

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
- RoHS Compliant

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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	2, 4, 6, 8, 10	1/Station	4
	Standard DIP Package	Top Actuated, Recessed Slide	90	2-10	1/Station	5
	Standard DIP Package	Side Actuated	76	2-10 & 12	1/Station	8
SPDT, DPST	Standard DIP Package	Side Actuated, Top Actuated	78	1-5	1/Station	7
Standard, Complement Code	Octal, BCD & Hex	Rotary	94	8, 10 & 16	1	20

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
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SINGLE THROW SWITCHES

Single Pole, Single Throw	Machine Insertable	Recessed Slide	90	2-10	1/Station	9
	Standard	Raised Rocker	76	2-10 & 12	1/Station	10
		Recessed Rocker	76	2-10 & 12	1/Station	10
		Side Actuated	76	2-10 & 12	1/Station	10
		Slide	78	2-10 & 12	1/Station	11
		Recessed Slide	78	2-10	1/Station	11
Multiple Pole, Single Throw	2PST	Slide*	78	1-5	1/Station	11
	3PST	Slide*	78	1-3	1/Station	11
	4PST	Slide*	78	1 & 2	1/Station	11
	5, 6, 7, 8, or 10PST	Slide*	78	1	1/Station	11

MULTIPLE THROW SWITCHES

Circuit Selector	1-of-10 Circuits	Linear Action Slide	79	10	1	15
	1-of-16 Circuits	Linear Action Slide	79	16	1	15
Single Pole, Multiple Throw	Standard	Raised Rocker	76	2-4	1/Station	10
		Recessed Rocker	76	2-4	1/Station	10
		Toggle	76	2-4	1/Station	10
		Slide	78	1-6	1/Station	10
Double Pole, Double Throw	Standard	Raised Rocker	76	1 & 2	1/Station	13
		Recessed Rocker	76	1 & 2	1/Station	13
		Toggle	76	1 & 2	1/Station	13
		Slide	78	1 & 2	1/Station	13

BINARY CODED OUTPUT SWITCHES

Standard Code	BCD & Hexadecimal Octal, BCD, & Hex	Linear Action Slide	79	10 & 16	1	16
		Rotary	94	8, 10 & 16	1	20
Complement	Octal, BCD, & Hex	Rotary	94	8, 10 & 16	1	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

- Half the Size of Standard DIP Switches
- Available in 2, 4, 6, 8, and 10 Positions
- Low Profile
- Less Mass for Easy Vacuum Pick & Place

APPLICATIONS

Used in any DIP application where space is at a premium such as notebook computers, hand-held radios, industrial control products, CD-ROM drives, cellular base stations and coin changers.

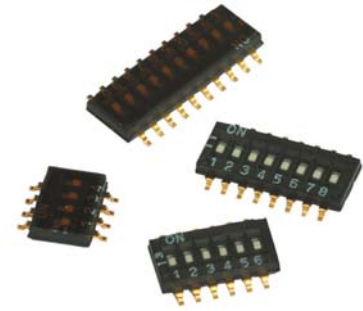


Fig. 1 Series 97C DIMENSIONS In inches (and millimeters)

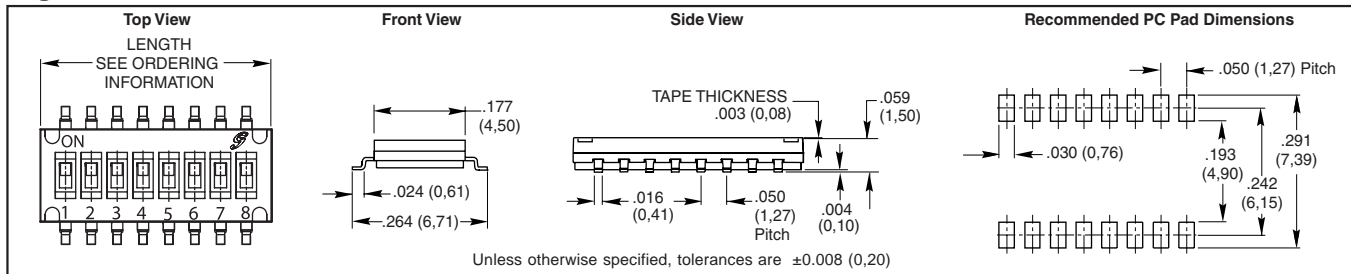
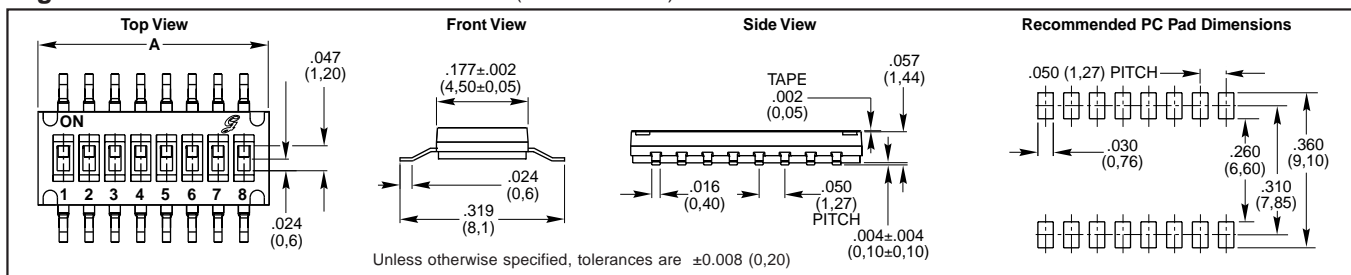


Fig. 2 Series 97R DIMENSIONS In inches (and millimeters)



SPECIFICATIONS

Electrical Ratings

Contact Rating: 25 mA at 24 Vdc switching; 100 mA at 50 Vdc non-switching
Contact Resistance: 100 mΩ max, initially
Insulation Resistance: 100 MΩ minimum at 100 Vdc

Dielectric Strength: 300 Vac for one minute
Switch Capacitance: 5pF maximum
Contact Arrangement: SPST

Mechanical Ratings

Life: 1,000 cycles minimum
Operation Force: 500 gF
Mechanical Shock: MIL-STD-202F, Method, 213B, Test Condition A. Gravity: 50G's (peak value), 11 m/sec. Direction and times: 6 sides and 3 times in each direction.
Vibration: MIL-STD-202F, Method 201A. Passed 6 hours (2 hours in each) of three

perpendicular planes at a cycle of 10-55-10Hz/1 minute.

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

Materials

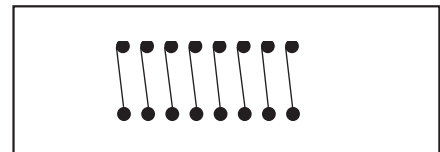
Base and Cover: UL94V-0 Nylon, black
Actuators: UL94V-0 Nylon thermoplastic, white
Base Contacts: Alloy copper with gold-plating over nickel
Terminals: Brass with gold-plating
Tape Seal: Kapton

Soldering Information

Vapor phase and IR-reflow soldering can be applied. With stands 255°C peak temperature.

All DIP switches are shipped in the "ON" position.

CIRCUITRY



Cleaning: Tape sealed versions are capable of withstanding washing processes using alcohol-based solvents only. Water or other water-based solvent washing processes are not recommended. Care should be taken to avoid flux adhering to the switch body from the circuit board soldering process. The switch should be allowed to cool for at least 3 minutes between the end of the solder process and the beginning of the wash process. The solvent stage of the cleaning process is not to exceed 1 minute and the whole wash process is not to exceed 3 minutes. Ultrasonic or pressure wash cleaning is not recommended.

Packaging Information

Tube: 130 pcs/tube (2 positions), 75 pcs/tube (4 positions), 54 pcs/tube (6 positions), 40 pcs/tube (8 positions), 33 pcs/tube (10 positions).
Tape and Reel: 97C: 4,000 pcs/reel (all positions). 97R: 2500 pcs/reel (all positions).

