
Mini-Universal MATE-N-LOK* Connector

1. SCOPE**1.1. Content**

This specification covers performance, tests and quality requirements for MATE-N-LOK* mini-universal connectors.

1.2. Qualification

When tests are performed on the subject product line, procedures specified in Figure 1 shall be used. All inspections shall be performed using the applicable inspection plan and product drawing.

1.3. Qualification Test Results

Successful qualification testing on the subject product line was completed on 02Aug04. Additional testing on alternate plating was completed on 21Jan11. The Qualification Test Report number for this testing is 501-589. This documentation is on file at and available from Engineering Practices and Standards (EPS).

2. APPLICABLE DOCUMENTS

The following documents form a part of this specification to the extent specified herein. Unless otherwise specified, the latest edition of the document applies. In the event of conflict between the requirements of this specification and the product drawing, the product drawing shall take precedence. In the event of conflict between the requirements of this specification and the referenced documents, this specification shall take precedence.

2.1. TE Connectivity (TE) Documents

- 102-950: Quality Specification (Qualification of Separable Interface Connectors)
- 109 Series: Test Specifications as indicated in Figure 1
- 114-16017: Application Specification (Mini-Universal MATE-N-LOK* Connectors)
- 501-589: Qualification Test Report (Mini-Universal MATE-N-LOK* Connector)

2.2. Commercial Standard

EIA-364: Electrical Connector/Socket Test Procedures Including Environmental Classifications

2.3. Reference Document

109-197: Test Specification (AMP Test Specifications vs EIA and IEC Test Methods)

3. REQUIREMENTS**3.1. Design and Construction**

Product shall be of the design, construction and physical dimensions specified on the applicable product drawing.

3.2. Materials

Materials used in the construction of this product shall be as specified on the applicable product drawing.

3.3. Ratings

- Voltage: 600 volts AC or DC
- Current: 11.2 amperes maximum
- Temperature: -55 to 105°C

3.4. Performance and Test Description

Product is designed to meet the electrical, mechanical and environmental performance requirements specified in Figure 1. Unless otherwise specified, all tests shall be performed at ambient environmental conditions per EIA-364.

3.5. Test Requirements and Procedures Summary

Test Description	Requirement	Procedure																		
Initial examination of product.	Meets requirements of product drawing.	EIA-364. Visual and dimensional (C of C) inspection per product drawing.																		
Final examination of product.	Meets visual requirements.	EIA-364. Visual inspection.																		
ELECTRICAL																				
Dry circuit resistance.	10 milliohms maximum initial. 20 milliohms maximum final.	EIA-364-23. Subject specimens to 100 milliamperes maximum and 20 millivolts maximum open circuit voltage. See Figure 3.																		
Insulation resistance.	1000 megohms minimum initial. 100 megohms minimum final.	EIA-364-21. Test between adjacent contacts of mated specimens.																		
Withstanding voltage.	1 minute hold with no breakdown or flashover.	EIA-364-20, Condition I. 1500 volts AC at sea level. Test between adjacent contacts of mated specimens.																		
Temperature rise vs current.	30°C maximum temperature rise at specified current.	EIA-364-70, Method 1. Stabilize at a single current level until 3 readings at 5 minute intervals are within 1°C. See Figure 4.																		
MECHANICAL																				
Termination tensile strength.	<table><tr><th>Wire Size AWG</th><th>Newtons [lbf] (Minimum)</th></tr><tr><td>30</td><td>8.9 [2]</td></tr><tr><td>28</td><td>13.3 [3]</td></tr><tr><td>26</td><td>17.8 [4]</td></tr><tr><td>24</td><td>31.1 [7]</td></tr><tr><td>22</td><td>48.9 [11]</td></tr><tr><td>20</td><td>62.3 [14]</td></tr><tr><td>18</td><td>80.1 [18]</td></tr><tr><td>16</td><td>102.3 [23]</td></tr></table>	Wire Size AWG	Newtons [lbf] (Minimum)	30	8.9 [2]	28	13.3 [3]	26	17.8 [4]	24	31.1 [7]	22	48.9 [11]	20	62.3 [14]	18	80.1 [18]	16	102.3 [23]	EIA-364-8. Determine crimp tensile at a maximum rate of 25 ± 6 mm [.98 ± .24 in] per minute.
Wire Size AWG	Newtons [lbf] (Minimum)																			
30	8.9 [2]																			
28	13.3 [3]																			
26	17.8 [4]																			
24	31.1 [7]																			
22	48.9 [11]																			
20	62.3 [14]																			
18	80.1 [18]																			
16	102.3 [23]																			

