The product described in this document has not been fully tested to ensure conformance to the requirements outlined below. Therefore, TE Connectivity (TE) makes no representation or warranty, express or implied, that the product will comply with these requirements. Further, TE may change these requirements based on the results of additional testing and evaluation. Contact TE Engineering for further details.

Universal Power Module Connector

1. SCOPE

1.1. Content

This specification covers performance, tests and quality requirement for TE Connectivity (TE)

Universal Power Module Connector (UPM). This module is a hard metric, board-to-board power connector designed to be compatible with IEC 1076-4-101 and is offered in 3 through 12 position modules. The design is in an “inverse-sex” orientation with the vertical receptacle module for finger probe protection. Both the headers and receptacles utilize TE ACTION PIN™ compliant pin for assembly into printed circuit boards. The vertical receptacle leads are polarized to allow only 1 orientation onto the printed circuit board, eliminating the possibility of reverse placement.

All the UPM product series includes four types: UPM right angle header, UPM right angle receptacle, UPM vertical receptacle, UPM vertical header.

1.2. Qualification

When tests are performed on the subject product line, procedures specified in item 3.4 shall be used. All inspections shall be performed using the applicable inspection plan and product drawing.

2. APPLICABLE DOCUMENTS AND FORMS

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. 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 Documents

- 114-1103 Application Specification of TE Universal Power Module (UPM) Connector
- 501-461 Qualification Test Report of TE Universal Power Module (UPM) Connector
- 502-1309 Engineering Report (Evaluation Testing of UPM High Current Header and Receptacle Assemblies)

2.2. Industry Documents

- EIA-364 Electrical Connector/Socket Test Procedures Including Environmental Classifications
- IEC 1076-4-101 Connectors for Electronic Equipment
- 109-197 Test Specification (TE Test Specification vs EIA and IEC Test Methods)

3. REQUIREMENTS

3.1. Design and Construction

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

3.2. Material

Housing: Thermoplastic.

Contact: High conductivity copper alloy

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Plating Version:

Gold plating or equivalent plating on product contact mating area, and matte tin plating on compliant pin area, all over matte nickel base-plated on copper surface. Three plating version available as below:

Plating version I: 0.76um Gold plating over 1.27um matte Nickel based-plating on copper contact area.

Plating version II: 0.76um "Gold plating plus Pd/Ni plating", over 1.27um matte Nickel based-plating on copper contact area.

Plating version III: 1.27um Gold plating over 1.27um matte Nickel based-plating on copper contact area (Replaced in 2006, TE PCN E-06-021069).

3.3. Ratings

- Voltage: 250V AC/DC
- Current:

Rated Current and test record of UPM STD and UPM HC Power Connector

Item	UPM STD Spec.	UPM STD Test Record	UPM HC Spec.	UPM HC Test Record
UPM 3P	10A	12A	16A	21A
UPM 4P	10A	11.5A	16A	20A
UPM 8P	10A	10A	16A	18.5A
UPM 12P	10A	8.5A	16A	17.5A

The Product Current vs Temperature Rise Curve, please refer to the appendix.

- Operating temperature: -55°C to 125°C
- Storage temperature: 20°C to 30°C

3.4. Test Requirements and Procedures Summary

Product is designed to meet the electrical, mechanical and environmental performance requirements specified in Item 3.5. Unless otherwise specified, all tests shall be performed at ambient environmental conditions, in accordance with EIA-364, 109-197.

Unless otherwise specified, all tests shall be performed at ambient environmental conditions.

Test Description	Requirement	Procedure
Initial examination of product	Meets requirements of product drawing, applicable instructions on customer drawing, and application specification.	EIA-364-18. Visual and dimensional (C of C) inspection per product drawing. Document gold plating thickness at contact interfaces.
Final examination of product	Meets visual requirements.	EIA-364-18. Visual inspection.

Test Description	Requirement	Procedure
	ELECTRICAL	
Product contact resistance, gold plating version	5 milliohms maximum, and Δ5 milliohms maximum.	EIA-364-23. Subject specimens to 100 milliamperes maximum and 20 millivolts maximum open circuit voltage.
Product contact resistance, gold plus Pd/Ni plating version	5 milliohms maximum, and Δ5 milliohms maximum.	EIA-364-23. Subject specimens to 100 milliamperes maximum and 20 millivolts maximum open circuit voltage.
Insulation resistance.	10000 megohms minimum	EIA-364-21. 500 volts DC, 1 minute duration. Test between adjacent contacts of specimens.
Withstanding voltage.	1500 V AC/DC, no breakdown or flashover.	EIA-364-20, Condition I. 1500 volts AC/DC duration 1 minute test between adjacent contacts of specimens.
Temperature rise vs current.	30°C maximum temperature rise at specified current.	EIA-364-70, Method II. Stabilize at a single current level until 3 readings at 5 minute intervals are within 1°C.