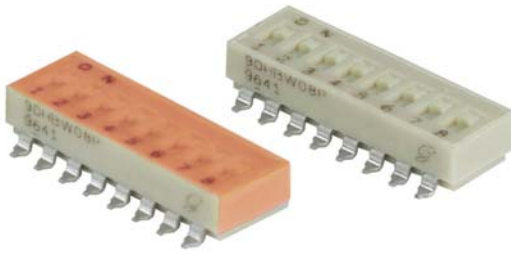
ORDERING INFORMATION

<p>97C06SRT</p>	Series: 97C see fig. 1, 97R see fig. 2
	Positions: 02 = .148 (3,76), 04 = .248 (6,30), 06 = .348 (8,84), 08 = .448 (11,38), 10 = .548 (13,92)
	T= RoHS compliant
	Packaging: Blank = Tube, R = Tape and Reel (see pkg note)
	Seal: Blank = Unsealed, S = Top Tape Seal

SERIES 90HB
SPST, Low Profile

FEATURES

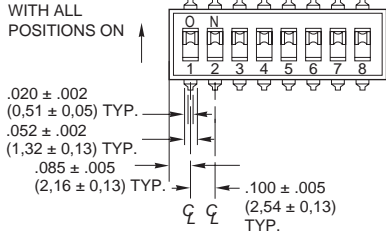
- Compatible with SMT Assembly, Including Infrared Reflow and Vapor-Phase
- Reliable Spring and Ball Contact



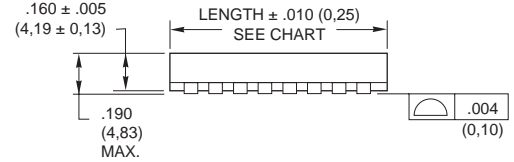
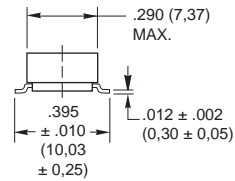
DIMENSIONS In inches (and millimeters)

Top View—Gull Wing

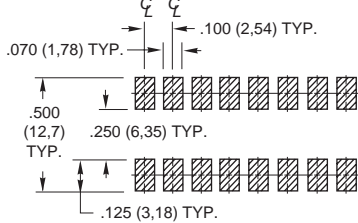
SWITCH IS PACKAGED AS SHOWN HERE WITH ALL POSITIONS ON



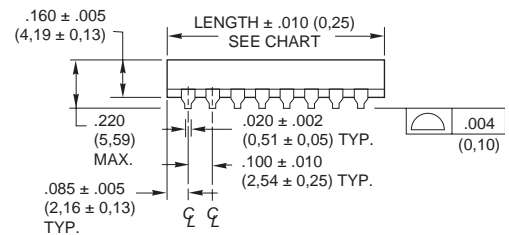
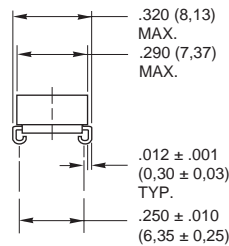
Gull Wing



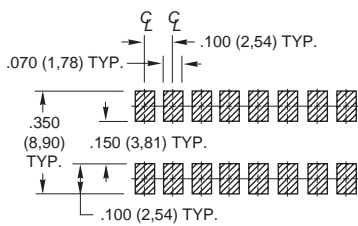
Recommended PC Pad Dimensions—Gull Wing



J-Bend



Recommended PC Pad Dimensions—J-Bend



CIRCUITRY

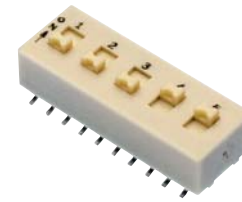
As viewed from the top of the switch in the positions shown in the drawi



SERIES 78H
SPDT and DPST

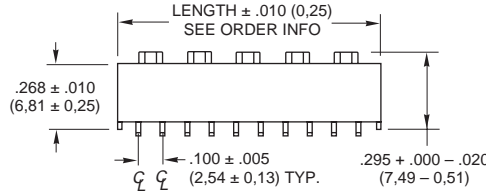
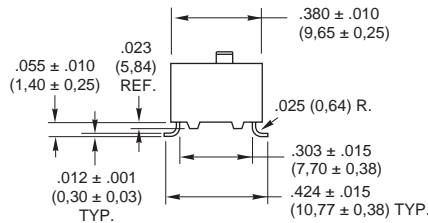
FEATURES

- Compatible with SMT Assembly Including Infrared Reflow and Vapor-Phase
- Reliable Spring and Ball Contact

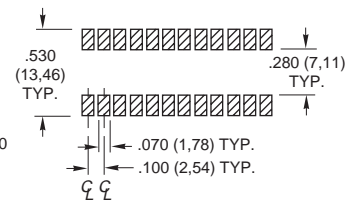


DIMENSIONS In inches (and millimeters)

SPDT, DPST, Top Actuated, Slide Operated

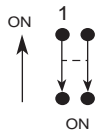
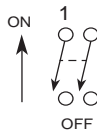
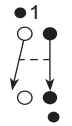
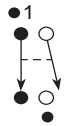


Recommended PC Pad Dimensions



CIRCUITRY

SPDT 2 Circuits (no common)



• Dot indicates active circuit.

SPECIFICATIONS

Electrical Ratings

Make-and-break Current Rating: 2,000 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: 2,000 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)

Terminal Strength: Per specification

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

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

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 MIL-STD-202, 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.

Materials and Finishes

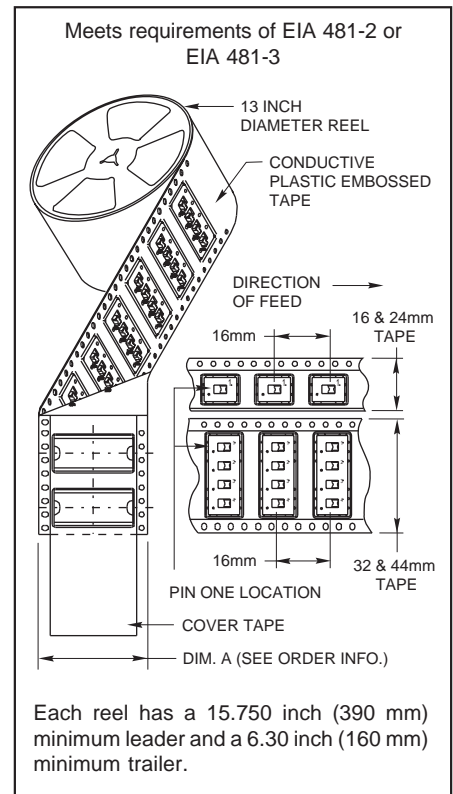
Shorting Member: Brass, gold-plated over nickel barrier.

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

Terminals: Copper alloy, matte tin-plated over nickel barrier.

Non-Conductive Parts: Cover is natural color thermoplastic, actuators are white thermoplastic (UL94V-0)

TAPE AND REEL PACKAGING



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	78HJ01GWT	78HF01GWT
2	0.480"	12,2 mm	24 mm	78HJ02GWT	78HF02GWT
3	0.680"	17,3 mm	32 mm	78HJ03GWT	78HF03GWT
4	0.880"	22,4 mm	44 mm	78HJ04GWT	78HF04GWT
5	1.080"	27,4 mm	44 mm	78HJ05GWT	78HF05GWT

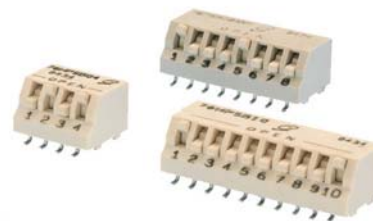
* Insert "R" before the "T" in the Grayhill part number for tape and reel packaging (500 switches/reel).

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

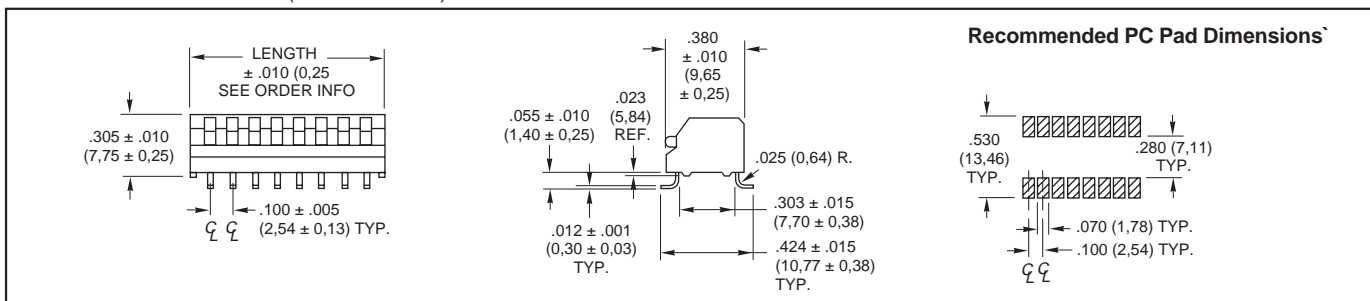
SERIES 76HP
Side Actuated PIANO-DIP®

FEATURES

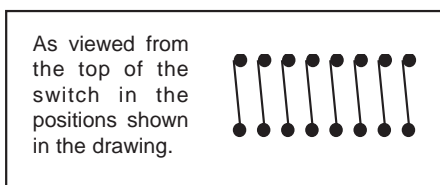
- Compatible with SMT Assembly Including Infrared Reflow and Vapor-Phase
- Easily Accessed when PC Boards are Racked
- Reliable Spring and Ball Contact



DIMENSIONS In inches (and millimeters)



