

# Military/Aerospace/HI-REL MIL-S-83731 Toggle Switches

## Features/Benefits

- **Qualified to MIL-S-83731 Cage Code 63HW9**
- **50  $\mu$  inch selective gold contact plating**
- **Epoxy sealed terminals for process compatibility**
- **Rated for logic level to 5 amp resistive loads and 2 amp inductive loads**
- **Flame retardant housing material**
- **RoHS compliant and compatible**

| Test Requirement                                | MIL-S-83731/9, 10, 13, 14, 15, 16                                                                                                                                                          |
|-------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. Strength of Terminal                         | 1 lb. – solder lug                                                                                                                                                                         |
| 2. Strength of Actuating Lever Pivot and Stop   | 10 lbs. & 8 lbs. throughout range                                                                                                                                                          |
| 3. Strength of Mounting Means                   | 15 lbs. in. torque on bushing                                                                                                                                                              |
| 4. Dielectric (Sea Level) Indication            | 1000 VAC Group B, 750 VAC after electrical endurance. 500 $\mu$ A max. leakage                                                                                                             |
| 5. Contact Voltage Drop                         | 2.5 millivolt initial, 5.0 millivolt after mechanical endurance @ 2-6 VDC 0.1 amp                                                                                                          |
| 6. Temperature Rise                             | 50° C rise max. @ rated resistive load after endurance test                                                                                                                                |
| 7. Short Circuit                                | 10 operations carry 100 amps resistive load @ lowest DC volts                                                                                                                              |
| 8. Mechanical Life                              | 20K operations at specified high and low temperatures                                                                                                                                      |
| 9. Electrical Endurance                         | 10K operations at specified high and low temperatures                                                                                                                                      |
| 10. Overload                                    | 50 operations @ 150% of rated resistive load                                                                                                                                               |
| 11. Electrical Endurance at Sea Level           | 10K operations resistive load @ room temperature<br>10K operations inductive load @ room temperature<br>10K operations lamp load @ room temperature<br>Performed on different test samples |
| 12. Vibration                                   | Method 204 of MIL-STD-202, test condition A<br>.06 D. A. or 10 G's 10-500 Hz, 10 usec. max. chatter                                                                                        |
| 13. Shock                                       | Fuse-method 213 or MIL-STD-202, 10 usec. max. chatter                                                                                                                                      |
| 14. Salt Spray<br>Test Upon Completion          | 48 hours – method 101 of MIL-STD-202, test condition B<br>10 operations resistive load (toggle sealed switches only)                                                                       |
| 15. Moisture Resistance<br>Test Upon Completion | Method 106 of MIL-STD-202<br>100 VDC potential between current carrying parts and panel                                                                                                    |
| 16. Sand & Dust                                 | Method 110 of MIL-STD-202, test condition B<br>6 hours @ 23°C 2.5K operations mechanical life (toggle sealed switches only)                                                                |
| 17. Explosion                                   | MIL-STD-202 method 109, maximum rated DC inductive load (toggle sealed switches only)                                                                                                      |
| 18. Sealing                                     | Toggle seal – 5 operations under 0.5 inches of H <sub>2</sub> O above top of bushing                                                                                                       |
| 19. A.) Toggle Seal<br>B.) Bushing Seal         | (Toggle sealed switches only)<br>(Panel sealed switches only)                                                                                                                              |
| 20. Temperature Operation                       | Mechanical life, –25°C to +71°C                                                                                                                                                            |
| 21. Life Low Cur. Level                         | No requirement                                                                                                                                                                             |
| 22. Fungus                                      | No requirement                                                                                                                                                                             |
| 23. Intermediate Current                        | 20K operations, 35/40 milliamps @ 5 VDC resistive load @ +71°C                                                                                                                             |
| 24. Thermal Shock                               | Method 107 of MIL-STD-202 test condition A; 5 cycles @ –55°C/+85°C                                                                                                                         |

