 | 78G01 | Recessed Slides Not Available | |
| | 2 | 0.680" | 17,3mm | 15 | 78G02 | | |
| | 3 | 0.980" | 24,9mm | 10 | 78G03 | | |
| 4PST | 1 | 0.480" | 12,2mm | 21 | 78H01 | Recessed Slides Not Available | |
| | 2 | 0.880" | 22,4mm | 12 | 78H02 | | |

For switches with 5, 6, 7, 8, or 10PST circuitry, contact Grayhill.

*A top tape seal is required for switches that are machine soldered or heavily cleaned after hand soldering. To order top seal versions, add "S" to the Grayhill part number.

ADDITIONAL INFORMATION

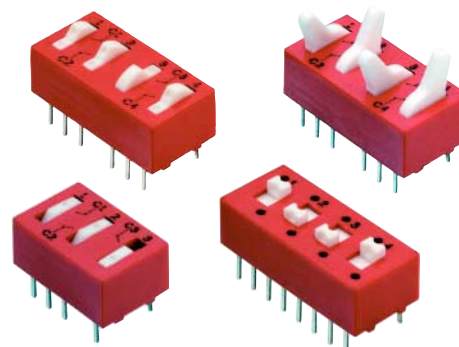
For Specifications see page B-16.
For other Options and Accessories, see pages B-20 and B-21.

Available from your local Grayhill Distributor.
For prices and discounts, contact a local Sales Office, an authorized local Distributor or Grayhill.

SERIES 76 and 78
SPDT

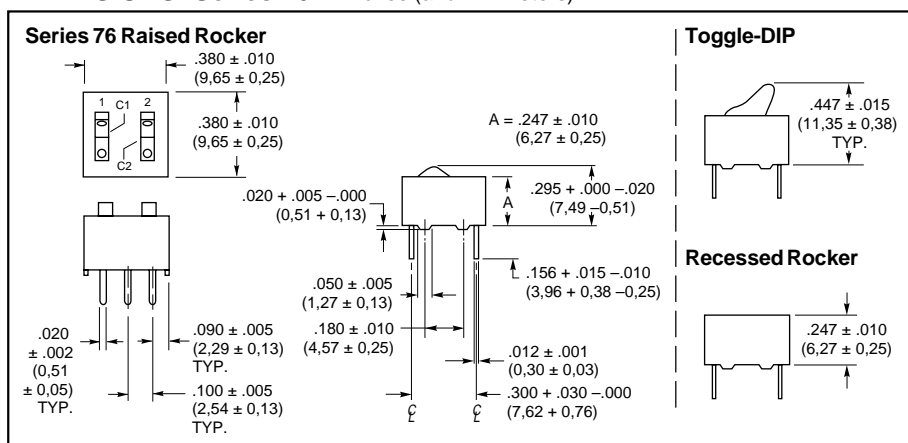
FEATURES

- Raised and Recessed Rocker, and Toggle Actuated Styles
- SPDT with a Common Pole, or SPDT with 2 Isolated Circuits
- Spring and Ball Contact
- Top Tape Seal Option for Most Styles

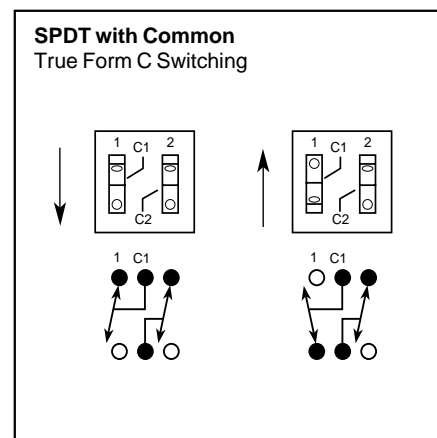


DIP Switches

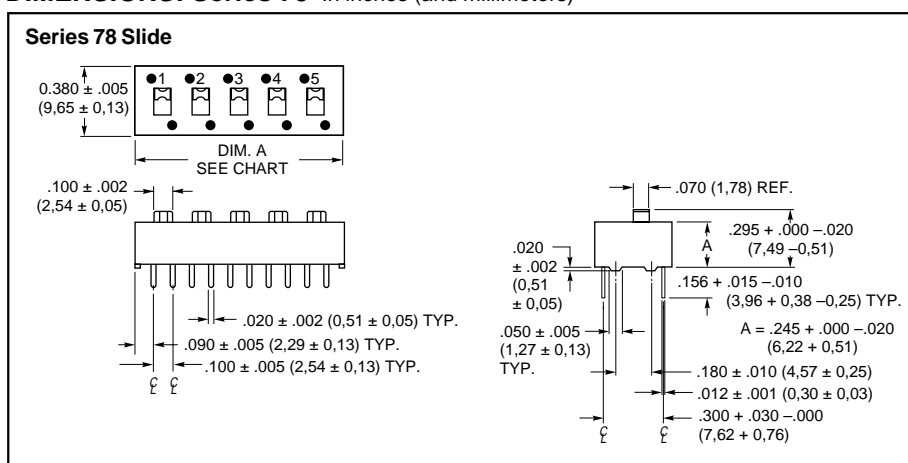
DIMENSIONS: Series 76 In inches (and millimeters)



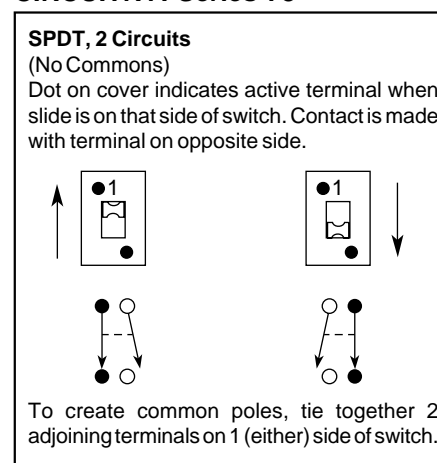
CIRCUITRY: Series 76



DIMENSIONS: Series 78 In inches (and millimeters)



CIRCUITRY: Series 78



ORDERING INFORMATION

| Circuitry | Positions | Length Inches | Length Metric | No./ Tube | Raised Type* | Recessed Rockers* | Toggle-DIP* |
|-----------------|-----------|---------------|---------------|-----------|--------------|-------------------|-------------|
| SPDT Form C | 2 | 0.380" | 9,7mm | 27 | 76SC02 | 76RSC02 | 76STC02 |
| | 3 | 0.580" | 14,7mm | 18 | 76SC03 | 76RSC03 | 76STC03 |
| | 4 | 0.780" | 19,8mm | 13 | 76SC04 | 76RSC04 | 76STC04 |
| SPDT 2 Circuits | 1 | 0.280" | 7,1mm | 35 | 78J01 | — | — |
| | 2 | 0.480" | 12,2mm | 21 | 78J02 | — | — |
| | 3 | 0.680" | 17,3mm | 15 | 78J03 | — | — |
| | 4 | 0.880" | 22,4mm | 12 | 78J04 | — | — |
| | 5 | 1.080" | 27,4mm | 9 | 78J05 | — | — |
| | 6 | 1.280" | 32,5mm | 8 | 78J06 | — | — |

*To order top seal versions, add "S" to the Grayhill part number. Not available on Toggle-DIP.