CIRCUITRY



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

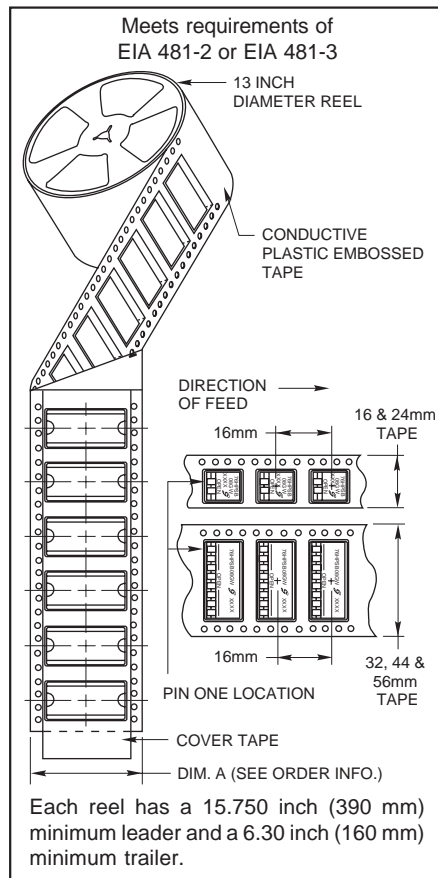
over nickel barrier.
Base Contacts: Copper alloy, gold-plated, over nickel barrier.
Terminals: Copper alloy, matte tin plated over nickel barrier.
Non-Conductive Parts: Cover is natural color thermoplastic, actuators are white thermoplastic (UL94V-O)
Tape Seal: Not available with Tape Seal.

SPECIFICATIONS

Electrical Ratings
Make-and-break Current Rating: 2,000 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

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 MIL-STD-202, Method 106

TAPE AND REEL PACKAGING



Mechanical Ratings

Mechanical Life: 2,000 operations per switch position
Vibration Resistance: Per Method 204, Test

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

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	76HPSB02GWRT
4	0.480"	12,2 mm	24 mm	76HPSB04GWRT
6	0.680"	17,3 mm	32 mm	76HPSB06GWRT
8	0.880"	22,4 mm	44 mm	76HPSB08GWRT
10	1.080"	27,4 mm	44 mm	76HPSB10GWRT

* For other lengths, contact Grayhill, Inc.

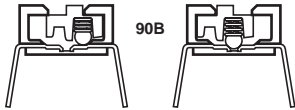
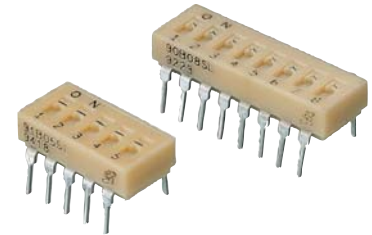
Available from your local Grayhill Distributor. For prices and discounts, contact a local Sales Office, an authorized local Distributor or Grayhill.

DIP Switches

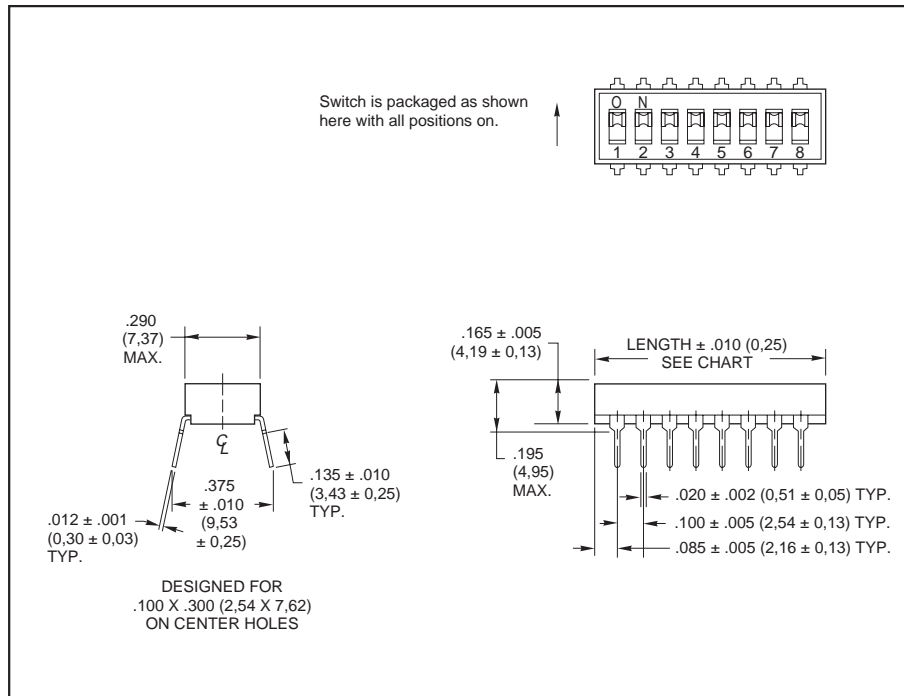
SERIES 90B
Machine Insertable MIDIP

FEATURES

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

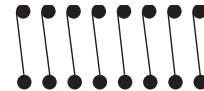


DIMENSIONS In inches (and millimeters)



CIRCUITRY

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



DIP Switches

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	90B02PT
3	.370"	9,4 mm	47	90B03PT
4	.470"	11,9 mm	37	90B04PT
5	.570"	14,5 mm	31	90B05PT
6	.670"	17,0 mm	26	90B06PT
7	.770"	19,6 mm	23	90B07PT
8	.870"	22,1 mm	20	90B08PT
9	.970"	24,6 mm	18	90B09PT
10	1.070"	27,2 mm	16	90B10PT

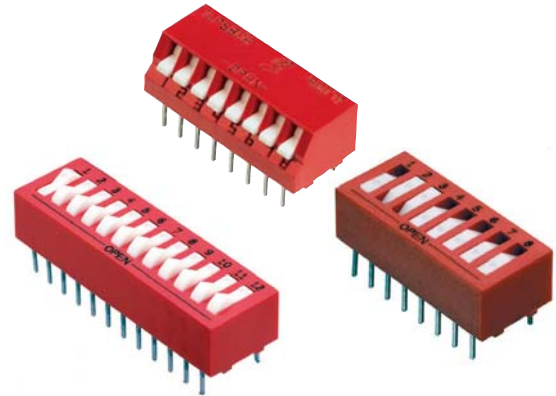
Available from your local Grayhill Distributor.
For prices and discounts, contact a local Sales Office, an authorized local Distributor or Grayhill.

*The "P" in the part number denotes top tape seal versions. To order without top tape seal, leave the "P" off the part number when ordering.

SERIES 76
SPST Rocker

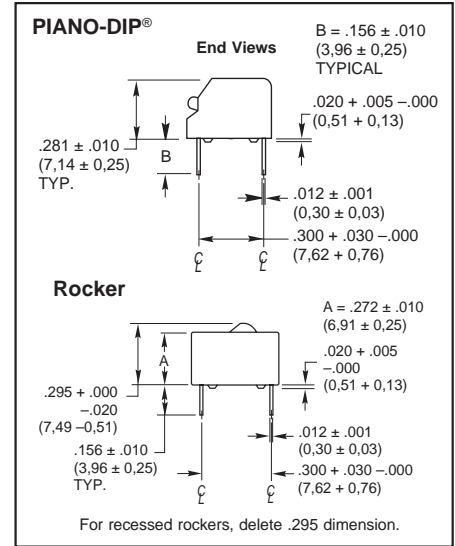
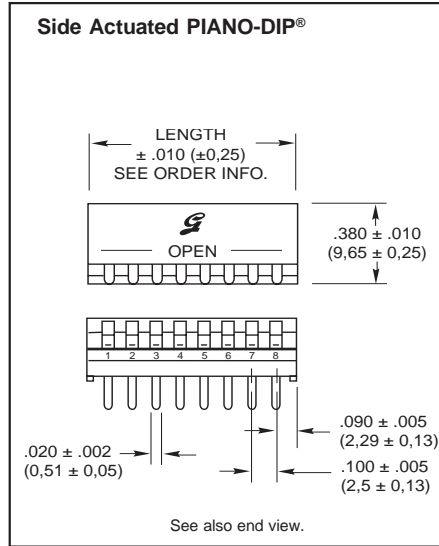
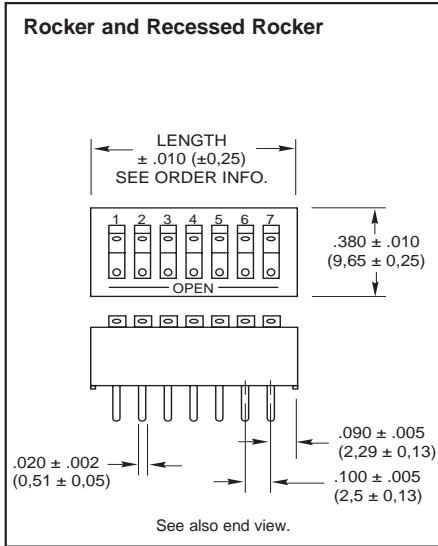
FEATURES

