# Switch, DIP, Premium 7000 Series

## 1. SCOPE

### 1.1. Content

This specification covers performance, tests and quality requirements for TE Connectivity (TE) 7000 series premium DIP switches.

### 1.2. Operation

Switches are manually rocker actuated and designed for wave soldering on printed circuit boards or insertion into DIP receptacles. Wave soldering shall conform to Application Specification 114-1056. Switches are designed for use in logic level switching applications.

### 1.3. Position

Switches are available in 1 through 12 positions with standard, low profile and side actuated, single pole single throw. Optionally, standard profile switch poles may be ganged for multi-pole single throw operation.

### 1.4. Termination

Standard switch termination consists of contacts on a .300 inch x .100 inch pattern for application directly on printed circuit boards or into DIP receptacles. Recommended hole size for printed circuit board use is .035 inch diameter.

### 1.5. Qualification

When tests are performed on subject product line, procedures specified in 109 Series Test Specifications shall be used. All inspections shall be performed using applicable inspection plan and product drawing.

## 2. APPLICABLE DOCUMENTS

The following documents form a part of this specification to the extent specified herein. Unless otherwise specified, latest edition of the document applies. In the event of conflict between requirements of this specification and product drawing, product drawing shall take precedence. In the event of conflict between requirements of this specification and referenced documents, this specification shall take precedence.

### 2.1. TE Documents

- 109-1: General Requirements for Test Specifications
- 109 Series: Test Specifications as indicated in Figure 1
- 114-1056: Application Specification
- 408-7779: Instruction Sheet
- 501-135: Qualification Test Report

## 3. REQUIREMENTS

### 3.1. Design and Construction

Product shall be of design, construction and physical dimensions specified on applicable product drawing.

3.2. Materials

- Case and base: Polyester, glass filled
- Rocker: Polyester
- Spring contacts and leads: Copper alloy, gold over nickel plating

3.3. Ratings

- Current:
  - Non-switching: 1.5 amperes maximum at 50 volts dc (resistive load)
  - Switching: 100 milliamperes maximum at 5.0 volts dc (resistive load); 25 milliamperes maximum 24.0 volts dc (resistive load)
- Temperature operating: -55 to 105°C

3.4. Performance and Test Description

Product is designed to meet electrical, mechanical and environmental performance requirements specified in Figure 1. Unless otherwise specified, all tests shall be performed at ambient temperature.

3.5. Test Requirements and Procedures Summary

| Test Description | Requirement | Procedure |
|---|---|---|
| Examination of product. | Meets requirements of product drawing and Application Specification 114-1056. | Visual, dimensional and functional per applicable quality inspection plan. |
| ELECTRICAL | | |
| Contact resistance, dry circuit. | 50 milliohms maximum initial. 100 milliohms final. | TE Spec 109-6-3. Subject switches to 50 mv maximum open circuit at 50 ma maximum. A minimum of 10 readings shall be measured. See Figure 3. |
| Insulation resistance. | 1 X $10^3$ megohms minimum. | TE Spec 109-28-3. Test between a minimum of 10 sets of open switches and a minimum of 10 sets of adjacent closed switch contacts. |
| Dielectric withstanding voltage. | 500 vdc dielectric withstanding voltage. 1 minute hold. 1 milliampere maximum leakage current. No flashover or corona. | TE Spec 109-29-1. Test between a minimum of 10 sets of open switches and a minimum of 10 sets of adjacent closed switch contacts. |
| Electrical stability. | Temperature rise shall not exceed 30°C from ambient. | TE Spec 109-45-1. Subject switch to 50 vdc at 1.5 amperes maximum current until temperature stabilizes. Measure temperature where shown in Figure 3. |
| Capacitance. | 5 picofarads maximum. | TE Spec 109-47, Condition D. Test between a minimum of 10 adjacent closed switch circuits. Apply a frequency of 100 kHz. |

Figure 1 (continued)

