

## DESIGN OBJECTIVES

### UNSEAL 24WAY/20WAY CONNECTOR, 108-101431

The product described in this document has not been fully tested to ensure conformance to the requirements outlined herein. TE Connectivity makes no representation or warranty, express or implied that the product will comply with these requirements. Further, TE Connectivity reserves the right these requirements based on the results of additional testing and evaluation. Contact TE Connectivity Engineering for further information. If necessary, This document will become the Product Specification at successful completion of testing.

## 1. Scope:

### 1.1 Content

This specification covers the requirements for product performance, test methods and quality assurance provisions of 24 & 20 WAY UNSEALED IN-LINE connector.

24WAY REC PLUG : \*-2298622-\*, Consists of 2298623-\*, \*-2298626-\*

24WAY TAB PLUG : \*-2298627-\*, Consists of 2298629-1, \*-2298630-\*

20WAY REC PLUG : \*2298671-\*. Consists of 2302509-\* 2302504-1

20WAY TAB PLUG : \*2298672-\* Consists of 2302512-\*, 2302504-1

### 1.2 Qualification

When tests are performed on the subject product line, the procedures specified in TE Connectivity 109 series specifications shall be used. All inspections shall be performed using the applicable Inspection Plan and Product Drawing.

## 2. Applicable Documents:

The following documents form a part of this Specification to the extent specified herein. In the event of conflict between the requirements of this Specification and 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.

				DR A.D 03MAR2017	 TE Connectivity Shanghai, China		
				CHK SY.W 03MAR2017			
				APP I.YIN 03MAR2017	NO. 108-101431	REV A	LOC ES
				PAGE 1 of 8	TITLE UNSEAL 20/24WAY CONNECTOR		
A	RELEASED	A.D	03MAR2017				
LTR	REVISION RECORD	DR	DATE				

## 2.1 TE Connectivity Specifications:

- A. 109 SERIES: Test Specification, Requirements for Test Methods.
- B. VW LV 214
- C. USCAR2-2013

## 3. Requirements:

### 3.1 Design and Construction

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

### 3.2 Materials

Description for material see in product drawing.

### 3.3 Ratings:

Operating temperature Range : -40°C to + 125°C

### 3.4 Performance and Test Descriptions

The product is designed to meet the electrical, mechanical and environmental performance requirements specified in paragraph 3.5 All tests are performed at ambient environmental conditions per VW LV214 unless otherwise specified



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### 3.5 Requirements and Procedures Summary

#### MECHANICAL TEST

Para.	Test items	Requirements	Procedures
3.5.1	Visual inspection	No damage	Acc. DIN EN 60512-1-1
3.5.2	Drop test	Samples all meet the 3.5.1; all the components in corrected position	Acc. USCAR-2 5.4.8 Samples from testing X, Y and Z axis orientation
3.5.3	Actuation forces for secondary lock	Open force $F_o=10N\sim 50N$ Close force $F_s<50N$	Acc. LV214 2010-03 PG6 E6.4 Apply axial load to secondary lock, engage to lock position from pre-lock position, un-equipped housings. Apply axial load to secondary lock, disengage to pre-lock position from lock position, un-equipped housings.
3.5.4	Polarizing/Keying	Keying/Polarizing efficiency > 3 times the insertion force (equipped housing), but at least: 24way: 150N 20way: 130N	Error-proof design of housings (Polarizing), applying axial load to housings, plug hsg, coding "A" of cap hsg. Coding "B", housings un-equipped, initial parts Error-proof design of housings (un-equipped housings)
3.5.5	Retention force of the housing latch/lock	The retention force must > 100N at 1mm	Acc. LV214 2010-03 E7.2 DIN EN 60512-15-6 Apply axial load to housings, un-equipped housings, Test speed: 50mm/min
3.5.6	Connector-Connector mating force	The mating force 24 way < 150N 20way < 130N	Applying axial load to housings, un-equipped housings. Test speed = 50mm/min.
3.5.7	Determination of the contact insertion forces	The insertion force must be measured and documented.	Acc. LV214 2010-03 E8.1 Apply axial load to contact Test speed: 50mm/min