ADDITIONAL INFORMATION

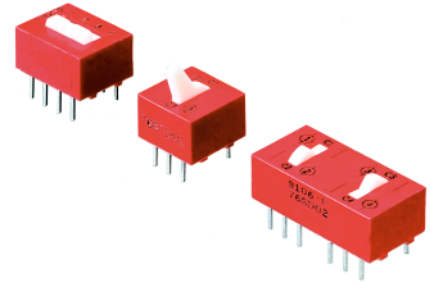
For Specifications, see page B-16. For Options and Accessories, see pages B-20 and B-21.

Available from your local Grayhill Distributor. For prices and discounts, contact a local Sales Office, an authorized local Distributor or Grayhill.

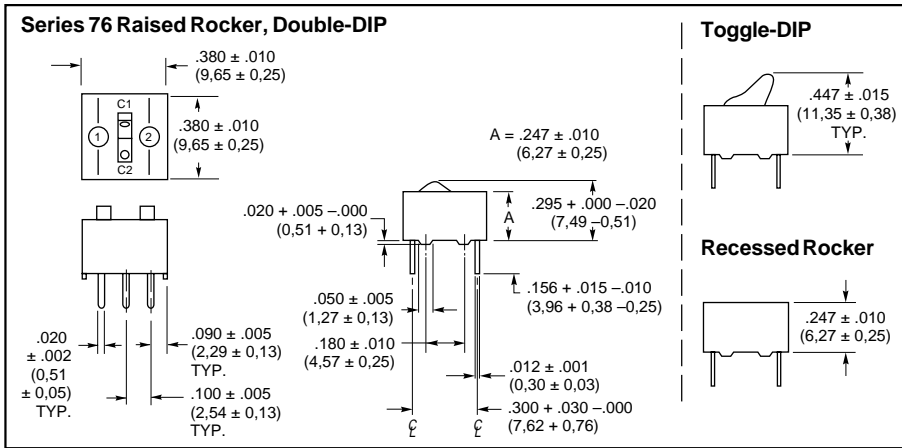
SERIES 76 and 78 DPDT

FEATURES

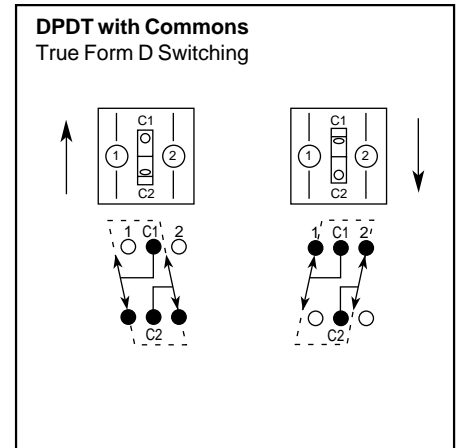
- Raised and Recessed Rocker, and Toggle Actuated Styles
- DPDT with Common Poles, or DPDT with 4 Isolated Circuits
- Spring and Ball Contact
- Top Tape Seal Option for Most Styles



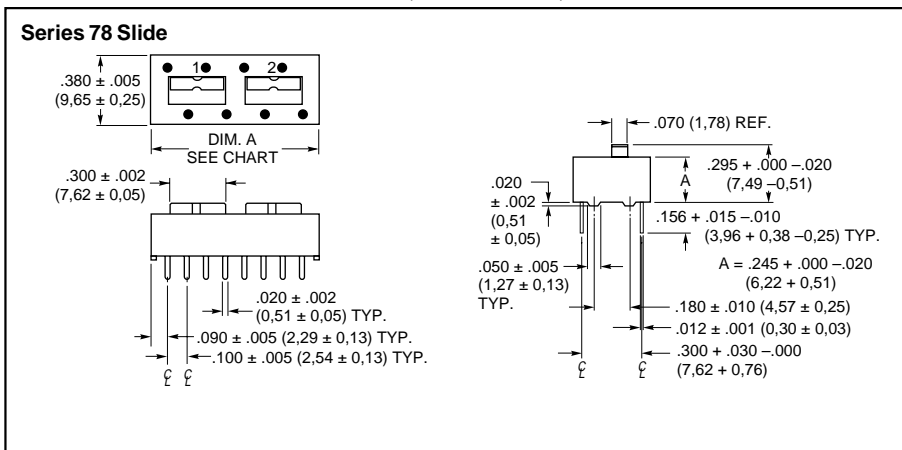
DIMENSIONS: Series 76 In inches (and millimeters)



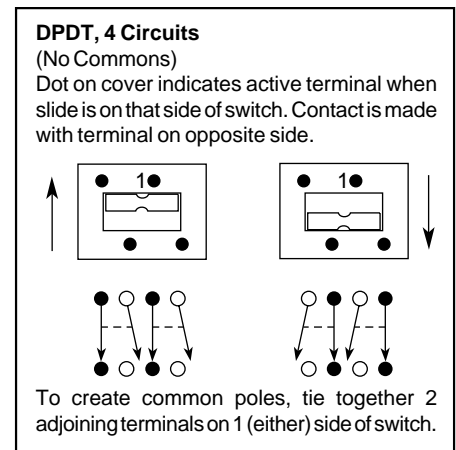
CIRCUITRY: Series 76



DIMENSIONS: Series 78 In inches (and millimeters)



CIRCUITRY: Series 78



ORDERING INFORMATION

| Circuitry | No./ Positions | Length Inches | Length Metric | No./ Tube | Raised Type* | Recessed Rockers* | Toggle-DIP* |
|--------------|----------------|---------------|---------------|-----------|--------------|-------------------|-------------|
| DPDT Form D | 1 | 0.380" | 9,7mm | 27 | 76SD01 | 76RSD01 | 76STD01 |
| | 2 | 0.780" | 19,8mm | 13 | 76SD02 | 76RSD02 | 76STD02 |
| DPDT 4 Circ. | 1 | 0.480" | 12,2mm | 21 | 78K01 | — | — |
| | 2 | 0.880" | 22,4mm | 12 | 78K02 | — | — |

ADDITIONAL INFORMATION

For Specifications, see page B-16. For other Options and Accessories, see pages B-20 and B-21.

Available from your local Grayhill Distributor. For prices and discounts, contact a local Sales Office, an authorized local Distributor or Grayhill.

A top tape seal is required for switches that are machine soldered or heavily cleaned after hand soldering. To order top seal versions, add "S" to the Grayhill part number. Not available on Toggle-DIP.

