

# AMP

## QUALIFICATION TEST REPORT

AMP\* Level V Insulation Displacement Connector  
(I.D.C.) Interconnection System

501-11

REV. 0

Product Specification: 108-25028  
CTL No.: CTL5237-400-001  
Date: 02-08-85  
Classification: Unrestricted  
Distribution: 25

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Corporate Test Laboratory Harrisburg, Pennsylvania

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## CORPORATE TEST LABORATORY

Qualification Test Report on  
Level V Insulation Displacement Connector  
P/Ns 1-102935-5, 1-102935-6, 2-102934-7  
2-102935-7 and 2-102936-7

### 1. Introduction

#### 1.1 Purpose

Testing was conducted to determine performance when tested to the requirements of AMP Specification 108-25028, Rev. 0.

#### 1.2 Scope

This report covers electrical and mechanical performance of AMP Level V Insulation Displacement Connector (I.D.C.) interconnection system made by the Circuit Components Division for the Interconnection & Component Products Group. Testing was performed between June 25, 1984 and October 15, 1984.

#### 1.3 Conclusion

The AMP Level V I.D.C. System conforms to the performance requirements of the product specification.

1.4 Product Description

AMP Insulation Displacement Connectors consist of Level V double row housings preloaded with insulation Displacement Receptacle Contacts. Contacts maintain a .125 x .125 centerline spacing and are intended to mate with .025 square posts.

1.5 Test Samples

20 Position Assembly

<u>Group #</u>	<u>Quantity</u>	<u>Part Number</u>	<u>Plating</u>	<u>Wire Size</u>
1A	2	1-102935-5	50 AU Duplex	AWG 24
B	2	1-102935-6	75 AU Duplex	AWG 24
2A	2	1-102935-5	50 AU Duplex	AWG 24
B	2	1-102935-6	75 AU Duplex	AWG 24
3A	2	1-102935-5	50 AU Duplex	AWG 24
B	2	1-102935-6	75 AU Duplex	AWG 24

32 Position Assembly

4A	1	2-102934-7	50 AU Duplex	AWG 20
B	1	2-102934-7	50 AU Duplex	AWG 22
C	1	2-102935-7	50 AU Duplex	AWG 22
D	1	2-102935-7	50 AU Duplex	AWG 24
E	1	2-102935-7	50 AU Duplex	AWG 26
F	1	2-102936-7	50 AU Duplex	AWG 26
G	1	2-102936-7	50 AU Duplex	AWG 28
H	1	2-102936-7	50 AU Duplex	AWG 30

Contacts are nickel plated with tin lead plating in the wire barrel and gold plating on the receptacle end.

1.6 Qualification Test Sequence

TEST OR EXAMINATION	TEST GROUP			
	1	2	3	4
Examination of Product	1	1	1	1
Termination Resistance, Rated Current		4,16	3,6	
Termination Resistance, Dry Circuit		3,8,11,15	2,5	
Dielectric Withstanding Voltage	4,7,12			
Insulation Resistance	5,9,11			
Current Cycling				3
Crimp Resistance				2,4
Vibration		12		
Physical Shock		13		
Mating Force		2,7		
Unmating Force		5,9		
Contact Retention	13			
Contact Engaging Force	2			
Contact Separating Force	3			
Crimp Tensile				5
Durability	6	6		
Thermal Shock	10	10		
Temperature-Humidity Cycling	8			
Salt Spray (A)		14		
Temperature Life			4	

(A) Unmate and Mate Before Final Measurements

2. Testing Summary2.1 Examination of Product - Groups 1-4

Test samples were visually, dimensionally, and functionally examined per applicable quality inspection plan.

Test Results

Samples meet the requirements of the quality inspection plan.

2.2 Contact Engaging Force - Group 1

A 0.026 inch square test gage was inserted into the connector a distance of 0.100 inch from point of contact. The force required to insert the gage was recorded.

Test Results

Samples passed the specification requirements.

Force - Ounces

<u>Sample #</u>	<u>Max.</u>	<u>Min.</u>	<u>Avg.</u>	<u>Spec. Max.</u>
1A1	8.96	4.96	6.39	9.00
1A2	7.42	4.93	6.17	9.00
1B1	7.36	4.96	6.19	9.00
1B2	9.00	7.20	7.74	9.00

2.3 Contact Separating Force - Group 1

A 0.026 inch square test gage was used to size the connector 3 times. A 0.024 inch square test gage was inserted a depth of 0.100 inch from point of contact and the force required to extract the pin was recorded.

