

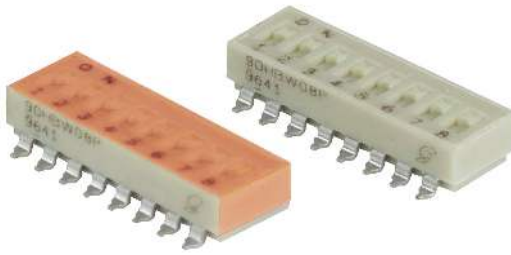


## SERIES 90HB SPST, Low Profile



### FEATURES

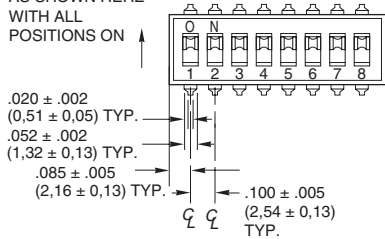
- Compatible with SMT Assembly, Including Infrared Reflow and Vapor-Phase
- Reliable Spring and Ball Contact



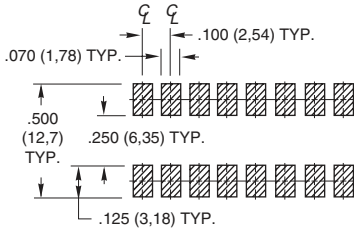
### DIMENSIONS In inches (and millimeters)

#### Top View—Gull Wing

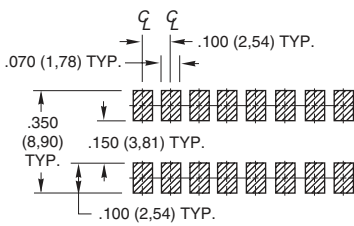
SWITCH IS PACKAGED AS SHOWN HERE WITH ALL POSITIONS ON



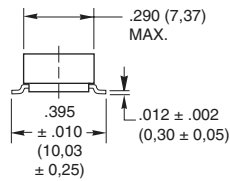
#### Recommended PC Pad Dimensions—Gull Wing



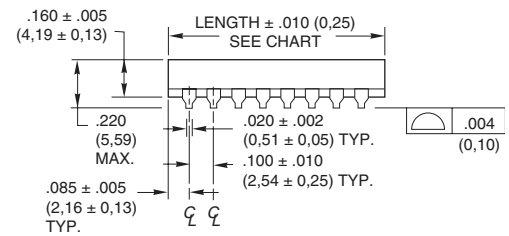
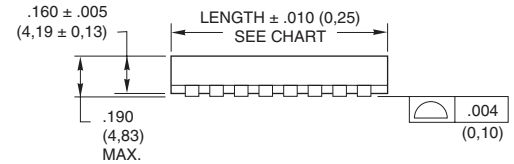
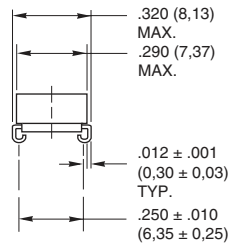
#### Recommended PC Pad Dimensions—J-Bend



#### 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.

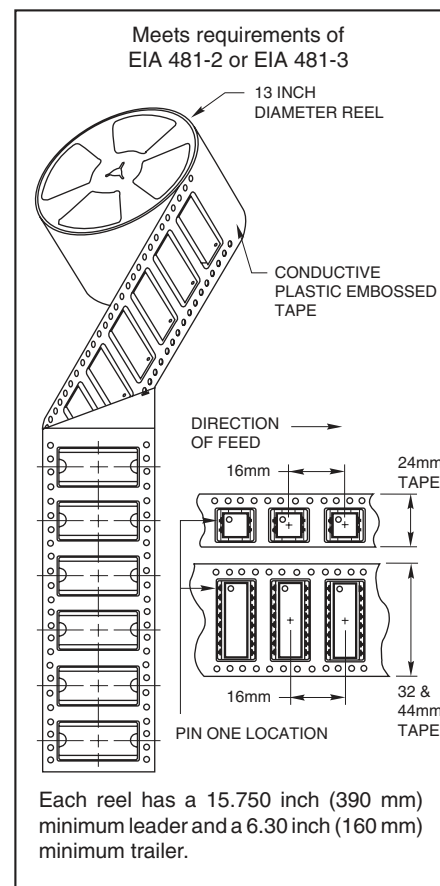
**Non-Conductive Parts:** Thermoplastic (UL94V-O)

### 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

Series

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

RoHS compliant

90HBW02PRT

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 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.

