

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.

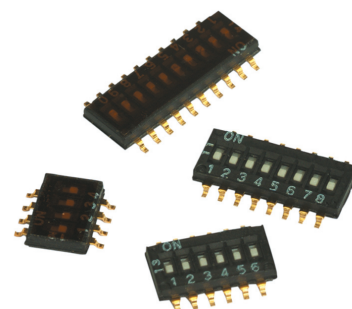


Fig. 1 Series 97C DIMENSIONS In inches (and millimeters)

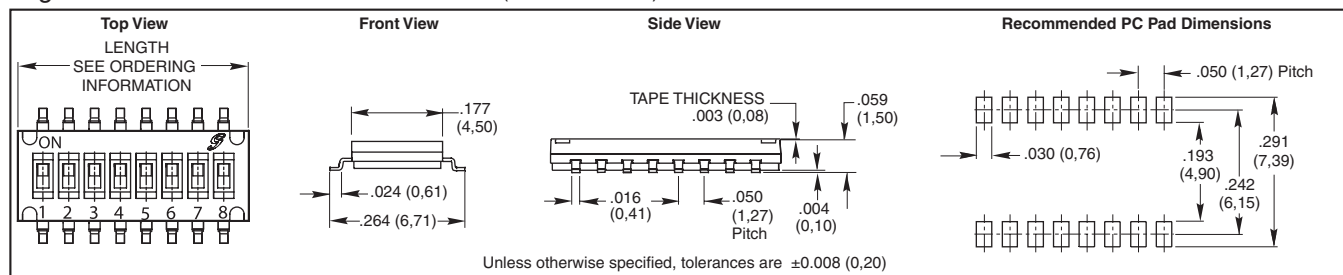
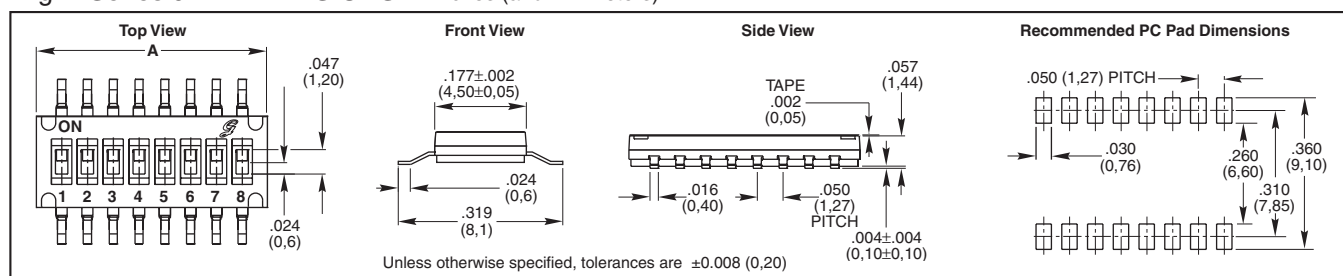


Fig. 2 Series 97R DIMENSIONS In inches (and millimeters)



SPECIFICATIONS

Electrical Ratings

Contact Rating: 25 mA at 24 Vdc switching;
100 mA at 50 Vdc non-switching

Contact Resistance: 100 m Ω max, initially
Insulation Resistance: 100 M Ω 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

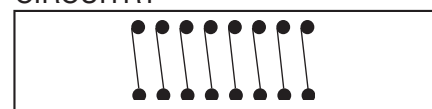
Tape Seal: Kapton

Soldering Information

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

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

CIRCUITRY



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).

Actuation Instructions: Switch slides should be actuated from a low angle in the intended direction of travel. The application of excess force from a high angle can cause permanent damage to the contact system of the switch. Tape seals must be removed to properly actuate the switches as described above. Click [here](#) for visual sample.