Test Description	Requirement	Procedure
	MECHANICAL	
Vibration for gold plating version	No discontinuities of 1 microsecond or longer duration. See Note.	EIA-364-28, Test Condition V, letter C. Duration 120 minutes in each of three mutually perpendicular planes.
Vibration for gold plus Pd/Ni plating version	No discontinuities of 1 microsecond or longer duration. See Note.	EIA-364-28, Test Condition V, letter C. Duration 120 minutes in each of three mutually perpendicular planes.
Mechanical shock	No discontinuities of 1 microsecond or longer duration. See Note.	EIA-364-27, TE Spec 109-26-1. Subject mated specimens to 50 G's half-sine shock pulses of 11 milliseconds duration. Five shocks in each direction applied along 3 mutually perpendicular planes, 30 total shocks.

Durability	250 cycles	EIA-364-09. Mate and unmate specimens for 200 cycles at a maximum rate of 500 cycles per hour.
Mating force	1 N maximum per contact	EIA-364-13. Measure force to mate specimens at a maximum rate of 12.7 mm [.5 in] per minute.
Unmating force	0.5 N minimum per contact	EIA-364-13. Measure force to unmate specimens at a maximum rate of 12.7 mm [.5 in] per minute.
Termination strength.	See Note.	EIA-364-13, TE Spec 109-64. Apply axial force of 10 N to plug contacts in both the mating and unmating directions at a maximum rate of 2.54 mm per minute and hold for 10 seconds.
Static load, transverse.	See Note.	A 25 N side-to-side load and a 50 N front-to-back load shall be applied to unmated plug and receptacles using a 3 mm rod with rounded end. Load shall be applied in the middle of the plug and receptacle modules approximately 6 and 11 mm above the printed circuit board.
Contact retention.	Axial displacement shall not exceed 0.2 mm with force applied or 0.1 mm after force has been removed.	EIA-364-13, TE Spec 109-30-1. 1. Apply axial force of 10 N to pin contacts in the unmating direction at a maximum rate of 2.54 mm per minute and hold for 5 seconds. 2. Apply axial force of 5 N to pin contacts in the mating direction at a maximum rate of 2.54 mm per minute and hold for 5 seconds. 3. Apply axial force of 5 N to receptacle contacts in both the mating and unmating directions at a maximum rate of 2.54 mm per minute and hold for 5 seconds.
Reseating	See Note.	Manually mating/unmating samples for three cycles.

Test Description	Requirement	Procedure
	ENVIRONMENTAL	
Thermal shock	See Note.	EIA-364-32. Subject mated specimens to 5 cycles between -55°C and 125°C.
Humidity, steady state.	See Note.	TE Spec 109-23-2, Condition D. Subject specimens to 56 days at 40°C and 93% RH with 60 volts DC applied between adjacent contacts.
Humidity-temperature cycling.	See Note.	EIA-364-31, TE Spec 109-23-3. Subject specimens to 6, 24 hour cycles of humidity/temperature cycling. A cycle consists of the following: Transition from 25°C and 95% RH to 55°C and 90% RH in 3 hours. Dwell at 55°C and 90% RH for 9 hours. Transition from 55°C and 90% RH to 25°C and 80% RH in 3 hours. Dwell at 25°C and 95% RH for 9 hours. At the end of the first cycle, remove specimens from chamber and precondition at -55°C for 2 hours. Place specimens in an altitude chamber and subject all adjacent contact pairs to 200 volts AC for 1 minute at a simulated altitude of 30000 feet.
Temperature life for gold plating version	See Note.	EIA-364-17, Method A, Condition 5. Subject mated specimens to 125°C for 16 hours.
Temperature life for gold plus Pd/Ni plating version	See Note.	EIA-364-17, Method A, Condition 5. Subject mated specimens to 125°C for 16 hours.

