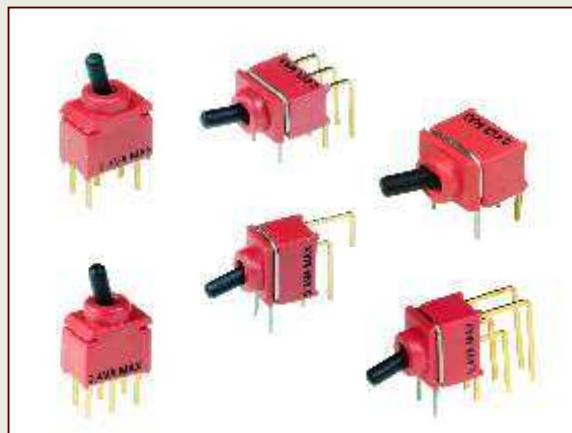


Sealed Ultra-miniature Toggle Switches 2D series



IP 67
ACCORDING TO
EN 60529:1991+A1:2001
IEC 60529:2001



General Specification

Contact Rating:	0.4VA max. @ 20V AC or DC max.
Initial contact resistance:	Below 100mΩ typ. @ 2-4VDC, 100mA
Insulation resistance:	500MΩ min. at 500VDC
Dielectric strength:	500VAC rms min. at sea level
Mechanical life at no load:	40,000 make-and-break cycles
Operating temperature range:	-30°~ +85°C
Hand Soldering:	300°C +/- 5°C for 3 seconds max with a 60W iron.
Wave Soldering:	260°C +/- 5°C; Duration 5 secs. max. (PCB thickness 1.6mm)

Materials

Housing & Base:	Glass filled Nylon 6/6 or 4/6, flame retardant, heat stabilised (UL94V-0)
Actuator:	Glass filled Nylon 6/6, flame retardant, heat stabilised (UL94V-0), with standard internal o-ring seal.
Switch Support:	Steel, nickel plated.
Contacts/Terminals:	Gold plated copper alloy.

How to Order

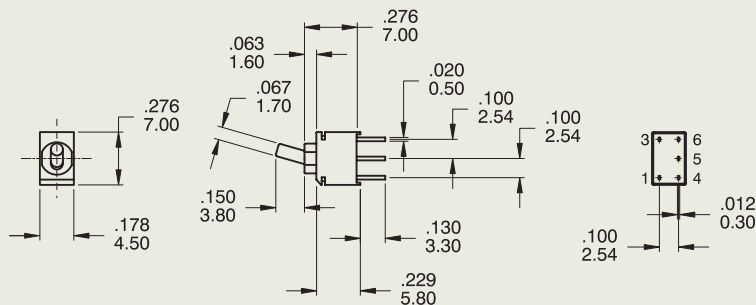
MODEL NO.	ACTUATOR	TERMINATIONS	TERMINAL MATERIAL	SEAL	ROHS SOLDERING
□ □ □ □ MODEL NO. 2D11- SP On-None-On 2D13- SP On-Off-On 2D19- SP Off-None-On 2D21- DP On-None-On 2D23- DP On-Off-On 2D29- DP Off-None-On	□ □ ACTUATOR N (STD) 3.80mm	□ □ □ TERMINATIONS PC PC thru-hole H9 90° Horizontal mount V9 90° Vertical mount SM SMT Horizontal mount (Single Pole versions only)	□ TERMINAL MATERIAL A Gold	□ SEAL E EPOXY (std)	□ ROHS SOLDERING L Rohns Compliant S Rohns & Lead Free F Halogen Free & Rohns Compliant

Switch Function

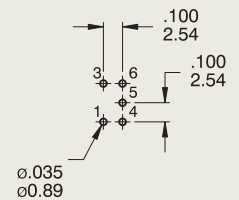
NO. POLES	MODEL NO.	SWITCH FUNCTION			CONNECTED TERMINALS / SCHEMATIC		
		POS.1	POS.2	POS.3	POS.1	POS.2	POS.3
							