## RATINGS

### CURRENT RATINGS – HIGH LEVEL

| Current Capacity in Amperes – Per Pole |                 |                |
|----------------------------------------|-----------------|----------------|
| 28V dc                                 | 115V ac, 400 Hz | 125V ac, 60 Hz |
| Lamp Load                              |                 |                |
| 1                                      | 1               | 1              |
| Resistive Load                         |                 |                |
| 5                                      | 5               | 5              |
| Inductive Load                         |                 |                |
| 2                                      | 2               | 2              |

### CURRENT RATINGS – LOGIC LEVEL

|                                                 |
|-------------------------------------------------|
| 0.5 Volt – Amp (VA) Max. @ 28 V Max. (AC or DC) |
|-------------------------------------------------|

## MATERIALS

CASE: Diallyl phthalate (DAP) (UL 94 V-0).

BUSHING: Brass, nickel plated.

HOUSING: Stainless steel.

ACTUATOR: Brass, chrome plated.

SWITCH SUPPORT: Brass, tin plated.

TERMINALS: Gold over nickel over copper alloy.

TERMINAL SEAL: Epoxy.

CONTACTS: Gold over nickel over silver over brass.

PANEL SEAL: Silicone rubber.

MOUNTING HARDWARE: Two hexagon nut, brass with nickel plating; one lockwasher, steel with nickel plating; one locking ring, brass with nickel plating.

**HOW TO ORDER:** Complete part numbers for MIL-S-83731 TOGGLE SWITCHES are shown on pages F–18 through F–21.

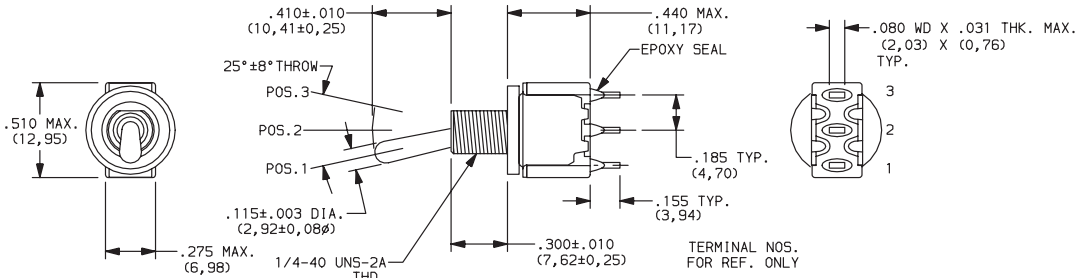


# Military/Aerospace/HI-REL

## MIL-S-83731 Toggle Switches

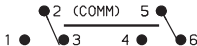


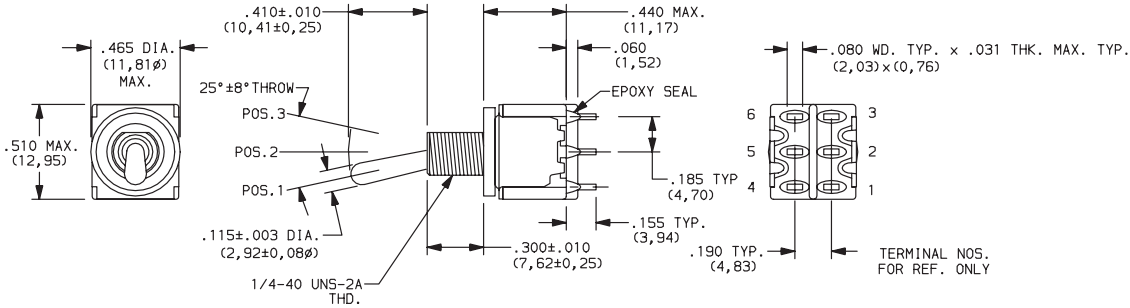
| NO. POLES | MODEL NO.    | SWITCH FUNCTION                                                                   |                                                                                   |                                                                                   | CONNECTED TERMINALS                                                               |                                                                                     |                                                                                     | SCHEMATIC                                                                                   |
|-----------|--------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------|
|           |              | POS. 1                                                                            | POS. 2                                                                            | POS. 3                                                                            | POS. 1                                                                            | POS. 2                                                                              | POS. 3                                                                              |                                                                                             |
|           |              |  |  |  |  |  |  |                                                                                             |
| SP        | M83731/9-211 | ON                                                                                | OFF                                                                               | ON                                                                                | 2-3                                                                               | OPEN                                                                                | 2-1                                                                                 | <br>SPDT |
|           | M83731/9-231 | ON                                                                                | NONE                                                                              | ON                                                                                |                                                                                   | N/A                                                                                 |                                                                                     |                                                                                             |
|           | M83731/9-261 | ON                                                                                | NONE                                                                              | MOM.                                                                              |                                                                                   | OPEN                                                                                |                                                                                     |                                                                                             |
|           | M83731/9-271 | MOM.                                                                              | OFF                                                                               | MOM.                                                                              |                                                                                   |                                                                                     |                                                                                     |                                                                                             |
|           | M83731/9-311 | ON                                                                                | OFF                                                                               | MOM.                                                                              |                                                                                   |                                                                                     |                                                                                     |                                                                                             |
|           | M83731/9-341 | NONE                                                                              | ON                                                                                | MOM.                                                                              |                                                                                   |                                                                                     |                                                                                     |                                                                                             |