Mixed flowing gas (3 gas).	See Note.	TE Spec 109-85-2. Subject mated specimens to environmental class II for 14 days.
Mixed flowing gas (4 gas).	See Note.	EIA-364-65, Class IIA. Subject mated specimens to environmental Class IIA for 20 days (10 days unmated, 10 days mated).
Industrial atmosphere.	See Note.	Subject 4 mated and 4 unmated specimens to 10 days exposure in a 500 ppm concentration of sulphur dioxide and a 100 ppm concentration of hydrogen sulfide at 25°C and 75% RH.
Electrical load, high temperature.	See Note.	TE Spec 109-43. Subject mated specimens with thermocouples attached and energized at 7.8 amperes to oven temperature of 70°C. Increase oven temperature until internal specimen temperature stabilizes at 125°C.

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 paragraph 3.5.*

3.5. Product Qualification Test Sequence

Test or Examination	Test Group (a)							
	1	2	3	4	5	6	7	8
	Test Sequence (b)							
Examination of product	1,17	1,12	1,11	1,10	1,7	1,8	1,5	
Product contact resistance, Au plating	2,13	2,8	2,7	2,7	2	2,6	2,4	
Product contact resistance, Au+Pd/Ni plating								1,3,5,7,9,11,13
Insulation resistance	3,12	3,9	3,6	3,8	3			
Dielectric withstanding voltage	4,14	4,10	4,8	4,9	4			
Temperature rise vs current						7		
Sinusoidal vibration, Au plating	7					5		
Sinusoidal vibration, Au+Pd/Ni plating								12
Mechanical shock	8							
Durability, Au plating		5,7		5				
Durability, Au+Pd/Ni plating								4,10
Contact retention					6			
Mating force	5,15		9					
Unmating force	6,16		10					
Termination strength					5			
Static load, transverse		11						
Thermal shock	9							
Humidity, steady state			5					
Humidity/temperature cycling	11(c)							
Electrical load, high temperature				6				
Temperature life, Au plated product	10					4		
Temperature life, Au+Pd/Ni plating								2
Mixed flowing gas (3 gas)						3(d)		
Mixed flowing gas (4 gas), Au plating							3	
Mixed flowing gas, Au+Pd/Ni plating								6(e),8(f)
Industrial atmosphere		6						

NOTE

(a) See paragraph 4.1.A.
(b) Numbers indicate sequence in which tests are performed.
(c) Perform dielectric withstanding voltage at 30000 feet after first cycle
(d) Precondition specimens with 10 cycles durability.
(e) Mated specimens.
(f) Unmated specimens.

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. Each test group shall consist of the fully populated head and receptacle connector with a minimum of 10 power contacts and 10 signal contacts measured.

B. Test Sequence

Qualification inspection shall be verified by test specimen as specified in Item 3.4.

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

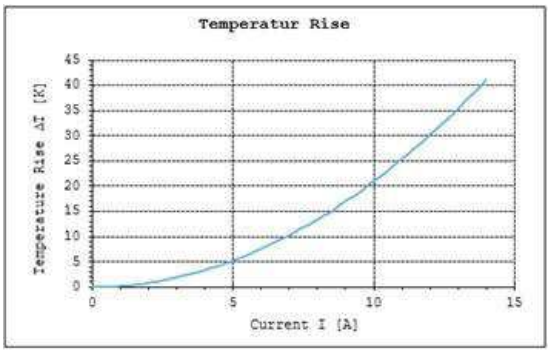
Acceptance is based on verification that the product meets the requirements of item 3.4. Failures attributed to equipment, test setup or operator deficiencies shall not disqualify the product. If product failure occurs, corrective action shall be taken and specimens resubmitted for qualification. Testing 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.

Appendix: Product Current & Temperature-rise, and Derating Curve

Figure 1. Current & Temperature-rise Curve, and Derating Curve of TE UPM STD 3P power



