

DESIGN OBJECTIVES

12way sealed in-line plug(12P MCON 1.2)
 16way sealed in-line plug(14P MCON 1.2 + 2P MCP 2.8)
 26way sealed in-line plug(22P MCON 1.2 + 4P MCP 2.8)

108-101428

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 12way & 16way & 26way sealed in-line plug connector.

12way REC Conn. : 2297907-1 Consists of 2297903-1, 2297904-1, 2297906-1
 12way TAB Conn. : 2297911-1 Consists of 2297908-1, 2297910-1
 16way REC Conn. : 2304884-1 Consists of 2404880-1, 2404881-1, 2404882-1, 2404883-1
 16way TAB Conn. : 2304887-1 Consists of 2404884-1, 2404885-1, 2404886-1
 26way REC Conn. : 2317001-1 Consists of 2317002-1, 2317003-1, 2317004-1,
 2317005-1, 2317015-1
 26way TAB Conn. : 2316988-1 Consists of 2316989-1, 2316990-1, 2316995-1

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.

				DR J.Z 07NOVY15		TE Connectivity Shanghai, China	
				CHK A.D 07NOVY15			
A4	Update Secondary Locking Spec.	V.S	12AUGY21	APP SY.W 07NOVY15	NO. 108-101428	REV A4	LOC ES
A3	Update Vibration Spec.	Z.W	06JULY19	PAGE 1 of 9	TITLE 12way & 16way & 26way sealed in-line plug		
A2	ADD 26WAY	Z.W	16APR19				
LTR	REVISION RECORD	DR	DATE				

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.

2.1 TE Connectivity Specifications:

- A. 109 SERIES: Test Specification, Requirements for Test Methods.
- B. VW LV 214
- C. USCAR-2
- D. If there is mismatch no specified, LV214 take precedence

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	No damage	USCAR-2
3.5.3	Actuation forces for secondary lock	1. Open force $F_o=10N\sim50N$ 2. Close force $F_s<50N$	Acc. LV214 2010-03 PG6 E6.4 16Way REC Housing F_o deviant to $8N\sim50N$
3.5.4	Polarizing /Key-ing	Keying/Polarizing efficiency >3 times the insertion force (equipped housing), but at least 80N	Acc. LV214 2010-03 E7.1 DIN EN 60512-13-5
3.5.5	Retention force of the housing latch/lock	The retention force must $>100N$	Acc. LV214 2010-03 E7.2 DIN EN 60512-15-6
3.5.6	Connector-Connector mating force	the mating force must $<75N$	Acc. LV214 2010-03 PG7 E7.4 16Way $F<120N$ (Deviant to LV214) 26Way lever force
3.5.7	Determination of the contact insertion forces	The insertion force must be measured and documented.	Acc. LV214 2010-03 E8.1
3.5.8	Contact removal force from the housing, primary lock only	MCON 1.2 terminal: Primary lock test $F_{prim}>40N$ MCP 2.8 terminal: Primary lock test $F_{prim}>80N$	Acc. LV214 2010-03 E8.2.1 MCON 1.2 terminal MCP 2.8 terminal 26way MCP 2.8 terminal $F_{prim}>70N$ (deviation to LV214)