\*\*Style "GB" contains 30µ gold plated terminals.



## Grayhill DIP Switch Processing Information

The information provided within is intended as processing guidelines for the assembly, soldering, cleaning, and use of Grayhill DIP switches. This information supersedes any other process information that is available in Grayhill Inc. catalogs or data sheets as related to Grayhill Inc. standard DIP switch products. Please contact Grayhill Inc. for any questions related to the information in this document.

### Mounting

Unless otherwise noted, Grayhill DIP switches are shipped with slides or rockers in the ON position and rotary DIP switches are shipped with the actuators in the 0 position. It is recommended that they be solder processed in those positions to ensure proper performance without issue.

### Soldering

**WAVE SOLDER:** Switches that can be processed using wave solder equipment (thru hole soldering) are as follows:

Grayhill Series 76SB, 76PSB, 76RSB, 76SC, 76RSC, 76RSD, 76SD, 76STC, 76STD, 78B, 78RB, 78F, 78G, 78H, 78J, 78K, 90B, 94H (thru hole models), and 94R

**Wave soldering guidelines:** Solder wave temperature is 260°C. max. for 5 seconds max. (0.063" thick PCB). Exposure to flux should be kept to a minimum.

**Manual soldering guidelines** (for thru hole switches): Soldering temperature is 350C for soldering iron tip with 3 seconds maximum of dwell time.

**REFLOW SOLDER:** Switches that can be processed using reflow process equipment are as follows:

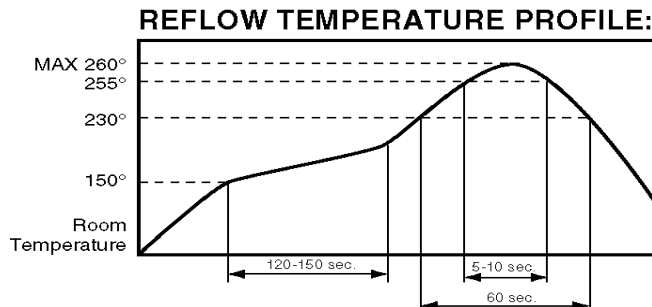
Grayhill Series 76HP, 78HF, 78HJ, 90B, 90HB, 94H, 94R, 97C, and 97R

**Reflow soldering guidelines:** Soldering temperature is 260C max. for 5 seconds, with a maximum of two reflow cycles at the maximum conditions. Switches should be allowed to cool for 3 to 5 minutes between reflow cycles. Reflow soldering should not be done to any Grayhill DIP switch products not listed directly above as the exposure to higher surface temperatures could cause permanent deformation of the plastic materials.

### Recommended Maximum Soldering Conditions:

#### Reflow Soldering Profile:

(260°C Peak Temperature)



### PCB Cleaning

In-line DIP switches that are tape sealed can be processed using certain washing processes as described below. Tape sealed switches can typically be identified by a suffix of ST or PT that follows after the series, switch style, and number of position identifiers (i.e., 76SB08ST). Non-tape sealed switches should not be subjected to any washing processes as they can introduce contaminants into the contact area of the switches. Rotary DIP products (94H & 94R) are internally sealed and can be processed the same as tape sealed products.

Tape sealed and rotary DIP switch products are qualified for immersion cleaning processes using alcohol or detergent based cleaning solvents at temperatures up to 140°F. maximum. Tape seal products must have the tape seal undisturbed until after any cleaning process. Cleaning processes that use ultrasonic agitation or that use pressurized sprays can defeat the tape and / or internal seals and allow contamination of the switches. They are not recommended for use on inline or rotary DIP products. Switches should not be washed directly after a soldering process. There should be a delay of at least three minutes to allow adequate time for cooling after soldering.

**Tape seal integrity:** Inline DIP products that are tape sealed are tested to meet and pass a gross leak test using 125°C Fluorinert for 20 seconds minimum. Reference MIL-202, Method 112.