Figure 1 (continued)

Test Description	Requirement	Procedure
Vibration, sinusoidal.	No discontinuities of 10 microseconds or longer duration. See Note.	EIA-364-28, Test Condition I. Subject mated specimens to 10-55-10 Hz traversed in 1 minute with 1.5 mm [.06 in] maximum total excursion. 2 hours in each of 3 mutually perpendicular planes. See Figure 5.
Mechanical shock.	No discontinuities of 10 microseconds or longer duration. See Note.	EIA-364-27, Method A. Subject mated specimens to 50 G's half-sine shock pulses of 11 milliseconds duration. 3 shocks in each direction applied along 3 mutually perpendicular planes, 18 total shocks. See Figure 6.
Durability.	See Note.	EIA-364-9. Mate and unmate tin plated specimens for 20 cycles, and gold plated specimens for 50 cycles at a maximum rate of 500 cycles per hour.
Contact retention.	Contacts shall not dislodge. See Note.	EIA-364-29. Apply an axial load of 35.6 N [8 lbf] at a maximum rate of 12.7 mm [.5 in] per minute.
Contact insertion force.	13.3 N [3 lbf] maximum per contact.	TE Spec 109-41. Measure force necessary to insert a contact into the housing at a maximum rate of 12.7 mm [.5 in] per minute.
Mating force.	6.7 N [1.5 lbf] maximum per circuit initial.	EIA-364-13. Measure force necessary to mate specimens without locking latches at a maximum rate of 12.7 mm [.5 in] per minute.
Unmating force.	0.7 N [.15 lbf] minimum per circuit final.	EIA-364-13. Measure force necessary to unmate specimens at a maximum rate of 12.7 mm [.5 in] per minute.
Housing lock strength.	40 N [9 lbf] minimum.	EIA-364-98. Determine housing lock strength at maximum rate of 12.7 mm [.5 in] per minute.
Housing panel retention.	133.4 N [30 lbf].	Determine housing panel retention at maximum rate of 12.7 mm [.5 in] per minute.
ENVIRONMENTAL		
Thermal shock.	See Note.	EIA-364-32, Test Condition VII. Subject specimens to 25 cycles between -55 and 105°C.

Figure 1 (continued)

Test Description	Requirement	Procedure
Humidity/temperature cycling.	See Note.	EIA-364-31, Method III. Subject specimens to 10 cycles (10 days) between 25 and 65°C at 80 to 100% RH.
Temperature life.	See Note.	EIA-364-17, Method A, Test Condition 4. Subject mated specimens to 105°C for 580 hours.
Mixed flowing gas.	See Note.	EIA-364-65, Class IIA (4 gas). Subject mated specimens to environmental Class IIA for 20 days.

NOTE

Shall meet visual requirements, show no physical damage, and meet requirements of additional tests as specified in the Product Qualification and Requalification Test Sequence shown in Figure 2.

Figure 1 (end)

3.6. Product Qualification and Requalification Test Sequence

A. Test Reports CTL1314-004 and CTL7166-007

Test or Examination	Test Group (a)				
	1	2	3	4	5
	Test Sequence (b)				
Initial examination of product	1	1	1	1	1
Dry circuit resistance	3,7	2,7			
Insulation resistance			3,7		
Withstanding voltage			4.8		
Temperature rise vs current		3,8			
Termination tensile strength				2	
Vibration, sinusoidal	5	6(c)			
Mechanical shock	6				
Durability	4				
Contact retention			10		
Contact insertion force			2		
Mating force	2				
Unmating force	8				
Housing lock strength			9		
Housing panel retention					2
Thermal shock			5		
Humidity/temperature cycling		4(d)	6		
Temperature life		5			
Mixed flowing gas		4(d)			
Final examination of product	9	9	11	3	3