SPECIFICATIONS: Standard and Military Qualified Styles

| Ratings | 76 | 78 | 90B |
|---|-----------------|-----------------|-----------------|
| Mechanical Life: Operations per switch position | 20,000 | 20,000 | 5,000 |
| Make-and-break Current Rating: Operations per switch position at these resistive loads 1 mA, 5 Vdc; 50 mA, 30 Vdc; or 150 mA, 30 Vdc: | 10,000 | 10,000 | — |
| 10 mA, 30 Vdc; or 10 mA, 50 mVdc: | — | — | 2,000 |
| 10 mA, 50 mVdc; or 25 mA, 24 Vdc; or 100 mA, 6 Vdc: | — | — | 2,000 |
| Contact Resistance: Initially: | ≤ 30 mΩ | ≤ 30 mΩ | ≤ 20 mΩ |
| After life, at 10 mA, 50 mVdc, open circuit: | ≤ 100 mΩ | ≤ 100 mΩ | ≤ 100 mΩ |
| Insulation Resistance: Minimum, at 100 Vdc between adjacent closed contacts and also across open switch contacts | | | |
| Initially (Mohms): | 5,000 | 5,000 | 5,000 |
| After life (Mohms): | 1,000 | 1,000 | 1,000 |
| Dielectric Strength: Minimum voltage (AC, RMS) measured between adjacent closed contacts and also across open switch contacts. | | | |
| Initially: | 750 V | 750 V | 500 V |
| After life: | 500 V | 500 V | 500 V |
| Current Carry Rating: Maximum rise of 20°C | 5 A | 4 A | 3 A |
| Switch Capacitance: At 1 megahertz | 2 pF | 2 pF | 2 pF |
| Operating Temperature Range: | -40°C to + 85°C | -40°C to + 85°C | -40°C to + 85°C |
| Storage Temperature Range: | -55°C to + 85°C | -55°C to + 85°C | -55°C to + 85°C |

DIP Switches

Mechanical Ratings

Vibration Resistance: Per Method 204, Test Condition B, 1 mS opening (10 mS allowed)
Mechanical Shock: Per Method 213, Test Condition A. 1 mS opening (10 mS allowed)
Thermal Shock Resistance: Per specification; no failures; passes contact resistance.
Terminal Strength: Per specification
Thermal Aging: 1,000 hours at 85°C; no failures.

Environmental Ratings

Meets all requirements of MIL- S-83504. Where Grayhill performance is superior, the MIL spec is listed in parentheses.
Moisture Resistance: Per specification, Method 106.

Soldering Information

Series 90 MIDIP® and Series 76 recessed rocker (76RSB style) sealed switches have been tested to EIA Standard RS-448-2. Similar performance can be expected from other sealed Series 76 and 78 DIP switches.
Solderability: Per MIL-STD-202, Method 208
Resistance to Soldering Heat: 76RSB: Passes EIA Standard using two, four, and six second soldering time. 90: Per MIL-S-83504, six second test.
Fluxing: Per EIA RS-448-2 with flux touching switch body.
Cleaning: 76RSB, 90: Passes immersion test using water/detergent. Acceptable solutions include 1-1-1 trichlorethane, freon, (TF, TE, or TMS), isopropyl alcohol, detergent (140°F maximum). Terpene acceptable for Series 90 only. Solutions which are not recommended include acetone, methylene chloride, freon TMC.

Materials and Finishes

Shorting Member (Ball): Brass, gold-plated 10 microinches minimum over nickel barrier.
Base Contacts: Copper alloy, gold-plated 10 microinches minimum over nickel barrier.
Terminals: Copper alloy, solder-plated over nickel barrier.
Non-Conductive Parts: Thermoplastic (UL94V-O)
Potting Material: Epoxy, 76,78 only.
Protective Cover: 76,78, only-Polycarbonate.

Tape and Reel Packaging

Tape Seal:
 76, 78: Polyester film
 90: Polyimide film or foil
Tape Seal Integrity: Passes gross leak test using 125°C flourinert for 20 seconds minimum. Reference MIL-STD-202, Method 112.

SERIES 76, 78 and 90

Military Qualified

TOP SEAL

All Grayhill DIP Switch part numbers ending in "S" have a tape seal. This is now the standard for

FEATURES

- All switches listed on these pages are qualified to MS83504

military qualified DIP switches. If you order by the military "M" number, you will also get the tape seal

version. The exception is the toggle actuated styles which are not top tape sealed.

ORDERING INFORMATION

| Circuitry | Description | Number of Positions | Military Part Number | Grayhill Part Number |
|--------------------------|--------------------|---------------------|----------------------|----------------------|
| Single Pole/Single Throw | Raised Rocker | 02 | M83504/01-022 | 76MSB02S |
| Single Pole/Single Throw | Raised Rocker | 03 | M83504/01-023 | 76MSB03S |
| Single Pole/Single Throw | Raised Rocker | 04 | M83504/01-024 | 76MSB04S |
| Single Pole/Single Throw | Raised Rocker | 05 | M83504/01-025 | 76MSB05S |
| Single Pole/Single Throw | Raised Rocker | 06 | M83504/01-026 | 76MSB06S |
| Single Pole/Single Throw | Raised Rocker | 07 | M83504/01-027 | 76MSB07S |
| Single Pole/Single Throw | Raised Rocker | 08 | M83504/01-028 | 76MSB08S |
| Single Pole/Single Throw | Raised Rocker | 09 | M83504/01-029 | 76MSB09S |
| Single Pole/Single Throw | Raised Rocker | 10 | M83504/01-030 | 76MSB10S |
| Single Pole/Single Throw | Raised Rocker | 12 | M83504/01-032 | 76MSB12S |
| Single Pole/Single Throw | Recessed Rocker | 02 | M83504/02-022 | 76MRSB02S |
| Single Pole/Single Throw | Recessed Rocker | 03 | M83504/02-023 | 76MRSB03S |
| Single Pole/Single Throw | Recessed Rocker | 04 | M83504/02-024 | 76MRSB04S |
| Single Pole/Single Throw | Recessed Rocker | 05 | M83504/02-025 | 76MRSB05S |
| Single Pole/Single Throw | Recessed Rocker | 06 | M83504/02-026 | 76MRSB06S |
| Single Pole/Single Throw | Recessed Rocker | 07 | M83504/02-027 | 76MRSB07S |
| Single Pole/Single Throw | Recessed Rocker | 08 | M83504/02-028 | 76MRSB08S |
| Single Pole/Single Throw | Recessed Rocker | 09 | M83504/02-029 | 76MRSB09S |
| Single Pole/Single Throw | Recessed Rocker | 10 | M83504/02-030 | 76MRSB10S |
| Single Pole/Single Throw | Recessed Rocker | 12 | M83504/02-032 | 76MRSB12S |
| Single Pole/Single Throw | Slide | 02 | M83504/04-022 | 78M02S |
| Single Pole/Single Throw | Slide | 03 | M83504/04-023 | 78M03S |
| Single Pole/Single Throw | Slide | 04 | M83504/04-024 | 78M04S |
| Single Pole/Single Throw | Slide | 05 | M83504/04-025 | 78M05S |
| Single Pole/Single Throw | Slide | 06 | M83504/04-026 | 78M06S |
| Single Pole/Single Throw | Slide | 07 | M83504/04-027 | 78M07S |
| Single Pole/Single Throw | Slide | 08 | M83504/04-028 | 78M08S |
| Single Pole/Single Throw | Slide | 09 | M83504/04-029 | 78M09S |
| Single Pole/Single Throw | Slide | 10 | M83504/04-030 | 78M10S |
| Single Pole/Single Throw | Slide | 12 | M83504/04-032 | 78M12S |
| Single Pole/Single Throw | Machine Insertable | 02 | M83504/12-002 | 90MB02S |
| Single Pole/Single Throw | Machine Insertable | 03 | M83504/12-003 | 90MB03S |
| Single Pole/Single Throw | Machine Insertable | 04 | M83504/12-004 | 90MB04S |
| Single Pole/Single Throw | Machine Insertable | 05 | M83504/12-005 | 90MB05S |
| Single Pole/Single Throw | Machine Insertable | 06 | M83504/12-006 | 90MB06S |
| Single Pole/Single Throw | Machine Insertable | 07 | M83504/12-007 | 90MB07S |
| Single Pole/Single Throw | Machine Insertable | 08 | M83504/12-008 | 90MB08S |
| Single Pole/Single Throw | Machine Insertable | 09 | M83504/12-009 | 90MB09S |
| Single Pole/Single Throw | Machine Insertable | 10 | M83504/12-010 | 90MB10S |
| Single Pole/Single Throw | Side Actuated | 02 | M83504/11-022 | 76MP SB02S |
| Single Pole/Single Throw | Side Actuated | 03 | M83504/11-023 | 76MP SB03S |
| Single Pole/Single Throw | Side Actuated | 04 | M83504/11-024 | 76MP SB04S |
| Single Pole/Single Throw | Side Actuated | 05 | M83504/11-025 | 76MP SB05S |
| Single Pole/Single Throw | Side Actuated | 06 | M83504/11-026 | 76MP SB06S |
| Single Pole/Single Throw | Side Actuated | 07 | M83504/11-027 | 76MP SB07S |
| Single Pole/Single Throw | Side Actuated | 08 | M83504/11-028 | 76MP SB08S |
| Single Pole/Single Throw | Side Actuated | 09 | M83504/11-029 | 76MP SB09S |
| Single Pole/Single Throw | Side Actuated | 10 | M83504/11-030 | 76MP SB10S |
| Single Pole/Single Throw | Side Actuated | 12 | M83504/11-032 | 76MP SB12S |
| Single Pole/Double Throw | Raised Rocker | 02 | M83504/05-022 | 76MSC02S |
| Single Pole/Double Throw | Raised Rocker | 03 | M83504/05-023 | 76MSC03S |
| Single Pole/Double Throw | Raised Rocker | 04 | M83504/05-024 | 76MSC04S |
| Single Pole/Double Throw | Recessed Rocker | 02 | M83504/06-022 | 76MRSC02S |
| Single Pole/Double Throw | Recessed Rocker | 03 | M83504/06-023 | 76MRSC03S |
| Single Pole/Double Throw | Recessed Rocker | 04 | M83504/06-024 | 76MRSC04S |