| Test Description | Requirement | Procedure |
|---|---|---|
| | MECHANICAL | |
| Solderability. | Contact post shall have a minimum of 95% solder coverage. | TE Spec 109-11-3.<br>Subject switch to solderability. |
| Vibration. | No discontinuities of 10 microseconds or longer duration.<br>No physical damage. | TE Spec 109-21-4.<br>Subject switches to 20 G's, 10-2000 Hz with 100 ma current applied. |
| Physical shock. | No discontinuities of 10 microseconds or longer duration.<br>No Physical damage. | TE Spec 109-26-1.<br>Subject mounted switch to 50 G's half-sine shock pulses of 11 milliseconds duration. 3 shocks in each direction applied along 3 mutually perpendicular planes, 18 total shocks. |
| Resistance to soldering heat. | No physical damage. | TE Spec 109-63-3.<br>Subject switch in OFF position to soldering heat. |
| Terminal strength, pull test. | No physical damage. | TE Spec 109-64, Condition A.<br>Subject 10 random switch terminals to an axial pull of 2 pounds. |
| Terminal strength, bend test. | No physical damage. | TE Spec 109-64, Condition B.<br>Subject 10 random switch terminals to two 45° bend cycles. |
| Durability. | No physical damage. | Subject mounted switch to 7000 cycles of actuation with a resistive load of 24 vdc and 25 ma maximum current applied. |
| Actuation force. | 24 ounces maximum per switch actuator initially and after durability. Switch shall be able to withstand a total actuation force of 3 pounds without resulting in improper operation or switch damage. | Apply force to switch actuators with the switch mounted as shown in Figure 4. |
| | ENVIRONMENTAL | |
| Thermal shock. | No physical damage. | TE Spec 109-22.<br>Subject switches in the ½ ON and ½ OFF condition to 5 non- operating cycles between -55° and 105°C. |
| Humidity-temperature cycling. | No physical damage. | TE Spec 109-23-3, Condition B.<br>Subject switches to humidity between 90 and 100% RH while temperature cycles between 25 and 65°C twice in 24 hours. 10 cycles are to be completed. Measure insulation resistance during recovery period. |
| Temperature life. | No physical damage. | TE Spec 109-43, Test Level 3, Duration A.<br>Subject switches in ON condition to temperature life. |

Figure 1 (continued)

| Test Description | Requirement | Procedure |
|---|---|---|
| Mixed flowing gas. | No physical damage. | TE Spec 109-85-2.<br>Subject switches in ON condition to environmental class II for 20 days. |

Figure 1 (end)

3.6. Conditioning for High-Temp UV-Sealed Switches

Prior to testing, high-temp UV-sealed switches shall be conditioned as follows:

A. Use high-temp UV-sealed parts
B. Heat parts in oven (air) for 5 minutes at 102 ± 3°C
C. Soak parts in Freon TMS for 5 minutes at 40 ± 1°C
D. Rinse in D.I. water for 1 minute
E. Dry in oven (air) at 60 ± 3°C for 10 minutes
F. Remove seal
G Actuate ten ON/OFF cycles

3.7. Conditioning for Tape Sealed and Hot-Melt Sealed Switches

Prior to testing, tape sealed and hot-melt sealed switches shall be conditioned as follows:

A. Use tape sealed or hot-melt sealed parts
B. Heat parts in oven (air) for 1 minute at 98 ± 2°C
C. Soak parts in D.I. water for 5 minutes at 40 ± 1°C
D. Dry in oven (air) at 60 ± 3°C for 10 minutes
E. Remove seal
F Actuate ten ON/OFF cycles

3.8. Product Qualification and Requalification Test Sequence

| Test or Examination | Test Group (a) | | | | | | |
|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| | Test Sequence (b) | | | | | | |
| Examination of product | 1,7 | 1,8 | 1,6 | 1,6 | 1,3 | 1,6 | 1 |
| Contact resistance, dry circuit | 3,5 | | | 2,5 | | 2,5 | |
| Insulation resistance | | 2,6 | | | | | |
| Dielectric withstanding voltage | | 3,7 | | | | | |
| Electrical stability (d) | | | | | | | 2 |
| Capacitance | | | 2 | | | | |
| Solderability | | | | | 2 | | |
| Vibration (f) | | | | | | 3 | |
| Physical shock (f) | | | | | | 4 | |
| Resistance to soldering heat (c) | | | 5 | | | | |
| Terminal strength, pull test (e) | | | 3 | | | | |
| Terminal strength, bend test (e) | | | 4 | | | | |
| Durability | 4 | | | | | | |
| Actuation force | 2,6 | | | | | | |
| Thermal shock | | 4 | | | | | |
| Humidity-temperature cycling | | 5 | | | | | |
| Temperature life | | | | 4 | | | |
| Mixed flowing gas | | | | 3 | | | |

**NOTE**

*(a) See paragraph 4.1.A.*
*(b) Numbers indicate sequence in which tests are performed.*
*(c) Reserve 1 switch for electrical stability test.*
*(d) Test only 1 switch.*
*(e) Ten random lead samples shall be used for each test, the remainder shall be used in subsequent sequential tests.*
*(f) Subject all switches to test in ON position and repeat test with all switches in the OFF position.*

Figure 2

## 4. QUALITY ASSURANCE PROVISIONS

4.1. Qualification Testing

A. Sample Selection

Connector housings and contacts shall be prepared in accordance with applicable Instruction Sheets. They shall be selected at random from current production. Test groups 1 thru 6 shall consist of 18 switches. Three switches per each test sequence. Each test sequence shall have 1 of each profile style and be used for qualification testing. Test groups 1 and 2 shall also be used for retention of qualification.