Tape seal material:

76,78: Polyester film, rated to 170°F. maximum temperature

90: Polyimide film, rated to 260°C. maximum temperature

# PRODUCT ADVISORY NOTICE

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## KEEPING YOU INFORMED OF PRODUCT CHANGES

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**To:** All Customers, Sales Representatives and Distributors

**Date:** December 28, 2018

**Subject:** 90 Series Floor Life Reset Instruction Change

This Product Advisory Notice is to alert you that Grayhill is modifying the 90 Series DIP Switch Shelf Reset Instructions. ***Please forward this notification to the appropriate person(s) in your organization.***

### Description of Change

All Grayhill DIP switch products that are labelled as moisture sensitive shall be recommended to be baked at a lower temperature profile than what is recommended per J-STD-033C. This standard applies to SMT components in general, and Solid State Surface product specifically. Internal to J-STD-033C, baking temperatures for floor life reset are specified based on the overall package body thickness; however, this standard in practice tends to apply to non-mechanical product. The recommended temperature based on J-STD-033C is 125°C; this temperature has been determined to be overly aggressive. In this nature, J-STD-033C should be disregarded. Additionally, NOTE 5 on the MSID Label of Grayhill's packaging / reel shall be also disregarded.

Due to the mechanical nature of Grayhill's product, the temperature recommended per J-STD-033C causes a breakdown in the lubricant used in the switch body and contributes to the following conditions:

- Oil separation and leeching of lubricant which can potentially impact pick-and-place applications through increased surface tension between the carrier tape pocket and the switch body

Grayhill has NOT seen any evidence of the following conditions caused by the oil separation condition described above:

- Impact on switch solderability.
- Long-term impact on Grayhill product life.
- Long-term impact on additional components exposed to oil from switch lubricant.

The lubricant used in the construction of this switch exhibits a stable chemical nature and is non-reactive under typical conditions of use, storage and transport.

Grayhill recommends the baking procedure for factory floor life reset to be 60°C  $\pm$ 2°C for 26 -28 hours. This temperature is not to be exceeded. Longer drying times may be used; however, they shall not exceed 44 hours. The ideal floor life reset process would be to use a dry box utilizing vacuum drying procedures as opposed to heat drying applications.

Grayhill believes that the only affected products are parts that have been opened and removed from their original packaging and have been exposed to a floor-life reset bake profile either in excess of 100°C or longer than 48 hours. All other products that have not been removed from original packaging (or products that have been reset using a temperature below 100°C or less than 48 hours) have NOT been shown to exhibit any issues. Grayhill believes this product to be fit for use. Additionally, product that has been baked in excess of the procedure recommended herein shall also be deemed generally fit for use in cases where typical automated production processes and schedules are not affected.



# PRODUCT ADVISORY NOTICE

KEEPING YOU INFORMED OF PRODUCT CHANGES

**Effective Date**

1/1/2019

**Part Numbers Affected**

		# POS	TAPE SEAL?	REEL?	M.S.L.
<b>90 SERIES</b>	90HBW02PRT	2	Y	Y	4
	90HBW03PRT	3	Y	Y	3
	90HBW04PRT	4	Y	Y	3
	90HBW05PRT	5	Y	Y	3
	90HBW06PRT	6	Y	Y	3
	90HBW07PRT	7	Y	Y	3
	90HBW08PRT	8	Y	Y	3
	90HBW10PRT	10	Y	Y	3
	90HBW02PT	2	Y	N	4
	90HBW03PT	3	Y	N	3
	90HBW04PT	4	Y	N	3
	90HBW05PT	5	Y	N	3
	90HBW06PT	6	Y	N	3
	90HBW07PT	7	Y	N	3
	90HBW08PT	8	Y	N	3
	90HBW10PT	10	Y	N	3
	90HBW02RT	2	N	Y	4
	90HBW03RT	3	N	Y	3
	90HBW04RT	4	N	Y	3
	90HBW05RT	5	N	Y	3
	90HBW06RT	6	N	Y	3
	90HBW07RT	7	N	Y	3
	90HBW08RT	8	N	Y	3
	90HBW10RT	10	N	Y	3
	90HBW02T	2	N	N	4
	90HBW03T	3	N	N	3
	90HBW04T	4	N	N	3
	90HBW05T	5	N	N	3
	90HBW06T	6	N	N	3
	90HBW07T	7	N	N	3
	90HBW08T	8	N	N	3
	90HBW10T	10	N	N	3

**Action Required**

None. Please contact your Grayhill, Inc. Sales Associate for further information.