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

ORDERING INFORMATION

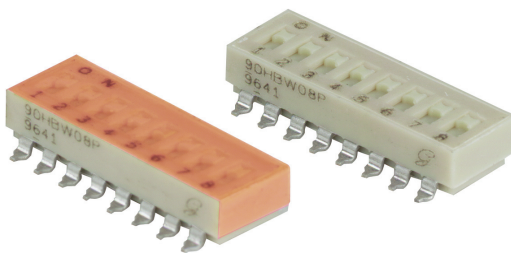
	Series: 97C see fig. 1, 97R see fig. 2
	Positions: 02 = .148 (3,76), 04 = .248 (6,30), 06 = .348 (8,84), 08 = .448 (11,38), 10 = .548 (13,92)
	T= RoHS compliant
	Packaging: Blank = Tube, R = Tape and Reel (see pkg note)
	Seal: Blank = Unsealed, S = Top Tape Seal

SERIES 90HB SPST, Low Profile



FEATURES

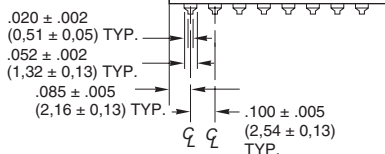
- Compatible with SMT Assembly, Including Infrared Reflow and Vapor-Phase
- Reliable Spring and Ball Contact



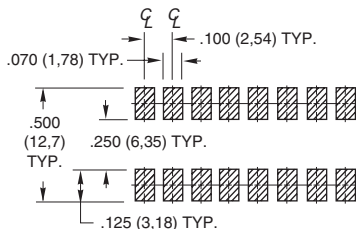
DIMENSIONS In inches (and millimeters)

Top View—Gull Wing

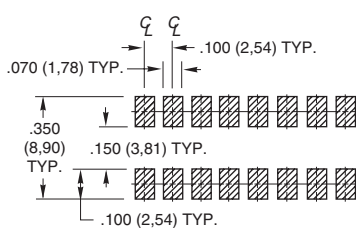
SWITCH IS PACKAGED
AS SHOWN HERE
WITH ALL
POSITIONS ON



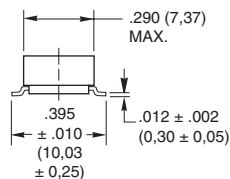
Recommended PC Pad Dimensions—Gull Wing



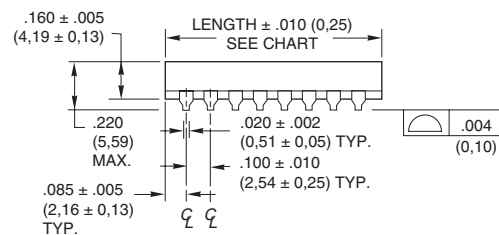
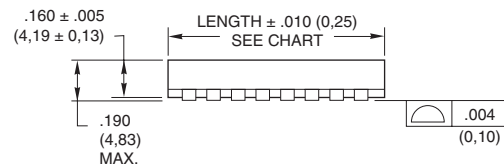
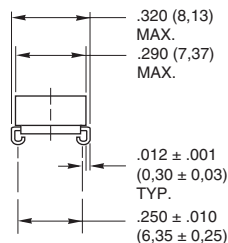
Recommended PC Pad Dimensions—J-Bend



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: 2,000 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 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.

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. High pressure aqueous

cleaning is not recommended.

Materials and Finishes

Shorting Member (Ball): Brass, gold-plate over nickel barrier.

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

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

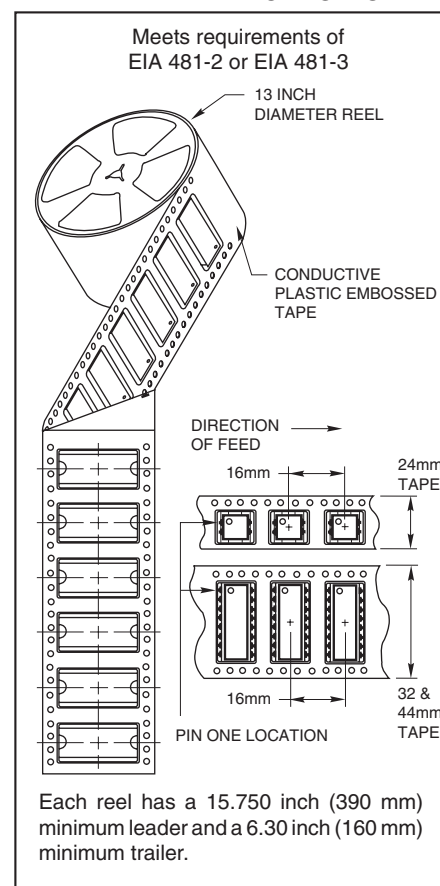
Non-Conductive Parts: Thermoplastic (UL94V-O)