SP	2D11-	ON	NONE	ON	5-6	N/A	5-4
	2D13-	ON	OFF	ON	5 (COMM) 	OPEN	5 (COMM) 
	2D19-	OFF	NONE	ON	OPEN	N/A	4-6 
DP	2D21-	ON	NONE	ON	2-3,5-6	N/A	2-1,5-4
	2D23-	ON	OFF	ON	2 (COMM)  5 	OPEN	2 (COMM)  5 
	2D29-	OFF	NONE	ON	OPEN	N/A	 

Function/Mounting Options

PC



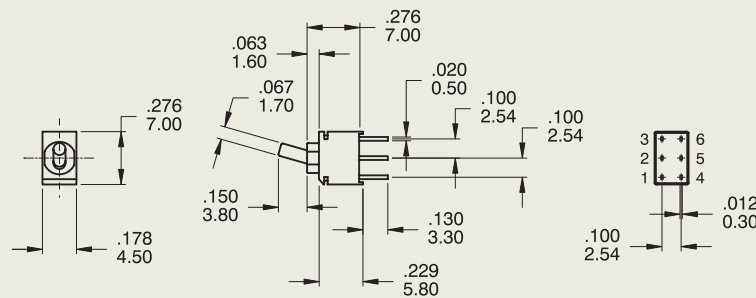
P.C. MOUNTING



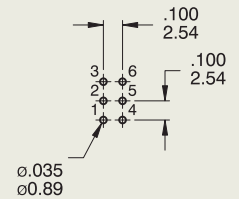
SPDT

Part No. Shown : 2D11-NPCAEL

PC



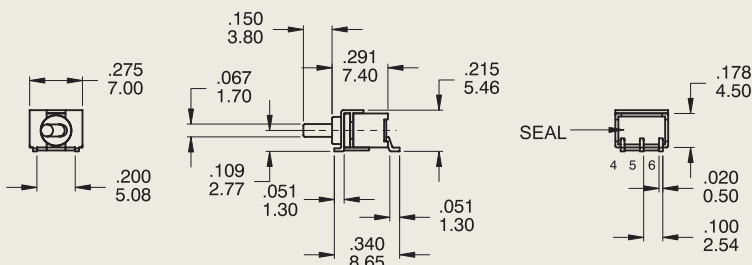
P.C. MOUNTING



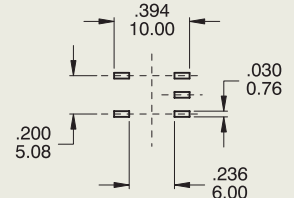
DPDT

Part No. Shown : 2D21-NPCAEL

SM (SPDT models only)



P.C. MOUNTING

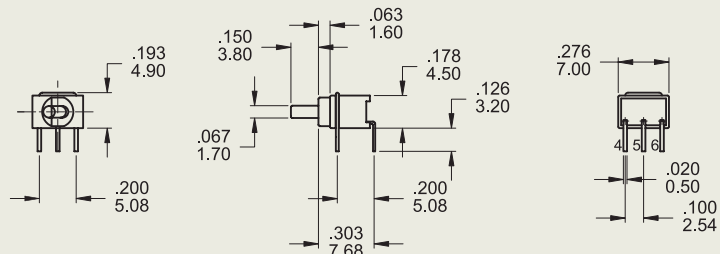


SPDT

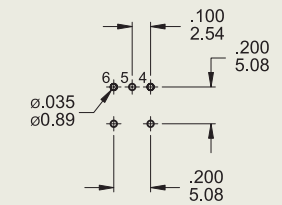
Part No. Shown : 2D11-NSMAEL

Function/Mounting Options (contd.)