SPDT

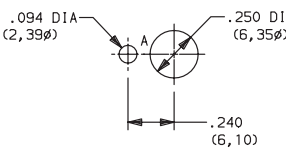
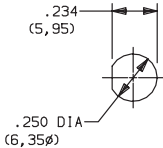


| NO. POLES | MODEL NO.     | SWITCH FUNCTION                                                                     |                                                                                     |                                                                                     | CONNECTED TERMINALS                                                                 |                                                                                       |                                                                                       | SCHEMATIC                                                                             |
|-----------|---------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
|           |               | POS. 1                                                                              | POS. 2                                                                              | POS. 3                                                                              | POS. 1                                                                              | POS. 2                                                                                | POS. 3                                                                                |                                                                                       |
|           |               |  |  |  |  |  |  |                                                                                       |
| DP        | M83731/10-211 | ON                                                                                  | OFF                                                                                 | ON                                                                                  | 2-3,5-6                                                                             | OPEN                                                                                  | 2-1,5-4                                                                               |  |
|           | M83731/10-231 | ON                                                                                  | NONE                                                                                | ON                                                                                  |                                                                                     | N/A                                                                                   |                                                                                       |                                                                                       |
|           | M83731/10-261 | ON                                                                                  | NONE                                                                                | MOM.                                                                                |                                                                                     | OPEN                                                                                  |                                                                                       |                                                                                       |
|           | M83731/10-271 | MOM.                                                                                | OFF                                                                                 | MOM.                                                                                |                                                                                     |                                                                                       |                                                                                       |                                                                                       |
|           | M83731/10-311 | ON                                                                                  | OFF                                                                                 | MOM.                                                                                | 2-3,5-6                                                                             | 2-3,5-4                                                                               | 2-1,5-4                                                                               |                                                                                       |
|           | M83731/10-321 | ON                                                                                  | ON                                                                                  | ON                                                                                  |                                                                                     |                                                                                       |                                                                                       |                                                                                       |
|           | M83731/10-331 | ON                                                                                  | ON                                                                                  | MOM.                                                                                | N/A                                                                                 | 2-3,5-6                                                                               | 2-1,5-4                                                                               |                                                                                       |
|           | M83731/10-351 | MOM.                                                                                | ON                                                                                  | MOM.                                                                                | 2-3,5-6                                                                             | 2-3,5-4                                                                               | 2-1,5-4                                                                               |                                                                                       |



