ELCON Mini cable-to-board power connector system, Three Position

1. SCOPE

1.1. Content

This specification covers the performance, test and quality requirements for the ELCON Mini three position cable connector plug and two mating board mount connectors. The cable connector plug assembly is used to connect the cable to the pc-board connector assembly.

1.2. Qualification

When tests are performed on subject product, procedures specified in this Product Specification shall be used. All inspections shall be performed using applicable inspection plan and product drawing.

2. APPLICABLE DOCUMENTS

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

2.1. TE Connectivity Documents

- 501-128028 Test report, Power/IO 35A Max. connector system
- 114-128029 Application specification, Power/IO 35A Max. connector-system
- 114-18037 Application specification, Standard Power Timer Contact
- 108-18025 Product specification, Standard Power Timer Contact
- 108-19346 Product specification, 2pos cable-to-board power connector system
- TEC-109-201 Test-specification, Component Heat Resistance to Lead-Free Reflow Soldering

2.2. Industry Document

IEC 60512 Connectors for electronic equipment - Tests and measurements
EIA-364 Electrical Connector/Socket Test Procedures Including Environmental Classifications

3. REQUIREMENTS

3.1. Design and Construction.

Products shall be of design, construction and physical dimensions as specified on the applicable customer product drawings C-2204529, C-2204534, C-2205535 and C-2204581.

3.2. Materials and finish.

- Housing cable connector- Liquid crystal polymer (LCP) Glass filled, color black, UL 94V-0.
- Housing board connector - Liquid crystal polymer (LCP) Glass filled, color black, UL 94V-0.
- Contacts power - Copper alloy, silver plated.

3.3. Ratings

| Indicates Change

- Operating voltage: 400V AC/DC
- Current:

  Max current for: 0.75mm² = 10A
  2.5mm² = 20 A
  4.00mm² = 26 A
  6.00mm² = 35 A

- Operating temperature: -40°C to 105°C
- Durability: 50 cycles.

3.4. Performance and Test Description

The product is designed to meet electrical, mechanical and environmental performance specified in this paragraph as tested per test sequence specified in Para 3.6.
Unless otherwise specified, all tests are performed at ambient environmental conditions per IEC specification 60068-1 clause 5.3 and are performed with connectors in mated condition.

V I S U A L			
Para	**Test Description**	**Performance Requirements**	**Procedures**
3.4.01	Examination of product	• Meets requirements of product drawing and applicable instructions on customer drawing, instruction sheet and application specification.	• Visual, dimensional and functional per applicable inspection plan.

E L E C T R I C A L			
Para	**Test Description**	**Performance Requirements**	**Procedures**
3.4.10	Termination resistance power contacts	• Termination resistance 3: Requirement: 0.8 mΩ max. (Initial) 0.8 mΩ max. (Final) • Termination resistance 1: Requirement: 2 mΩ max. (Initial) 2 mΩ max. (Final)	• In acc. with IEC 60512-2-1 • Max. open voltage 20mV. • Max. current 100 mA DC. • All contacts to be ensured. • Measuring points shall be as indicated in Figure 2
3.4.11	Insulation resistance	• 5x10³ MΩ minimum Initial • 1x10³ MΩ minimum final	• In accordance with IEC 60512-3-1 • Test voltage 100V DC. • Duration: 1 minute. • Test between adjacent contacts.
3.4.12	Voltage proof	• No break-down or flash-over	• In acc. with IEC 60512-4-1 • Test voltage 500 V rms for adjacent contacts unmated • Duration 1 minute. • Test is applicable for unmated board-connector and unmated cable-connector
3.4.13	Electrical load and temperature	• Temperature rise is 30℃ maximum over ambient temperature.	• In accordance with IEC 60512-9-2 • Oven temperature: 65℃ • Duration: 1000 hrs • Current: For 6mm² conductor, 35A, all contacts charged.
3.4.14	Current temperature derating curve	• Temperature rise is 30℃ maximum over ambient temperature	• In acc. with IEC 60512-5-2 test 5b • 35A for 6mm² Conductor

3.4.15	Short-circuit capacity power contacts		• Test-current 3000 A/ 10 ms on a mated connector-system • Max 5 operations • Executed by customer
3.4.16	Resistance with bulk resistance	• Termination resistance 2: Requirement: 1.5 mΩ average. (Initial) 1.5 mΩ average. (Final)	• In acc. with IEC 60512-2-1 • Max. open voltage 20mV. • Max. current 100 mA DC. • All contacts to be ensured. Measuring points shall be as indicated in Figure 2