H9



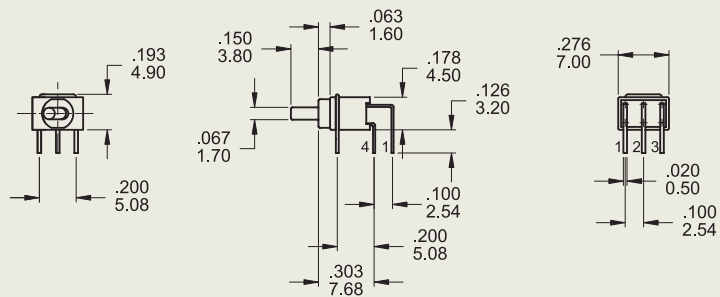
P.C. MOUNTING



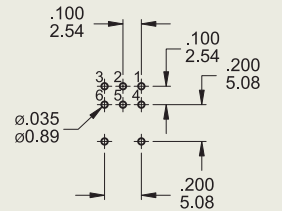
SPDT

Part No. Shown : 2D11-NH9AEL

H9



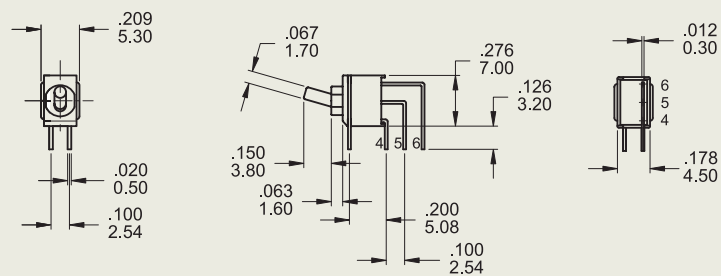
P.C. MOUNTING



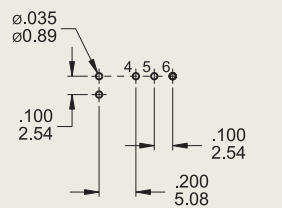
DPDT

Part No. Shown : 2D21-NH9AEL

V9



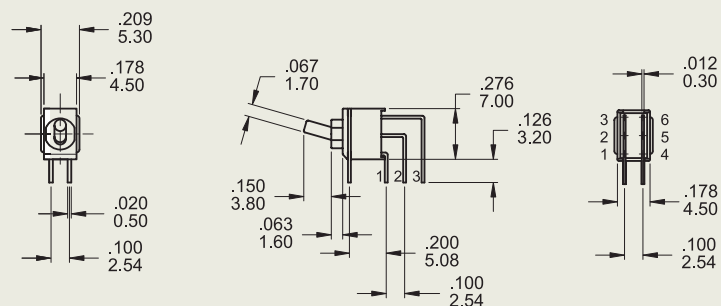
P.C. MOUNTING



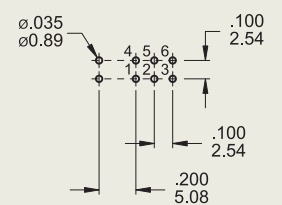
SPDT

Part No. Shown : 2D11-NV9AEL

V9



P.C. MOUNTING



DPDT

Part No. Shown : 2D21-NV9AEL

2D SERIES SPECIFICATION

Test Sequence

ITEM	DESCRIPTION	TEST CONDITIONS	REQUIREMENTS
①	Visual Examination	Visual Examination check without any external force applied	There shall be no defects that affect the serviceability of the product.
②	Contact Resistance	@2-4VDC 100mA.	100mΩ Max.
③	Insulation Resistance	Measurements shall be made following application of 500 V/DC potential across terminals and cover.	500MΩ min/500VDC 100mA
④	Dielectric Withstanding Voltage	500 VAC (25Hz or 30Hz) 0.5mA shall be applied across terminals and cover for 1 minute.	There shall be no breakdown or flashover.
⑤	Solder Heat Resistance	Through Hole Type Wave Soldering Soldering Temperature: 260±5°C. Duration of Solder Immersion: 5 ±1 Seconds. PCB is 1.6mm in thickness Manual Soldering Soldering Temperature 300°C . Duration of Solder Heat Max. 3 seconds.	Shall be free from pronounced backlash and falling-off or breakage of terminals. Shall conform to the limits in items ② to ④.
⑥	Vibration	Shall be tested in accordance with Method 201A of MIL-STD-202F. (a) Frequency: 10-55-10Hz in 1 min./cycle. (b) Direction: 3 vertical directions including the directions of operation (c) Test time: 2 hours in each direction	Shall conform to the limits in items ② to ④.
⑦	Shock	Shall be tested in accordance with Method 213B condition A of MIL-STD-202F (a) Acceleration: 50g (b) Action time: 11±1ms (c) Testing direction: 6 sides (d) Test cycle: 3 times in each direction	Shall conform to the limits in items ② to ④.
⑧	Actuation Force	Model-1305N Mechanical Test	Dependant on switch function.
⑨	Operating Life	Measurements shall be made following the test below: (a) Working with 0.4A @ 20VAC resistive load - gold plated. (b) Rate of operation: 6-8 operations per minute. (c) Electrical Life Test: 6,000 cycles	(1) Shall conform to the limits in items ③ to ④.
		Mechanical Life Test: 40,000 cycles:	Shall conform to the limits in item ②.
⑩	Resistance Low Temperature	Following the test set forth below the sample shall be left in normal temperature and humidity conditions for 1 hour before the measurements are made: (a) Temperature -40±3°C. (b) Time 96 hours.	Shall conform to the limits in items ② to ④.
⑪	Resistance High Temperature	Following the test set forth below the sample shall be left in normal temperature and humidity conditions for an hour before the measurements are made: (a) Temperature 85±2°C . (b) Time 96 hours.	Shall conform to the limits in items ③ & ④.