DPDT

### PANEL MOUNTING

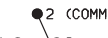


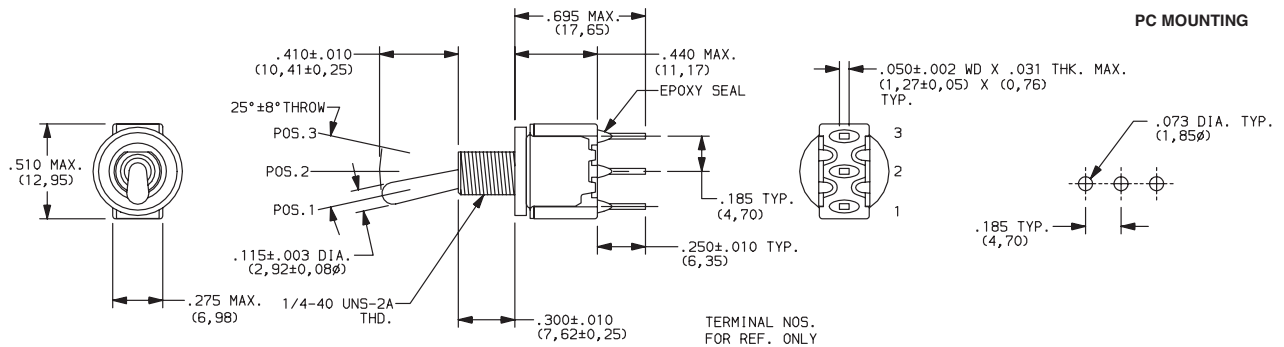
Without locking ring.

With standard locking ring.



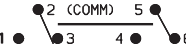


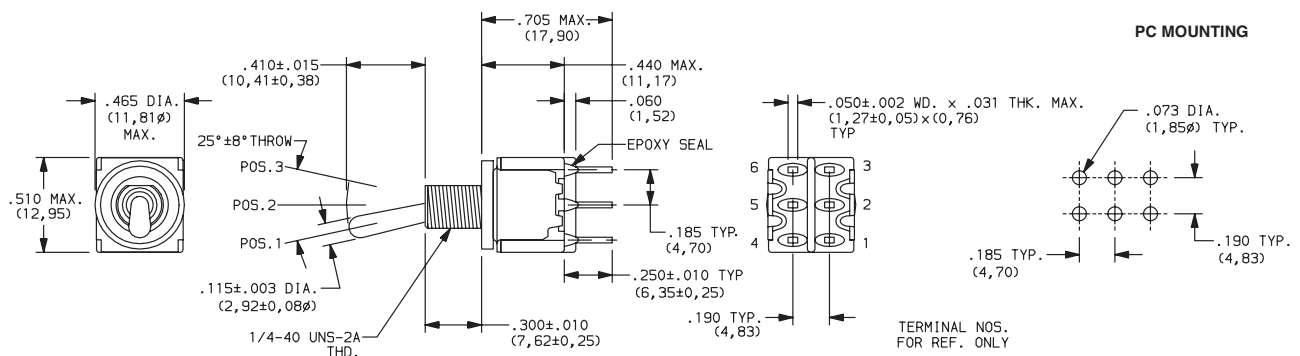
| NO. POLES | MODEL NO.    | SWITCH FUNCTION                                                                   |                                                                                   |                                                                                   | CONNECTED TERMINALS                                                                |                                                                                     |                                                                                     | SCHEMATIC                                                                                   |
|-----------|--------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------|
|           |              | POS. 1                                                                            | POS. 2                                                                            | POS. 3                                                                            | POS. 1                                                                             | POS. 2                                                                              | POS. 3                                                                              |                                                                                             |
|           |              |  |  |  |  |  |  |                                                                                             |
| SP        | M83731/9-212 | ON                                                                                | OFF                                                                               | ON                                                                                | 2-3                                                                                | OPEN                                                                                | 2-1                                                                                 | <br>SPDT |
|           | M83731/9-232 | ON                                                                                | NONE                                                                              | ON                                                                                |                                                                                    | N/A                                                                                 |                                                                                     |                                                                                             |
|           | M83731/9-262 | ON                                                                                | NONE                                                                              | MOM.                                                                              |                                                                                    | OPEN                                                                                |                                                                                     |                                                                                             |
|           | M83731/9-272 | MOM.                                                                              | OFF                                                                               | MOM.                                                                              |                                                                                    |                                                                                     |                                                                                     |                                                                                             |
|           | M83731/9-312 | ON                                                                                | OFF                                                                               | MOM.                                                                              |                                                                                    |                                                                                     |                                                                                     |                                                                                             |
|           | M83731/9-342 | NONE                                                                              | ON                                                                                | MOM.                                                                              | N/A                                                                                | 2-3                                                                                 | 2-1                                                                                 |                                                                                             |