Tape and Reel Packaging

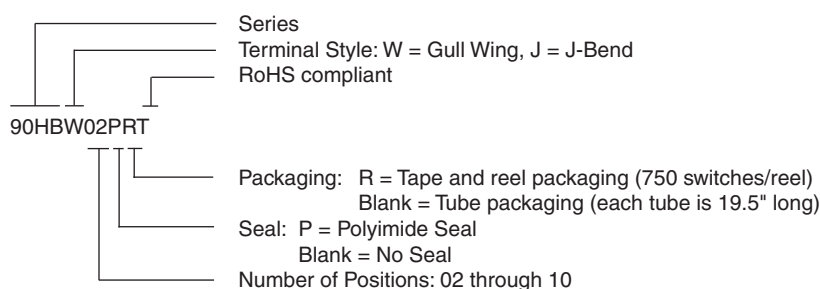
Tape Seal Integrity: Passes gross leak test using 125°C flourinert for 20 seconds minimum. Reference MIL-STD-202, Method 112

Tape Seal: Polyimide film

TAPE AND REEL PACKAGING



ORDERING INFORMATION



No. of Positions	Length Inches	Length Metric	Number Per Tube
2	.270"	6,9 mm	60
3	.370"	9,4 mm	47
4	.470"	11,9 mm	37
5	.570"	14,5 mm	31
6	.670"	17,0 mm	26
7	.770"	19,6 mm	23
8	.870"	22,1 mm	20
9	.970"	24,6 mm	18
10	1.070"	27,2 mm	16

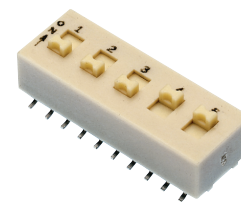
Available from your local Grayhill Distributor. For prices and discounts, contact a local Sales Office, an authorized local Distributor or Grayhill.

** Note: 100% matte tin terminal plating does not meet MIL-S-83504 for lead content.

SERIES 78H SPDT and DPST

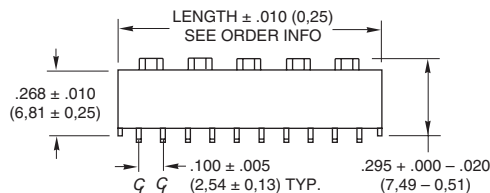
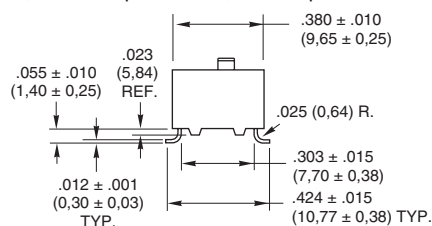
FEATURES

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

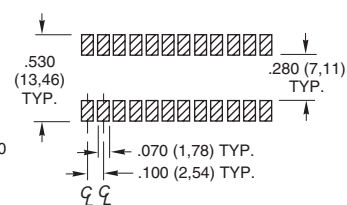


DIMENSIONS In inches (and millimeters)

SPDT, DPST, Top Actuated, Slide Operated



Recommended PC Pad Dimensions

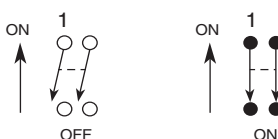


CIRCUITRY

SPDT 2 Circuits (no common)



DPST



• 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.