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Para.	Test items	Requirements	Procedures										
3.5.8	Contact removal force from the housing, primary lock only	Primary lock test displacement: F prim>40N for MQS0.64; F prim>40N for MCON1.2CB; F prim>60N for MCP2.8K	Acc. USCAR2-2013 5.4.1 Apply axial load to contact, pull or push contact away from hsgs. Test speed: 50mm/min.										
3.5.9	Contact removal force from the housing, secondary lock & Primary lock	for MQS0.64 F>60N for MCON1.2CB F >70N for MCP2.8K F>100N	Acc. USCAR2-2013 5.4.1 Apply axial load to contact, pull or push contact away from hsgs. Test speed: 50mm/min.										
3.5.10	Clip mount & retention force	Mount force <80N Retention force >110N	Push speed: 50mm/min										
<b>ENVIRONMENTAL TEST</b>													
3.5.11	Derating with housing	Acc. LV214 PG13 E13.2	Acc. LV214 PG 13 E13.2										
3.5.12	Contact resistance	<b>Initial</b> MQS: 0.35mm <sup>2</sup> 10mΩ MCON1.2: 0.5、0.75mm <sup>2</sup> 10 mΩ MCP2.8 2.5mm <sup>2</sup> 5mΩ 4.0mm <sup>2</sup> 5mΩ <b>After environment</b> MQS: 0.35mm <sup>2</sup> 15mΩ MCON1.2: 0.5、0.75mm <sup>2</sup> 15mΩ MCP2.8 2.5mm <sup>2</sup> 10mΩ 4.0mm <sup>2</sup> 5mΩ	Acc. USCAR 5.3.2.4										
3.5.13	Contact resistance continuous during dynamic load, broad-band random vibration with test current(100mA)	No function-relevant damage must occur Circuit interruption monitoring takes place during the test. Permissible circuit interruption <1000ns. The circuit considered interrupted when the contact resistance exceeds 7 Ω . Interruptions are not permissible.	Acc. LV214 PG 17 E14.0 DIN EN 60068-2-64 Measurement frequency: 1 measured value per min Severity: see below table <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Severity</th> <th>TC (temperature cycle)</th> <th>Random vibration with TC</th> <th>Sine wave with TC</th> <th>No. of shocks</th> </tr> </thead> <tbody> <tr> <td>1) "Body" unsealed</td> <td>0 min/20 °C 60 min/-40 °C 150 min/-40 °C 300 min/105 °C 420 min/105 °C 480 min/20 °C</td> <td>8 h per axis RMS value of acceleration 19,7 m/s<sup>2</sup> Hz (m/s<sup>2</sup>)/Hz 10 10 55 3,25 180 0,125 300 0,125 360 0,07 1 000 0,07</td> <td>No sine wave</td> <td>A = 30 g T = 6 ms sinusoidal half-wave No. of shocks: 6 000</td> </tr> </tbody> </table>	Severity	TC (temperature cycle)	Random vibration with TC	Sine wave with TC	No. of shocks	1) "Body" unsealed	0 min/20 °C 60 min/-40 °C 150 min/-40 °C 300 min/105 °C 420 min/105 °C 480 min/20 °C	8 h per axis RMS value of acceleration 19,7 m/s <sup>2</sup> Hz (m/s <sup>2</sup> )/Hz 10 10 55 3,25 180 0,125 300 0,125 360 0,07 1 000 0,07	No sine wave	A = 30 g T = 6 ms sinusoidal half-wave No. of shocks: 6 000
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Para.	Test items	Requirements	Procedures										
3.5.14	Contact resistance continuous during endurance shock test with test current (100mA)	No function-relevant damage must occur Circuit interruption monitoring takes place during the test. Permissible circuit interruption <1000ns. The circuit considered interrupted when the contact resistance exceeds 7 Ω . Interruptions are not permissible.	Acc. LV214 PG 17 E14.0 DIN EN 60068-2-27 Severity: see below table <table border="1"> <thead> <tr> <th>Severity</th> <th>TC (temperature cycle)</th> <th>Random vibration with TC</th> <th>Sine wave with TC</th> <th>No. of shocks</th> </tr> </thead> <tbody> <tr> <td>1) "Body" unsealed</td> <td>0 min/20 °C 60 min/-40 °C 150 min/-40 °C 300 min/105 °C 420 min/105 °C 480 min/20 °C</td> <td>8 h per axis RMS value of acceleration 19,7 m/s<sup>2</sup> Hz (m/s<sup>2</sup>/Hz) 10 10 55 3,25 180 0,125 300 0,125 360 0,07 1 000 0,07</td> <td>No sine wave</td> <td>A = 30 g T = 6 ms sinusoidal half-wave No. of shocks: 6 000</td> </tr> </tbody> </table>	Severity	TC (temperature cycle)	Random vibration with TC	Sine wave with TC	No. of shocks	1) "Body" unsealed	0 min/20 °C 60 min/-40 °C 150 min/-40 °C 300 min/105 °C 420 min/105 °C 480 min/20 °C	8 h per axis RMS value of acceleration 19,7 m/s <sup>2</sup> Hz (m/s <sup>2</sup> /Hz) 10 10 55 3,25 180 0,125 300 0,125 360 0,07 1 000 0,07	No sine wave	A = 30 g T = 6 ms sinusoidal half-wave No. of shocks: 6 000
Severity	TC (temperature cycle)	Random vibration with TC	Sine wave with TC	No. of shocks									
1) "Body" unsealed	0 min/20 °C 60 min/-40 °C 150 min/-40 °C 300 min/105 °C 420 min/105 °C 480 min/20 °C	8 h per axis RMS value of acceleration 19,7 m/s <sup>2</sup> Hz (m/s <sup>2</sup> /Hz) 10 10 55 3,25 180 0,125 300 0,125 360 0,07 1 000 0,07	No sine wave	A = 30 g T = 6 ms sinusoidal half-wave No. of shocks: 6 000									
3.5.15	Long-term aging in dry heat		Acc. DIN EN 60068-2-2 Test B Duration: 1000h Temperature: 130°C Subsequent aging: 48h at RT										
3.5.16	Functional test	There must be no functional impairments detected on the housing. Cracking or delamination that affect the function are not permissible. Contact resistance: Comply with below table  MQS: 0.35mm <sup>2</sup> 15mΩ MCON1.2: 0.5、0.75mm <sup>2</sup> 15mΩ MCP2.8 2.5mm <sup>2</sup> 10mΩ 4.0mm <sup>2</sup> 5mΩ Contact pull-out force must comply with below: for MQS0.64, MCON1.2CB F >55N for MCP2.8K F>80N	Acc.USCAR 5.3.2.4										
3.5.17	Resistance to agents	No functionally significant structural or dimensional change Insulation resistance>100 M Ω The DUT must remain fully functional	DUTs must be exposed to the fluids and aged for 48h at the required aging temperature. For chemical and method, see Appendix A										