**SPDT**

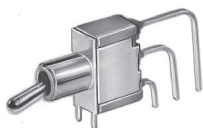


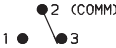
| NO. POLES | MODEL NO.     | SWITCH FUNCTION                                                                     |                                                                                     |                                                                                     | CONNECTED TERMINALS                                                                  |                                                                                       |                                                                                       | SCHEMATIC                                                                             |
|-----------|---------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
|           |               | POS. 1                                                                              | POS. 2                                                                              | POS. 3                                                                              | POS. 1                                                                               | POS. 2                                                                                | POS. 3                                                                                |                                                                                       |
|           |               |  |  |  |  |  |  |                                                                                       |
| DP        | M83731/10-212 | ON                                                                                  | OFF                                                                                 | ON                                                                                  | 2-3,5-6                                                                              | OPEN                                                                                  | 2-1,5-4                                                                               |  |
|           | M83731/10-232 | ON                                                                                  | NONE                                                                                | ON                                                                                  |                                                                                      | N/A                                                                                   |                                                                                       |                                                                                       |
|           | M83731/10-262 | ON                                                                                  | NONE                                                                                | MOM.                                                                                |                                                                                      | OPEN                                                                                  |                                                                                       |                                                                                       |
|           | M83731/10-272 | MOM.                                                                                | OFF                                                                                 | MOM.                                                                                | 2-3,5-6                                                                              | 2-3,5-4                                                                               | 2-1,5-4                                                                               |                                                                                       |
|           | M83731/10-312 | ON                                                                                  | OFF                                                                                 | MOM.                                                                                |                                                                                      |                                                                                       |                                                                                       |                                                                                       |
|           | M83731/10-322 | ON                                                                                  | ON                                                                                  | ON                                                                                  |                                                                                      |                                                                                       |                                                                                       |                                                                                       |
|           | M83731/10-332 | ON                                                                                  | ON                                                                                  | MOM.                                                                                | N/A                                                                                  | 2-3,5-6                                                                               | 2-1,5-4                                                                               |                                                                                       |
|           | M83731/10-342 | NONE                                                                                | ON                                                                                  | MOM.                                                                                | 2-3,5-6                                                                              | 2-3,5-4                                                                               | 2-1,5-4                                                                               |                                                                                       |
|           | M83731/10-352 | MOM.                                                                                | ON                                                                                  | MOM.                                                                                | 2-3,5-6                                                                              | 2-3,5-4                                                                               | 2-1,5-4                                                                               |                                                                                       |

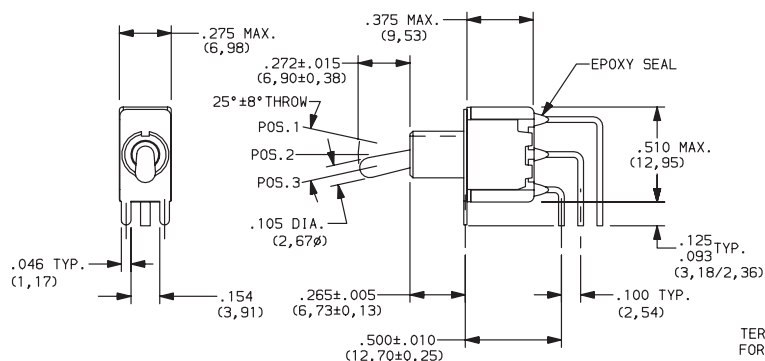


**DPDT**

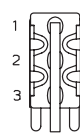
# Military/Aerospace/HI-REL MIL-S-83731 Toggle Switches