ADDITIONAL INFORMATION

For dimensions and number per packaging tube, see equivalent non-qualified styles, pages B-11 through B-15. For Specifications, see page B-16.

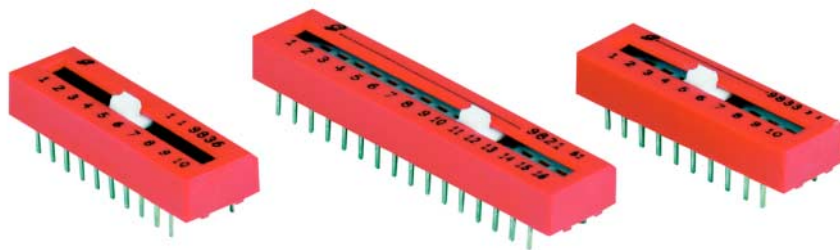
Available from your local Grayhill Distributor.

For prices and discounts, contact a local Sales Office, an authorized local Distributor or Grayhill.

SERIES 79A
SERIES 79C
Linear Action Tap

FEATURES

- Single-Setting Programming
- Isolated or Bussed Circuits
- 10 or 16 Positions
- 125 mA, 6 Vdc, 2000 Cycles



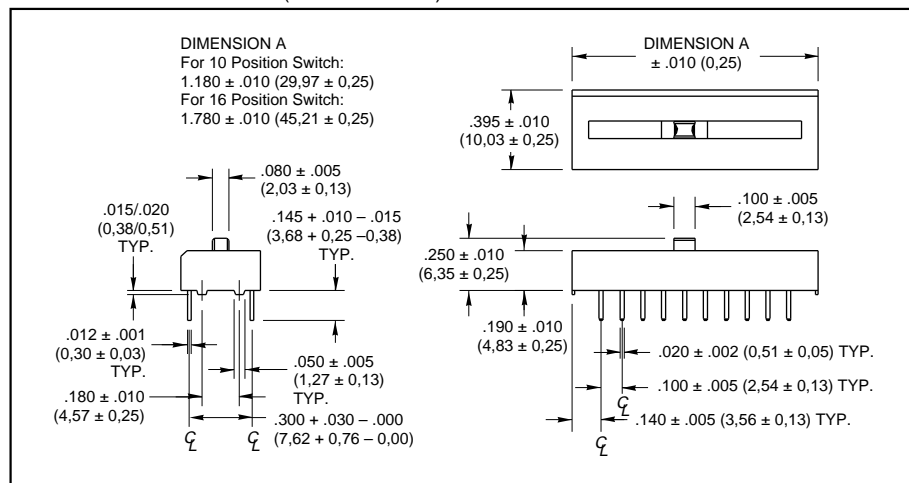
Circuit Selector
Isolated Circuits in 10 and 16 Positions

Each position is a single isolated circuit, which connects the two terminals across the switch package. The movable contact is non-shorting.

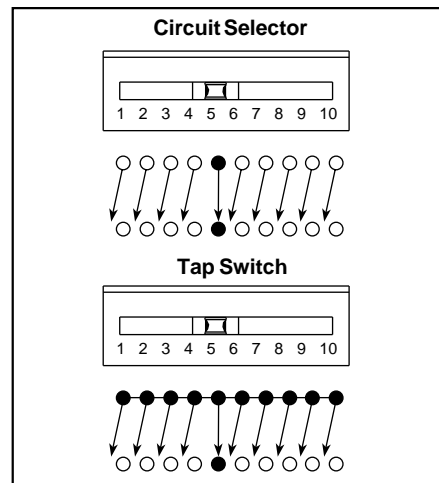
Tap Switch
SP/10 Positions, and SP/16 Postions

All contacts on one side of the switch are internally bussed for a common pole. Any terminal on that side may be used as a common, the others may be clipped. The movable contact is non-shorting.

DIMENSIONS In inches (and millimeters)



CIRCUITRY



SPECIFICATIONS

Electrical Ratings

Make-and-break Current Rating: 2,000 cycles at 10 mA, 50 mVdc; 2,000 cycles at 125 mA, 6 Vdc; 2,000 cycles at 50 mA, 30 Vdc.

Contact Resistance: (measured at 10 mA, 50 mVdc) Coded Switches: 60 mohms maximum initially. Other Switches: 50 mohms maximum initially. After Llife: 100 mohms maximum

Insulation Resistance (at 100 Vdc):

Between adjacent isolated contacts: Initial: 5,000 Mohms; 1,000 Mohms minimum after life. Across open contacts: Initial: 5,000 Mohms; 1,000 Mohms minimum after life.

Dielectric Strength: Between adjacent isolated contacts and also across open contacts. Initially: 750 Vac; 500 Vac after life

Contact Carry Rating: 2 Amps with a maximum contact temperature rise of 20°C

Mechanical Ratings

Mechanical Life: 4,000 cycles minimum. Note: a cycle is one complete operation, back and forth through all switch positions.

