AMP*

# QUALIFICATION TEST REPORT

DIPLOMATE* LF
Low Force DIP Socket

501-120 Rev. 0

| | |
|---|---|
| Product Specification: | 108-1073, Rev. 0 |
| CTL No.: | CTL1504-008-005 |
| Date: | July 16, 1990 |
| Classification: | Unrestricted |
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AMP

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Qualification Test Report
DIPLOMATE LF
Low Force DIP Socket

## 1. Introduction

### 1.1 Purpose

Testing was performed on AMP's DIPLOMATE LF Low Force DIP Socket to determine if it meets the requirements of AMP Product Specification 108-1073, Rev. 0.

### 1.2 Scope

This report covers the electrical, mechanical, and environmental performance of the DIPLOMATE LF Low Force DIP Socket, manufactured by the Integrated Circuit Connector Products Division of the Capital Goods Business Sector. The testing was performed between January 15, 1990 and July 13, 1990.

### 1.3 Conclusion

The DIPLOMATE LF Low Force DIP Socket meets the electrical, mechanical, and environmental performance requirements of AMP Product Specification 108-1073, Rev. 0.

## 1.4 Product Description

The DIPLOMATE LF (Low Force) DIP Socket has been designed to provide a socket header with low force mating characteristics. They are available in 24, 28, and 40 position (with a row spacing of .600) and a 64 position (with a row spacing of .900). A pusher and slide cam is utilized to lock the I.C. in place after mating.

## 1.5 Test Samples

The test samples were randomly selected from current production, and the following part numbers were used for test:

| Test Group | Quantity | Part Number | Description |
|---|---|---|---|
| 1,2,4,5,6,7 | 12 | 641893-1 | 24 Pos. BeCu SnPb |
| 1,4,5,6,7 | 10 | 641893-2 | 24 Pos. BeCu Au |
| 1 | 2 | 641895-1 | 40 Pos. BeCu SnPb |
| 1,3 | 4 | 641895-2 | 40 Pos. BeCu Au |
| 1 | 2 | 643007-2 | 64 Pos. BeCu Au |

## 1.6 Qualification Test Sequence

| | Test Groups | | | | | | |
|---|---|---|---|---|---|---|---|
| Test or Examination | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Examination of Product | 1,10 | 1,6 | 1,6 | 1,5 | 1,8 | 1,4 | 1 |
| Termination Resistance, Dry Circuit | 3,8 | 2,5 | 2,5 | 2,4 | | | |
| Dielectric Withstanding Voltage | | | | | 3,7 | | |
| Insulation Resistance | | | | | 2,6 | | |
| Capacitance | | | | | | 2 | |
| Vibration, Discontinuity | 5 | | | | | | |
| Physical Shock | 6 | | | | | | |
| Activating Force | 2 | | | | | | |
| Deactivating Force | 7 | | | | | | |
| Separating Force | 9 | | | | | | |
| Contact Retention | | | | | | | 2 |
| Durability | 4 | 3 | 3 | | | | |
| Solderability | | | | | | 3 | |
| Thermal Shock | | | | | 4 | | |
| Humidity-Temperature Cycling | | 4 | | | 5 | | |
| Industrial Mixed Flowing Gas | | | 4 | | | | |
| Temperature Life | | | | 3 | | | |

The numbers indicate sequence in which tests were performed.

## 2. Summary of Testing

### 2.1 Examination of Product - All Groups

All samples submitted for testing were selected from normal production lots. They were inspected and accepted by the Product Assurance Department of the Capital Goods Business Sector.

### 2.2 Termination Resistance, Dry Circuit - Groups 1, 2, 3, 4

All termination resistance measurements, taken at 100 milliamperes dc. and 20 millivolts open circuit voltage, were less than the specification requirement of 20 milliohms initial and a maximum change (ΔR) of 10 milliohms.

| Test Group | No. of Samples | Condition | Max. | Mean |
|---|---|---|---|---|
| 1 | 384 | Initial | 14.0 | 10.28 |
| | 384 | After Mechanical Testing (ΔR) | +6.4 | -0.19 |
| 2 | 48 | Initial | 8.3 | 6.90 |
| | 48 | After Humidity Cycling (ΔR) | +7.7 | +3.00 |
| 3 | 80 | Initial | 5.1 | 3.37 |
| | 80 | After Industrial Mixed Gas (ΔR) | +3.6 | +1.33 |
| 4 | 96 | Initial | 10.2 | 7.72 |
| | 96 | After Temperature Life (ΔR) | +2.2 | +0.55 |

All values in milliohms

### 2.3 Dielectric Withstanding Voltage - Group 5

There was no dielectric breakdown or flashover between adjacent contacts, when a test voltage of 1000 Vac was applied for one minute.