Test Results

Samples passed the specification requirements.

Force - Ounces

<u>Sample #</u>	<u>Max.</u>	<u>Min.</u>	<u>Avg.</u>	<u>Spec. Min.</u>
1A1	2.05	1.60	1.80	1.00
1A2	2.34	1.79	2.05	1.00
1B1	2.59	1.79	2.26	1.00
1B2	6.21	3.78	4.39	1.00

2.4 Dielectric Withstanding Voltage - Group 1

Unmated connectors were subjected to a dielectric withstanding voltage for a period of one minute:

<u>Test Voltage</u>		<u>Altitude</u>
<u>a.c.</u>	<u>r.m.s.</u>	<u>Feet</u>
	750	Sea Level
	300	50,000
	275	70,000

Test Results

No breakdown or flashover occurred initially, after durability, or after thermal shock.

2.5 Insulation Resistance - Group 1

A test voltage of 500 volts dc was applied to adjacent contacts of the unmated connector for a period of one minute, after which the resistance was recorded.

Test Results

Samples passed the minimum requirements initially and after conditioning.

Resistance-Megohms

<u>Sample #</u>	<u>Minimum Initial</u>	<u>Minimum After Temp-Humidity</u>	<u>Minimum After Thermal Shock</u>
1A1	$2.7 \times 10^5$	$8.8 \times 10^7$	$1.8 \times 10^7$
1A2	$4.2 \times 10^4$	$1.2 \times 10^7$	$2.5 \times 10^7$
1B1	$2.7 \times 10^7$	$4.0 \times 10^8$	$1.8 \times 10^7$
1B2	$1.0 \times 10^6$	$1.8 \times 10^8$	$1.0 \times 10^7$

Specification Limit Initial:  $5.0 \times 10^3$  Megohms Minimum  
 Specification Limit after Conditioning:  $1.0 \times 10^3$  Megohms Minimum

2.6 Durability - Group 1

Connector assemblies were mated and unmated 200 times at a rate of 500 cycles per hour.

Test Results

No physical damage occurred, and samples passed the specification requirements for dielectric withstanding voltage.

2.7 Temperature-Humidity Cycling - Group 1

Mated connectors were subjected to ten 24-hour Temperature-Humidity cycles between 25° and 65°C with a relative humidity of 95% with cold shock at -10°C. On five of the first nine days, a cold shock for three hours was performed with humidity uncontrolled.

Test Results

Samples passed the specification requirements for insulation resistance during the recovery period.

2.8 Thermal Shock - Group 1

Samples were subjected to 5 cycles of exposure to the below extremes:

$105^\circ\text{C} \begin{matrix} +5^\circ \\ -0^\circ\text{C} \end{matrix}$  for 30 Minutes

$-65^\circ\text{C} \begin{matrix} -5^\circ \\ +0^\circ\text{C} \end{matrix}$  for 30 Minutes

Transition between extremes was less than 5 minutes.

Test Results

No physical damage occurred, and samples passed the specification requirements for dielectric withstanding voltage and insulation resistance.

2.9 Contact Retention - Group 1

An axial load of 2.0 pounds was applied to crimped contacts.

Test Results

No samples dislodged from their normal locking position.

2.10 Mating Force - Group 2

Connectors were mated with their respective square post header a distance of 0.100 inch from initial contact, and the force required was recorded.

Test Results

Force - Ounces Per Contact

<u>Sample #</u>	<u>Initial</u>	<u>After Durability</u>	<u>Spec. Max.</u>
2A1	5.76	5.44	9.00
2A2	5.76	5.60	9.00
2B1	5.60	8.00	9.00
2B2	5.76	6.72	9.00

2.11 Termination Resistance, Dry Circuit - Group 2

Mated connectors were attached to a four-terminal measuring system having 50 mv. open circuit and a 100 ma. maximum current flow. The voltage drop from the bottom of the post assembly to a point 0.38 inch beyond the insulation support on the wire was recorded.

Test Results

The maximum, minimum, and average resistance of the mated connector was recorded. All samples passed the specification requirements.

