Product Verification of AMP* Power Series 15, 30 and 45 Connectors

1. INTRODUCTION

1.1. Purpose

Testing was performed on AMP* Power Series 15, 30 and 45 connectors to verify performance of product subjected to a variety of electrical, mechanical and environmental tests including: mating/unmating, durability, contact retention, crimp resistance and current ratings.

1.2. Scope

This report covers connectors tested under test reports CTL B033812-024, B033812-025, | B033812-026, B033812-029 and CTL B033812-027. Testing was performed by the Engineering Assurance Product Test Laboratory.

1.3. Test Samples

Test samples were representative of normal production lots. Samples identified with the following part numbers were used for test.

Sample Group	Quantity	Part Number	Description
CTL B033812-024 - Crimp Tensile			
13	7	1445962-2	Series 45 contact on 10 AWG wire, 105 strands at .010 per strand
15	7	1445962-2	Series 45 contact on 10 AWG wire, 37 strands at .0167 per strand
CTL B033812-025 - Temperature Rise and Contact Resistance			
1	10	1445962-2	Series 45 contact on 10 AWG wire, .116 crimp height
2	10	1445962-2	Series 45 contact on 12 AWG wire, .105 crimp height
3	10	1445962-2	Series 45 contact on 14 AWG wire, .096 crimp height
CTL B033812-026 - Mating, Unmating and Durability			
1	5	1445962-2	Series 45 contact on 14 AWG wire
2	5	1445962-2	Series 45 contact on 10 AWG wire
CTL B033812-029 - Contact Retention			
1	5	1445962-2	Series 45 contact in housing PN 1445957-3
2	5	1604112-2	Series 30 contact in housing PN 1445957-3
3	5	1604113-2	Series 15 contact in housing PN 1445957-3
CTL B033812-027 - Temperature Rise and Contact Resistance			
1	10	1604112-2	Series 30 contact on 12 AWG wire
2	10	1604112-2	Series 30 contact on 14 AWG wire
3	10	1604112-2	Series 30 contact on 16 AWG wire

Figure 1

* Trademark
| Indicates change

2. TEST RESULTS

2.1. CTL B033812-024 - Crimp Tensile

Summary of crimp tensile results are shown in Figure 2. Samples were tensiled at a maximum rate of 1 inch per minute. Maximum force values recorded until wires pulled from contacts.

Sample Group 13	
Sample	Force (lb)
Average	199.3
Minimum	186.7
Maximum	210.8

Sample Group 15	
Sample	Force (lb)
Average	179.6
Minimum	157.8
Maximum	195.9

Figure 2

2.2. CTL B033812-025 - Temperature Rise and Contact Resistance

Samples were exposed to mechanical and environmental tests of the type and sequence shown in Figure 3.

Test	Sequence	Method
Temperature rise vs current	1,11	EIA-364-70, Method I
Low level crimp resistance	2,4,6,8,10	EIA-364-23
Temperature life	3	EIA-364-17, 125˚C for 168 hours
Thermal shock	5	EIA-364-32. 200 cycles between -40 and 105˚C
Vibration	7	EIA-364-28, Condition VII, Level D
Humidity-temperature cycling	9	EIA-364-31, Method III

Figure 3

Temperature rise was measured initially prior to any exposure, and again after all other testing was performed. Figure 4 shows initial and final temperature rise readings.

Sample	Group 1 10 AWG at 40 amperes	Group 2 12 AWG at 30 amperes	Group 3 14 AWG at 24 amperes
Initial Temperature Rise vs Current Readings (˚C)			
Average	28.0	21.6	22.6
Minimum	26.5	21.1	21.4
Maximum	29.1	22.6	23.6
Standard Deviation	1.0	0.5	0.7
Final Temperature Rise vs Current Readings (˚C)			
Average	39.5	28.1	29.5
Minimum	32.1	25.5	25.0
Maximum	51.5	32.0	33.3
Standard Deviation	7.0	2.3	3.6

Figure 4

Crimp resistance was measured initially prior to any exposure, and again after each exposure. Final change in resistance as compared to initial readings was calculated with the results recorded in Figure 5.

Sample Group	Wire Size (AWG)	Initial Crimp Resistance (micro ohms maximum)	Change in Crimp Resistance From Initial (micro ohms maximum)
1	10	40	30
2	12	50	20
3	14	90	50

Figure 5

2.3. CTL B033812-026 - Mating, Unmating and Durability

Samples in Test Group 1 were subjected to mating and unmating testing per EIA-364-13. The results are recorded in Figure 6.

Sample	Mating Force (lbs)	Unmating Force (lbs)
Average	4.74	4.79
Minimum	3.45	3.97
Maximum	6.49	5.34

Figure 6

Samples in Test Group 2 were subjected to durability cycling per EIA-364-9 with termination resistance performed per EIA-364-23 prior to durability testing and after 100, 1000 and 5000 cycles of durability. Maximum termination resistance readings are shown in Figure 7.

	Initial	100 Cycles	1000 Cycles	5000 Cycles
Milliohms maximum	0.38	0.42	0.43	0.39

Figure 7

2.4. CTL B033812-029 - Contact Retention

The housing was held in a slotted fixture attached to the baseplate of the tensile machine. The cable was clamped in an air jaw attached to a loadcell on the crosshead of the tensile machine. The force necessary to pull the contact from the housing was measured. Testing was performed at a speed of 1 inch per minute. All samples were pulled until failure. The forces are recorded in Figure 8.

Sample	Series 45	Series 30	Series 15
Average	35.14	36.44	38.53
Minimum	28.38	29.60	36.93
Maximum	41.38	40.16	41.44

Figure 8

2.5. CTL B033812-027 - Temperature Rise and Contact Resistance

Samples were exposed to mechanical and environmental tests of the type and sequence shown in Figure 9.

Test	Sequence	Method
Temperature rise vs current	1,11	EIA-364-70, Method I
Low level crimp resistance	2,4,6,8,10	EIA-364-23
Temperature life	3	EIA-364-17, 125˚C for 168 hours
Thermal shock	5	EIA-364-32. 200 cycles between -40 and 105˚C
Vibration	7	EIA-364-28, Condition VII, Level D
Humidity-temperature cycling	9	EIA-364-31, Method III

Figure 9

Temperature rise was measured initially prior to any exposure, and again after all other testing was performed. Figure 10 shows initial and final temperature rise readings.

Sample	Group 1 12 AWG at 30 amperes	Group 2 14 AWG at 24 amperes	Group 3 16 AWG at 19 amperes
Initial Temperature Rise vs Current Readings (˚C)			
Average	27.8	26.2	25.6
Minimum	26.8	25.0	23.8
Maximum	28.7	28.1	26.8
Final Temperature Rise vs Current Readings (˚C)			
Average	41.3	28.2	27.0
Minimum	32.4	26.8	24.1
Maximum	56.7 (see Note)	30.0	28.1

NOTE *Possible error of measurement, inline mating contact measured 39.9˚C at the time this measurement was recorded, no assignable cause to this measurement.*

Figure 10