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

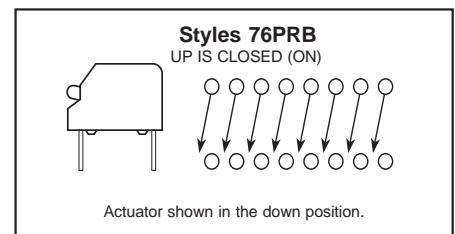
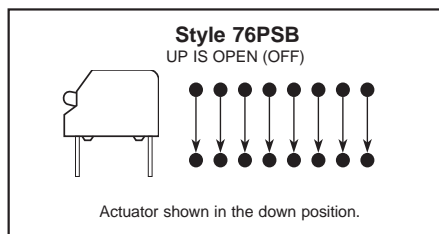
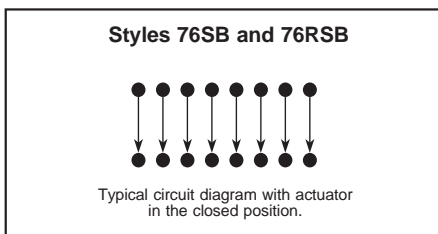


DIP Switches

DIMENSIONS In inches (and millimeters)



CIRCUITRY



ORDERING INFORMATION

Series

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

76RSB04ST

T = RoHS compliant
Sealed*: S = Tape 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

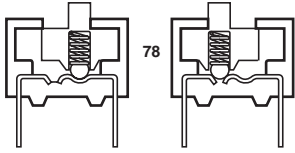
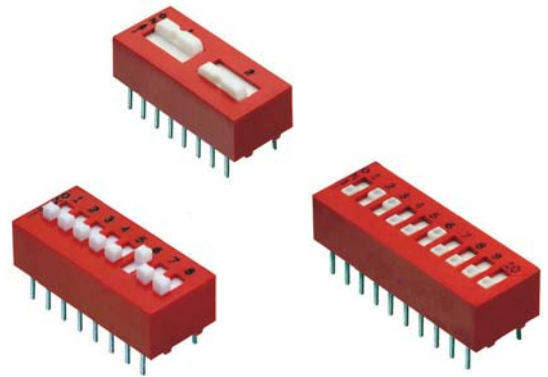
*A top tape seal is required for switches that are machine soldered or heavily cleaned after hand soldering. To order top seal versions, add "S" to the Grayhill part number.

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

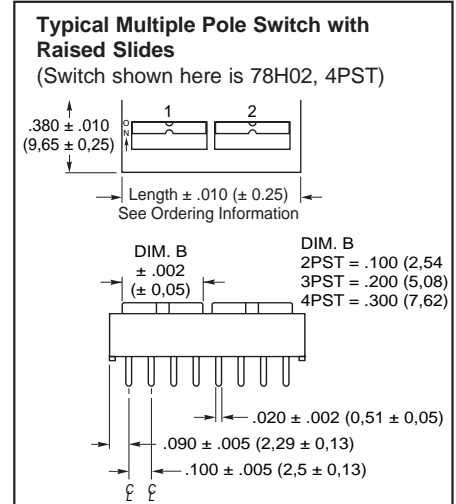
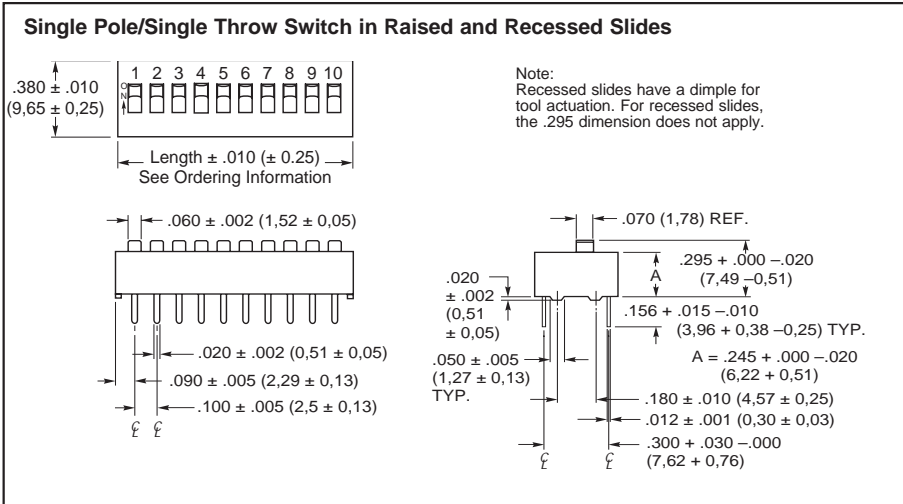
SERIES 78 SPST To 4PST Slide

FEATURES

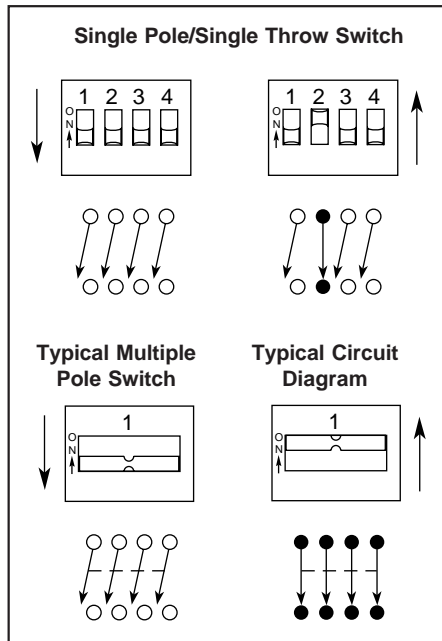
- Raised and Recessed Slides
- SPST, 2PST, 3PST, 4PST
- Sealed Base Standard
- Spring and Ball Contact
- Top Tape Seal Option



DIMENSIONS In inches (and millimeters)



CIRCUITRY



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" before the "T" in the Grayhill part number.

ORDERING INFORMATION

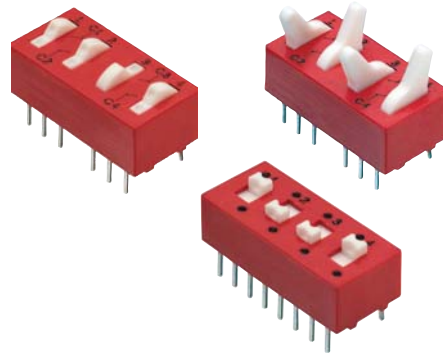
Circuitry	No. of Positions	Length Inches	Length Metric	No./Tube	Raised Slides*	Recessed Slides*	
SPST	2	0.280"	7,1mm	35	78B02T	78RB02T	
	3	0.380"	9,7mm	27	78B03T	78RB03T	
	4	0.480"	12,2mm	21	78B04T	78RB04T	
	5	0.580"	14,7mm	18	78B05T	78RB05T	
	6	0.680"	17,3mm	15	78B06T	78RB06T	
	7	0.780"	19,8mm	13	78B07T	78RB07T	
	8	0.880"	22,4mm	12	78B08T	78RB08T	
	9	0.980"	24,9mm	10	78B09T	78RB09T	
	10	1.080"	27,4mm	9	78B10T	78RB10T	
	12	1.280"	32,5mm	8	78B12T	78RB12T	
	2PST	1	0.280"	7,1mm	35	78F01T	Recessed Slides Not Available
		2	0.480"	12,2mm	21	78F02T	
3		0.680"	17,3mm	15	78F03T		
4		0.880"	22,4mm	12	78F04T		
5		1.080"	27,4mm	9	78F05T		
6		1.280"	32,5mm	8	78F06T		
3PST	1	0.380"	9,7mm	27	78G01T	Recessed Slides Not Available	
	2	0.680"	17,3mm	15	78G02T		
	3	0.980"	24,9mm	10	78G03T		
4PST	1	0.480"	12,2mm	21	78H01T	Recessed Slides Not Available	
	2	0.880"	22,4mm	12	78H02T		