Group 2

<u>Sample #</u>	<u>Initial</u>			<u>After Durability</u>		
	<u>Max.</u>	<u>Min.</u>	<u>Avg.</u>	<u>Max.</u>	<u>Min.</u>	<u>Avg.</u>
2A1	5.34	4.89	5.16	5.60	4.73	5.20
2A2	5.43	5.01	5.28	5.66	5.16	5.33
2B1	5.34	4.84	5.19	5.93	5.25	5.49
2B2	5.31	5.05	5.21	5.47	5.13	5.28



<u>Sample #</u>	<u>After Thermal Shock</u>			<u>After Salt Spray</u>		
	<u>Max.</u>	<u>Min.</u>	<u>Avg.</u>	<u>Max.</u>	<u>Min.</u>	<u>Avg.</u>
2A1	5.65	5.02	5.40	5.95	5.22	5.62
2A2	5.39	5.04	5.24	6.80	4.98	5.63
2B1	5.87	4.92	5.31	8.60	5.52	6.05
2B2	5.75	5.40	5.52	6.59	5.72	6.06

All Values in Milliohms

Specification Requirement: 12.0 Milliohms Maximum

2.12 Termination Resistance, Rated Current - Group 2

Mated connectors were attached to a four-terminal measuring system and the voltage drop from the bottom of the post assembly to a point 0.38 inch beyond the insulation support on the wire was recorded. A test current of 3.0 amperes d.c. was applied.

Test Results

The maximum, minimum, and average resistance of the mated connector was recorded. All samples passed the specification requirements.

Group 2

<u>Sample #</u>	<u>Initial</u>			<u>After Salt Spray</u>		
	<u>Max.</u>	<u>Min.</u>	<u>Avg.</u>	<u>Max.</u>	<u>Min.</u>	<u>Avg.</u>
2A1	5.43	5.15	5.26	6.50	5.34	5.76
2A2	5.34	5.01	5.19	6.34	5.34	5.71
2B1	5.53	5.16	5.32	9.41	5.54	5.94
2B2	5.50	5.20	5.38	6.04	5.60	5.78

All Values in Milliohms

Specification Requirement: 12.0 Milliohms Maximum

2.13 Unmating Force - Group 2

Connectors were mated and unmated and the force required to unmate the connector the third time was recorded.

Test Results

Samples passed the specification requirements.

Force - Ounces Per Contact

<u>Sample #</u>	<u>Initial</u>	<u>After Durability</u>	<u>Spec. Min.</u>
2A1	4.40	6.40	1.00
2A2	3.84	4.60	1.00
2B1	5.60	8.00	1.00
2B2	4.00	4.00	1.00

2.14 Durability - Group 2

Connector assemblies were mated and unmated 200 times, at a rate of 500 cycles per hour.

Test Results

No physical damage occurred and samples passed the specification requirements for termination resistance, mating, and unmating force.

2.15 Thermal Shock - Group 2

Samples were subjected to 5 cycles of exposure to the below extremes.

105°C  $\begin{matrix} +5^\circ \\ -0^\circ\text{C} \end{matrix}$  for 30 Minutes

-65°C  $\begin{matrix} -5^\circ \\ +0^\circ\text{C} \end{matrix}$  for 30 Minutes

Transition between extremes was less than 5 minutes.

Test Results

No physical damage occurred, and samples passed the specification requirements for termination resistance.

2.16 Vibration - Group 2

Mated samples were mounted rigidly to a vibration table by clamping the printed circuit board, and the wire was supported 12 inches from the connector. The test parameters are a simple harmonic motion having an amplitude of either 0.06 inch double amplitude or 15 gravity units peak, whichever is less. This vibration frequency was varied logarithmically between 10 and 2000 Hz. and back in approximately 20 minutes. This cycle was performed 12 times in three mutually perpendicular planes for a total of 12 hours. Samples were monitored for discontinuities of greater than 1 microsecond using a test current of 100 milliamperes.

Test Results

No discontinuities or evidence of physical damage occurred during testing.

2.17 Physical Shock - Group 2

Mated connectors were subjected to a shock test. The parameters are a sawtooth waveform of 100 gravity units with a duration of 6 milliseconds. Three shocks were applied in each of three

mutually perpendicular planes for a total of 18 shocks. Samples were monitored for discontinuities greater than 1 microsecond using a test current of 100 milliamperes.