Vibration Resistance: 10 to 2,000 Hz at 15G or 0.060" double amplitude, per MIL-STD-202F per MIL-5-83504; Method 213, Condition A. No damage and no contact openings exceeding 10 mS (Method 204, Test Condition B).

Shock Resistance: 509, 11 mS, half sine; no damage and no openings exceeding 10 mS (Method 213, Test Condition A).

Environmental Rating

Operating Temperature Range: -40°C to +85°C

Storage Temperature Range: -55°C to +85°C

Moisture Resistance: 240 hours with temperature cycling and polarization, per MIL-STD-202F, Method 305

Materials and Finishes

Nonconductive Parts: Plastic UL94V-O
Shorting Arm: Phosphor bronze, plated. 10 microinches minimum gold over 20 microinches minimum nickel

Base Contacts: Copper alloy, plated. 10 microinches minimum gold over 20 microinches minimum nickel

Terminals: Copper alloy, plated. 60 microinches minimum (90/10) tin lead solder over 20 microinches minimum nickel

Potting Material: Epoxy

Tape and Seal Packaging

Seal Strength: Per MIL-STD-202, Method 112. 30 seconds at 125° hot Fluorocarbon

Solderability: Per MIL-STD-202, Method 208.

Tape Seal: Polyester film

ORDERING INFORMATION

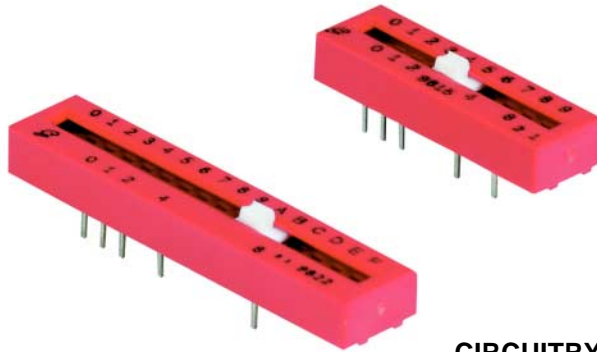
| Number of Positions | Type of Circuit Code | Number per Tube | Part Number* |
|---------------------|----------------------|-----------------|--------------|
| 10 | Circuit Selector | 9 | 79A10 |
| 10 | Single Pole | 9 | 79C10 |
| 16 | Circuit Selector | 6 | 79A16 |
| 16 | Single Pole | 6 | 79C16 |

*A top tape seal is required for switches that are machine soldered or heavily cleaned after hand soldering. To order top seal versions, add "S" to the Grayhill part number.

SERIES 79B Linear Action Tap

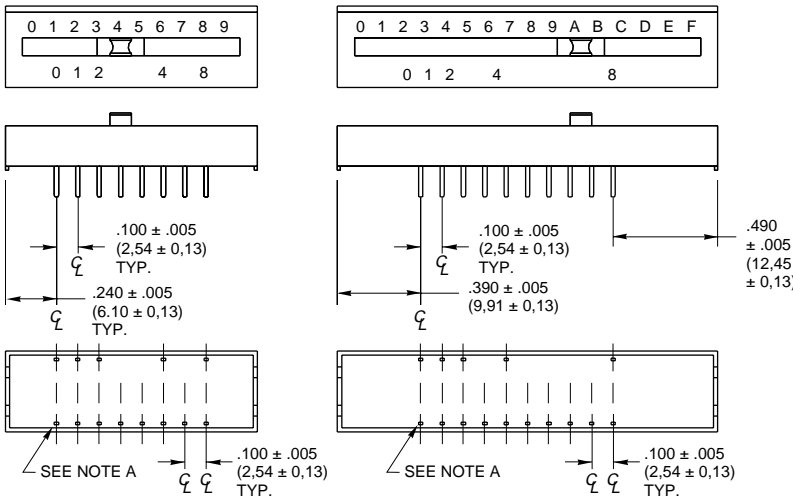
FEATURES

- Reliable Switching, Positive Detent
- Codes in BCD and Hexadecimal
- True Zero Output
- 10 or 16 Positions
- 2000 Cycle Life
- Up to 60,000 Detent Operations



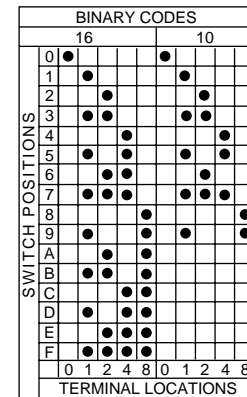
DIMENSIONS In inches (and millimeters)

All dimensions not shown here are the same as those on the facing page.



NOTE A: All terminals on this side of the switch are bussed internally. Any one of them may be used as the common terminal.

CIRCUITRY



Dot indicates contact made between contact and output terminal.

SPECIFICATIONS

Electrical Ratings

Make-and-break Current Rating: 2,000 cycles at 10 mA, 50 mVdc; 2,000 cycles at 125 mA, 6 Vdc; 2,000 cycles at 50 mA, 30 Vdc.

Contact Resistance: 100 mohms maximum after life, measured at 10 mA dc and 50 mV (open circuit). Initial values are 60 mohms maximum for coded switches, and 50 mohms for other linear action switches.

Insulation Resistance (at 100 Vdc): Between adjacent isolated contacts: Initial: 5,000 Mohms minimum; After Life: 1,000 Mohms minimum
Across open contacts: Initial: 5,000 Mohms minimum; After Life: 1,000 Mohms minimum

Dielectric Strength: Between adjacent isolated contacts and across open contacts. Initial: 750 Vac; After Life: 500 Vac

Contact Carry Rating: 2 amps with a maximum contact temperature rise of 20°C.

Mechanical Ratings

Mechanical Life: 4,000 cycles minimum. Note: a cycle is one complete operation, back and forth through all switch positions.

Vibration Resistance: 10 to 2,000 Hz at 15G or 0.060" double amplitude; no damage and no contact openings exceeding 10 mS (Method 204, Test Condition B).

Shock Resistance: 509, 11 mS, half sine; no damage and no openings exceeding 10 microseconds (Method 213, Test Condition A).

Environmental Ratings

Refer to MIL-STD-202F per MIL-S-83504

Operating Temperature Range: -40°C to +85°C

Storage Temperature Range: -55°C to +85°C

Moisture Resistance: 240 hours with temperature cycling and polarization, per MIL-STD-202F, Method 305

Materials and Finishes

Nonconductive Parts: Plastic UL94V-O

Shorting Arm: Phosphor bronze, plated 10 microinches minimum gold over 20 microinches minimum nickel.

Base Contacts: Copper alloy, plated 10 microinches minimum gold over 20 microinches minimum nickel.

Terminals: Copper alloy, plated. 60 microinches minimum solder (90/10) over 20 microinches minimum nickel.

Potting Material: Epoxy

Tape Seal and Packaging

Tape Seal: Polyester film

ORDERING INFORMATION

| Number of Positions | Type of Circuit Code | Number per Tube | Part Number* |
|---------------------|----------------------|-----------------|--------------|
| 10 | Binary Code Decimal | 9 | 79B10 |
| 16 | Hexadecimal | 6 | 79B16 |

*A top tape seal is required for switches that are machine soldered or heavily cleaned after hand soldering. To order top seal versions, add "S" to the Grayhill part number.