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

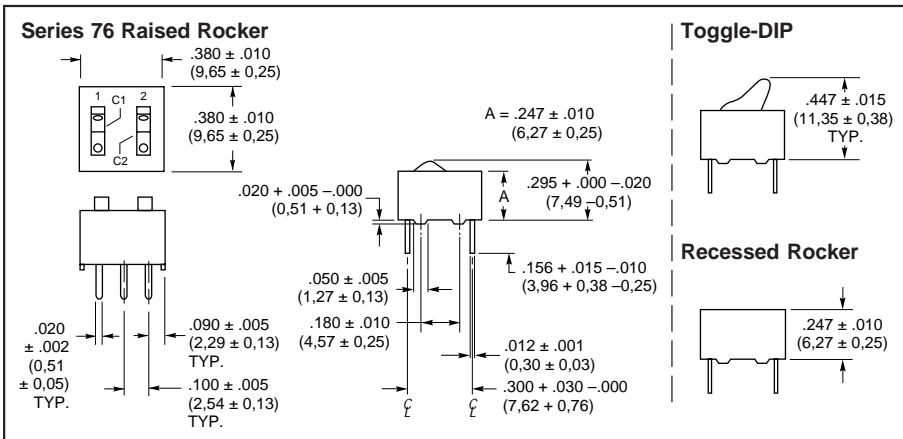
SERIES 76 and 78
SPDT

FEATURES

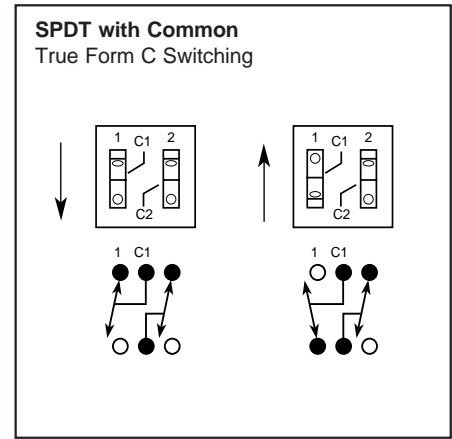
- Raised and Recessed Rocker, and Toggle Actuated Styles
- SPDT with a Common Pole, or SPDT with 2 Isolated Circuits
- Spring and Ball Contact
- Top Tape Seal Option for Most Styles



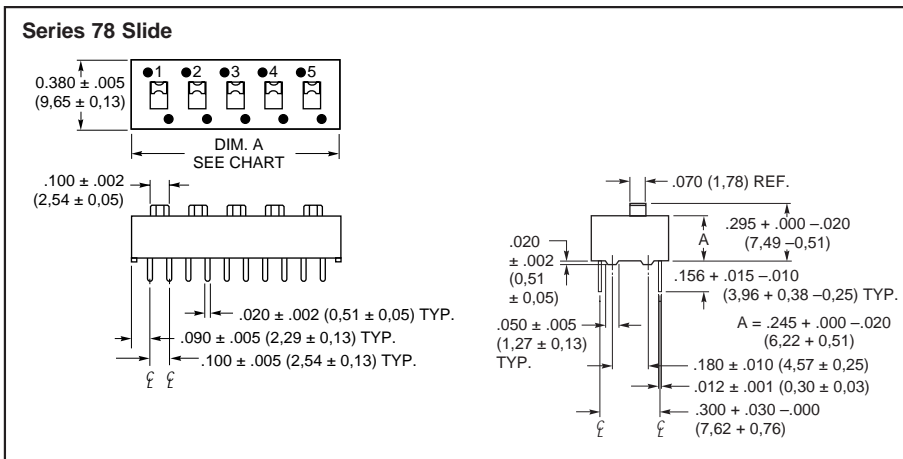
DIMENSIONS: Series 76 In inches (and millimeters)



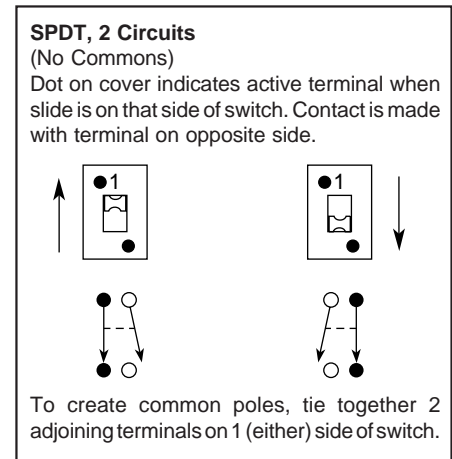
CIRCUITRY: Series 76



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	76SC02T	76RSC02T	76STC02T
	3	0.580"	14,7mm	18	76SC03T	76RSC03T	76STC03T
	4	0.780"	19,8mm	13	76SC04T	76RSC04T	76STC04T
SPDT 2 Circuits	1	0.280"	7,1mm	35	78J01T	—	—
	2	0.480"	12,2mm	21	78J02T	—	—
	3	0.680"	17,3mm	15	78J03T	—	—
	4	0.880"	22,4mm	12	78J04T	—	—
	5	1.080"	27,4mm	9	78J05T	—	—
	6	1.280"	32,5mm	8	78J06T	—	—

*To order top seal versions, add "S" before the "T" in the Grayhill part number.

Not available on Toggle-DIP.

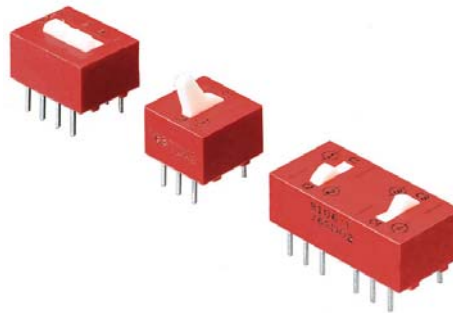
Available from your local Grayhill Distributor. For prices and discounts, contact a local Sales Office, an authorized local Distributor or Grayhill.

SERIES 76 and 78

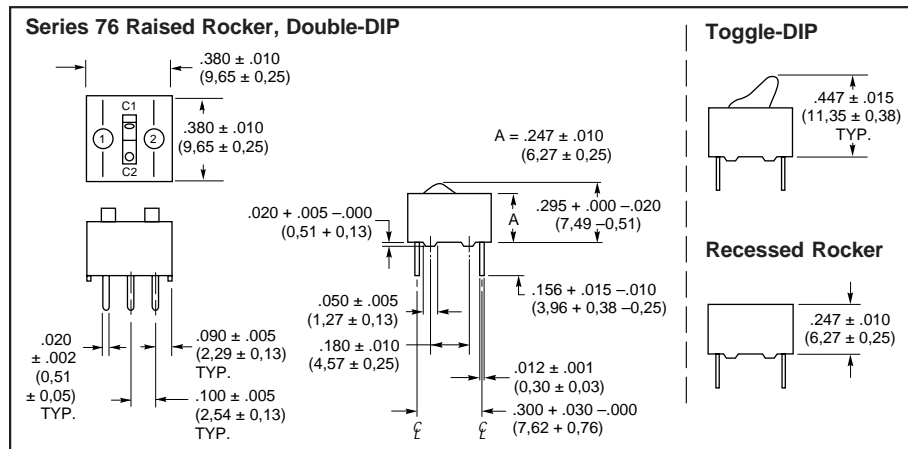
DPDT

FEATURES

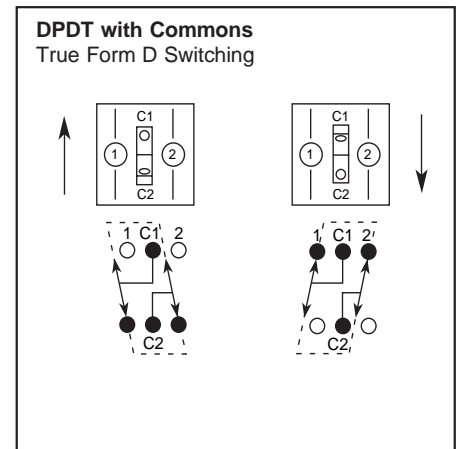
- Raised and Recessed Rocker, and Toggle Actuated Styles
- DPDT with Common Poles, or DPDT with 4 Isolated Circuits
- Spring and Ball Contact
- Top Tape Seal Option for Most Styles



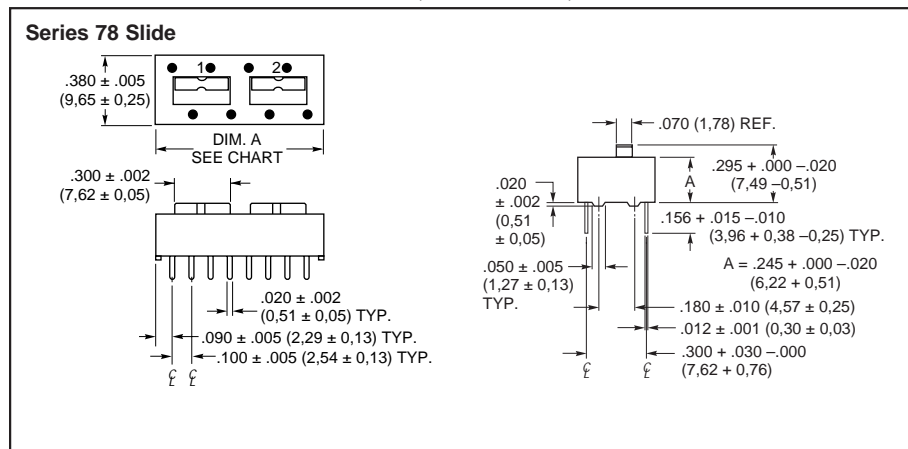
DIMENSIONS: Series 76 In inches (and millimeters)



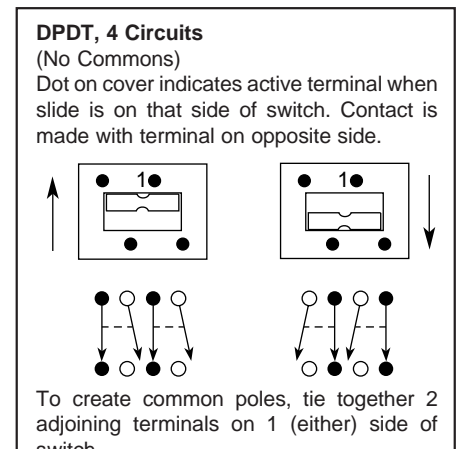
CIRCUITRY: Series 76



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	76SD01T	76RSD01T	76STD01T
	2	0.780"	19,8mm	13	76SD02T	76RSD02T	76STD02T
DPDT 4 Circ.	1	0.480"	12,2mm	21	78K01T	—	—
	2	0.880"	22,4mm	12	78K02T	—	—

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" before the "T" in the Grayhill part number. Not available on Toggle-DIP.