MECHANICAL			
Para	**Test Description**	**Performance Requirements or Severity**	**Procedures**
3.4.20	Vibration Sinusoidal	• No discontinuity > 1µs. is allowed • no physical damage is allowed	• In accordance with IEC 60512-6-4 • 10-500 Hz sweeping • 1 oct./min. • displacement 0,75mm • peak-acceleration: 10g • duration of 30 minutes in each of 3 mutual perpendicular axes.
3.4.21	Physical shock	• No discontinuity > 1µs. is allowed • no physical damage is allowed	• In accordance with IEC 60512-6-3 • Subject connector to 50 g half sine shock, pulses of 11ms duration. • 6 shocks in each of 3 mutual perpendicular axes.
3.4.22	Insertion/withdrawal forces	• Total mating force 60N maximum;120N for 2X3 • total un-mating force 6N minimum; 12N min. for 2X3	• In accordance with IEC 60512-13-2 • Mate and un-mate connector-pair separately • Speed: 10 mm/min.
3.4.23	Latch activation force	• Maximum force needed to open latch: 30N	• In accordance with TE lab-procedures.
3.4.24	Mechanical operation	• No functional damage is allowed • Locking latch shall latch into the PCB connector.	• In accordance with IEC 60512-9-1 • Mate and un-mate connector-pair • Rate: 500 cycles/hour. Speed: 10 mm/s • Operation cycles: 50 times; 100 times for Au plating
3.4.25	Contact retention force in cable connector.	• Maximum allowed displacement is 0,2 mm	• In accordance with IEC 60512-15-1 • Apply 50 N straight force at a contact of the cable connector, in un-mating direction during 10 sec.
3.4.26	Cable pull in 5 directions	• No functional damage is allowed • Latch should be in place.	• In accordance with IEC 60512-17-3 • Cable connector mated on board connector. • Directions: un-mating, up, down, left, right • Pull on pair of wires with 60 N forces, during 10 sec.
3.4.27	Locking latch strength	• No functional damage is allowed • Latch should be in place.	• In accordance with IEC 60512-15-1 • Apply 100 N straight force at the mated cable connector, in un-mating direction.
3.4.28	Crimp tensile.	• Power Contact Conduct Size Tensile 0.75mm² 100N 2.5mm² 200N 4mm² 250N min. 6mm² 300N min.	• In accordance with IEC 60512-16-4, Test 16d Tensile strength (crimped connections) • Determine crimp tensile at a rate of 25 to 100mm per minute. • The cable clamp should not be attached (it must be left open) when performing the

			tensile test.
3.4.29	Mounting force in to PCB for hold down	• 20N max. per contact	• In accordance with IEC 60512-13-2 • Insert Board Connector into PCB • Speed: 10 mm/min.
3.4.30	Complaint pin insertion	• EON: 110N max. per complaint pin • Action Pin: 60~200N per action pin	• EIA-364-5 • Measure force necessary to correctly apply a specimen to a printed circuit board at a maximum rate of 12.7mm per minute.
3.4.31	Radial hole distortion	• 0.070 mm maximum radial distortion. 0.008mm minimum copper wall remaining.	• EIA-364-96 • Measure at 0.2~0.5mm depth.
3.4.32	Complaint pin retention	• EON: 6.7N Min. per complaint pin • Action Pin: 40N Min. per action pin	• EIA -364-29 • Measure force necessary to remove a correctly applied specimen from its printed circuit board at a maximum rate of 12.7mm per minute.
3.4.33	Break force of pull tab for 2x3	• 240N	• In accordance with IEC 60512-15-1 Speed:10mm/min.

E N V I R O N M E N T A L			
Para	**Test Description**	**Performance Requirements**	**Procedures**
3.4.40	Rapid change of temperature	See Note.	• In accordance with IEC 60512-11-4 • -40°/90°C, 0,5 hrs / 0,5 hrs, 5 cycles
3.4.41	Climatic sequence	See Note.	• In accordance with IEC 60512-11-1 • Sequence: 90°C, 16 hrs 25°/55°C, RH 93%, 24 hrs -40°C, 2 hrs 25°/55°C, RH 93%, 24 hrs
3.4.42	Damp/heat steady state	See Note.	• In accordance with IEC 60512-11-3 • Temperature 40°C, RH 95%, • Duration: 21 days
3.4.43	Corrosion mixed flowing gas	See Note.	• In accordance with IEC 60512-11-7 • Temperature 25°C, RH 75%, • Cl2 10 ppb, NO2 200 ppb, H2S 10 ppb, SO2 200 ppb. Duration: 10 days
3.4.44	Thermal shock	• No functional damage is allowed • Locking latch shall latch into the PCB connector.	• EIA-364-32F, Test Condition II. • Subject mated specimens to 5cycles between -65 and 105°C with 120 minute dwells at temperature extremes.
3.4.45	Temperature life	• No functional damage is allowed • Locking latch shall latch into the PCB connector.	• EIA-364-17, Method B, Test Condition 4, Test Time Condition C. • Subject mated specimens to 105°C for 1000 hours.

Figure 1 (end)

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.

3.5. Additional Test and Measuring Details

Termination Resistance Measurement.
Termination resistance shall be measured as indicated in Figure 2.
Bulk of wire with crimp resistance is included in the requirement of R3 and therefore it shall be measured and documented separately.

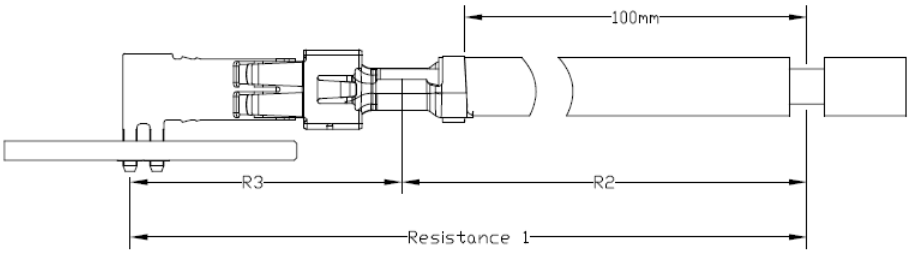

Figure 2

3.6. Product Qualification and Requalification Test Sequence

Test or examination	Para	TEST-GROUP (a)									
		1	2	3	4	5	6	7	8	9	10
		TEST-SEQUENCE (b)									
Examination of product	3.4.01	1,9,13	1,6	1,9	1,17	1,4	1,6	1,3(c)	1	1, 5	1
Termination resistance	3.4.10	2,6,10	2,5	2,4,6,8	2,6,10,14						
Insulation resistance	3.4.11				3,7,11,15						
Voltage proof	3.4.12				4,8,12,16						
Electrical load and temperature	3.4.13		4								
Current temperature derating curve	3.4.14		3								
Short-circuit capacity power contacts	3.4.15							2(c)			
Resistance at crimp	3.4.16					2					
Vibration Sinusoidal	3.4.20	4									
Physical shock	3.4.21	5									
Insertion/withdrawal force(No contacts)	3.4.22	3,12									
Latch activation force	3.4.23						2,5				
Mechanical operation(half of number)	3.4.24			3,7							
Contact retention in cable connector	3.4.25	11									
Cable pull in 5 directions	3.4.26	7									
Locking latch strength	3.4.27	8									
Crimp tensile	3.4.28					3					
Mounting force in to PCB	3.4.29								2		
Complaint pin insertion	3.4.30									2	
Complaint pin distortion	3.4.31										
Complaint pin retention	3.4.32									4	
Break force of pull tab	3.4.33										2
Rapid change of temperature	3.4.40				5						
Climatic sequence	3.4.41				9						
Damp/heat steady state	3.4.42				13						
Corrosion mixed flowing gas	3.4.43			5(d)							
Thermal shock	3.4.44						3				
Temperature life	3.4.45						4			3	

Figure 3 (continued)

Note, (a) See paragraph 4.1
(b) Numbers indicate sequence in which tests are performed
(c) Executed by the customer
(d) Connectors for this tests shall be preconditioned by mating and un-mating 10 cycles

Sample-quantities	Sum	TEST-GROUP									
		1	2	3	4	5	6	7	8	9	10
Board connectors	24	6	6	3	3		3	3	6	6	
Cable connectors(Terminated to cable)	21	6(e)	6(e)	3	3			3			
Cable with power contact	6					6(e)					
Cable connectors(No cable)	3						3				
Cable connectors(2x3, No cable)	3						3				5

(e) Half are 4mm² cables the other half are 6mm² cables.

Figure 3(end)

4. QUALITY ASSURANCE PROVISIONS

4.1. Qualification Testing

A. Specimen Selection

Samples shall be prepared in accordance with applicable instructions and shall be selected at random from current production.

Unless details to perform test require otherwise, plugs shall be terminated on cables according to applicable instructions and requirements specified in appropriate Application Specification and Instruction Sheet.

Unless otherwise specified, all test-groups shall each consist of a minimum of 5 connectors of which all contacts shall be tested.

B. Test Sequence

Qualification inspection shall be verified by testing samples as specified in paragraph 3.7

4.2. Requalification Testing

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

4.3. Acceptance

Acceptance is based on verification that product meets requirements of Para 3.4. Failures attributed to equipment, test set-up, test sub-components or operator deficiencies shall not disqualify the product. When product failure occurs, corrective action shall be taken and samples resubmitted for qualification. Testing to confirm corrective action is required before re-submittal.

4.4. Quality Conformance Inspection

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