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Para.	Test items	Requirements	Procedures																																																								
3.5.9	Contact pull-out strength in the contact housing, secondary locking device only	MCON 1.2 terminal: Secondary lock test $F_{sec} > 30N$ (deviation) MCP 2.8 terminal: Secondary lock test $F_{sec} > 45N$ (deviation)	Acc. LV214 2010-03 E8.2.2																																																								
3.5.10	CPA function test	1.CPA actuation force Mated Connector: $5N \leq$ Force to CPA $\leq 30N$. 2.CPA Closing Force Unmated Connector:80N Min.	Acc. DIN EN 60512-1-1(for 26way inline)																																																								
ENVIRONMENTAL TEST																																																											
3.5.11	Housing effect on derating	Acc. LV214 PG13 E13.2	Acc. LV214 PG 13 E13.2																																																								
3.5.12	Contact resistance	Acc. LV214 Table D.1 for different contact size and conductor cross section <table border="1" style="font-size: small;"> <thead> <tr> <th>Conductor cross-section in mm²/contact size in mm</th> <th>0,13</th> <th>0,22</th> <th>0,35</th> <th>0,5</th> <th>0,75</th> <th>1,0</th> </tr> </thead> <tbody> <tr> <td>0,63</td> <td>30</td> <td>30</td> <td>15</td> <td>15</td> <td>15</td> <td>-</td> </tr> <tr> <td>1,2</td> <td>20</td> <td>20</td> <td>15</td> <td>15</td> <td>15</td> <td>15</td> </tr> <tr> <td>1,5</td> <td>-</td> <td>15</td> <td>15</td> <td>15</td> <td>15</td> <td>15</td> </tr> <tr> <td>2,8</td> <td>-</td> <td>15</td> <td>15</td> <td>15</td> <td>15</td> <td>10</td> </tr> <tr> <td>4,8-6,3</td> <td>-</td> <td>10</td> <td>10</td> <td>8</td> <td>8</td> <td>8</td> </tr> <tr> <td>8</td> <td>-</td> <td>-</td> <td>-</td> <td>-</td> <td>-</td> <td>-</td> </tr> <tr> <td>9,5-12</td> <td>-</td> <td>-</td> <td>-</td> <td>-</td> <td>-</td> <td>-</td> </tr> </tbody> </table>	Conductor cross-section in mm ² /contact size in mm	0,13	0,22	0,35	0,5	0,75	1,0	0,63	30	30	15	15	15	-	1,2	20	20	15	15	15	15	1,5	-	15	15	15	15	15	2,8	-	15	15	15	15	10	4,8-6,3	-	10	10	8	8	8	8	-	-	-	-	-	-	9,5-12	-	-	-	-	-	-	Acc. DIN EN 60512-2-1
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9,5-12	-	-	-	-	-	-																																																					
3.5.13	Insulation resistance		Acc. DIN EN 60512-3-1																																																								
3.5.14	Endurance shock test		USCAR-2 V2 Engine profile																																																								
3.5.15	Resonance frequency of the contact assembly	The vibration response of the housing must also be recorded and documented as a graph together with the excitation profile in the test report	Acc. DIN EN 60068-2-6 Dynamic load, sinusoidal Sweep speed: 1oct./min $a=10m/s^2$ $f=5Hz-2000Hz-5Hz$																																																								
3.5.16	Aging in dry heat(120h, 130°C)		Acc. DIN EN 60068-2-2 Test B Duration: 120h Temperature: 130°C																																																								