SPECIFICATIONS: Standard Styles

Ratings	76	78	90B
Mechanical Life: Operations per switch position	2,000	2,000	2,000
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:	2,000	2,000	—
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

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 MIL-STD-202, 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: 76, 78 and 90 series tape sealed products: 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.

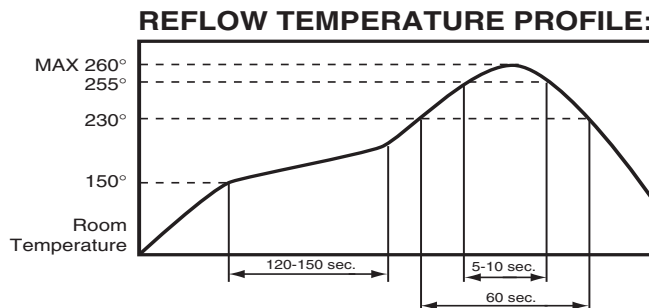
Materials and Finishes

Shorting Member (Ball): Brass, gold-plated over nickel barrier.
Base Contacts: Copper alloy, gold-plated over nickel barrier.
Terminals: Copper alloy, matte tin plated over nickel barrier.
Non-Conductive Parts: Thermoplastic (UL94V-O)
Potting Material: Epoxy, 76,78 only.
Protective Cover: 76,78, only-Polycarbonate.
Tape Seal:
 76, 78: Polyester film
 90: Polyimide film
Tape Seal Integrity: Passes gross leak test using 125°C flourinert for 20 seconds minimum. Reference MIL-STD-202, Method 112.

Recommended Soldering Conditions:

Reflow Soldering Profile:

(260°C Peak Temperature)



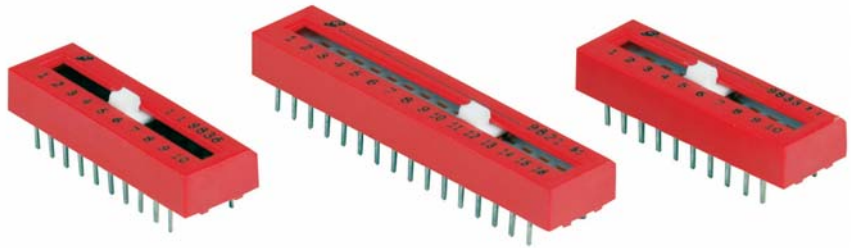
WAVE SOLDERING: 260°C maximum solder temperature for 5 seconds max.

SERIES 79A

Linear Action Circuit Selector

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

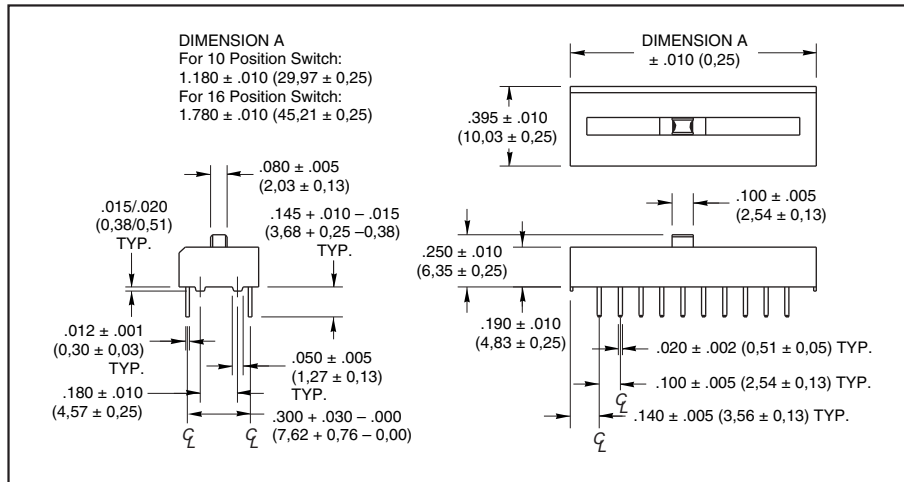
Each position is a single isolated circuit, which connects the two terminals across the switch package. The movable contact is non-shorting.

Tap Switch

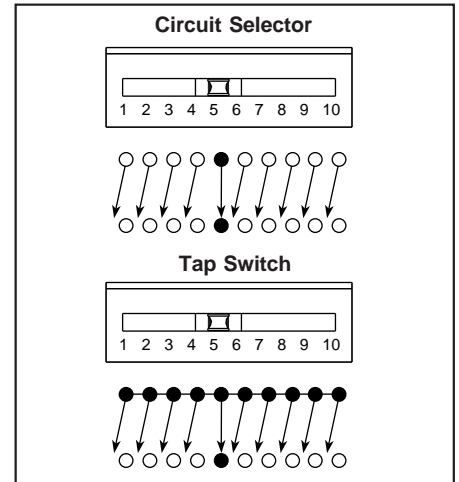
SP/10 Positions, and SP/16 Positions

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 Life: 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 maximum. 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, gold plate over nickel plate

Base Contacts: Copper alloy, gold plate over nickel plate

Terminals: Copper alloy, matte tin plated over nickel barrier.

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

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

ORDERING INFORMATION

Number of Positions	Type of Circuit Code	Number per Tube	Part Number*
10	Circuit Selector	9	79A10T
10	Single Pole	9	79C10T
16	Circuit Selector	6	79A16T
16	Single Pole	6	79C16T

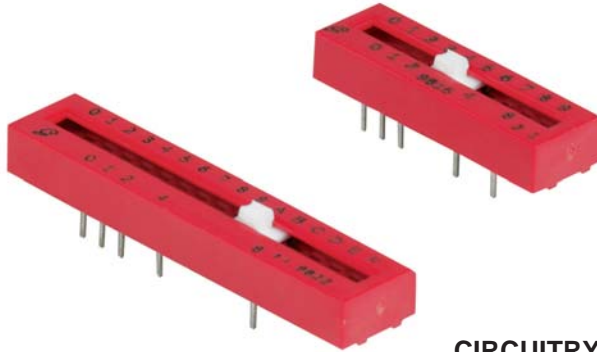
*A top tape seal is required for switches that are machine soldered or heavily cleaned after hand soldering. To order top seal versions, add "S" before the "T" in the Grayhill part number.

SERIES 79B

Linear Action, Coded Output

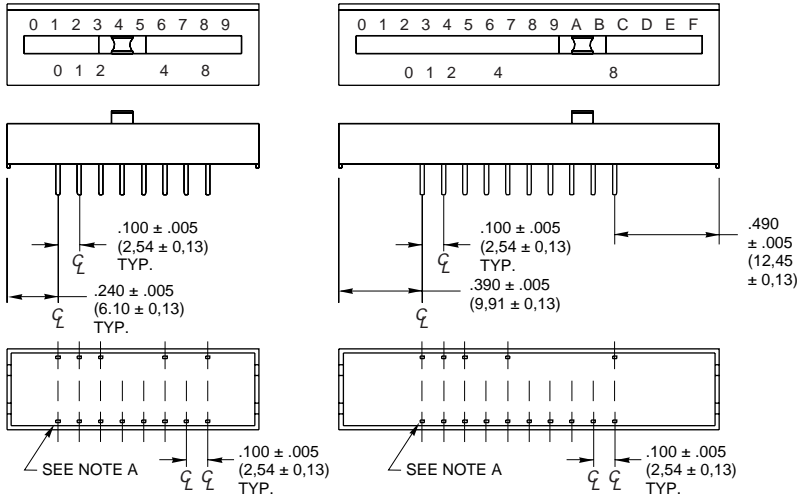
FEATURES

- 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



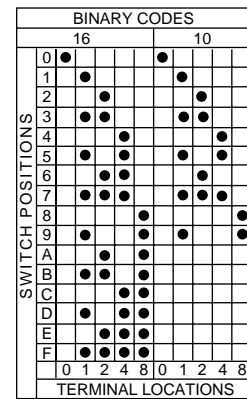
DIMENSIONS In inches (and millimeters)

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



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 maximum. 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, gold plate over nickel plate

Base Contacts: Copper alloy, gold plate over nickel plate

Terminals: Copper alloy, matte tin plated over nickel barrier

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	79B10T
16	Hexadecimal	6	79B16T

*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" before the "T" in the Grayhill part number.