NOTE

- (a) See paragraph 4.1.A.
- (b) Numbers indicate sequence in which tests are performed.
- (c) Discontinuities shall not be measured. Energize at 18 °C level for 100% loadings per Quality Specification 102-950.
- (d) The 4th test in this sequence shall be either humidity/temperature cycling for tin plated specimens or mixed flowing gas for gold plated specimens. Precondition specimens with 5 durability cycles.

Figure 2

B. Test Report EA20100461T

Test or Examination	Test Group (a)		
	1	2	3
	Test Sequence (b)		
Initial examination of product	1	1	1
Dry circuit resistance	3,7	2,7	
Temperature rise vs current		3,8	
Vibration, sinusoidal	5	6(c)	
Mechanical shock	6		
Durability	4		
Mating force	2		
Unmating force	8		
Termination tensile strength			2
Temperature life		5	
Mixed flowing gas		4(d)	
Final examination of product	9	9	3

NOTE

- (a) See paragraph 4.1.A.
- (b) Numbers indicate sequence in which tests are performed.
- (c) Discontinuities shall not be measured. Energize at 18 °C level for 100% loadings per Quality Specification 102-950.
- (d) Precondition specimens with 5 durability cycles.

Figure 3

4. QUALITY ASSURANCE PROVISIONS

4.1. Qualification Testing

A. Specimen Selection

Specimens shall be prepared in accordance with applicable Instruction Sheets and shall be selected at random from current production. All test groups shall each consist of 5 random connector assemblies. All contacts shall be crimped to appropriate test conductors per Application Specification 114-16017.

B. Test Sequence

Qualification inspection shall be verified by testing specimens as specified in Figures 2 and 3.

4.2. Requalification Testing

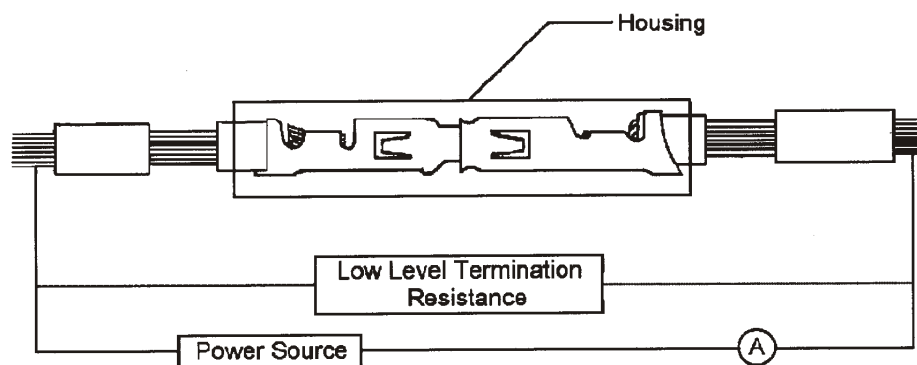
If changes significantly affecting form, fit or function are made to the product or manufacturing process, product assurance shall coordinate requalification testing, consisting of all or part of the original testing sequence as determined by development/product, quality and reliability engineering.

4.3. Acceptance

Acceptance is based on verification that the product meets the requirements of Figure 1. Failures attributed to equipment, test setup or operator deficiencies shall not disqualify the product. If product failure occurs, corrective action shall be taken and specimens resubmitted for qualification. Testing to confirm corrective action is required before resubmittal.

4.4. Quality Conformance Inspection

The applicable quality inspection plan shall specify the sampling acceptable quality level to be used. Dimensional and functional requirements shall be in accordance with the applicable product drawing and this specification.



NOTE Bulk wire resistance shall be subtracted from resistance readings.