ADDITIONAL INFORMATION

For other Options and Accessories, see pages B-20 and B-21.

Available from your local Grayhill Distributor.

For prices and discounts, contact a local Sales Office, an authorized local Distributor or Grayhill.

SERIES 78
Right Angle Option

FEATURES

- Easy Access
- SPST Circuitry



DIMENSIONS In inches (and millimeters)

Series 78

LENGTH $\pm .010$ (0,25) SEE CHART

$.380 \pm .010$ (9,65 \pm 0,25)

$.115 \pm .015$ (2,92 \pm 0,38) TYP.

$.090 + .020 - .005$ (2,29 + 0,51 - 0,13) TYP.

$.020 \pm .002$ (0,51 \pm 0,05) TYP.

$.100 \pm .005$ (2,54 \pm 0,13) TYP.

$.090 \pm .005$ (2,29 \pm 0,13) TYP.

SPST Switch Length

| NO. OF STATIONS | LENGTH INCHES | LENGTH MILLIMETERS |
|-----------------|---------------|--------------------|
| 2 | 0.280 | 7,1 MM |
| 3 | 0.380 | 9,7 MM |
| 4 | 0.480 | 12,2 MM |
| 5 | 0.580 | 14,7 MM |
| 6 | 0.680 | 17,3 MM |
| 7 | 0.780 | 19,8 MM |
| 8 | 0.880 | 22,4 MM |
| 9 | 0.980 | 24,9 MM |
| 10 | 1.080 | 27,4 MM |
| 12 | 1.280 | 32,5 MM |

Note: Terminal row spacing is designed to be used in PC board holes with .100 X .100 (2,54 x 2,54) centers.

The 12 station length is for Series 76 switches. For switches of circuitry other than SPST, see standard switch pages.

SPECIFICATIONS

Electrical Ratings

Make-and-break Current:
At 1 mA, 5 Vdc: 10,000 operations
At 50 or 125 mA, 30 Vdc: 10,000 operations

Materials and Finishes

Terminal Ends: Copper alloy, solder (90/10) plated 150 microinches minimum over copper/nickel barrier solderability per MIL-STD-202, Method 208

For other specifications, see Additional Information.

ADDITIONAL INFORMATION

For SPST switches, see page B-12.
For Multipole/ST switches see page B-13.
For SPDT switches, see page B-14; and for DPDT switches, see page B-15.

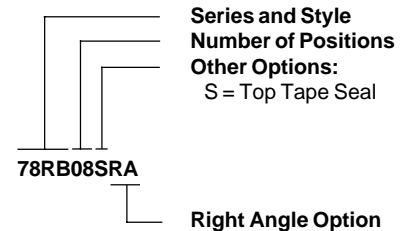
For additional specifications, see page B-16.

CHOICES

| Circuitry | Type of Actuation | Series & Style | Number Of Positions | Other Options |
|-----------|-------------------|----------------|---------------------|---------------|
| SPST | Raised Slide | 78B | 02 thru 10 | S |
| SPST | Recessed Slide | 78RB | 02 thru 10 | S |
| 2PST | Raised Slide | 78F | 01 thru 05 | S |
| 3PST | Raised Slide | 78G | 01 thru 03 | S |
| 4PST | Raised Slide | 78H | 01 & 02 | S |
| SPDT-2 | Raised Slide | 78J | 01 thru 05 | S |
| DPDT-4 | Raised Slide | 78K | 01 & 02 | S |

ORDERING INFORMATION

Sample number orders a right angle mount, top tape sealed, 8-position, SPST switch with recessed slides. Part number for the same switch without tape seal and lines would be 78RB08RA.



Available from your local Grayhill Distributor. For prices and discounts, contact a local Sales Office, an authorized local Distributor or Grayhill.

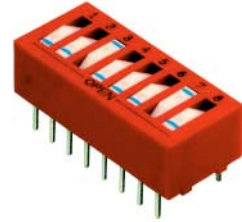
OPTIONS

Position Identification Line Option

For Series 76RSB, 76RSC, 76RSD, & 90B
 A line can be added to the recessed rocker or Series 90 slide actuator to provide positive identification of the actuator position. To order, add L as a final suffix to the part number. For example, 76RSB08 becomes 76RSB08L; and, 90B08S becomes 90B08SL.
Available from a local Grayhill Distributor.

Other Switch Markings

For Series 76, 78, & 90
 We can mark your part number or other wording on the switch, often at no charge. For some markings there will be a nominal charge for tooling plus a set-up charge. In addition, there is a marking charge per side per switch. Add it to the unit price and discount it accordingly.
To order, contact Grayhill.



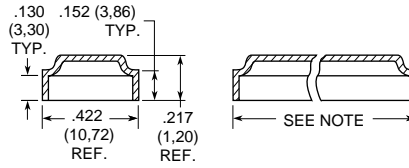
ACCESSORIES

Protective Cover Accessory

For Series 76, & 78

Rigid, clear plastic cover fits all but toggle actuated switches. It provides a top cover for less strenuous cleaning, serves as a dust cover in dirty environments, and provides protection against accidental actuation.

Material: 76,78, only-Polycarbonate.
 Purchase as a separate item. Check length of the desired DIP Switch, and then select from the ordering information on this page.
Available from a local Grayhill Distributor.



Note: For length, add .042" (1.07 MM) to length of DIP switch.



DIPSTICK Accessory

For all series

Pen-sized plastic DIPSTICK has a tapered end for actuating DIP Switches.

Part Number **90-DIPSTICK**

Available from a local Grayhill Distributor

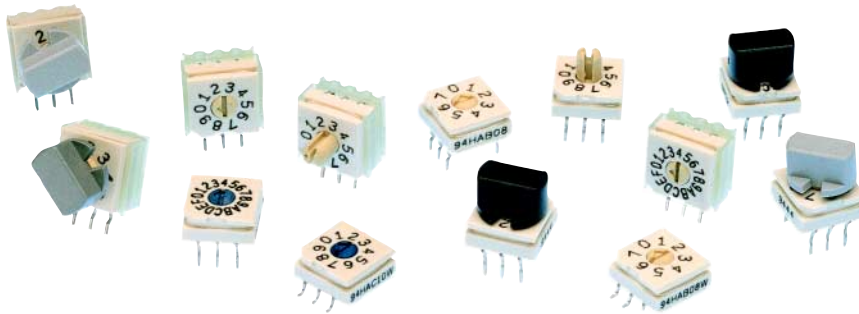


ORDERING INFORMATION

| Length Inches | Protective Cover Part Number |
|---------------|------------------------------|
| 0.280 | 76P02 |
| 0.380 | 76P03 |
| 0.480 | 76P04 |
| 0.580 | 76P05 |
| 0.680 | 76P06 |
| 0.780 | 76P07 |
| 0.880 | 76P08 |
| 0.980 | 76P09 |
| 1.080 | 76P10 |
| 1.180 | 79P10 |
| 1.780 | 79P16 |

Available from your local Grayhill Distributor.
 For prices and discounts, contact a local Sales Office, an authorized local Distributor or Grayhill.

