QUALIFICATION TEST REPORT

SOCKET, DIPLOMATE* DL,
DIP, LOW PROFILE

501-029 Rev. B

Product Specification:	108-1066 Rev. G
CTL No.:	CTL1529-097-012
	CTL1529-106-016
	ACL1529-129
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CORPORATE TEST LABORATORY

Qualification Test Report
DIPLOMATE DL Socket

1. Introduction

1.1 Purpose

Testing was performed on AMP DIPLOMATE DL (dual leaf) Low Profile DIP Socket to determine its conformance to the requirements of AMP Product Specification 108-1066 Rev. G.

1.2 Scope

This report covers the electrical, mechanical, and environmental performance of the DIPLOMATE DL Low Profile DIP Socket manufactured by the Integrated Circuit Connector Products Division of the Capital Goods Business Group. The testing was performed between November 10, 1989 and March 23 1990 for the solder tail sockets and between November 11, 1990 and September 27, 1993 for the surface mount sockets.

1.3 Conclusion

The DIPLOMATE DL Low Profile DIP Socket meets the electrical, mechanical, and environmental performance requirements of AMP Product Specification 108-1066 Rev. G.

1.4 Product Description

The DIPLOMATE DL socket is available in 6 through 64 positions. The dual wiping contacts are available in both phosphor bronze and beryllium copper base metal with either tin or gold plating. The large target area of the contact and taper side ramps in the housing insure easy entry of a DIP package.

1.5 Test Samples

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

Test Group	Quantity	Part Nbr	Description
1,2,4,5,6,7	2 ea.	2-641600-1	16 Pos. BeCu Tin Socket
1,3,4,5,6,7	2 ea.	2-641606-2	16 Pos. BeCu Gold Socket
1,2,4,5,6,7	2 ea.	2-641600-3	16 Pos. PhBr Tin Socket
1,2,3,4,5,6	2 ea.	2-641600-4	16 Pos. PhBr Gold Socket
1,2,4,5,6,7	2 ea.	2-382403-3	16 Pos. PhBr Tin Socket
1,3,4,5,6,7	2 ea.	2-382403-4	16 Pos. PhBr Gold Socket
1,2,4,5,6,7	2 ea.	2-382409-3	28 Pos. PhBr Tin Socket
1,3,4,5,6,7	2 ea.	2-382409-4	28 Pos. PhBr Gold Socket
1,2,7	2 ea.	2-641606-1	40 Pos. BeCu Tin Socket
1,3,7	2 ea.	2-641606-2	40 Pos. BeCu Gold Socket
1,2,7	2 ea.	2-641606-3	40 Pos. PhBr Tin Socket
1,3,7	2 ea.	2-641606-4	40 Pos. PhBr Gold Socket

1.6 Qualification Test Sequence

	Test Groups						
Test or Examination	1	2	3	4	5	6	7
Examination of Product	1,8	1,6	1,6	1,8	1	1	1,8
Termination Resistance, Dry Circuit	3,7	2,5	2,5				3,6
Dielectric Withstanding Voltage				3,7			
Insulation Resistance				2,6			
Capacitance					2		
Vibration	5						
Physical Shock	6						
Engaging Force	2						2
Separating Force							7
Contact Retention					2	2	
Durability	4	3	3				4
Solderability					3		
Resistance to Soldering Heat						3	
Thermal Shock				4			
Humidity-Temperature Cycling		4		5			
Mixed Flowing Gas			4				
Temperature Life							5

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 current production lots. They were inspected and accepted by the Product Assurance Department of the Capital Goods Business Group.

2.2 Termination Resistance, Dry Circuit - Groups 1,2,3,7

All termination resistance measurements, taken at 100 milliamperes DC and 50 millivolts open circuit voltage were less than 20 milliohms initially and had a maximum change in resistance (ΔR) of less than 10 milliohms.

2.3 Dielectric Withstanding Voltage - Group 4

No dielectric breakdown or flashover occurred when a test voltage was applied between adjacent contacts.

2.4 Insulation Resistance - Group 4

All insulation resistance measurements were greater than 10,000 megohms.

2.5 Capacitance - Group 5

All capacitance measurements were less than 0.5 picofarads.

2.6 Vibration - Group 1

No discontinuities of the contacts were detected during vibration. Following vibration, no cracks, breaks, or loose parts on the socket assemblies were visible.

2.7 Physical Shock - Group 1

No discontinuities of the contacts were detected during physical shock. Following physical shock testing, no cracks, breaks, or loose parts on the socket assemblies were visible.

2.8 Contact Engaging Force - Groups 1,7

All contact engaging forces were less than 340 grams per contact.

2.9 Contact Separating Force - Group 7

All contact separating forces were greater than 25 grams per contact.

2.10 Contact Retention - Group 6

No physical damage occurred to either the contacts or the housing, and no contacts dislodged from the housings as a result of supplying an axial load of 340 grams to each contacts.

2.11 Durability - Groups 1,2,3,7

No physical damage occurred to the samples as a result of mating and unmating the socket with a test gage 50 times for solder tail sockets and 25 times for surface mount sockets.