Figure 3
Dry Circuit Resistance Measurement Points

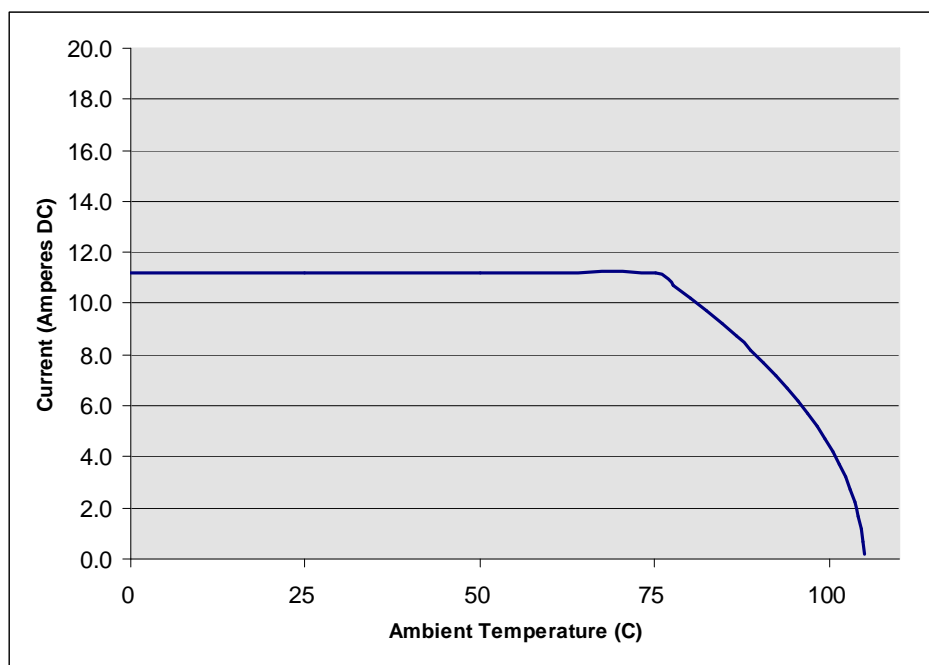


Figure 4A
Current Carrying Capability (11.21 amperes)
Test Reports CTL1314-004 and CTL7166-007

Wire Size (AWG)	Percent Connector Loading		
	Single	47%	100%
Brass/Tin Pin and Socket			
16	1.00	.668	.486
30	.248	.166	.121

NOTE To determine acceptable current carrying capacity for percentage connector loading and wire gage indicated, use the Multiplication Factor (F) from the above chart and multiply it times the Base rated Current for a single circuit at the maximum ambient operating temperature shown in Figures 4A.