| NO. POLES | MODEL NO.     | SWITCH FUNCTION                                                                   |                                                                                   |                                                                                   | CONNECTED TERMINALS                                                                |                                                                                     |                                                                                     | SCHEMATIC                                                                                                       |
|-----------|---------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|
|           |               | POS. 1                                                                            | POS. 2                                                                            | POS. 3                                                                            | POS. 1                                                                             | POS. 2                                                                              | POS. 3                                                                              |                                                                                                                 |
|           |               |  |  |  |  |  |  |                                                                                                                 |
| SP        | M83731/13-211 | ON                                                                                | OFF                                                                               | ON                                                                                | 2-3                                                                                | OPEN                                                                                | 2-1                                                                                 | <br>1 ● 2 (COMM) ● 3<br>SPDT |
|           | M83731/13-231 | ON                                                                                | NONE                                                                              | ON                                                                                |                                                                                    | N/A                                                                                 |                                                                                     |                                                                                                                 |
|           | M83731/13-261 | ON                                                                                | NONE                                                                              | MOM.                                                                              |                                                                                    |                                                                                     |                                                                                     |                                                                                                                 |
|           | M83731/13-271 | MOM.                                                                              | OFF                                                                               | MOM.                                                                              |                                                                                    |                                                                                     |                                                                                     |                                                                                                                 |
|           | M83731/13-311 | ON                                                                                | OFF                                                                               | MOM.                                                                              |                                                                                    | OPEN                                                                                |                                                                                     |                                                                                                                 |
|           | M83731/13-341 | NONE                                                                              | ON                                                                                | MOM.                                                                              | N/A                                                                                | 2-3                                                                                 | 2-1                                                                                 |                                                                                                                 |

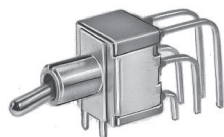
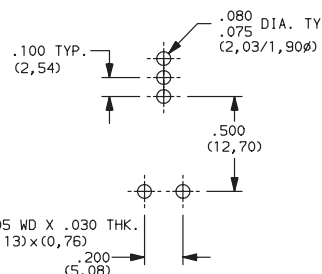