### 2.4 Insulation Resistance - Group 5

All insulation resistance measurements were greater than the specification requirement of 10000 megohms.

### 2.5 Capacitance - Group 6

All capacitance measurements were less than the 1.0 picofarad specification maximum.

### 2.6 Vibration, Discontinuity - Group 1

There were no discontinuities of the contacts greater than one microsecond during vibration. Following vibration, there were no cracks, breaks, or loose parts on the connector assemblies.

2.7 Physical Shock - Group 1

There were no discontinuities of the contacts greater than one microsecond during physical shock. Following physical shock testing, there were no cracks, breaks, or loose parts on the connector assemblies.

2.8 Activating Force - Group 1

All activating force measurements were less than the specification requirements of 11.0 kilograms for 24 and 28 position, 11.5 kilograms for 40 position, and 15.5 kilograms for 64 position connectors.

2.9 Deactivating Force - Group 1

All deactivating force measurements were greater than the specification requirements of 0.5 kilograms for 24 and 28 position, 1.0 kilograms for 40 position, and 2.0 kilograms for 64 position connectors.

2.10 Separating Force - Group 1

All separating forces were greater than the specification requirement of 40 grams per contact.

2.11 Contact Retention - Group 7

There was no physical damage to either the contacts or the housing, and no contacts dislodged from the housings as a result of applying 340 grams axial load to the contacts.

2.12 Durability - Groups 1, 2, 3

There was no physical damage to the samples, as a result of mating and unmating the connector with a .010 thick gage, 200 times.

2.13 Solderability - Group 6

The contact leads met the requirement of 95% minimum solder coverage.

2.14 Thermal Shock - Group 5

There was no evidence of physical damage to either the contacts or the connectors, as a result of thermal shock.

2.15 Humidity-Temperature Cycling - Groups 2, 5

There was no evidence of physical damage to either the contacts or the connectors, as a result of exposure to humidity temperature cycling.

2.16 Industrial Mixed Flowing Gas - Group 3

There was no evidence of physical damage to either the contacts or the connectors, as a result of exposure to the pollutants of industrial mixed flowing gas.

2.17 Temperature Life - Group 4

There was no evidence of physical damage to either the contacts or the connectors, as a result of exposure to a temperature of 105°C for 96 hours.

3. Test Methods

3.1 Examination of Product

The product drawings and inspection plans were used to examine the samples. They were examined visually and functionally.

3.2 Termination Resistance, Low Level

Termination resistance measurements at low level current were made, using a four terminal measuring technique (Figure 1). The test current was maintained at 100 milliamperes dc, with an open circuit voltage of 20 millivolts dc.

