



2 to 6 pos, MCON 1.2 – LL Connector Family, Sealed – HT Application

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1. SCOPE

1.1 Content

This specification covers the performance, tests and quality requirements for the Connector 2 to 6pos. MCON 1.2 – LL Connector Family, Sealed - HT Application

1.2 Qualification

**When tests are performed the following specifications and standards shall be used.
All verification shall be performed using the applicable inspection plan and product drawing.**

1.3 Connector overview

2. APPLICABLE DOCUMENTS

The following documents are part of this specification. In the case of conflict between the requirements of this specification and the product drawing or of conflict between the requirements of this specification and the referenced documents, this specification shall take precedence.

2.1 TE Documents

- A 109-1: General Requirements for Test Specifications
- B Customer Drawings
- C Application Specification for MCON 1.2 - Female Connectors
[114-18861](#)
- D Application Specification for MCON 1.2 - Male Connectors
[114-18910](#)
- E Product Specifications for MCON 1.2 - Contact
[108-18782](#)
- F Application Specification for MCON 1.2 - Contact
[114-18464](#)

2.2 Other Documents

SEA International; USCAR-2; Revision 6; Revised: February 2013
PERFORMANCE SPECIFICATION FOR AUTOMOTIVE ELECTRICAL CONNECTOR SYSTEM

- A DIN IEC 512 Electromechanically components for electronic equipment, basic testing procedures and measuring methods
Edition: June 1995
- B ISO 8092/2 Road Vehicles-Connections for on-board electrical wiring harnesses
Edition: February 1996
- C DIN IEC 68 Electrical engineering, basic environmental testing procedures
Edition: March 1983
- A DIN 40050 Part 9 Road vehicles, degrees of protection (IP-Code), protection against foreign objects, water and contact, electrical equipment
Edition : May 1993
- B Test guidelines for Road Vehicles-Connectors – LV214 *)
Edition: 2004-10

*) All mechanical and Water tightness property verification of the connector were conducted and fulfilled in accordance with LV214 as well: PG6, PG7, PG8, PG23 and PG28

3. REQUIREMENTS

3.1 Design and Construction

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

3.2 Materials

Descriptions for material see in customer drawings

3.3 Ratings

A Voltage acc. IEC 664 (DIN VDE 0110)

B Current carrying capability of used contacts see specification 108-18782

C Temperature -40 to +150 °C – USCAR-2 Spec. Temp. Class 4 *)

D Degree of Protection IPX9K

E Durability depends on contacts
See specification [108-18782](#)

*) ambient temperature and heating up by current

3.4 Performance and Test Description

The product is designed to meet the electrical, mechanical and environmental performance requirements specified in paragraph 3.5. All tests are performed at environmental conditions per IEC 512 unless otherwise specified.

3.5 Test Requirements and Procedures Summary

3.5.1 General Requirements

Test Description	Requirement	Procedure
Visual- and dimensional examination	Meets requirements of product-customer-drawing	
ELECTRICAL INSPECTIONS		
Current-temperature capability	See TE-Specification 108-18782, MCON-1.2 Dependent of the application and type, different values result for which reason reference should be made to examples in the specification. When a comparable example cannot be found, the application must be investigated and tested on an individual basis.	
Max. temperature rise of contacts		
Change of temperature rise at the end of lifetime		
Voltage proof	Value and nature of the test voltage: 500V~ No disruptive/breakdown	Acc. DIN IEC 60512-2, Test 4a Method to be used: C Time of testing 60s
Insulation resistance	Insulation resistance > 100 MΩ	Acc. DIN IEC 60512-2, Test 3a Method to be used: C Test voltage: 500V= Time of testing: 60s