Test Results

No discontinuities or evidence of physical damage occurred during testing.

2.18 Salt Spray - Group 2

Mated connectors were subjected to a 48-hour salt spray test using a 5% salt concentration.

Test Results

Samples, caked with salt deposits, were unmated and washed thoroughly, then remated. Samples passed the specification requirements for termination resistance.

2.19 Termination Resistance, Dry Circuit - Group 3

Mated connectors were attached to a four-terminal measuring system having 50 mv open circuit and a 100 ma. maximum current flow. The voltage drop from the bottom of the post assembly to a point 0.38 inch beyond the insulation support on the wire was recorded.

Test Results

The maximum, minimum, and average resistance of the mated connector was recorded. All samples passed the specification requirements.

Group 3

<u>Sample #</u>	<u>Initial</u>			<u>After (1) Day - Temperature Life</u>		
	<u>Max.</u>	<u>Min.</u>	<u>Avg.</u>	<u>Max.</u>	<u>Min.</u>	<u>Avg.</u>
3A1	5.58	4.93	5.30	5.59	4.72	5.28
3A2	5.34	5.12	5.22	5.76	5.19	5.44
3B1	5.46	4.94	5.19	5.44	5.04	5.23
3B2	5.44	5.18	5.35	5.42	4.95	5.09

<u>Sample #</u>	<u>After (2) Days - Temperature Life</u>			<u>After (4) Days - Temperature Life</u>		
	<u>Max.</u>	<u>Min.</u>	<u>Avg.</u>	<u>Max.</u>	<u>Min.</u>	<u>Avg.</u>
3A1	6.21	5.16	5.51	6.65	5.59	5.99
3A2	6.08	5.26	5.54	7.91	5.33	6.06
3B1	5.72	5.14	5.46	6.38	5.18	5.62
3B2	5.94	5.07	5.32	6.09	5.28	5.67

<u>Sample #</u>	<u>After (8) Days - Temperature Life</u>			<u>After (16) Days - Temperature Life</u>		
	<u>Max.</u>	<u>Min.</u>	<u>Avg.</u>	<u>Max.</u>	<u>Min.</u>	<u>Avg.</u>
3A1	8.00	5.53	6.25	9.19	5.74	6.32
3A2	9.47	5.57	6.50	8.37	5.61	6.75
3B1	6.63	5.11	5.72	7.24	5.61	6.48
3B2	6.19	4.99	5.52	7.83	5.36	6.04

<u>After (33) Days - Temperature Life</u>			
<u>Sample #</u>	<u>Max.</u>	<u>Min.</u>	<u>Avg.</u>
3A1	8.41	5.71	6.38
3A2	9.54	5.48	6.54
3B1	9.77	5.46	6.53
3B2	8.53	5.26	6.03

All Values in Milliohms

Specification Requirement: 12.0 Milliohms Maximum

## 2.20 Termination Resistance, Rated Current - Group 3

Mated connectors were attached to a four-terminal measuring system, and the voltage drop from the bottom of the post assembly to a point 0.38 inch beyond the insulation support on the wire was recorded. A test current of 3.0 amperes d.c. was applied.

### Test Results

The maximum, minimum, and average resistance of the mated connector was recorded. All samples passed the specification requirements.

### Group 3

<u>Sample #</u>	<u>Initial</u>			<u>After (1) Day - Temperature Life</u>		
	<u>Max.</u>	<u>Min.</u>	<u>Avg.</u>	<u>Max.</u>	<u>Min.</u>	<u>Avg.</u>
3A1	5.62	4.33	5.16	5.63	5.18	5.43
3A2	5.33	5.13	5.21	5.54	5.20	5.38
3B1	5.52	5.06	5.28	5.66	5.22	5.40
3B2	5.28	5.06	5.18	5.32	5.10	5.23

<u>Sample #</u>	<u>After (2) Days - Temperature Life</u>			<u>After (4) Days - Temperature Life</u>		
	<u>Max.</u>	<u>Min.</u>	<u>Avg.</u>	<u>Max.</u>	<u>Min.</u>	<u>Avg.</u>
3A1	6.35	5.14	5.61	6.52	5.32	5.92
3A2	5.86	5.19	5.50	6.42	5.46	5.88
3B1	5.84	5.25	5.48	6.16	5.27	5.66
3B2	5.45	5.17	5.30	5.79	5.16	5.58