SERIES 94H
Binary Coded



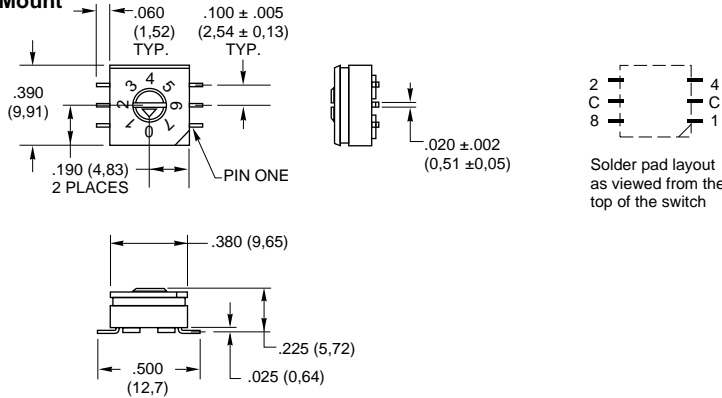
FEATURES

- Sealed Construction; No Tape Seal Required
- Surface Mount or Thru-Hole Style
- Tube or Tape and Reel Packaging
- Octal, BCD, and Hexadecimal Code
- In Standard or Complement
- Standard and Right Angle Mount
- Flush or Extended Actuators
- Gold-Plated Contacts

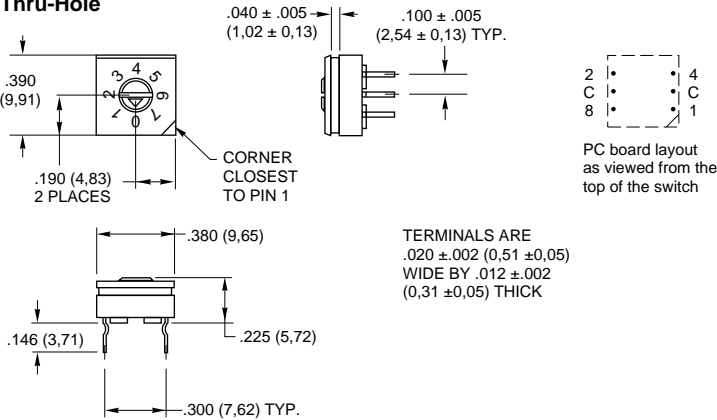
DIMENSIONS In inches (and millimeters)

Tolerances are $\pm .010$ inches unless specified otherwise.

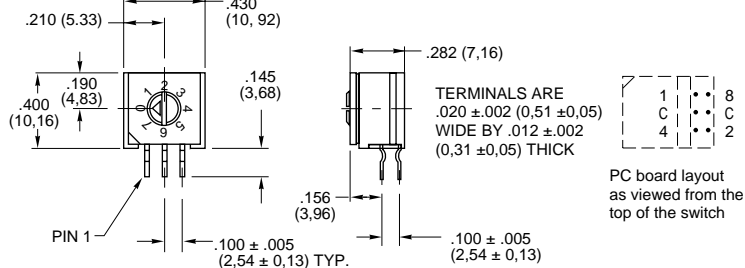
Surface Mount



Standard Thru-Hole



Right Angle Thru-Hole



ACTUATOR STYLES/FACTUATOR STYLES

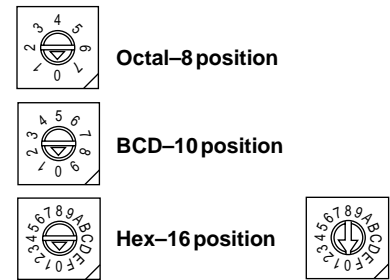
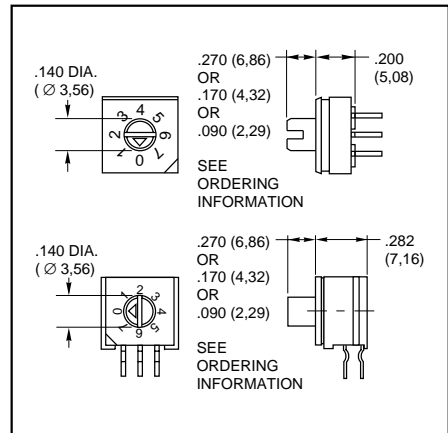


Figure 1

Figure 2

All actuation types are available in octal (8), binary coded decimal (10), or hexadecimal (16) codes; with either standard or complement output. Standard code outputs have natural color rotors; complements in a contrasting color.

EXTENDED ACTUATOR TYPES



DIP Switches

SERIES 94R

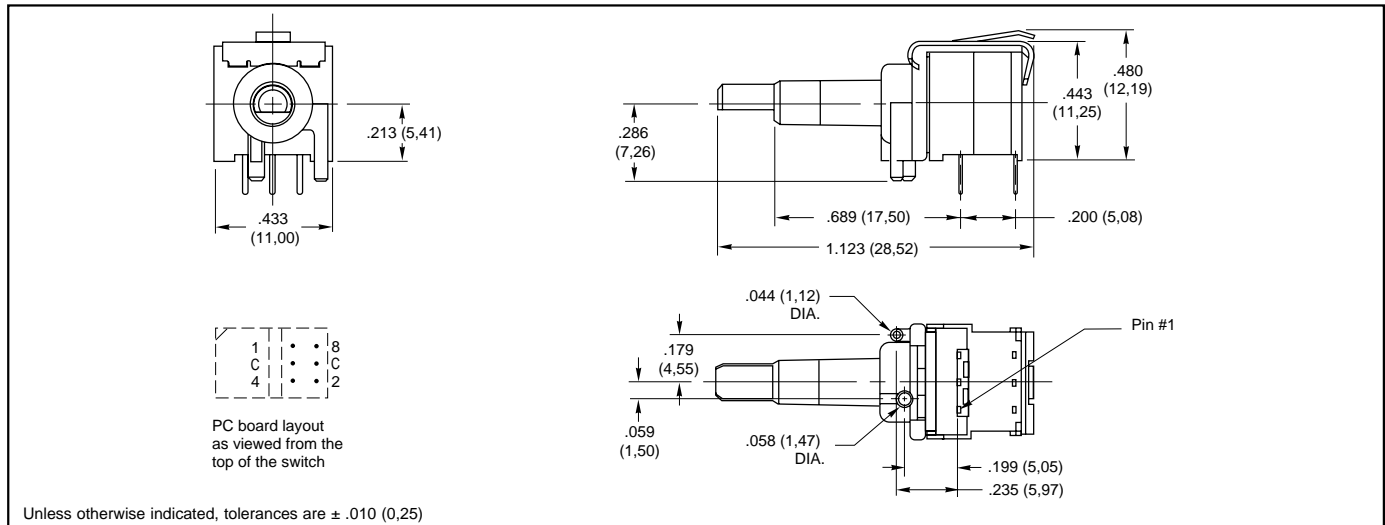
Economical, Binary Coded

FEATURES

- 10,000 Cycles of Operation
- Gold-Plated Contacts
- Sealed Contact System
- Right Angle Mount
- Octal, BCD & Hexadecimal Codes
- Standard or Complement



DIMENSIONS In inches (and millimeters)



SPECIFICATIONS: Series 94H and 94R

Electrical Ratings

Make-and-break Current Rating: 30 mA at 30 Vdc for 10,000 cycles of operation.