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

SERIES 78C

Right Angle Option

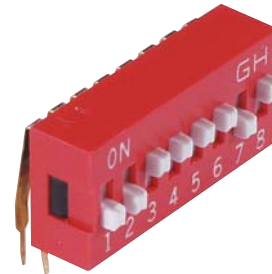


FEATURES

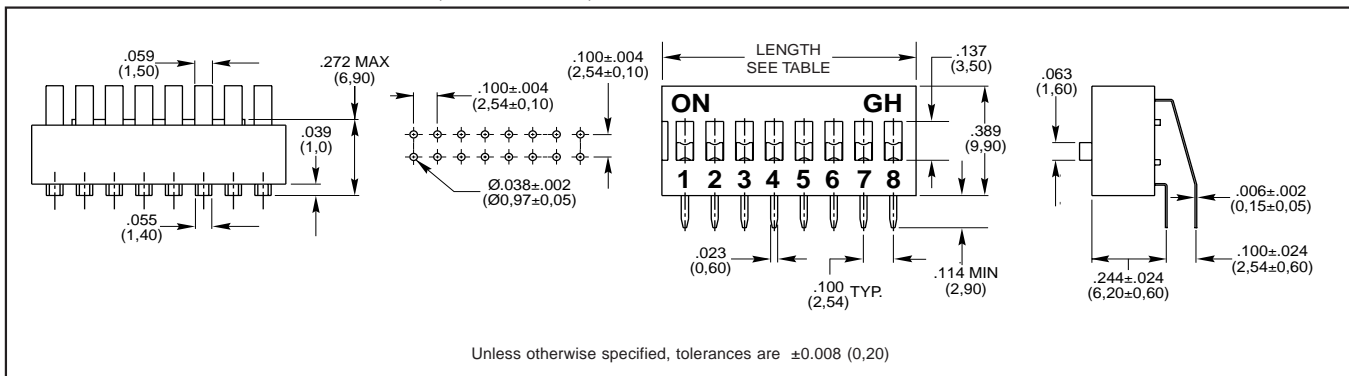
- Easy Access
- SPST Circuitry
- 2-10 and 12 positions available
- Sealed versions available

APPLICATIONS

Telecommunications, computers and peripherals, instruments and controls.



Series 78C DIMENSIONS In inches (and millimeters)



DIP Switches

SPECIFICATIONS

Mechanical

- Mechanical Life:** 2000 operations per switch.
- Operation Force:** 1000gf max.
- Stroke:** 2.0mm
- Operation Temp:** -20°C to 70°C
- Storage Temp:** -40°C to 85°C
- Vibration Test:** MIL-STD-202F METHOD 201A.
- Frequency: 10-55-10Hz/1 min.
- Directions: X,Y,Z, three mutually perpendicular directions.
- Time: 2 hours each direction.
- High reliability.
- Shock Test:** MIL-STD-202F METHOD 213 B. CONDITION A.
- Gravity: 50G (peak value), 11 msec.
- Direction and times: 6 sides and 3 Times in each direction.
- High reliability.

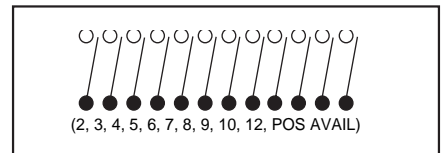
Electrical

- Electrical Life:** 2000 operations per switch
- 24VDC, 25mA.
- Non-Switching Rating:** 100mA, 50VDC.
- Switching rating:** 25mA, 24VDC.
- Contact Resistance:** 50mΩ max. at initial.
- Insulation Resistance:** (at 500VDC) 100mΩ min.
- Dielectric Strength:** 500VAC/1 minute.
- Capacitance:** 5pF max.
- Circuit: Single pole single throw.

Soldering and Cleaning Process

- For best results follow these recommendations:
- Keep switch contacts in "OFF" position for all operations.
- Wave Soldering:** Recommended solder temperature: 500°F (260°C) max 5 seconds.
- Hand Soldering:** Use a soldering iron of 30 Watts or less, controlled at 608°F (320°C) approximately 2 seconds while applying solder.
- Cleaning:** Tape sealed versions withstand cleaning processes.

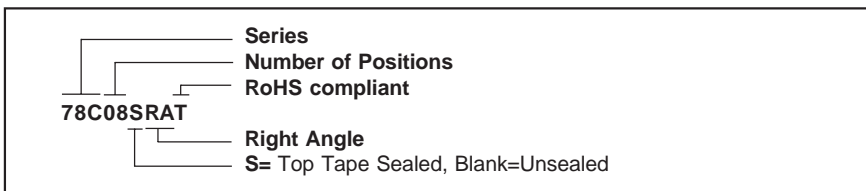
CIRCUITRY



Materials

- Base Contact:** Phosphor bronze with gold plating over nickel
- Terminals:** Brass with gold plating over nickel
- Nonconductive Parts:** Plastic UL94V-0
- Potting Material:** Epoxy
- Tape Seal:** Polyester film.

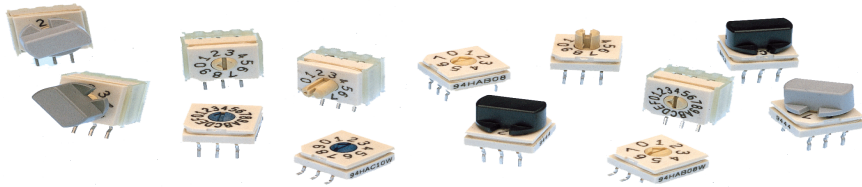
ORDERING INFORMATION



TABLE

Grayhill Part Number	Length Dimension inches (mm)	Packaging
78C02RAT	0.254(6,44)	73 pcs/tube
78C03RAT	0.354(8,98)	52 pcs/tube
78C04RAT	0.454(11,52)	40 pcs/tube
78C05RAT	0.554(14,06)	33 pcs/tube
78C06RAT	0.654(16,60)	28 pcs/tube
78C07RAT	0.754(19,14)	24 pcs/tube
78C08RAT	0.854(21,68)	21 pcs/tube
78C09RAT	0.954(24,22)	19 pcs/tube
78C10RAT	1.054(26,76)	17 pcs/tube
78C12RAT	1.254(31,84)	14 pcs/tube
78C02SRAT	0.254(6,44)	70 pcs/tube
78C03SRAT	0.354(8,98)	52 pcs/tube
78C04SRAT	0.454(11,52)	39 pcs/tube
78C05SRAT	0.554(14,06)	32 pcs/tube
78C06SRAT	0.654(16,60)	28 pcs/tube
78C07SRAT	0.754(19,14)	24 pcs/tube
78C08SRAT	0.854(21,68)	21 pcs/tube
78C09SRAT	0.954(24,22)	19 pcs/tube
78C10SRAT	1.054(26,76)	17 pcs/tube
78C12SRAT	1.254(31,84)	14 pcs/tube

SERIES 94H
Binary Coded



FEATURES

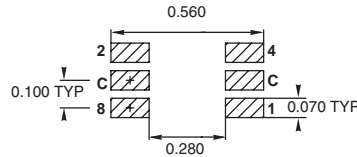
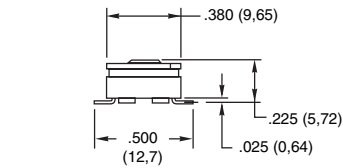
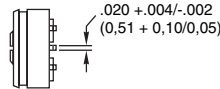
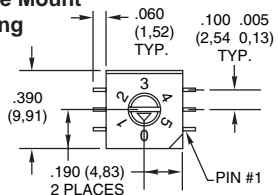
- Sealed Construction; No Tape Seal Required
- Surface Mount or Thru-Hole Style
- Tube or Tape and Reel Packaging
- Octal, BCD, and Hexadecimal Code
- In Standard or Complement
- Standard and Right Angle Mount
- Flush or Extended Actuators
- Gold-Plated Contacts

DIP Switches

DIMENSIONS In inches (and millimeters)

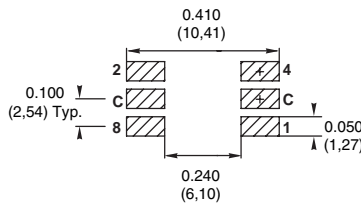
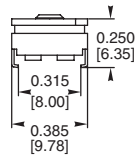
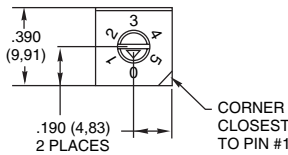
Tolerances are $\pm .010$ inches unless specified otherwise.