Figure 4B
Current Rating
Test Reports CTL1314-004 and CTL7166-007

Derating Curve

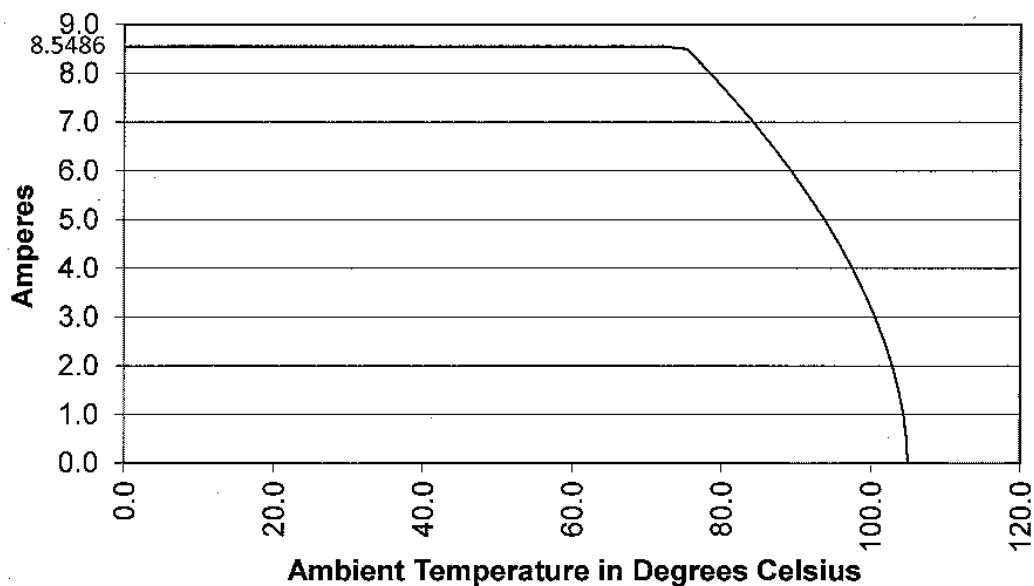


Figure 4C
Current Carrying Capability (8.55 amperes)
Test Report EA20100461T

Wire Size (AWG)	Percent Connector Loading		
	Single	47%	100%
Palladium Nickle Pin and Socket			
18	1.00	.699	.528

NOTE

To determine acceptable current carrying capacity for percentage connector loading and wire gage indicated, use the Multiplication Factor (F) from the above chart and multiply it times the Base rated Current for a single circuit at the maximum ambient operating temperature shown in Figures 4C.

Figure 4D
Current Rating
Test Report EA20100461T

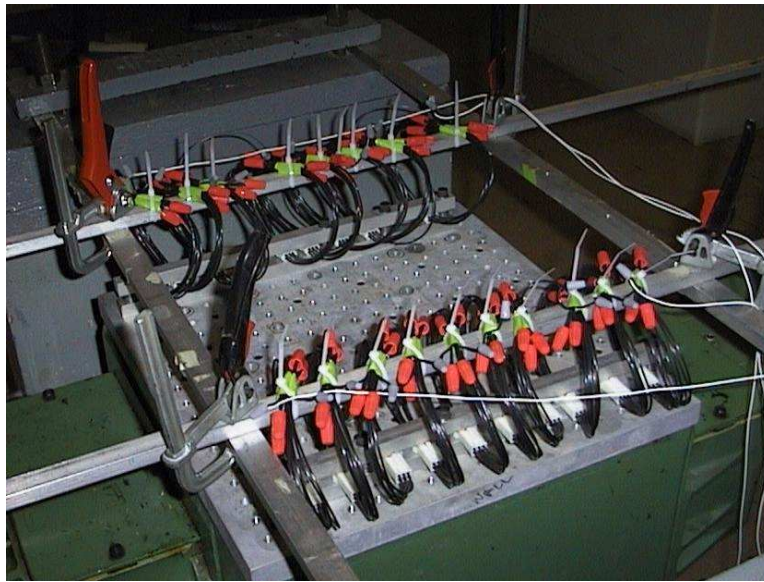


Figure 5
Vibration Mounting Fixture

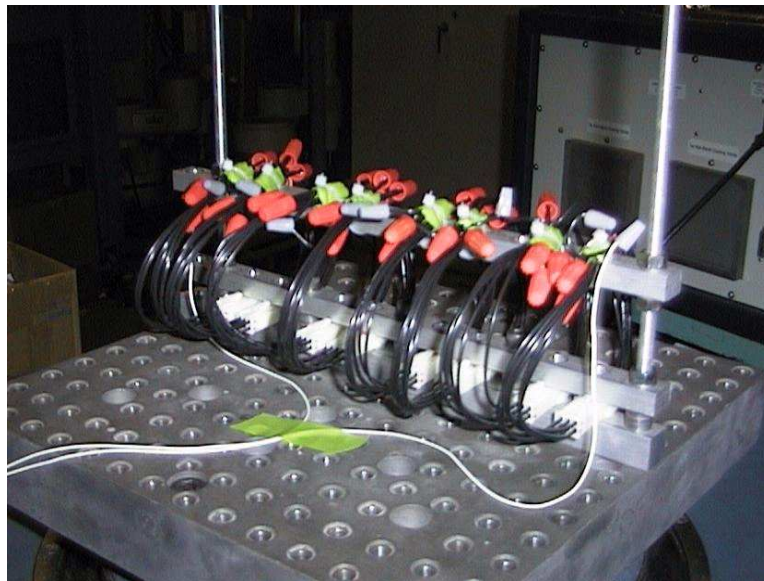


Figure 6
Mechanical Shock Mounting Fixture