Carrying Current Rating: 100 mA at 50 Vdc

Contact Resistance: 50 mohms maximum initially (measured at 10 mA, 50 mVdc). 150 mohms maximum after life.

Insulation Resistance: (measured at 100 Vdc across open switch contacts) Initial: 5000 Mohms minimum. After Life: 1000 Mohms minimum.

Dielectric Strength: (measured across open switch contacts) Initial: 500 Vac RMS minimum. After Life: 250 Vac RMS

Mechanical Ratings

Mechanical Life: 10,000 cycles of operation. One cycle is a rotation through all positions and a complete return through all positions.

Mechanical Shock: 1000g's, 0.5 mS, half sine per MIL-STD-202F, Method 213, Test Condition E.

Vibration Resistance: 10-2000 Hz at 15G or 0.060" double amplitude per MIL-STD-202F, Method 204, Test Condition B.

Operational Torque: 2 to 6 inch-ounces initially and 1.2 inch-ounces minimum after life.

Environmental Ratings

Operating Temperature Range: -40° to +85° C.

Storage Temperature Range: -40° to +85° C.

Moisture Resistance: 240 hours with temperature cycling and polarization. Passes insulation resistance and dielectric strength per MIL-STD-202F, Method 106 following exposure.

Materials and Finishes

Rotor and Switch Body: Plastic (UL94V-O)

Contact Material: Copper alloy, plated. 30 microinches minimum gold over 50 microinches minimum nickel.

Shorting Member: Copper alloy, plated. 30 microinches minimum gold over 50 microinches minimum nickel.

Terminals: Copper alloy, plated. 100 microinches minimum 90/10 tin lead solder over 50 microinches minimum nickel.

Internal O-ring: Rubber BUNA-N

Soldering Information

Soldering Temperature: 250° C for 10 seconds maximum.

Cleaning: Acceptable solutions include 1-1-1 Trichlorethane, Freon (TF, TE, or TMS), Isopropyl Alcohol and detergent (140°F maximum). Solutions which are not recommended include Acetone, Methylene Chloride, and Freon TMC.

CODE & TRUTH TABLES: Series 94H and 94R

| Standard Output | CODE OUTPUT | | | | CODE OUTPUT | | | | Complement Output |
|-----------------|-------------|---|---|---|-------------|---|---|---|-------------------|
| | 1 | 2 | 4 | 8 | 1 | 2 | 4 | 8 | |
| 0 | | | | | | | | | |
| 1 | ● | | | | ● | ● | ● | ● | |
| 2 | | ● | | | | ● | ● | ● | ● |
| 3 | ● | ● | | | ● | ● | ● | ● | |
| 4 | | | ● | | ● | ● | ● | ● | ● |
| 5 | ● | | | ● | | ● | ● | ● | ● |
| 6 | ● | ● | | | | ● | ● | ● | ● |
| 7 | | ● | | ● | ● | ● | ● | ● | |
| 8 | | | | ● | ● | ● | ● | ● | ● |
| 9 | ● | | | | ● | ● | ● | ● | ● |
| A | | ● | | | ● | ● | ● | ● | ● |
| B | ● | ● | | | ● | ● | ● | ● | ● |
| C | | | ● | | | ● | ● | ● | ● |
| D | ● | | | ● | | ● | ● | ● | ● |
| E | ● | ● | | | | ● | ● | ● | ● |
| F | ● | ● | ● | ● | ● | ● | ● | ● | ● |

Dot indicates terminal to common connection. All switches are continuous rotation.

Octal and Octal Complement outputs are 0 thru 7 positions.

BCD and BCD Complement outputs are 0 thru 9 positions.

Hexadecimal and Hexadecimal Complement outputs are 0 thru F positions.

Standard codes have natural color rotors; complements have rotors in a contrasting color.

ORDERING INFORMATION: Series 94H

Series
Actuator Style: A = Flush, Figure 1
 B = .27, Figure 1 (see page B-20)
 C = .17, Figure 1 (see page B-20)
 E = .09, Figure 1 (see page B-20)
 F = Flush, Figure 2

Code: B = Standard, C = Complementary

Packaging: R = Tape and Reel
 Blank = Tube*

Terminal Style: RA = Right Angle, Thru-Hole
 W = Surface Mount
 Blank = Thru-Hole

Number of Positions: 08 = Octal, 8 Position
 10 = BCD, 10 Position
 16 = Hex, 16 Position

* 27 Pieces per tube for surface mount and perpendicular, 24 pieces per tube for right angle switches.

ORDERING INFORMATION: Series 94R

| Continuous Rotation Versions | | | |
|------------------------------|------------------|---------------------------|------------------------|
| Code | No. of Positions | Standard Code Part Number | Complement Part Number |
| Octal | 8 | 94RB08C | 94RC08C |
| BCD | 10 | 94RB10C | 94RC10C |
| Hexadecimal | 16 | 94RB16C | 94RC16C |
| Rotational Stop Versions* | | | |
| Code | No. of Positions | Standard Code Part Number | Complement Part Number |
| Hexadecimal | 16 | 94RB16F | 94RC16F |

* Consult Grayhill for 8 or 10 position

SERIES 94 High Temperature Knobs: For Shaft Extensions

Slotted knobs show switch markings. Contact Grayhill for other knob material/ marking color combinations and geometrics.

* Use only with Actuator Type B or C

ORDERING INFORMATION: Series 94 High Temperature Knobs*

| Knob Style and Height | Knob Color | Arrow Color | Part Number |
|-----------------------|------------|-------------|-------------|
| 1A | Gray | N/A | 947706-001 |
| 5A | Gray | Black | 947706-005 |
| 1B | Black | N/A | 947705-001 |
| 1B | Gray | N/A | 947705-012 |
| 2B | Gray | White | 947705-004 |
| 3B | Gray | Black | 947705-017 |
| 4B | Gray | Black | 947705-018 |
| 1B | Natural | N/A | 947705-009 |
| 4B | Black | White | 947705-010 |
| 5B | Gray | Black | 947705-019 |

*Ordered as a separate item.

TAPE AND REEL PACKAGING: Series 94H

Meets requirements of EIA 481-2.

13 INCH DIAMETER REEL

CONDUCTIVE PLASTIC EMBOSSED TAPE

16mm

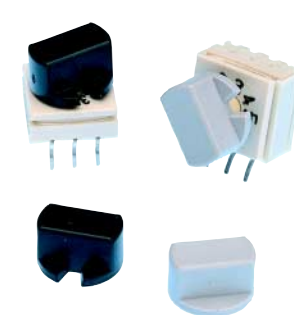
PIN 1 CHAMFER

24mm

DIRECTION OF FEED →

Each reel contains 750 switches with a 15.35 inch (390 mm) minimum leader and a 6.30 inch (160 mm) minimum trailer.

DIP Switches



Available from your local Grayhill Distributor. For prices and discounts, contact a local Sales Office, an authorized local Distributor or Grayhill.