B. Test Sequence

Qualification inspection shall be verified by testing samples as specified in Figure 2.

4.2. Retention of Qualification

If, in a five-year period, no changes to the product or process occur, the product shall be subjected to groups 1 and 2 of the testing described in the test sequence, see Figure 2. Justification for exceeding this time limit must be documented and approved by the division manager.

4.3. Requalification Testing

If changes significantly affecting form, fit or function are made to product or manufacturing process, product assurance shall coordinate requalification testing, consisting of all or part of original testing sequence as determined by development/product, quality and reliability engineering.

4.4. Acceptance

Acceptance is based on verification that product meets requirements of Figure 1. Failures attributed to equipment, test setup or operator deficiencies shall not disqualify product. When product failure occurs, corrective action shall be taken and samples resubmitted for qualification. Testing to confirm corrective action is required before resubmittal.

4.5. Quality Conformance Inspection

The applicable quality inspection plan will specify sampling acceptable quality level to be used. Dimensional and functional requirements shall be in accordance with applicable product drawing and this specification.

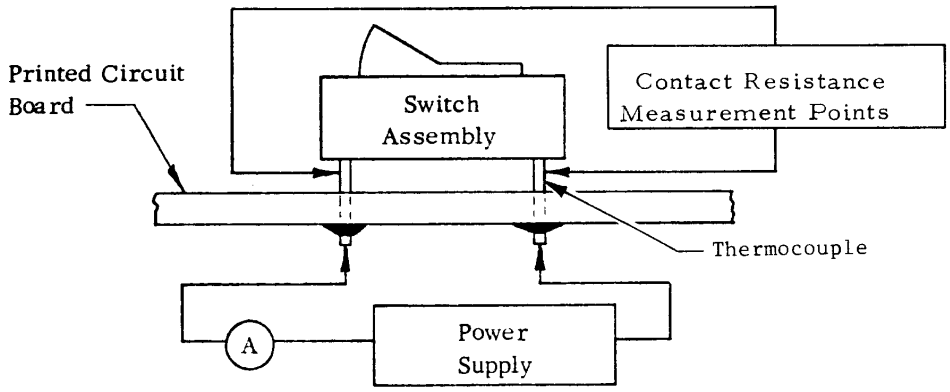


Figure 3
Temperature & Resistance Measurement Points, Typical

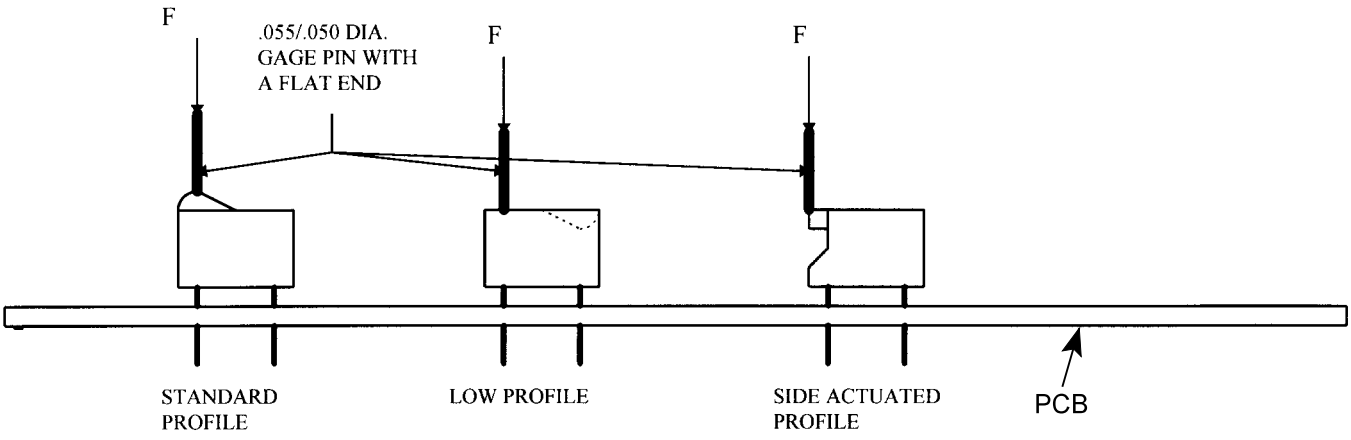


Figure 4
Actuation Force