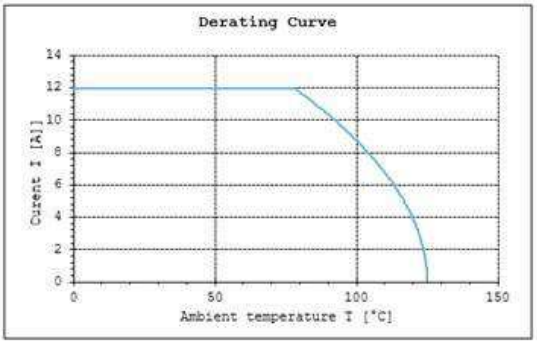
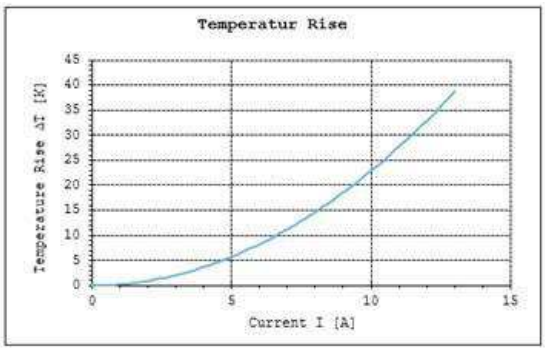


Figure 2. Current & Temperature-rise Curve, and Derating Curve of TE UPM STD 4P power



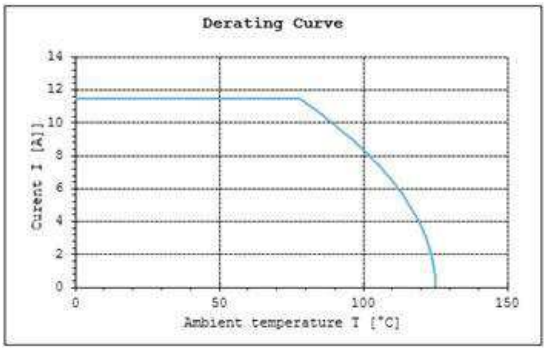
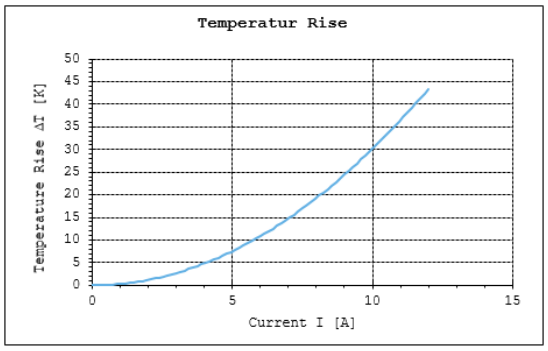


Figure 3. Current & Temperature-rise Curve, and Derating Curve of TE UPM STD 8P power



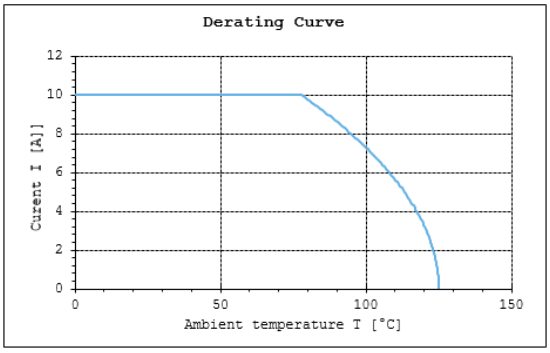
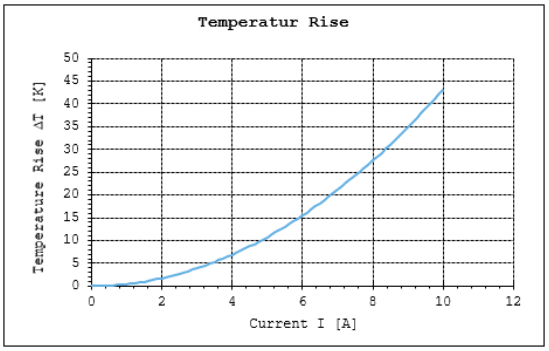


Figure 4. Current & Temperature-rise Curve, and Derating Curve of TE UPM STD 12P power



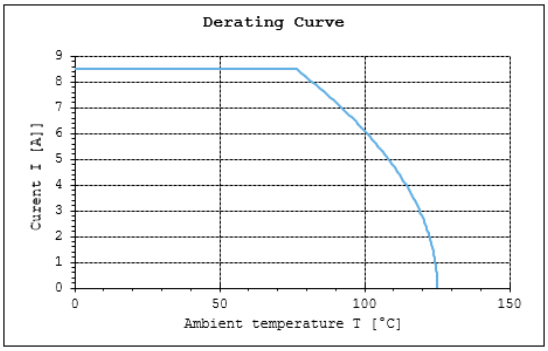


Figure 5. Current & Temperature-rise Curve, and Derating Curve of TE UPM HC 3P power

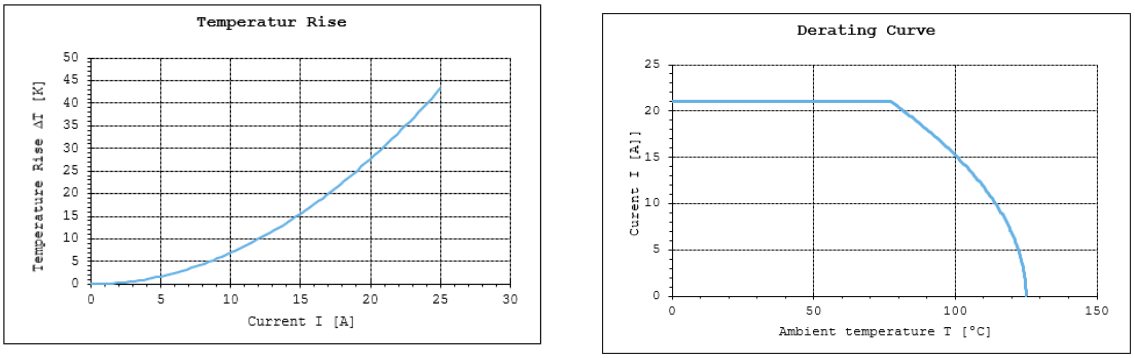


Figure 6. Current & Temperature-rise Curve, and Derating Curve of TE UPM HC 4P power

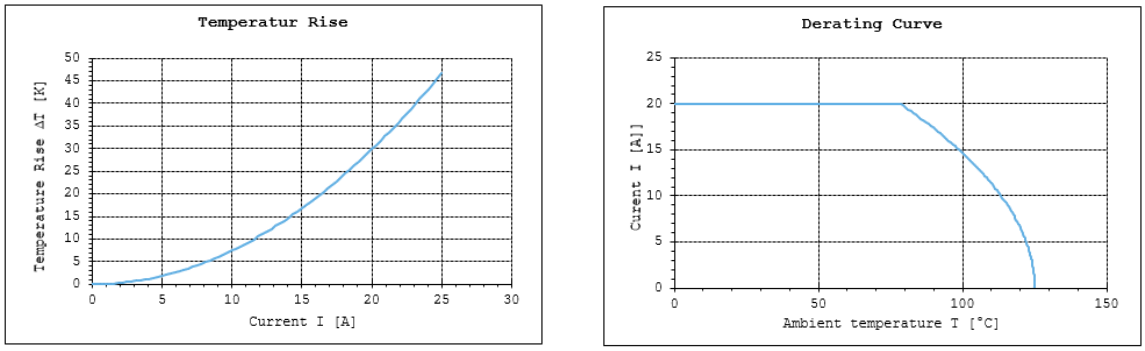


Figure 7. Current & Temperature-rise Curve, and Derating Curve of TE UPM HC 8P power

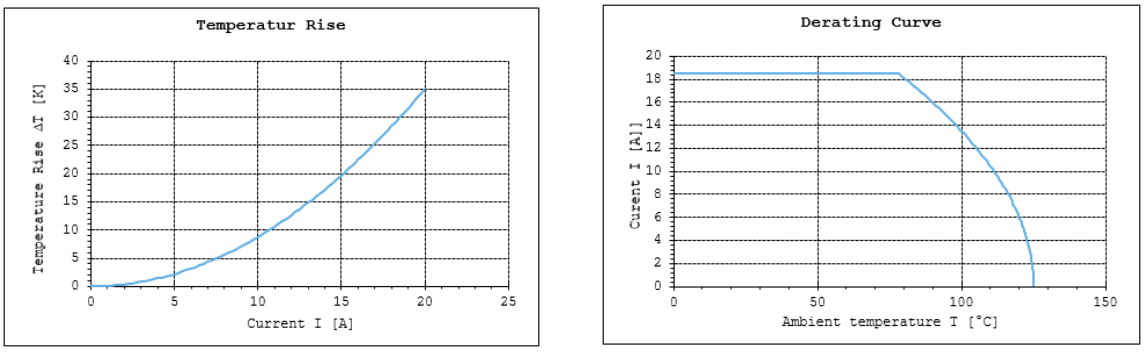


Figure 8. Current & Temperature-rise Curve, and Derating Curve of TE UPM HC 12P power