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Para.	Test items	Requirements	Procedures																																																								
3.5.17	Humid heat, constant		Acc. DIN EN 60068-2-30 Duration: 10days Temperature: 40°C Relative humidity: 95% After this test, the insulation resistance must be measured at the earliest after 30min and at the latest after 60min																																																								
3.5.18	Low temperature aging		Acc. DIN EN 60068-2-1 Duration: 48h Temperature: -40°C																																																								
3.5.19	Removal and insertion at -20°C	It must be possible to open and re-close the connector even at -20°C Any latch elements present must not break off or crack upon actuation	Acc. LV214 2010-03 PG20 B 20.4																																																								
3.5.20	Aging in dry heat(48h,80°C)	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. DIN EN 60068-2-2 Test B Duration: 48h Temperature: 80°C																																																								
3.5.21	Long-term aging in dry heat		Acc. DIN EN 60068-2-2 Test B Duration: 1000h Temperature: 130°C Subsequent aging: 48h at RT																																																								
3.5.22	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 <table border="1"> <thead> <tr> <th>Conductor cross-section in mm²/contact size in mm</th> <th>0,13</th> <th>0,22</th> <th>0,35</th> <th>0,5</th> <th>0,75</th> <th>1,0</th> </tr> </thead> <tbody> <tr> <td>0,63</td> <td>30</td> <td>30</td> <td>15</td> <td>15</td> <td>15</td> <td>-</td> </tr> <tr> <td>1,2</td> <td>20</td> <td>20</td> <td>15</td> <td>15</td> <td>15</td> <td>15</td> </tr> <tr> <td>1,5</td> <td>-</td> <td>15</td> <td>15</td> <td>15</td> <td>15</td> <td>15</td> </tr> <tr> <td>2,8</td> <td>-</td> <td>15</td> <td>15</td> <td>15</td> <td>15</td> <td>10</td> </tr> <tr> <td>4,8-6,3</td> <td>-</td> <td>10</td> <td>10</td> <td>8</td> <td>8</td> <td>8</td> </tr> <tr> <td>8</td> <td>-</td> <td>-</td> <td>-</td> <td>-</td> <td>-</td> <td>-</td> </tr> <tr> <td>9,5-12</td> <td>-</td> <td>-</td> <td>-</td> <td>-</td> <td>-</td> <td>-</td> </tr> </tbody> </table> Contact pull-out force must comply with 3.5.8, 3.5.9	Conductor cross-section in mm ² /contact size in mm	0,13	0,22	0,35	0,5	0,75	1,0	0,63	30	30	15	15	15	-	1,2	20	20	15	15	15	15	1,5	-	15	15	15	15	15	2,8	-	15	15	15	15	10	4,8-6,3	-	10	10	8	8	8	8	-	-	-	-	-	-	9,5-12	-	-	-	-	-	-	Acc. LV214 2010-03 E8.2.1 E 8.2.2
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3.5.23	Temperature shock		Acc. DIN EN 60068-2-14 Duration: 144cycles Temperature: -40°C/130°C 15min respectively Acclimatization period: max.10s
3.5.24	Immersion with pressure difference		Acc. DIN EN 60068-2-13 DIN EN 60512-14-5 Medium: low surface-tension 5% NaCl solution a) Normal pressure b) -10KPa, holding time 5min c) -50KPa, holding time 5min d) Normal pressure Change in pressure: 10KPa/min
3.5.25	Line movement during immersion with pressure difference-vacuum		Acc. LV214 2010-03 B 23.2 No fixed clamping of the lines(no tension on the lines) Free moving line length:100mm Movement profile: - Deflection of the line bundle by 100mm at a 10mm displacement from the single-wire seal - Hold for 10s - Deflection until the opposite final position - Hold for 10s The movement profile is performed once per pressure stage during the pressure loading Movement direction: perpendicular to the cable routing separation direction, in both spatial axes
3.5.26	Thermal shock test		Acc. LV214 2010-03 B 23.3 Medium: low surface-tension 5% NaCl solution Air temperature: 120°C Duration:30min each Water temperature: 0°C Duration:15min each Number of cycles: 5
3.5.27	Degree of protection test	The insulation resistance must >100M Ω	Acc. LV214 2010-03B 23.4 DIN 40050-9 Severity: IP X9K Test duration per side: 15s Distance, nozzle-DUT: (100~150)mm Pressure: 80bar Temperature: 80°C

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3.6 Product Qualification Test and Sequences

SAMPLE QUANTITIES						
Test or examination	TEST GROUP(MECHANICAL TESTS)					
	1	2	3	4	5	6
	PG6		PG7		PG8	PG13
3.5.1 Visual inspection	1,3	1	1,5	1,3	1,5	1,3
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, with secondary lock					4	
3.5.10 CPA function test				2		
3.5.11 Housing effect on derating						2
Number	3	6	15	5	4	3

SAMPLE QUANTITIES				
Test or examination	TEST GROUP(ENVIRONMENTAL TEST)			
	7	8	9	10
	PG17	PG20	PG21	PG23
3.5.1 Visual inspection	1,3, 7	1,6,9,12	1,7	1,4,7,9,12
3.5.2 Drop test		11		
3.5.8 Contact removal force from the housing, primary lock only				
3.5.9 Contact removal force from the housing, with secondary lock			6	
3.5.12 Contact resistance	2,5		2,4	
3.5.13 Insulation resistance		2,5		11
3.5.14 Endurance shock test	4			
3.5.15 Resonance frequency of the contact assembly	6			
3.5.16 Aging in dry heat(120h, 130°C)		3		2
3.5.17 Humid heat, constant		4		
3.5.18 Low temperature aging		7		
3.5.19 Removal and insertion at -20°C		8		
3.5.20 Aging in dry heat(48h,80°C)		10		
3.5.21 Long-term aging in dry heat			3	
3.5.22 Functional test			5	
3.5.23 Temperature shock				3
3.5.24 Immersion with pressure difference				5
3.5.25 Line movement during immersion with pressure difference-vacuum				6
3.5.26 Thermal shock test				8
3.5.27 Degree of protection test				10
Number	4	5	10	7

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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.

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