Surface Mount & Machine Insertable Half Pitch DIP Switches

1. SCOPE

1.1. Content

This specification covers performance, tests and quality requirements for the AMP* surface mountable Dual-Inline Packaging (DIP) switches on 0.050 inch center spacing. These switches are manually operated using a slider that connects individual circuits on a customer provided Printed Circuit Board (PCB). They are designed to be applied directly to the surface of the PCB on a prescribed solder pad layout by conventional methods used in surface mount technology including infrared reflow and vapor phase soldering. The half pitch surface mount DIP switch (0.050 inch spacing) is intended for use in more space-restrictive settings than the standard pitch (0.100 inch spacing) switches. Standard termination for surface mount switches is to solder the switch onto the PCB contact pads on a 0.300 X 0.050 inch pattern. Recommended pad size and exact layout are specified on the AMP Customer Drawing.

1.2. Qualification

When tests are performed on the subject product line, procedures specified in Figure 1 shall be used. All inspections shall be performed using the applicable inspection plan and product drawing.

1.3. Qualification Test Results

Successful qualification testing on the subject product line was completed on 19Mar99. The Qualification Test Report number for this testing is 501-469. This documentation is on file at and available from Engineering Practices and Standards (EPS).

2. APPLICABLE DOCUMENTS

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

A. 109-1: General Requirements for Test Specifications
B. 109 Series: Test Specifications as indicated in Figure 1
C. Corporate Bulletin 401-76: Cross-reference between AMP Test Specifications and Government or Commercial Documents
D. 501-469: Qualification Test Report

3. REQUIREMENTS

3.1. Design and Construction

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

3.2. Materials

Materials used in the construction of this product shall be as specified on the applicable product drawing.

* Trademark
I Indicates change

LOC B

3.3. Ratings

A. Current:
   1. Non-switching: 100 milliamperes at 50 Vdc maximum
   2. Switching: 25 milliamperes at 24 Vdc maximum

B. Temperature:
   1. Operating: -40 to 85°C
   2. Storage: -40 to 85°C

3.4. Performance and Test Description

Product is designed to meet the electrical, mechanical and environmental performance requirements specified in Figure 1. Unless otherwise specified, all tests shall be performed at ambient environmental conditions per AMP Specification 109-1.

3.5. Test Requirements and Procedures Summary

Test Description	Requirement	Procedure
Examination of product.	Meets requirements of product drawing.	Visual, dimensional and functional per applicable QIP.
	ELECTRICAL	
Dry circuit resistance.	100 milliohms maximum.	AMP Spec 109-6-6. Subject samples to 20 mV maximum open circuit at 100 ma maximum. See Figure 3.
Insulation resistance.	100 megohms minimum final.	AMP Spec 109-28-4. Test between a minimum of 5 sets of opposite leads with contacts in the OFF position and a minimum of 5 sets of adjacent contacts in the ON position.
Dielectric withstanding voltage.	300 Vac at sea level. 1 minute hold with no breakdown or flashover. 0.5 milliampere maximum leakage current.	AMP Spec 109-29-1. Test between a minimum of 5 sets of opposite leads with contacts in the OFF position and a minimum of 5 sets of adjacent contacts in the ON position.
Temperature rise vs current.	Less than 10°C temperature rise at rated current.	AMP Spec 109-45-1. Determine temperature rise after thermal stabilization is achieved. See Figure 4.
Capacitance.	10 picofarads maximum.	AMP Spec 109-47. Test between a minimum of 10 adjacent contacts in the ON position using a frequency of 100 kHz.

Figure 1 (cont)

Test Description	Requirement	Procedure
	MECHANICAL	
Vibration, random.	No discontinuities of 1 microsecond or longer duration. See Note.	AMP Spec 109-21-7. Subject mated samples to 3.13 G's rms between 5-500 Hz. 15 minutes in each of 3 mutually perpendicular planes.
Mechanical shock, specified pulse.	No discontinuities of 1 microsecond or longer duration. See Note.	AMP Spec 109-26-1, except 30 G's. Subject mated samples to 30 G's half-sine shock pulses of 11 milliseconds duration. 3 shocks in each direction applied along 3 mutually perpendicular planes, 18 total shocks.
Durability.	No open circuits in the ON position. No short circuits in the OFF position. See Note.	AMP Spec 109-27. Subject samples to 1000 actuation cycles with an applied resistive load of 25 milliamperes maximum at 24 Vdc.
Resistance to soldering heat.	See Note.	AMP Spec 109-63-6. Subject samples in the OFF position to 255 ± 5°C for 30 seconds.
Actuation force.	100 to 700 grams initial. 60 grams minimum final. See Note.	Measure force necessary to move the actuator from the OFF to the ON position and then to the OFF position using gage shown. See Figure 5.
	ENVIRONMENTAL	
Thermal shock.	See Note.	AMP Spec 109-22. Subject samples in the OFF position to 5 non-operating cycles between -40 and 85°C.
Humidity-temperature cycling.	See Note.	AMP Spec 109-23-3, Condition B. Subject samples in the OFF position to 10, 24 hour cycles between 25 and 65°C at 95% RH.
Temperature life.	See Note.	AMP Spec 109-43. Subject samples in the ON position to temperature life at 85°C for 1000 hours.
Mixed flowing gas.	See Note.	AMP Spec 109-85-2. Subject samples in the ON position to environmental class II for 14 days.