MECHANICAL INSPECTIONS			
Terminal retention force	First locking device	min. 30N	Acc. to USCAR-2; Rev. 6 Point 5.4.1 Testing speed: 50mm/min
	Second locking device	min. 70N	
	The required retention forces are absolute values.		
Terminal insertion force	Socket:	max. 15N	Acc. to USCAR-2; Rev. 6 Point 5.4.1 Testing speed: 50mm/min
Connector to Connector mating force (Fully equipped connectors)	2-6pos. :	max. 75N	Acc. to USCAR-2; Rev. 6 Point 5.4.2 Testing Speed: 50mm/min
Connector to Connector un-mating force – Connector lock fully disengaged (Fully equipped connectors)	2-6pos :	max. 75N	Acc. to USCAR-2; Rev. 6 Point 5.4.2 Testing speed: 50mm/min
Connector to Connector un-mating force – Connector lock fully engaged (Fully equipped connectors)	Retention force (without damage or deformation of the housing) 2-6pos :	max. 110N	Acc. to USCAR-2; Rev. 6 Point 5.4.2 Testing speed: 50mm/min
Polarization Feature Effectiveness	2-6pos :	min. 150N	Acc. to USCAR-2; Rev. 6 Point 5.4.4 Testing speed: 50mm/min
Miscellaneous Component Engage and Disengage Force Retainer moving forces	Closing Force of Retainer (Pre-set to lock) 2-6pos :	min. 15N max. 60N	Acc. to USCAR-2; Rev. 6 Point 5.4.5 Testing speed: 50mm/min
	Opening Force of Retainer (Lock to Pre-set) (without damage or deformation of the locking device)		
	2-6pos :	min. 18N max. 50N	

<p>Miscellaneous Component Engage and Disengage Force</p> <p>CPA moving forces</p>	<p>Engage force (Pre-set to lock) Mated with Counterpart (without damage or deformation of the CPA)</p> <p>2-6pos : max. 22N</p> <p>Disengage force (Lock to Pre-set) Mated with counterpart (without damage or deformation of the CPA)</p> <p>2-6pos : min. 10N max. 30N</p> <p>Engage force (Pre-set to lock) Without Counterpart (without damage or deformation of the CPA)</p> <p>2-6pos : min. 60N</p>	<p>Acc. to USCAR-2; Rev. 6 Point 5.4.5</p> <p>Testing speed: 50mm/min</p>
<p>Vibration/Mechanical Shock</p>	<p>No physical damage. No discontinuities and current drop below 95mA for more than 1µs.</p> <p>Change of contact resistance greater than 7.0 Ω for more than 1µs 200 % Gold plated 300 % Silver plated 350 % Tinned</p> <p>Class 4 requirements: Temperature rating: -40°C + 150°C</p> <p>Vibration Class: see Appendix</p>	<p>Acc. to USCAR-2 rev.6 Point 5.4.6</p> <p>See Appendix.</p>
<p>Connector to Connector Audible Click</p>	<p>The values measured in this test shall be documented in the test report. These values should be considered for information only and are used to compare connector designs or to assist in the connector selection/wire harness design process.</p>	<p>Acc. to USCAR-2 rev.6 Point 5.4.7</p>

ENVIRONMENTAL INSPECTIONS		
Thermal Shock	<p>No physical damage</p> <p>Class 4 requirements: Temperature rating: -40°C + 150°C</p>	<p>Acc. to USCAR-2 rev.6 Point 5.6.1</p>
Long-term temperature storage	<p>No physical damage.</p> <p>Class 4 requirements: Temperature rating: -40°C + 150°C</p> <p>Storage duration: 1008H</p>	<p>Acc. to USCAR-2 rev.6 Point 5.6.3</p>
Protection against solid foreign objects and water	<p>No medium shall penetrate into the connector. The functioning of latching and releasing elements must remain fully maintained.</p> <p>Class 4 requirements: Temperature rating: -40°C + 150°C</p> <p>Degree of Protection IPX9K</p>	<p>Acc. to USCAR-2 rev.6</p> <p>Point 5.6.2 Temperature/Humidity Cycling</p> <p>Point 5.6.3 High Temperature Exposure</p> <p>Point 5.6.5 Submersion</p> <ul style="list-style-type: none"> • Submersion of the samples in salt water solution (0°C) • Chamber temperature acc. to class 4. <p>Point 5.6.6 Initial - Pressure / Vacuumleak test</p> <ul style="list-style-type: none"> • Submersion of the samples in salt water solution (0°C) • Air pressure test up to 48 kPa (0,5 bar) • Vacuum test 48 kPa/15s <p>Point 5.6.6 After aging - Pressure / Vacuumleak test</p> <ul style="list-style-type: none"> • Submersion of the samples in salt water solution (0°C) • Air pressure test up to 28 kPa (0,3 bar) • Vacuum test 28 kPa/15s <p>Point 5.6.7 High Pressure Spray</p> <ul style="list-style-type: none"> • Water temperature: 80+/-5°C • Water pressure: 8.000-10.000 kPa (80-100bar) • Duration: 30sec 0°/30°/60°/90° • Distacnce: 10-15cs