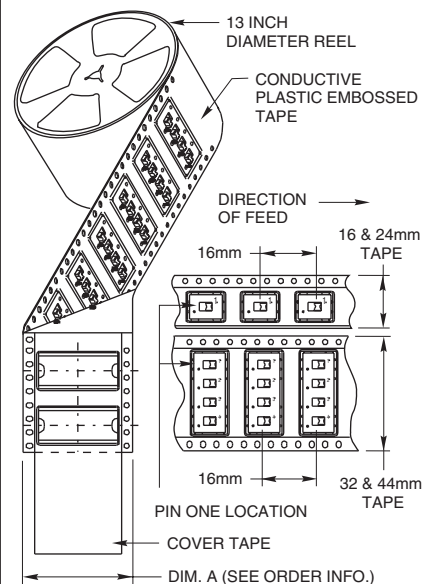
Base Contacts: Copper alloy, gold-plated over nickel barrier.

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

Meets requirements of EIA 481-2 or EIA 481-3



Each reel has a 15.750 inch (390 mm) minimum leader and a 6.30 inch (160 mm) minimum trailer.

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).

** Note: 100% matte tin terminal plating does not meet MIL-S-83504 for lead content.

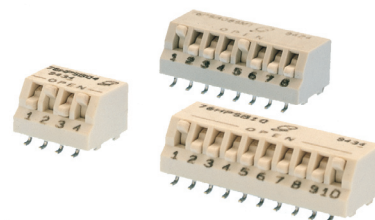
Available from your local Grayhill Distributor. For prices and discounts, contact a local Sales Office, an authorized local Distributor or Grayhill.

SERIES 76HP

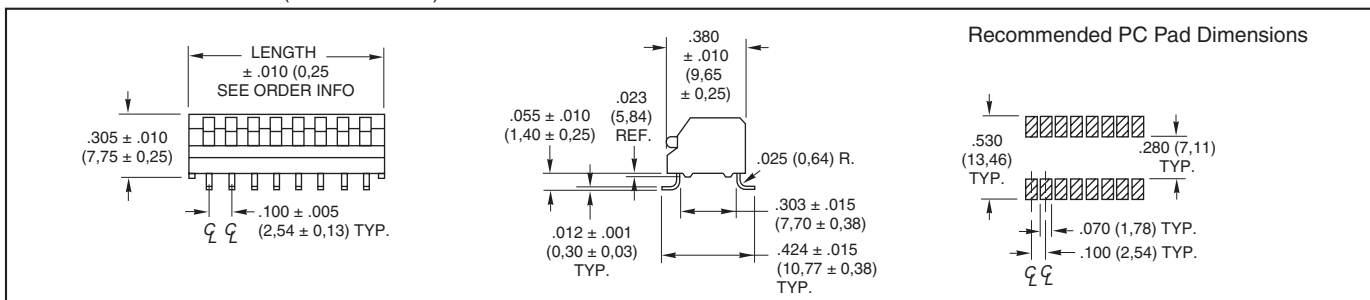
Side Actuated PIANO-DIP®

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

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 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: 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)

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 MIL-STD-202, 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 over nickel barrier.

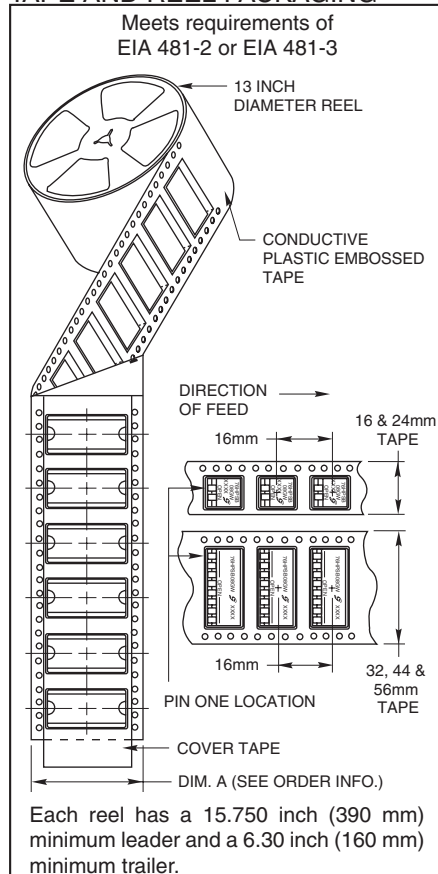
Base Contacts: Copper alloy, gold-plated, over nickel barrier.

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.

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	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.

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