



AMPLIMITE\* PCB Mounted Connectors

1. INTRODUCTION

1.1 Purpose

Testing was performed on the TE Connectivity’s AMLIMITE\* PCB Mounted Connectors to determine their conformance to the requirements of TE Specification 108-130023 Rev A.

1.2. Scope

This report covers the electrical, mechanical, and environmental performance of the AMPLIMITE\* PCB Mounted connector manufactured by the Data and Devices Business Unit. The testing was performed in December 2016.

1.3. Conclusion

The AMPLIMITE PCB Mounted connectors meet the electrical, mechanical, and environmental performance requirements of TE Connectivity Product Spec 108-130023, rev A.

1.4. Product Description

AMPLIMITE\* PCB Mounted Connectors are available in 9, 15, 25, 26, 44, and 62 position right angle plug and receptacle.

All of the housings for the plug and receptacle connectors are molded with black or blue compound with 94V-0 rating. The metal shell is made from steel with nickel plating.

1.5. Test Samples

The test samples were randomly selected from Normal current production lots and the following part numbers were used.

Test Group	Sample Size	Part Number	Description
A through J	5	2311589-1	AMPLIMITE* REC, HD22, R/A, 15P, B/L, 4-40 S/LOC
	5	2311763-3	AMPLIMITE* REC, HD22, R/A 15P, B/L, 4-40 INS
	5	2311765-2	AMPLIMITE* REC, HD20, R/A, 9P, B/L, 4-40 S/LOC
	5	2311766-1	AMPLIMITE* REC HD20, R/A 25P, B/L, 4-40 S/LOC
	5	2311768-1	AMPLIMITE* REC HD22, R/A 26P, B/L, 4-40 INS
	5	2311770-2	AMPLIMITE* REC HD22, R/A, 44P, B/L, 4-40 S/LOC
	5	2311771-1	AMPLIMITE* REC, HD22, R/A, 62P, B/L, 4-40 INS
	5	2311773-1	AMPLIMITE* Plug HD22, R/A, 62P, B/L, 4-40 INS
	5	2311774-1	AMPLIMITE* Plug HD22, R/A 15P, B/L, 4-40 INS
	5	2311775-1	AMPLIMITE* Plug HD22, R/A 15P, B/L, 4-40 S/LOC
	5	2311777-1	AMPLIMITE* Plug HD22, R/A 44P, B/L, 4-40 INS

1.6 Qualification Test Sequence

TEST OR EXAMINATION	TEST GROUP									
	A	B	C	D	E	F	G	H	I	J
	TEST SEQUENCE (a)									
Examination of product	1,7	1,9	1,5	1,5	1,5	1,5	1,5	1,3	1,3	1,3
Low Level Contact Resistance		2,8	2,4	2,4	2,4	2,4	2,4			
Dielectric Withstanding Voltage	3,6									
Insulation Resistance	2,5									
Temperature Rise								2		
Mating Force		3,6								
Unmating Force		4,7								
Durability		5								
Vibration, Random			3							
Solderability										2
Resistance to Soldering Heat									2	
Thermal Shock				3						
Humidity	4				3					
Temperature Life						3				
Salt Spray							3			

(a) The numbers indicate sequence in which tests were performed

**2.0. 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 receiving location.

2.2. Low Level Contact Resistance – Groups B, C, D, E, F, and G

All samples were mated contacts assembled in housing and subjected to 50 millivolts open circuit at 100 milliamperes max.

See chart below for the min and max before and after the subjected tests for each sample.

P/N	Group	Max Spec Initial/Final	Min LLCR Initial (MΩ)	Max LLCR Initial (MΩ)	Test	Min LLCR Final (MΩ)	Max LLCR Final (MΩ)
2311586-1 2311774-1	B	20 mΩ /30 mΩ	9.62	13.61	Durability	11.54	15.73
	C		9.26	13.26	Vibration	10.05	14.11
	D		9.28	13.19	Thermal Shock	10.23	13.79
	E		9.13	13.26	Humidity	10.15	14.11
	F		9.81	10.94	Temp Life	10.11	12.08
	G		9.83	10.76	Salt Spray	10.61	13.58
2311771-1 2311773-1	B	20 mΩ /30 mΩ	10.31	11.83	Durability	10.37	13.37
	C		9.82	10.81	Vibration	10.75	14.99
	D		9.93	11.10	Thermal Shock	9.88	12.63
	E		9.81	10.79	Humidity	9.93	14.44
	F		9.97	11.52	Temp Life	10.24	14.95
	G		9.90	10.82	Salt Spray	10.25	12.10
2311763-3 2311775-1	B	20 mΩ /30 mΩ	10.35	11.67	Durability	9.90	13.89
	C		9.88	11.15	Vibration	11.02	15.63
	D		10.01	11.09	Thermal Shock	10.06	12.60
	E		10.11	11.11	Humidity	9.89	13.55
	F		9.94	11.68	Temp Life	9.88	14.26
	G		9.99	10.45	Salt Spray	10.55	13.39
2311770-2 2311777-1	B	20 mΩ /30 mΩ	16.36	16.77	Durability	17.21	17.91
	C		16.28	16.76	Vibration	17.41	17.94
	D		16.47	16.61	Thermal Shock	17.26	17.82
	E		11.47	11.83	Humidity	12.34	12.65
	F		10.39	11.27	Temp Life	11.04	12.65
	G		10.25	11.94	Salt Spray	11.38	12.79