3.6 Qualification Test Sequence

Test	Test Type	Test Group									
		D	E	F	G	H	M	N	P	RSAA	TUAB
		Test Sequence									
General	5.1	1	1	1	1	1	1	1	1	1	1
Visual and dimensional examination	5.1.8	2,4	2,4	2,4	2,4	2,4	2,8	2,8	2,8	2,11	2,11
Connector and/or terminal cycling	5.1.7						3	3	3	3	3
Circuit continuity monitoring	5.1.9						5	5			
Dry circuit resistance	5.3.1						4,6	4,6	4,6		
Voltage drop	5.3.2						7	7	7		
Terminal retention force Primary lock	5.4.1	3							9	12	12
Terminal insertion force	5.4.1	3									
Connector to Connector mating force (fully equiped conectors)	5.4.2				3						
Connector to Connector un-mating force (connector lock desingaged)	5.4.2				3						
Connector to Connector un-mating force (connector lock engaged)	5.4.2				3						
Polarization feature effectiveness	5.4.4					3					
Miscellaneous component engage and disengage force - Retainer moving force	5.4.5		3								
Miscellaneous component engage and disengage force - CPA moving force	5.4.5		3								
Vibration/Mehanical shock	5.4.6						5				
Connector to Connector audible click	5.4.7			3							
Insulation resistance	5.5.1									4,7	4,7
Thermal Shock	5.6.1							5			
Temperature/Humidity Cyclling	5.6.2									6	
High Temperature Exposure	5.6.3								5		6
Submertion	5.6.5									9	9
Pressure/Vacuumleak test	5.6.6									5,8	5,8
High Pressure spray	5.6.7									10	10

4. QUALITY ASSURANCE PROVISIONS

4.1 Qualification Testing

A Sample Selection

The samples shall be prepared in accordance with product drawings. They shall be selected at random from current production.

Test Groups shall consist of:

Test Group D:	10 connectors	3)
Test Group E:	10 connectors	1)
Test Group F:	16 connectors	
Test Group G:	15 connectors	
Test Group H:	2)	
Test Group M:	10 connectors	
Test Group N:	10 connectors	
Test Group P:	10 connectors	
Test Group RSAA:	10 connectors	
Test Group TUAB:	10 connectors	

- 1) 10 Samples for each application Misc. Component Engage/Disengage Force test.
- 2) Sample size for Polarization Effectiveness is determined by the procedure
- 3) Refer to individual procedure

B Test Sequence

Qualification inspection shall be verified by testing samples as specified in paragraph 3.6.

4.2 Requalification Testing

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

3.7 Acceptance

Acceptance is based on verification that the product meets the requirements of paragraph 3.5. Failures attributed to equipment, test setup, 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 resubmittal.

4.4 Quality Conformance Inspection

The applicable quality inspection plan will 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.

5. APPENDIX

Vibration acc. to USCAR-2 rev.6, point 5.4.6

V4 – Sinusoidal²

F [Hz]	Accel. [m/s ²]	Accel. G
100	100	10,2
150	150	15,3
200	300	30,6
240	300	30,6
270	100	10,2
440	150	15,3

V4 - Random

F [Hz]	PSD ¹	PSD g ² /Hz
10	10	0,104
100	10	0,104
300	0,51	0,0051
500	20	0,208
2000	20	0,208
g _{ms}	181	18,5 g

NOTES:

- (1) PSD in (m/s²)²
- (2) Sine Frequency sweep is: 1 octave/minute for all sine profiles

Vibration profile:

