POWER TRIPLE LOCK* PCB Headers

1. SCOPE

1.1. Contents

This specification covers performance, tests and quality requirements for the TE Connectivity (TE) POWER TRIPLE LOCK* printed circuit board (PCB) header assemblies. The POWER TRIPLE LOCK* PCB header assembly is a wire-to-board connection consisting of contacts seated in a housing that mates to POWER TRIPLE LOCK* plug housings with contacts on 6.0 mm centerlines. A complete connector consists of a header assembly, a POWER TRIPLE LOCK* plug housing with receptacle contacts crimped to wires and inserted, a TPA (optional) and a CPA (optional).

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. Revision Summary

Revisions to this specification include:

- Design Objective changed to Product Spec
- Not fully tested note removed
- 501-143228 assigned
- DWV changed to 3.2kV and 2.2kV initial/final
- Humidity/Temp test changed from Method III to IV
- Appendix 1 and 2 added

2. APPLICABLE DOCUMENTS

The following documents and forms constitute a part of this specification to the extent specified herein. Unless otherwise indicated, the latest edition of the document applies.

2.1. TE Connectivity Specifications

114-32136	Application Specification (POWER TRIPLE LOCK* PCB Headers)
501-143228	Qualification Test Report
114-106118	Application Specification (POWER TRIPLE LOCK* Connector System)

2.2. Commercial Standards and Specifications

EIA-364	Electrical Connector Test Procedures Including Environmental Classifications

2.3. Reference Document

109-197	Test Specification (TE Test Specifications vs. EIA and IEC Test Methods)

3. REQUIREMENTS

3.1. Design and Construction

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

3.2. Ratings

A. Voltage Rating: 600V AC/DC

B. Current Rating: See Table 1 for applicable current carrying capability. Maximum rated current that can be carried by this product is limited by maximum operating temperature of the housings (105°C or 150°C) and temperature rise of the contacts (30°C). Variables to be considered for each application are: wire size, connector size, contact material, ambient temperature, and printed circuit board design.

C. Temperature Rating:

- Standard Temperature: -55°C to +105°C
- High Temperature version: -55°C to +150°C (rating requires mating with a High Temp Plug containing High Temp Contacts)

3.3. Performance Requirements and Test Description

Where applicable the Headers will be mated with the appropriate POWER TRIPLE LOCK* plug housings containing contacts crimped to #12 AWG stranded wire.

3.4. Test Requirements and Procedure Summary

Test Description	Requirement	Procedure
Examination of Product	Meet requirements of product drawing and TE specification (114-32136). After testing, there shall be no corrosive influence on the performance and no physical damage.	EIA-364-18 Visual and dimensional (C of C) inspection per the product drawing.
Electrical		
Termination Resistance (Low Level Contact Resistance)	Initial: 3.5 mΩ (milliohms) maximum Final: 10 mΩ (milliohms) maximum	EIA-364-23 Subject contacts assembled in a housing to 20mV Max. Open Circuit at 100mA. Subtract the resistance of the wire from measurement. Connection per Figure 2 below.
Insulation Resistance	Initial: 1000 MΩ minimum Final: 100 MΩ minimum	EIA-364-21 Apply 500 VDC and hold for 2 minutes. Test between contacts in adjacent circuits and between housing and contacts in an unmated connector.
Dielectric Withstanding Voltage	1 minute hold without a creep discharge or flashover. Current leakage: 5 mA maximum	EIA-364-20, Condition I 3.2 kilovolts AC at sea level (initial), 2.2 kilovolts AC at sea level (final). Hold at specified voltage for 1 minute. Test between contacts in adjacent circuits and between housing and all contacts in an unmated connector.
Temperature Rise vs. Current	30ºC maximum when subjected to the specified current indicated in Table 1.	EIA-364-70, Method 1 Measure the temperature rise above ambient created by the energizing current. Measurement must be taken at a place where there is no influence from air convection. Contacts to be assembled in housing with all circuits connected. Stabilize at a single current level until 3 readings at 5 minute intervals are within 1ºC.

Figure 1 (continued)