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### 3.6 Product Qualification Test and Sequences

<b>SAMPLE QUANTITIES</b>					
<b>Test or examination</b>	<b>TEST GROUPS</b>				
	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
	24way: (3F+3M) 20way (3F+3M)	24way: (8F+8M) 20way (8F+4M)	24way: (16F+16M) 20way (16F+16M)	24way: (16F+16M) 20way (16F+8M)	24way: (16M) 20way (4M)
3.5.1 Visual inspection	1,3	1	1,5	1,5	1
3.5.2 Drop test	2				
3.5.3 Actuation forces for secondary lock		2			
3.5.4 Polarizing/Keying			2		
3.5.5 Retention force of the housing latch/lock			3		
3.5.6 Connector-Connector mating force			4		
3.5.7 Determination of the contact insertion forces				2	
3.5.8 Contact removal force from the housing, primary lock only				3	
3.5.9 Contact removal force from the housing, secondary & Primary lock				4	
3.5.10 clip mount & retention force					2

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# SAMPLE QUANTITIES

Test or examination	TEST GROUPS( Environment Test)				
	6	7	8	9	.....
	24way: (2F+2M) 20way (2F+2M)	24way: (3F+3M) 20way (5F+5M)	24way: (2F+2M) 20way (2F+2M)	24way: (5F+5M) 20way (5F+5M)	
3.5.1 Visual inspection	1,3	1,4,7	1,3	1,7	
3.5.9 Contact removal force from the housing, secondary & Primary lock				6	
3.5.11 Derating with housing	2				
3.5.12 Contact resistance		2,6		2,4	
3.5.13 Contact resistance continuous during dynamic load, broad-band random vibration with test current(100mA)		3			
3.5.14 Contact resistance continuous during endurance shock test with test current (100mA)		5			
3.5.15 Long-term aging in dry heat				3	
3.5.16 Functional test				5	
3.5.17 Resistance to agents			2		
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## 4. QUALIFICATION TEST

### 4.1 Sample selection

Samples shall be prepared in accordance with applicable specification.

### 4.2 Test sequence

Qualification test shall be conducted as sequence specified in 3.6.

### 4.3 Requalification test

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

## 5. APPENDIX

### Appendix A

No.	PG	Chemical agent	Description	Application			Aging temp. °C
				Dousing	Rubbing in	Spraying	48 h
1	22 A	Cold-cleaning agent/cockpit cleaning agent	Commercially available			x	50
2	22 A	Penetrating oil	Commercially available			x	50
3	22 A	Undiluted washer fluid anti-freeze	Commercially available	x			50
4	22 A	Isopropanol	Commercially available	x			RT
5	22 A	Grease	High melting point grease		x		50
6	22 B	Brake fluid	DOT 4/DOT 5	x			50
7	22 B	FAM test fuel (gasoline/premium)	Commercially available	x			RT
8	22 B	Diesel	DIN EN 590	x			RT
8	22 B	Biodiesel	DIN EN 14214	x			RT
8	22 B	Diesel additive AdBlue	DIN 70070	x			RT
9	22 B	Engine oil 5W-30	Fully synthetic	x			50
10	22 B	Power steering fluid	According to requirement	x			50
10	22 B	Automatic transmission fluid	Fully synthetic	x			50
11	22 B	Radiator antifreeze	Stable to -40 °C	x			50
12	22 B	Battery fluid: Relevant only for DUTs that can come into contact with battery fluid	Diluted sulfuric acid; density 1,28 g/ml	x			50
13	22 B	Road salt solution	Mixture PG18C	x			50

Dousing  
Rubbing in  
Spraying

At least 100 ml (according to DIN EN ISO 175 at least 8 ml/cm<sup>2</sup> surface)  
damp cotton cloth  
approx. 1 s per side

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