NOTE *Shall meet visual requirements, show no physical damage, and meet requirements of additional tests as specified in the Product Qualification and Requalification Test Sequence shown in Figure 2.*

Figure 1 (end)

3.6. Product Qualification and Requalification Test Sequence

Test or Examination	Test Group (a)				
	1	2	3	4	5
	Test Sequence (b)				
Examination of product	1,9	1,7	1,5	1,8	1,3
Dry circuit resistance	3,7	2,4	2,4		
Insulation resistance				2,6	
Dielectric withstanding voltage				3,7	
Temperature rise vs current		6(c)			
Capacitance		5			
Vibration	5				
Mechanical shock	6				
Durability	4				
Resistance to soldering heat					2
Actuation force	2,8				
Thermal shock				4	
Humidity-temperature cycling				5	
Temperature life		3			
Mixed flowing gas			3		

NOTE

(a) See Para 4.1.A.
(b) Numbers indicate sequence in which tests are performed.
(c) Test only 1 sample, 100% energized.

Figure 2

4. QUALITY ASSURANCE PROVISIONS

4.1. Qualification Testing

A. Sample Selection

Samples shall be prepared in accordance with applicable Instruction Sheets and shall be selected at random from current production. All test groups shall each consist of 3 switches of the largest position size. Prior to testing and after soldering to printed circuit boards, sealed samples shall be conditioned as follows: Immerse samples in distilled water at 70 +0 -5°C for 5 minutes. Dry samples in oven at 125 ± 3°C for 5 minutes. Remove seal from samples. Activate each position ON and OFF 5 times.