<u>Sample #</u>	<u>After (8) Days - Temperature Life</u>			<u>After (16) Days - Temperature Life</u>		
	<u>Max.</u>	<u>Min.</u>	<u>Avg.</u>	<u>Max.</u>	<u>Min.</u>	<u>Avg.</u>
3A1	7.67	5.46	6.13	10.22	5.47	6.27
3A2	7.96	5.59	6.38	7.68	5.42	6.41
3B1	6.74	5.38	5.91	8.63	5.54	6.34
3B2	6.50	5.26	5.69	7.58	5.51	5.94

<u>After (33) Days - Temperature Life</u>			
<u>Sample #</u>	<u>Max.</u>	<u>Min.</u>	<u>Avg.</u>
3A1	7.31	5.44	6.13
3A2	6.87	5.48	6.16
3B1	8.44	5.55	6.31
3B2	6.86	5.26	5.75

All Values in Milliohms  
Specification Requirement: 12.0 Milliohms Maximum

2.21 Temperature Life - Group 3

Mated connectors were subjected to 33 days at 118°C. Termination resistance was recorded initially, and after 1, 2, 4, 8, 16, and 33 days.

Test Results

There was no evidence of physical damage. Samples passed the specification requirements for termination resistance.

2.22 Crimp Resistance - Group 4

Mated connectors were attached to a four-terminal measuring system and energized with the specified current listed below. After samples stabilized in temperature, the voltage drop from the end of the crimp barrel to a point 0.38 inch back on the wire was recorded.

<u>Wire Size</u> <u>AWG.</u>	<u>Test Current</u> <u>Amperes</u>	<u>Resistance Milliohms</u> <u>Maximum Initial</u>
30	1.0	7.0
28	1.5	7.0
26	2.0	5.0
24	3.0	4.0
22	3.0	3.0
20	3.0	3.0

ΔR: 2.0 Milliohms Maximum

Test Results

The maximum, minimum, average and  $\Delta R$  of the crimp was recorded. All samples passed the specification requirements.

Group 4

<u>Sample #</u>	<u>Initial</u>			<u>After Current Cycling</u>			<u><math>\Delta R</math> Max.</u>
	<u>Max.</u>	<u>Min.</u>	<u>Avg.</u>	<u>Max.</u>	<u>Min.</u>	<u>Avg.</u>	
4A	1.68	1.10	1.37	1.99	1.40	1.54	0.52
4B	1.71	1.06	1.53	1.81	1.31	1.65	0.35
4C	1.73	1.14	1.44	1.84	1.42	1.63	0.42
4D	2.15	1.94	1.99	2.19	1.94	2.03	0.12
4E	2.59	2.26	2.48	2.70	2.49	2.57	0.33
4F	2.70	2.42	2.58	2.74	2.61	2.62	0.12
4G	3.78	3.39	3.63	4.05	3.58	3.71	0.27
4H	6.21	5.15	5.39	7.13	5.21	5.50	0.92

2.23 Current Cycling - Group 4

Mated connectors were subjected to 50 cycles at 125% rated current. A cycle consists of 30 minutes on time and 15 minutes off.

Test Results

Samples passed the specification requirement of a maximum  $\Delta R$  of 2.0 milliohms.

2.24 Crimp Tensile - Group 4

Samples were subjected to a crimp tensile test at a rate of 1.0 inch per minute.

Test Results


The maximum, minimum, and average tensile strength was recorded. All samples passed the minimum specification requirements.

Group 4


<u>Sample #</u>	<u>Max.</u>	<u>Min.</u>	<u>Avg.</u>	<u>Wire Size AWG</u>	<u>Min. Req. Lbs.</u>
4A	19.5	11.7	15.8	20	9.5
4B	18.0	12.6	15.1	22	4.5
4C	18.7	12.6	14.8	22	6.0
4D	14.6	8.7	11.8	24	7.0
4E	9.5	6.0	7.2	26	2.5
4F	8.7	7.1	7.9	26	3.5
4G	6.4	5.0	5.5	28	3.0
4H	4.7	3.3	4.0	30	2.0

3. Validation

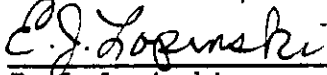
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