Mechanical		
Sinusoidal Vibration (Low Frequency)	No electrical discontinuity greater than 1 µs shall occur. Final LLCR: 10 mΩ (milliohms) maximum No physical damage.	EIA-364-28, Test Condition I Subject mated connectors to 10-55-10 Hz frequency range traversed over 1 minute at an amplitude of 1.52mm. Apply for 2 hours in each of 3 mutually perpendicular planes. 100 mA applied electrical load
Mechanical Shock	No electrical discontinuity greater than 1 µs shall occur. Final LLCR: 10 mΩ (milliohms) maximum No physical damage.	EIA-364-27 Method H Subject mated connector to 50G's half-sine shock pulse of 11ms duration. 3 drops each to normal and reversed directions of X, Y and Z axis. Total of 18 drops.
Connector Mating Force	(9.0 x Pos.) N maximum per contact	EIA-364-13 Operation speed: 12.7mm/min. Measure the force required to mate connectors without locking latches.
Contact Retention Force	20 N minimum per contact	EIA-364-29 Method C Operation speed: 12.7mm/min. Apply an axial force in the opposite direction of the insertion of the header pin contacts while the housing is secured.
Durability (Manually repeated Mating / Un-mating)	Final LLCR: 10 mΩ (milliohms) maximum	Manually mate and un-mate specimens No. of Cycles: 50 cycles
Resistance to Soldering Heat	See Notes (a) and (b)	EIA-364-56, Procedure 3 Condition Letter G for 5 second and 10 second exposure durations
Connector Locking Strength	89 N minimum (without CPA) 133.5 N minimum (with CPA)	EIA-364-98 Operation speed: 25.4 mm/min (max).
Environmental		
Thermal Shock	Final LLCR: 10 mΩ (milliohms) maximum	EIA-364-32, Test Condition I Subject mated specimens to 25 cycles between -55 °C and 85 °C with 30 minute dwell time at temperature extremes and 1 minute transition between temperatures. This measurement is taken after specimens are held at ambient room temperature for 3 hours.
Humidity-Temperature Cycling	Dielectric withstanding voltage (final) 2.2kV AC 1 minute Final Insulation Resistance: 100 MΩ minimum Final Termination Resistance: 10 mΩ (milliohms) maximum	EIA-364-31, Method IV Subject mated specimens to 10 cycles between 25ºC and 65ºC at 80-100% R.H. Measurements to be recorded after specimens are held for 3 hours at ambient temperature and humidity. 1 cycle is 24 hours.
Salt Spray	Final Termination Resistance: 10 mΩ (milliohms) maximum No corrosive influence on the performance.	EIA-364-26, Condition B Subject mated connectors to 5±1% salt concentration for 48 hours. Measurement is taken after removing the salt. Specimens dried per the specification.

Figure 1 (continued)

Temperature Life	No damage detrimental to product performance.	EIA-364-17, Method A Subject mated connector to 105±2ºC for a duration of 500 hours. Measurement to be recorded after specimens are held for 3 hours at ambient temperature and humidity.
Glow Wire Test 850°C (HDT version only)†	Test at 850°C (Flame duration ≤ 30 seconds after probe removal). Lighted tissue paper shall not burn.	IEC 60695-2-11 and IEC 60335-1 Tests to be conducted on each of 3 perpendicular sides. Perform a visual check and take picture after the test.

† In addition to the 850°C test, the resin must have a GWIT ≥ 775°C.

NOTE

a) Product 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 3.

b) Some distortion of the header is permissible provided that it continues to function and can be mated with the applicable plug.

Figure 1 (end)

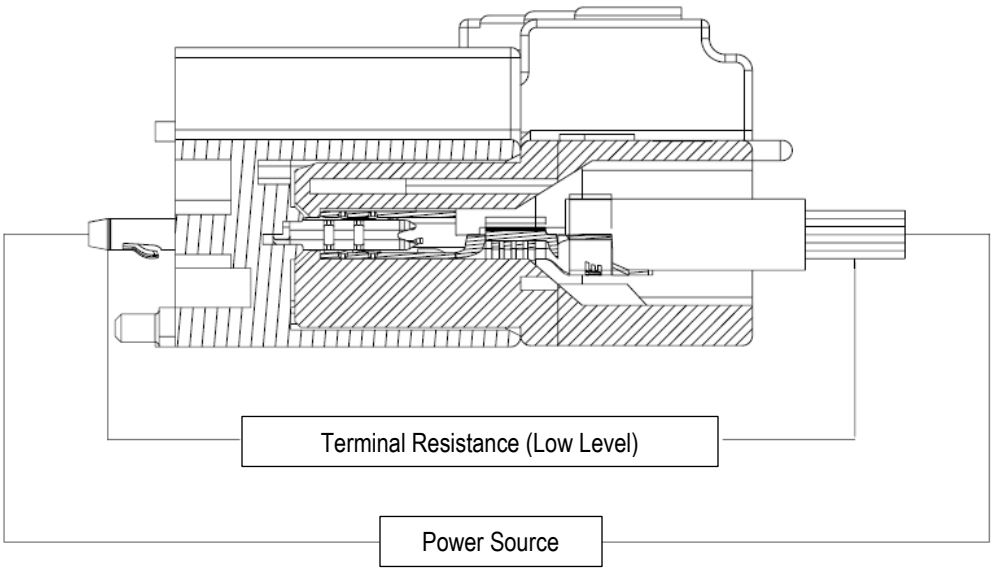


Figure 2: Low Level Contact Resistance Measuring Method

(Resistance of the wire to be subtracted)