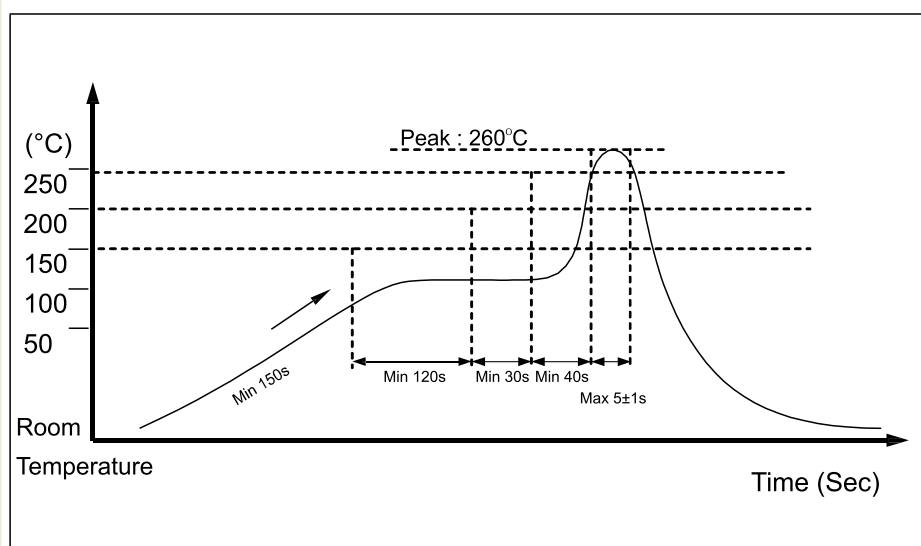
SWITCHING SOLUTIONS FOR EUROPE

⑫	Resistance Humidity	Following the test set forth below the sample shall be left in normal temperature and humidity conditions for an hour before the measurements are made: (a) Temperature $40\pm 2^{\circ}\text{C}$. (b) Relative Humidity 90~95%. (c) Time 96 hours.	Shall conform to the limits in items ② & ③.
⑬	The Salt Testing	Following the test set forth below the sample shall be left in normal temperature and humidity conditions for an hour before the measurements are made: (a) Temperature $35\pm 2^{\circ}\text{C}$. (b) The ratio of salt-water: 5%. (c) The spray amount of salt- water 1~2 ml/h. (d) Time 48 hours.	The testing standard based on bubble, crack, and magnifying glass with gauge.
⑭	IP67 Testing	Protected against the effects of temporary immersion in water. (1m below the surface of the water for a duration of 30 mins.).	IP67 according to EN60529: 1991+A1: 2000 IEC 60529: 2001

Soldering Conditions

Vapour phase

Temperature Profile



Manual Soldering

Soldering Temperature	Max.300°C
Continuous Soldering Time	Max. 3 seconds

Wave soldering

Recommended Soldering Temperature	260±5°C
Duration of Solder Immersion	Max. 5 seconds

(PCB is 1.6mm in thickness)

Precautions in Handling:

Care should be exercised so that flux from the upper part of the printed circuit board does not adhere to the switch.

E&OE. Specifications are subject to change without notice.