B. Test Sequence

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

4.2. Requalification Testing

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

4.3. Acceptance

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

4.4. Quality Conformance Inspection

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

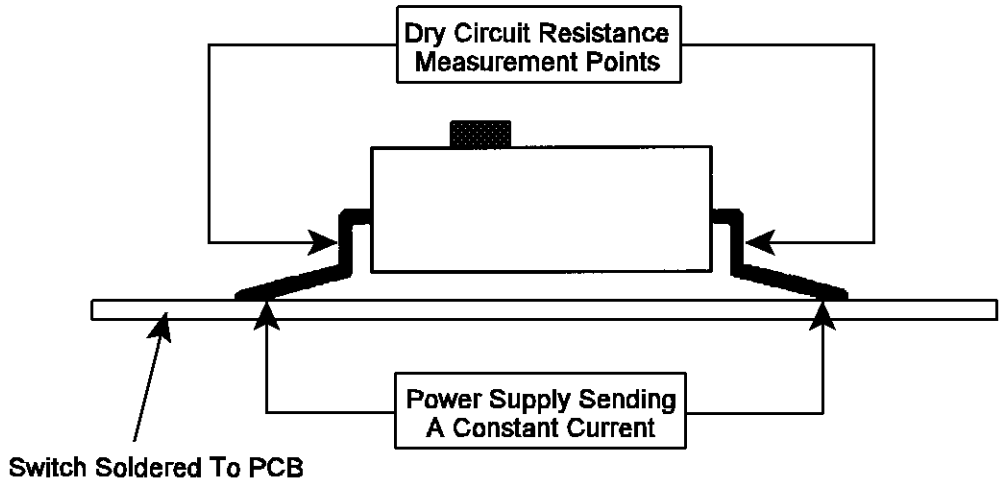


Figure 3
Dry Circuit Resistance Measurement Points

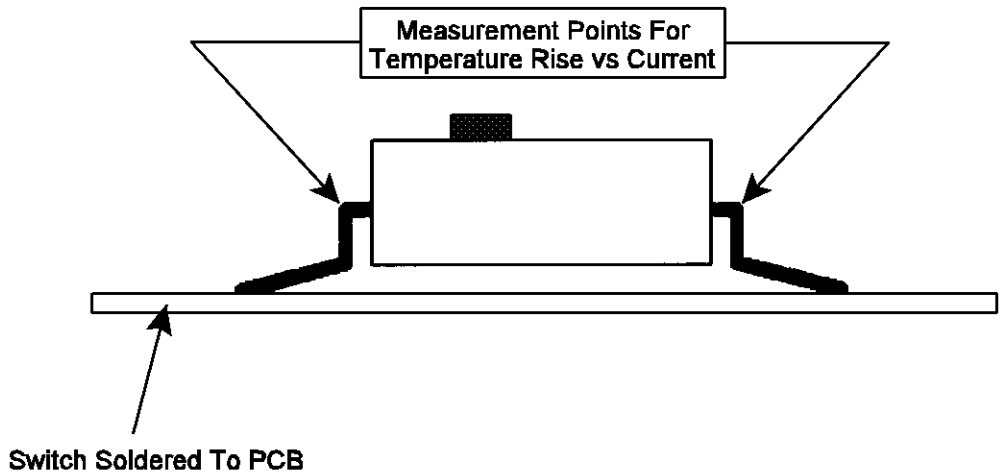
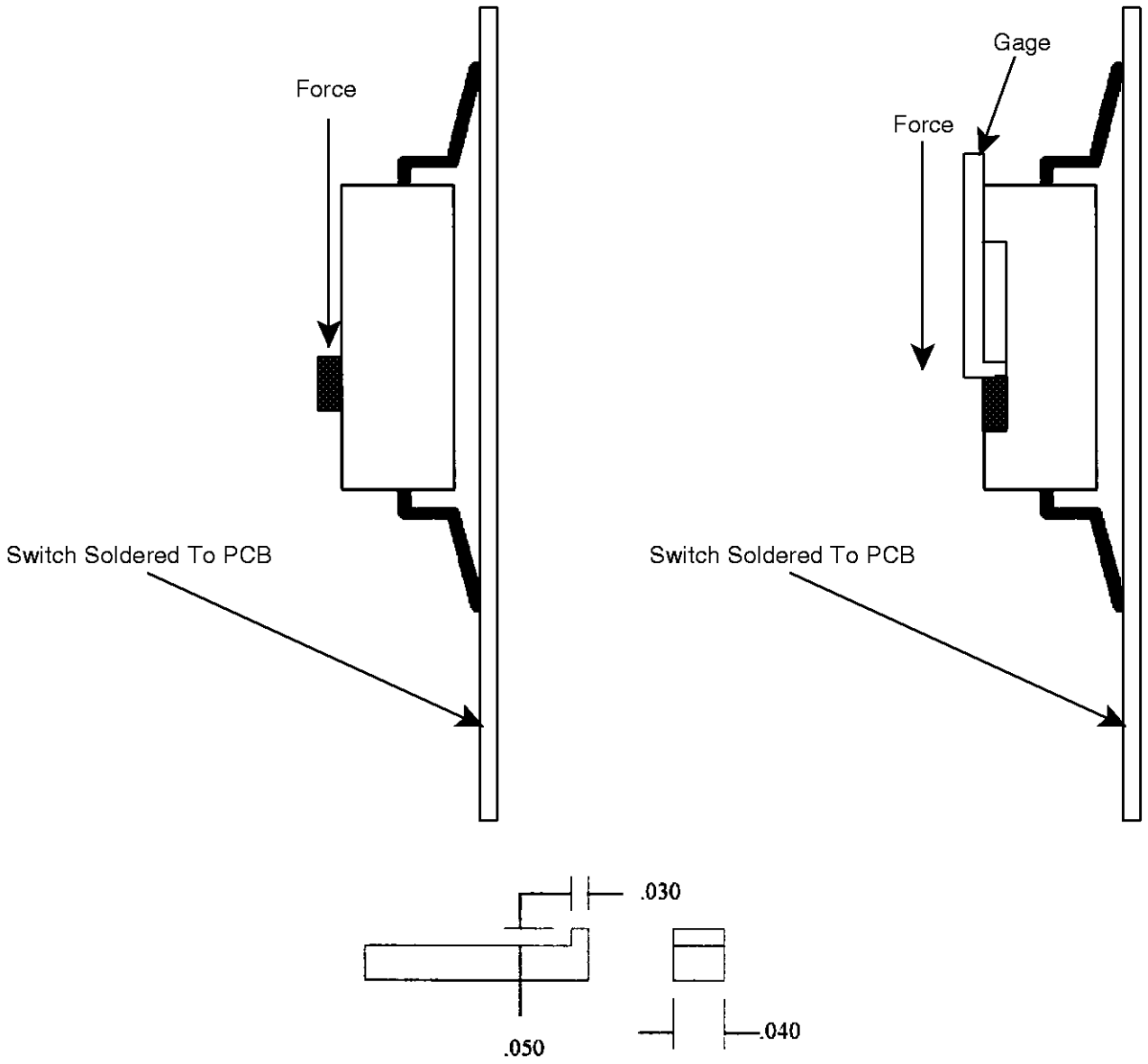


Figure 4
Temperature Rise vs Current Measurement Points



NOTE *All test gage dimensions are in inches. Material shall be tool steel hardened to Rc 52 minimum.*

Figure 5
Actuation Force Test Configurations