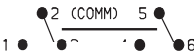
**SPDT**

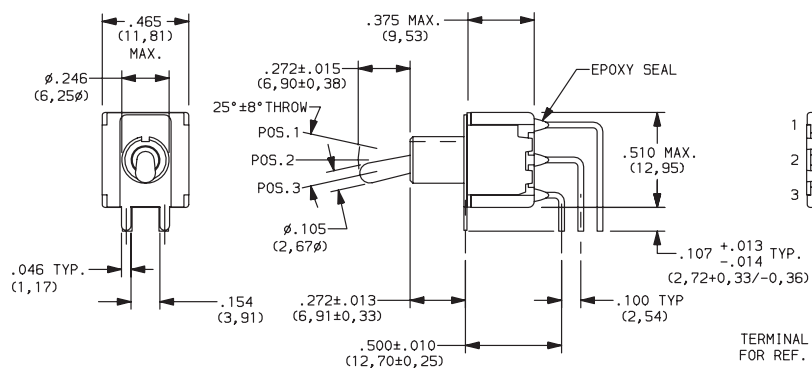


TERMINAL NOS.  
FOR REF. ONLY

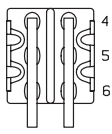
## PC MOUNTING



| NO. POLES | MODEL NO.     | SWITCH FUNCTION                                                                     |                                                                                     |                                                                                     | CONNECTED TERMINALS                                                                  |                                                                                       |                                                                                       | SCHEMATIC                                                                             |
|-----------|---------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
|           |               | POS. 1                                                                              | POS. 2                                                                              | POS. 3                                                                              | POS. 1                                                                               | POS. 2                                                                                | POS. 3                                                                                |                                                                                       |
|           |               |  |  |  |  |  |  |                                                                                       |
| DP        | M83731/14-211 | ON                                                                                  | OFF                                                                                 | ON                                                                                  | 2-3,5-6                                                                              | OPEN                                                                                  | 2-1,5-4                                                                               |  |
|           | M83731/14-231 | ON                                                                                  | NONE                                                                                | ON                                                                                  |                                                                                      | N/A                                                                                   |                                                                                       |                                                                                       |
|           | M83731/14-261 | ON                                                                                  | NONE                                                                                | MOM.                                                                                |                                                                                      | OPEN                                                                                  |                                                                                       |                                                                                       |
|           | M83731/14-271 | MOM.                                                                                | OFF                                                                                 | MOM.                                                                                | 2-3,5-6                                                                              | 2-3,5-4                                                                               | 2-1,5-4                                                                               |                                                                                       |
|           | M83731/14-311 | ON                                                                                  | OFF                                                                                 | MOM.                                                                                |                                                                                      |                                                                                       |                                                                                       |                                                                                       |
|           | M83731/14-321 | ON                                                                                  | ON                                                                                  | ON                                                                                  |                                                                                      |                                                                                       |                                                                                       |                                                                                       |
|           | M83731/14-331 | ON                                                                                  | ON                                                                                  | MOM.                                                                                | N/A                                                                                  | 2-3,5-6                                                                               | 2-1,5-4                                                                               |                                                                                       |
|           | M83731/14-341 | NONE                                                                                | ON                                                                                  | MOM.                                                                                | 2-3,5-6                                                                              | 2-3,5-4                                                                               | 2-1,5-4                                                                               |                                                                                       |
|           | M83731/14-351 | MOM.                                                                                | ON                                                                                  | MOM.                                                                                | 2-3,5-6                                                                              | 2-3,5-4                                                                               | 2-1,5-4                                                                               |                                                                                       |

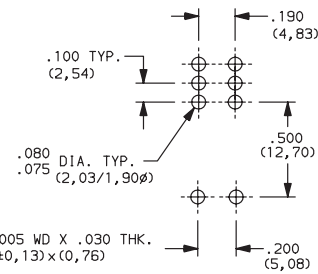


**DPDT**



TERMINAL NOS.  
FOR REF. ONLY

## PC MOUNTING

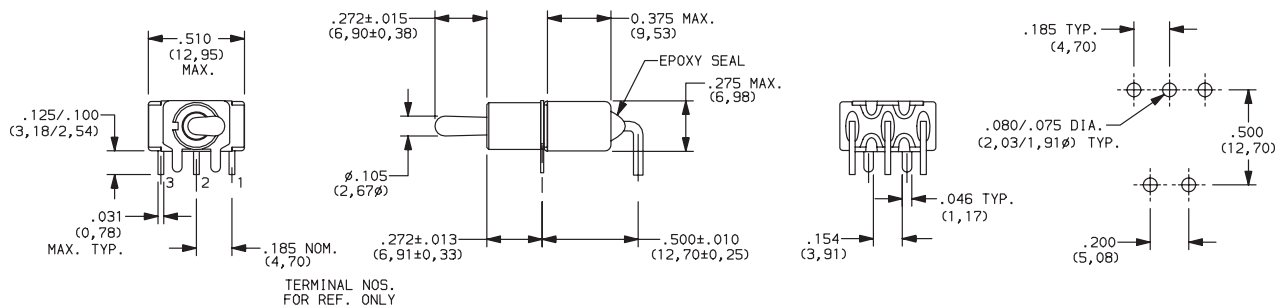


# Military/Aerospace/HI-REL MIL-S-83731 Toggle Switches

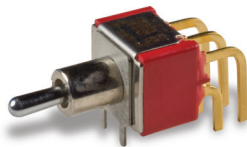


| NO. POLES | MODEL NO.     | SWITCH FUNCTION |        |        | CONNECTED TERMINALS |        |        | SCHEMATIC |
|-----------|---------------|-----------------|--------|--------|---------------------|--------|--------|-----------|
|           |               | POS. 1          | POS. 2 | POS. 3 | POS. 1              | POS. 2 | POS. 3 |           |
|           |               |                 |        |        |                     |        |        |           |
| SP        | M83731/15-211 | ON              | OFF    | ON     | 2-3                 | OPEN   | 2-1    | <br>SPDT  |
|           | M83731/15-231 | ON              | NONE   | ON     |                     | N/A    |        |           |
|           | M83731/15-261 | ON              | NONE   | MOM.   |                     | N/A    |        |           |
|           | M83731/15-271 | MOM.            | OFF    | MOM.   |                     | OPEN   |        |           |
|           | M83731/15-311 | ON              | OFF    | MOM.   |                     | OPEN   |        |           |
|           | M83731/15-341 | NONE            | ON     | MOM.   | N/A                 | 2-3    | 2-1    |           |