Surface Mount Gullwing

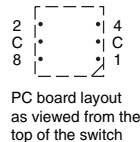
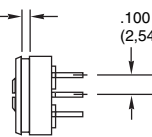
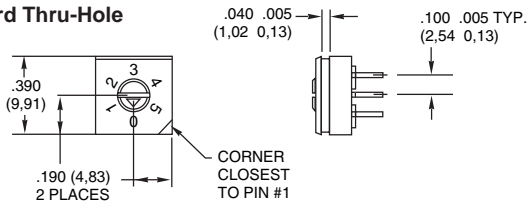


Solder pad layout as viewed from the top of the switch

Surface Mount J-Lead



Standard Thru-Hole



TERMINALS ARE
.020 +.004/-0.002
(0,51 + 0,10/0,05)
WIDE BY .012 .002
(0,31 0,05) THICK
.038 DIA. HOLE SIZE
RECOMMENDED

ACTUATOR STYLES



Octal-8 position



BCD-10 position



Hex-16 position



Figure 1
"A" style rotor

Figure 2
"F" style rotor

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

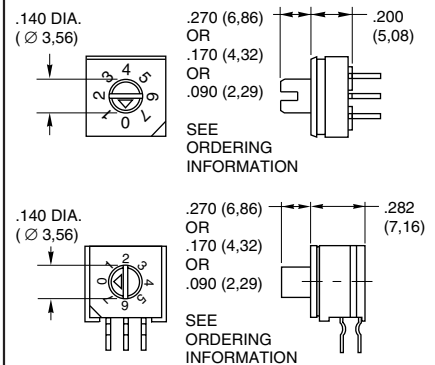
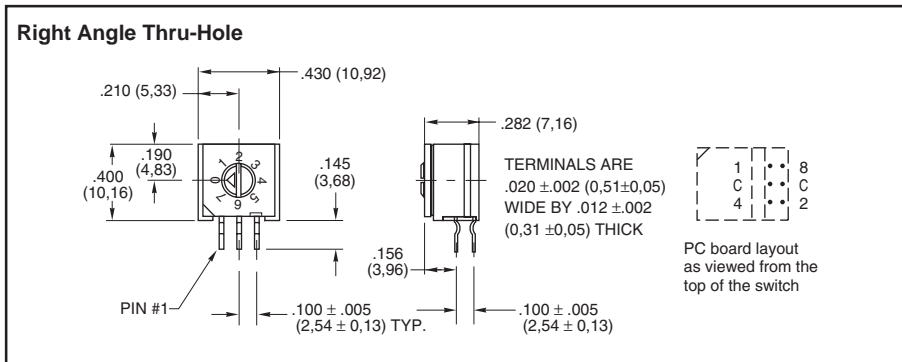


Figure 3

DIMENSIONS In inches (and millimeters)



ORDERING INFORMATION: Series 94H

94HAB10WRT

Series
Actuator Style: A = Flush, Figure 1
 B = .270, Figure 3 (see page B-21)
 C = .170, Figure 3 (see page B-21)
 E = .090, Figure 3 (see page B-21)
 F = Flush, Figure 2

Code: B = Standard (Natural),
 C = Complementary (Contrasting Color)

RoHS Compliant

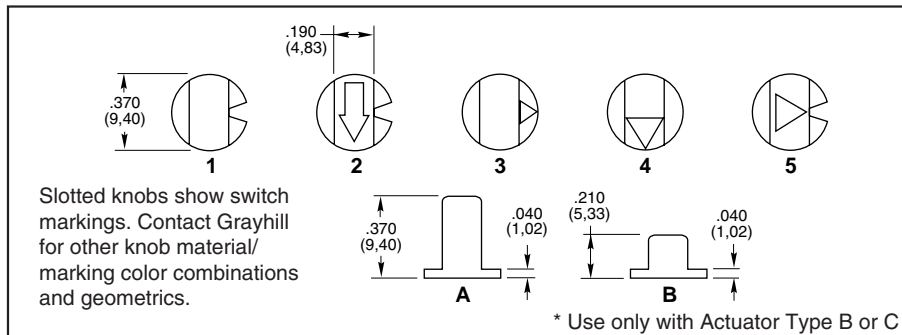
Packaging: R = Tape and Reel, (Surface Mount Only)
 Blank = Tube*

Terminal Style: RA = Right Angle, Thru-Hole
 J = J-Lead
 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 thru-hole, 24 pieces per tube for right angle switches.

SERIES 94 High Temperature Knobs: For Shaft Extensions



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. B = Standard (Natural), C = Complementary (Contrasting Color).

TAPE AND REEL PACKAGING: Series 94H

Meets requirements of EIA 481-2.

13 INCH DIAMETER REEL

CONDUCTIVE PLASTIC EMBOSSED TAPE

16mm [Carrier tape height]

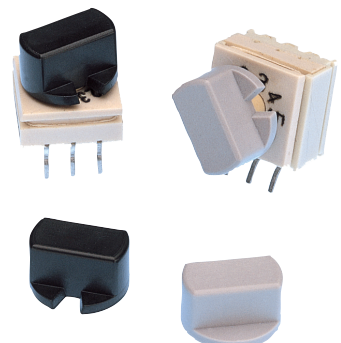
PIN #1 CHAMFER

24mm [Carrier tape width]

DIRECTION OF FEED →

Each reel contains the following number of switches with a 15.35 inch (390 mm) minimum leader and a 6.30 inch (160 mm) minimum trailer.

94HA style	750 sw/reel
94HB style	150 sw/reel
94HC style	200 sw/reel
94HE style	300 sw/reel
94HF style	750 sw/reel



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

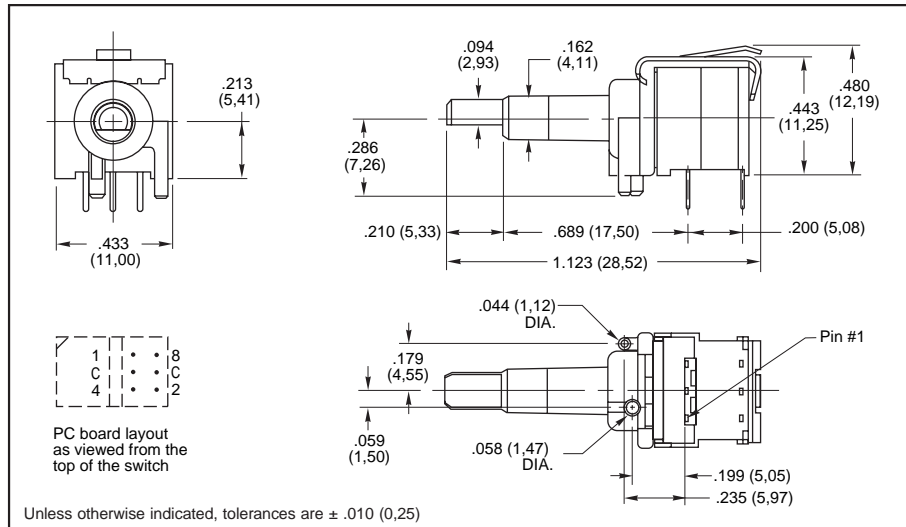
SERIES 94R

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
- RoHS Compliant

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, matte tin plated over nickel barrier.

ORDERING INFORMATION: Series 94R

Continuous Rotation Versions			
Code	No. of Positions	Standard Code Part Number	Complement Part Number
Octal	8	94RB08CT	94RC08CT
BCD	10	94RB10CT	94RC10CT
Hexadecimal	16	94RB16CT	94RC16CT
Rotational Stop Versions*			
Code	No. of Positions	Standard Code Part Number	Complement Part Number
Hexadecimal	16	94RB16FT	94RC16FT

* Consult Grayhill for 8 or 10 position



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.

Internal O-ring: Rubber BUNA-N

Soldering Information

- Soldering Temperature:** 260° C 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.

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.



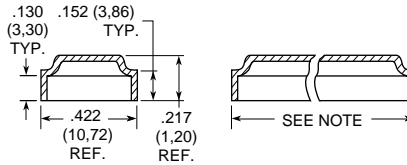
ACCESSORIES

Protective Cover Accessory

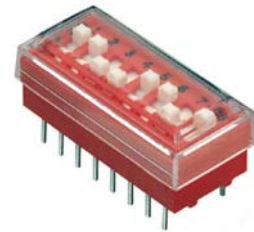
For Series 76, & 78

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.