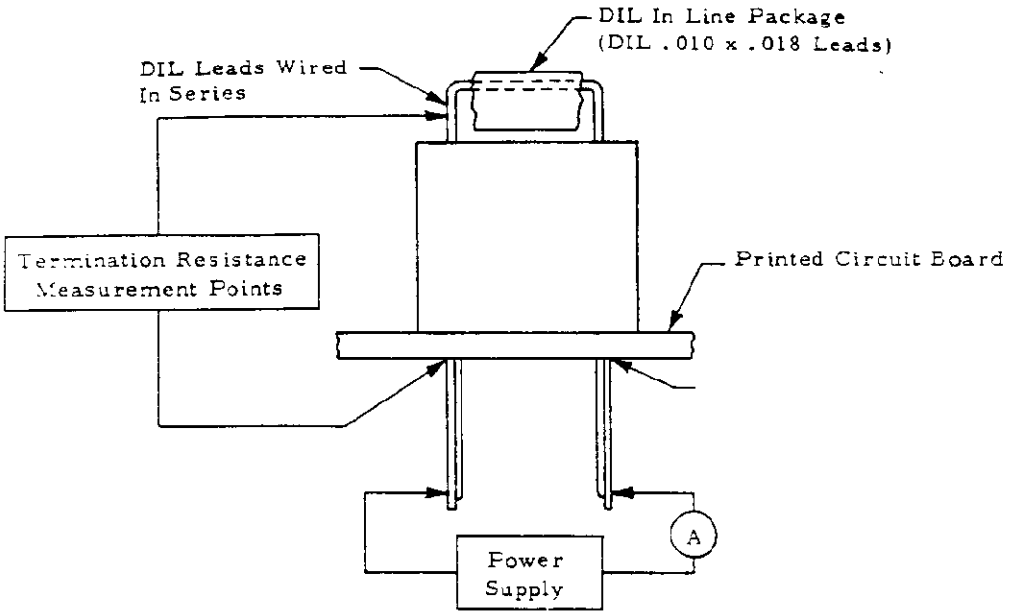


Figure 1
Typical Termination Resistance Measurement Points

3.3 Dielectric Withstanding Voltage

A test potential of 1000 Vac was applied between the adjacent contacts. This potential was applied for one minute and then returned to zero.

3.4 Insulation Resistance

Insulation resistance was measured between adjacent contacts, using a test voltage of 500 volts dc. This voltage was applied for one minute before the resistance was measured.

3.5 Capacitance

The capacitance was measured between the adjacent contacts. A test frequency of 1.0 megahertz was applied between the adjacent circuits.

3.6 Vibration, Discontinuity, Sine

Connectors mated with IC's were subjected to sinusoidal vibration, having a simple harmonic motion with an amplitude of 0.06 inch, double amplitude. The vibration frequency was varied logarithmically between the limits of 10 and 2000 Hz and returned to 10 Hz in 20 minutes. This cycle was performed 12 times in each of three mutually perpendicular planes, for a total vibration time of 12 hours. Connectors were monitored for discontinuities greater than one microsecond, using a current of 100 milliamperes in the monitoring circuit.

3.7 Physical Shock

Connectors mated with IC's were subjected to a physical shock test, having a sawtooth waveform of 100 gravity units (g peak) and a duration of 6 milliseconds. Three shocks in each direction were applied along the three mutually perpendicular planes, for a total of 18 shocks. The connectors were monitored for discontinuities greater than one microsecond, using a current of 100 milliamperes in the monitoring circuit.

3.8 Activating Force

The force required to actuate the socket assembly was measured. The rate of travel was 0.5 inch/minute.

3.9 Deactivating Force

The force required to deactivate the socket assembly was measured. The rate of travel was 0.5 inch/minute.

3.10 Separating Force

The force required to unmate a .015 x .008 thick gage from each contact was measured, using a free floating fixture with the rate of travel at 0.5 inch/minute.

3.11 Contact Retention

An axial load of 340 grams was applied to each contact. The force was applied in a direction to cause removal of the contacts from the housing.

3.12 Durability

Connectors and .010 thick gage were mated and unmated 200 times, at a rate not exceeding 500 per hour.

3.13 Solderability

The connector assembly contact solder tails were subjected to a solderability test. The solder tails were immersed in a non-active flux for 5 to 10 seconds, allowed to drain for 10 to 60 seconds, then held over molten solder without contact for 2 seconds. The solder tails were immersed in the molten solder at a rate of approximately one inch per second, held for 3 to 5 seconds, then withdrawn. After cleaning in isopropyl alcohol, the samples were visually examined for solder coverage. The solder used for testing was 60/40 tin lead composition and was maintained at a temperature of 245°C.

3.14 Thermal Shock

Unmated connectors were subjected to five cycles of temperature extremes, with each cycle consisting of 30 minutes at each temperature. The temperature extremes were -55°C and 105°C for tin sockets and -55°C and 125°C for gold contacts. The transition between temperatures was less than one minute.

3.15 Humidity-Temperature Cycling

Connectors were exposed to 10 cycles of humidity-temperature cycling. Each cycle lasted 24 hours, and consisted of cycling the temperature between 25°C and 65°C twice, while the relative humidity was held at 95%. During five of the first nine cycles, the connectors were exposed to a cold shock at -10°C for 3 hours. After the cold shock, the samples were vibrated for 15 minutes.

3.16 Industrial Mixed Flowing Gas, Class II

Mated connectors were exposed for 20 days in the industrial mixed flowing gas chamber. Class II exposure is defined as a temperature of 30°C and a relative humidity of 70%. Pollutants are $Cl_2$ at 10 ppb, $NO_2$ at 200 ppb, and $H_2S$ at 10 ppb.

3.17 Temperature Life

Connectors mated with IC's were subjected to 96 hours at an elevated temperature of 105°C.

4. Validation

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