2.12 Solderability - Group 4

The contact leads had a minimum of 95% solder coverage.

2.13 Resistance to Soldering Heat - Group 6

No evidence of physical damage to either the contacts or the socket was visible as a result of soldering heat.

2.14 Thermal Shock - Group 4

No evidence of physical damage to either the contacts or the socket was visible as a result of thermal shock.

2.15 Humidity-Temperature Cycling - Groups 2,4

No evidence of physical damage to either the contacts or the socket was visible as a result of exposure to humidity-temperature cycling.

2.16 Mixed Flowing Gas - Group 3

No evidence of physical damage to either the contacts or the connector was visible as a result of exposure to the pollutants of mixed flowing gas.

2.17 Temperature Life - Group 7

No evidence of physical damage to either the contacts or the socket was visible as a result of exposure to an elevated temperature.

3. Test Methods

3.1 Examination of Product

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 (Figures 1 & 2). The test current was maintained at 100 milliamperes DC with an open circuit voltage of 50 millivolts DC.

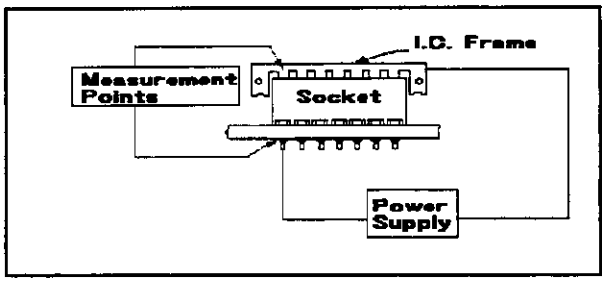

Figure 1
Typical Termination Resistance Measurement Points (solder tail)

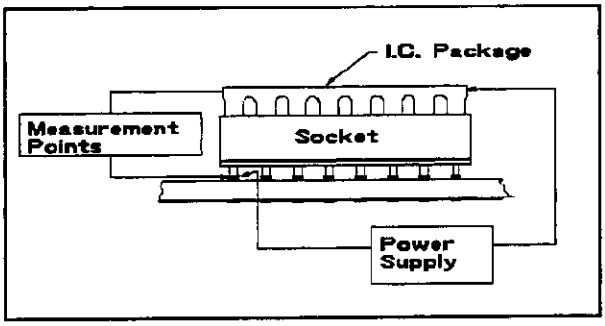

Figure 2
Typical Termination Resistance Measurement Points (surface mount)

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 two minutes before the resistance was measured.

3.5 Capacitance

Capacitance was measured between the adjacent contacts of unmated sockets, using a test frequency of 1.0 MHz.

3.6 Vibration, Sine

Sockets mated with dummy IC packages 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. Sockets were monitored for discontinuities greater than one microsecond, using a current of 100 milliamperes in the monitoring circuit.

3.7 Physical Shock

Sockets mated with dummy IC packages were subjected to a physical shock test, having a sawtooth waveform of 100 gravity units (g peak) and a duration of 6.0 milliseconds. Three shocks in each direction were applied along the three mutually perpendicular planes, for a total of 18 shocks. The sockets were monitored for discontinuities greater than one microsecond, using a current of 100 milliamperes in the monitoring circuit.

3.8 Contact Engaging Force

Engaging forces were acquired by inserting a 0.013 inch cluster gage in to the socket. The force per contact was calculated.

3.9 Contact Separating Force

After 2 unmonitored cycles of preconditioning with a 0.015 inch gage, Separating forces were acquired by withdrawing a 0.008 inch gage from the socket.

3.10 Contact Retention

An axial load of 340 grams was applied to each contact and held for 60 seconds. The force was applied in a direction to cause removal of the contacts from the housing.

3.11 Durability

Surface mount sockets were mated and unmated 25 times using an 0.015 inch cluster gage, at a rate 0.5 inch/min.
Solder tail sockets were mated and unmated 50 times using an 0.015 inch cluster gage, at a rate 0.5 inch/min.

3.12 Solderability

Socket assembly contact solder tails were subjected to a solderability test by immersing them in a activated rosin 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 then immersed in the molden 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.

3.13 Resistance to Soldering Heat

Solder tail sockets mounted to printed circuit boards were immersed in a solder bath for 10 seconds. The bath was maintained at 260°C.

3.14 Thermal Shock

Unmated sockets mated were subjected to 5 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 sockets. The transition between temperatures was less than one minute.

3.15 Humidity-Temperature Cycling

Unmated sockets 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 sockets were exposed to a cold shock at -10°C for 3 hours.

3.16 Mixed Flowing Gas, Class II

Mated connectors were exposed for 20 days to a mixed flowing gas Class II exposure. Class II exposure is defined as a temperature of 30°C and a relative humidity of 70% with the pollutants of $C1_2$ at 10 ppb, NO_2 at 200 ppb, and H_2S at 10 ppb.

3.17 Temperature Life

Sockets mated with dummy IC packages were exposed to a temperature of 105°C for 96 hours.

4. Validation

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