DIP Switch Electrical Durability and Thermal Shock Testing

1. INTRODUCTION

1.1. Purpose

Testing was performed on Tyco Electronics Dual-in-line Package (DIP) Switches to determine their ability to meet the dimensional, electrical durability and thermal shock testing requirements after being subjected to submersion in a standard RoHS compliant wave solder bath by Philips Lighting.

1.2. Scope

This report covers the dimensional, electrical and environmental performance of DIP Switches. Electrical durability and thermal shock testing was performed at the Harrisburg Electrical Components Test Laboratory (HECTL) between 11Dec09 and 16Dec09. The test file number for this testing is EA20091072T. This documentation is on file at and available from the HECTL. Dimensional measurements were performed by Ames Industries Inc., 2999 Elizabethtown Road, Hershey, Pa. on 21Dec09.

1.3. Conclusions

The DIP Switches listed in paragraph 1.4., conformed to the dimensional, electrical and environmental performance requirements specified herein.

1.4. Test Specimens

Specimens identified with the following part numbers were used for test:

Test Group	Quantity	Part Number	Description
1	5	1571983-1	GDH02S04, DIP switch, virgin specimens
2	5	1571983-1	GDH02S04, DIP switch, applied to boards by Philips Lighting

Figure 1

1.5. Environmental Conditions

Unless otherwise stated, the following environmental conditions prevailed during testing:

- Temperature: 15 to 35°C
- Relative Humidity: 25 to 75%

2. SUMMARY OF TESTING

2.1. Dimensional

All 1.00 mm, 2.21 mm, 3.66 mm and 6.20 mm dimensions were within drawing requirements.

2.2. LLCR

All LLCR measurements, taken at 100 milliamperes maximum and 20 millivolts maximum open circuit voltage were less than 100 milliohms initially and after testing.

Specimen ID	Initial	After 1000 Cycles of Electrical Durability	After 5 Cycles of Thermal Shock
Test Group 1 - Virgin Specimens			
1-1	22.73	29.94	31.33
1-2	23.90	33.30	28.86
1-3	23.77	27.76	49.96
1-4	26.72	26.60	25.54
1-5	27.40	33.80	25.75
Test Group 2 -Applied by Philips Lighting Using Wave Solder Submersion			
2-1	28.15	45.50	37.54
2-2	24.61	24.44	24.61
2-3	26.42	24.69	26.07
2-4	25.65	37.12	40.30
2-5	26.54	23.80	24.79

Figure 2

2.3. Electrical Durability

Specimens were visually examined and no evidence of physical damage detrimental to product performance was observed.

2.4. Thermal Shock

Specimens were visually examined and no evidence of physical damage detrimental to product performance was observed.

3. TEST METHODS

3.1. Dimensional

Specified dimensions were measured using a SmartScope.

3.2. LLCR

LLCR measurements were made using a 4 terminal measuring technique. The test current was maintained at 100 milliamperes maximum with a 20 millivolt maximum open circuit voltage.

3.3. Electrical Durability

Board mounted specimens (test group 1 epoxied to test boards, test group 2 wave soldered to test boards) had a 30 AWG bus wire was connected to each terminal. Each specimen was measured initially for LLCR and then connected to a 24 volt DC power supply with a 960 ohm load resistor to achieve a test current of 0.025 ampere. Specimens were then manually cycled 1000 times at an approximate rate of 10 cycles per minute. LLCR was again measured after completion of the 1000 cycles.

3.4. Thermal Shock

Specimens were subjected to thermal shock testing in accordance with EIA-364-32D Method A, Test Condition I with a modified low temperature of -40°C. Testing consisted of 5 cycles between -40 and 85°C with 30 minute dwells at each temperature extreme and 5 minute transition between temperatures.