## PC MOUNTING

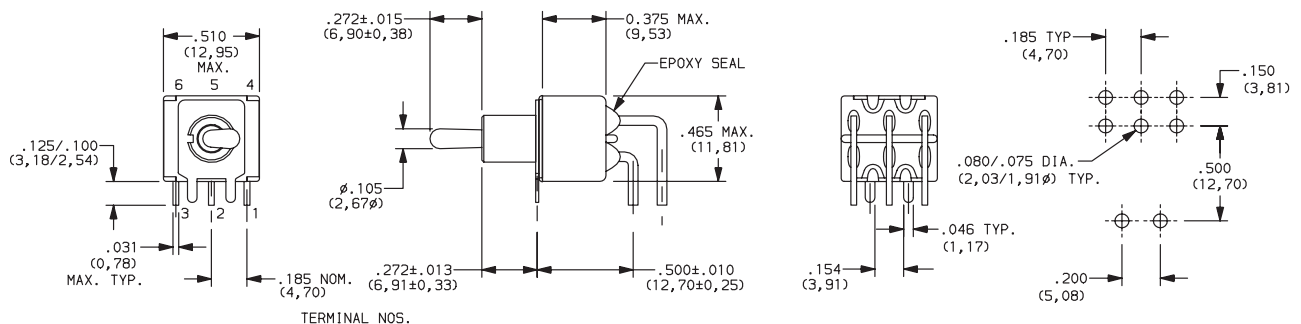


## SPDT



| NO. POLES | MODEL NO.     | SWITCH FUNCTION                                                                     |                                                                                     |                                                                                      | CONNECTED TERMINALS                                                                   |                                                                                       |                                                                                       | SCHEMATIC                                                                             |
|-----------|---------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
|           |               | POS. 1                                                                              | POS. 2                                                                              | POS. 3                                                                               | POS. 1                                                                                | POS. 2                                                                                | POS. 3                                                                                |                                                                                       |
|           |               |  |  |  |  |  |  |                                                                                       |
| DP        | M83731/16-211 | ON                                                                                  | OFF                                                                                 | ON                                                                                   | 2-3,5-6                                                                               | OPEN                                                                                  | 2-1,5-4                                                                               |  |
|           | M83731/16-231 | ON                                                                                  | NONE                                                                                | ON                                                                                   |                                                                                       | N/A                                                                                   |                                                                                       |                                                                                       |
|           | M83731/16-261 | ON                                                                                  | NONE                                                                                | MOM.                                                                                 |                                                                                       |                                                                                       |                                                                                       |                                                                                       |
|           | M83731/16-271 | MOM.                                                                                | OFF                                                                                 | MOM.                                                                                 | 2-3,5-6                                                                               | OPEN                                                                                  |                                                                                       |                                                                                       |
|           | M83731/16-311 | ON                                                                                  | OFF                                                                                 | MOM.                                                                                 |                                                                                       |                                                                                       |                                                                                       |                                                                                       |
|           | M83731/16-321 | ON                                                                                  | ON                                                                                  | ON                                                                                   | 2-3,5-6                                                                               | 2-3,5-4                                                                               | 2-1,5-4                                                                               |                                                                                       |
|           | M83731/16-331 | ON                                                                                  | ON                                                                                  | MOM.                                                                                 |                                                                                       |                                                                                       |                                                                                       |                                                                                       |
|           | M83731/16-341 | NONE                                                                                | ON                                                                                  | MOM.                                                                                 | N/A                                                                                   | 2-3,5-6                                                                               | 2-1,5-4                                                                               |                                                                                       |
|           | M83731/16-351 | MOM.                                                                                | ON                                                                                  | MOM.                                                                                 | 2-3,5-6                                                                               | 2-3,5-4                                                                               | 2-1,5-4                                                                               |                                                                                       |

## PC MOUNTING



## DPDT