3.5. Product Qualification and Requalification Test Sequence

TEST OR EXAMINATION	TEST GROUP (a)								
	1	2	3	4	5	6	7	8	9
	TEST SEQUENCE (b)								
Examination of Product	1, 7	1, 5	1, 8	1, 3	1, 3	1, 5	1, 3	1, 3	1, 3
Termination Resistance (Low Level)	2, 6					2, 4			
Insulation Resistance			2, 6						
Dielectric Withstanding Voltage			3, 7						
Temperature Rise vs. Current		2, 4							
Sinusoidal Vibration (Low Frequency)	4								
Mechanical Shock	5								
Durability (Repeated Mating/Un-mating)	3								
Connector Mating Force								2	
Contact Retention Force							2		
Resistance to Soldering Heat				2					
Connector Locking Strength					2				
Thermal Shock			4						
Humidity-Temperature Cycling			5						
Temperature Life		3							
Salt Spray						3			
Glow Wire Test (High Temp Only)									2

Figure 3

NOTE

a) Specimens shall be prepared in accordance with applicable instruction sheets and shall be selected at random from current production. Test groups 1, 2, 3, 6 and 7 shall each consist of a minimum of 5 specimens with a minimum of 30 data points. Test groups 4, 5, and 8 shall each consist of a minimum of 5 specimens.

b) Numbers indicate the sequence in which tests are performed.

Appendix 1: Initial 30°C T-rise Currents

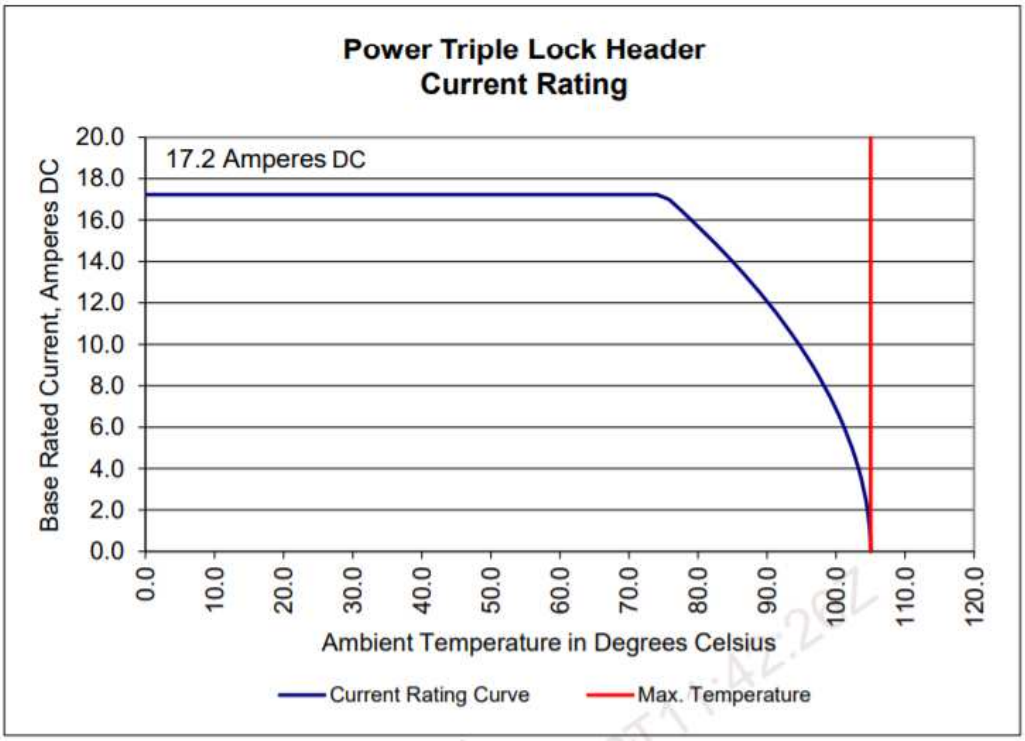
Number of Adjacent Positions (Circuits)	Max Current (A)	
	Vertical Header	Right Angle Header
2	20	19.5
3	19	18.5
4	18	17.5
5	17	16.5

NOTE

a) *These currents are expected to produce an initial 30°C maximum temperature rise at the contacts when the header assembly is soldered into a PC board and mated with a POWER TRIPLE LOCK* high temperature plug assembly containing contacts crimped to #12 AWG wire (see section 3.4). It is expected that the traces in the PC board will be of adequate size so that they do not contribute to the overall temperature.*

b) *It is equally important that the maximum recommended current for the plug assembly not be exceeded (refer to Specification 108-106118).*

Appendix 2: T-Rise Current after Temp Life, 105C at 500 Hours
Current Rating Curve with Standard Temp Header housings (105ºC Temperature Rating) and High Temperature Plug Assembly.



Current Rating Factors (F)

Loading Density	Wire Size, 12 AWG
Single Circuit	1
60%	.862
100%	.787