2311766-1	B	20 mΩ /30 mΩ	10.08	11.55	Durability	10.20	12.23
	C		9.96	11.25	Vibration	10.65	13.86
	D		10.30	11.01	Thermal Shock	10.71	14.83
	E		10.04	10.97	Humidity	10.49	14.32
	F		9.87	11.12	Temp Life	10.07	13.74
	G		10.22	10.82	Salt Spray	10.33	13.66
2311765-2	B	20 mΩ /30 mΩ	9.80	11.87	Durability	10.23	12.58
	C		9.89	11.21	Vibration	11.12	14.19
	D		9.81	10.89	Thermal Shock	10.94	13.83
	E		9.94	11.02	Humidity	10.00	13.01
	F		9.92	11.63	Temp Life	10.87	14.53
	G		9.85	10.95	Salt Spray	10.62	14.57
2311768-1	B	20 mΩ /30 mΩ	9.97	11.85	Durability	11.40	13.89
	C		9.84	11.11	Vibration	11.67	13.97
	D		10.19	10.97	Thermal Shock	10.42	14.52
	E		9.90	10.96	Humidity	10.02	14.40
	F		9.92	11.57	Temp Life	10.19	11.66
	G		9.92	10.86	Salt Spray	10.32	12.82

### 2.3 Dielectric Withstanding Voltage – Group A

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

### 2.4. Insulation Resistance – Group A

All initial and final insulation resistance measurements were greater than 1000 megaohms.

### 2.5. Temperature Rise - Group H

All positions were wired in series forming a single circuit in each connector. All samples were tested with the rated current of 3 A and allowed to stabilize. Min T-rise: 7.62 °C; Max T-rise: 28.65 °C

### 2.6. Vibration, Random – Group C

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

#### 2.7. Mating Force – Group B

All mating force requirements were less than the specified requirements. Max Reading: 0.296Kgf/contact

#### 2.8. Unmating Force – Group B

All unmating force requirements were less than the specified requirements. Min Reading: 0.02Kgf/contact

#### 2.9. Durability – Group B

No physical damage occurred to the samples as a result of mating and unmating the connectors for 100 cycles at a rate of 300 cycles/hr..

#### 2.10. Solderability – Group J

The contacts had a minimum of 95% solder coverage.

#### 2.11. Thermal Shock – Group D

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

#### 2.12. Humidity – Group A

No evidence of physical damage to either the contacts or the connector was visible as a result of exposure to humidity.

#### 2.13. Temperature Life – Group F

No evidence of physical damage to either the contacts or the connector was visible as a result of exposure to elevated temperatures.

#### 2.14. Salt Spray – Group G

No evidence of damage or abnormal conditions to either the contacts or the connectors as a result of exposure to the salt spray.

#### 2.15. Final Examination – All Groups

All samples were inspected and accepted by the product assurance department of receiving location.

### 3.0. Test Methods

#### 3.1. Examination of product

Product drawings and inspection plans were used to inspect the samples. They were examined visually and functionally.

#### 3.2 Low Level Contact Resistance

LLCR was measured at low level current using a four-terminal measuring technique. The rest current was maintained at 100 milliamperes with an open circuit voltage at 50 millivolts.

#### 3.3. Dielectric Withstanding Voltage

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

#### 3.4. Insulation Resistance

Insulation resistance was measured between adjacent contacts of unmated connectors, using 500 volts DC for one minute.

#### 3.5. Temperature Rise

Connector temperature was measured, while a single circuit was energized at the specific current.

#### 3.6. Vibration, Random

Mated connectors were subjected to a random vibration test, specified per EIA 364-28 Condition V Test letter A. Each mated connector was tested for 15 minutes in each of the three mutually perpendicular planes.

#### 3.7. Mating Force

The force required to mate individual connectors were measured using a free-floating fixture with the rate of travel of 100 mm per minute.

#### 3.8. Unmating Force

The force required to unmate individual connectors were measured using a free-floating fixture with the rate of travel 100 mm per minute.

#### 3.9. Solderability

Connector assemblies contact tails were subjected to steam aging for 8 hours and then dipped in a solder bath at 260C for 5 seconds. They were then checked visually for 95% coverage.

#### 3.10. Thermal Shock

Subjected mated connector to 5 cycles between -55 degrees C and +85 degrees C with each cycle consisting of thirty minutes dwell time at -55 degrees C and 105 degrees C. The transition between temperatures was less than five minutes.

#### 3.11. Humidity

Mated connectors were subjected to 10 hours at 25 - 65C with 95% relative humidity.

#### 3.12. Temperature Life

Mated connectors were subjected to temperature life at 85C for 96 hours.

#### 3.13. Salt Spray

Mated connectors were subjected to a salt concentration of 5% at 35 +/-2 C for 24 hours.