Dynamic Ultra Connector

1 SCOPE

1.1 Content

This specification describes the design, the characteristics, the tests and the quality requirements of the ***Dynamic Ultra Connector****.*
*Header: *-28344659-*, *-2834674-*, *-2834682-*, *-2834684-**
*Receptacle: *-2834663-*, *-2834672-*, *-2834686-*, *-2834688-**
*Terminal: 2834466-**

1.2 Qualification

When testing the named products the following the specified specifications and standards shall be used. All tests have to be done using the applicable inspection plan and drawings.

2 APPLICABLE DOCUMENTS

The following documents form a part of this specification to the extent specified herein. In the case of a conflict between this specification and the specified documents, this specification has priority.
For the listed documents is valid the specification at the date of the first release of this specification.

2.1 Standards

A.	*DIN/IEC 60512*	*Electromechanical components for electronic equipment, basic testing procedures and measuring methods*
B.	*DIN EN 60068*	*Environmental tests*
C.	*DIN IEC 68*	*Electrical Engineering, basic environmental testing procedures*
D.	*LV214*	*Car Plug connectors – Test procedure*
E.	*USCAR*	*Performance Specification for Automotive Electrical Connector System*
F.	*EIA-364*	*Electrical Connector / Socket Test Procedures Including Environmental Classifications*

2.2 DESCRIPTION

All design and construction data, such as dimensions, materials, wire sizes, etc., are shown in the product drawings.

3 PROPERTIES

3.1 General Requirements

The product must correspond with the drawing, concerning the design and the physical dimensions.

3.2 Technical Data - Ratings

Current carrying capacity	*3A(22AWG), 2A(24AWG),1A(26AWG)*
Voltage carrying capacity	*125 VAC MAX*
Maximum mating cycles	*20 cycles for tin-plated contacts*
Temperature range	*-40℃ to +125℃ for tin-plated contacts (including temperature rise)*

3.3 Materials

A. Contact:
Material: Copper Alloy
Finish: Pre Tin Plating or Tin plating over Nickel Plating
Contact Point: Tin plating
Soldering Point: Tin plating

B. Housing:
Material: PBT or PA
Color: Black or Grey or Natural

C. Retention Peg:
Material: SUS
Finish: Tin plating over Nickel Plating

3.4 Performance

The product performs the electrical, mechanical and climatic requirements of Chapter 3.5

3.5 Electrical, Mechanical and Climatic requirements

3.5.1 LV214 Test Items

Test Description	Properties	Bemerkung
PG0 **Inspection of as-received condition**		
E 0.1 Visual inspection	Drawing conformity	DIN EN 60512-1-1
E 0.2.1 Contact resistance in contact area	$R_{INTTIAL}$ ≤ 10 mΩ	DIN EN 60512-2-1
E 0.2.2 Contact resistance in connection area		DIN EN 60512-2-1
E 0.3 Insulation resistance	R_{ISO} > 100MΩ at U = 500V, t = 60s	DIN EN 60512-3-1
PG7 Functional Reliability of the Housings	*Error-Proof Design of Housings:* *Keying-Efficiency F_{COD} ≥ 50N:* *Polarization-Efficiency F_{POL} ≥ 80N* *Positive-Locking Retention Force* *F_{RiEG} ≥ 40N (1-2 Pos)* *≥ 50N (3-5 Pos)* *≥ 60N (6Pos or more)* *Mating/Unmating Force of housing:* *F_{STECK} ≤ 75N* *F_{ZIEH} ≤ 75N*	*DIN EN 60512-13-5* *DIN EN 60512-15-6,* *equipped housing*
PG8 Insertion and Retention Forces	*Contact Insertion Force F_{EIN} ≤ 5N* *Contact Retention Force* *Primary Locking F_{PRIM} ≥ 15N* *Primary Locking + Secondary Locking F_{SEK} ≥ 50N*	*DIN IEC 60512-8, Test 15b* *Testing Speed: 25mm/min*
PG10 **Contacts: conductor pull-out strength**		
E 0.1 Visual inspection		DIN EN 60512-1-1
E 10.1 Conductor pull-out strength	Conductor pull-out strength: 0.13mm²: F_{pull} > 20N 0.22mm²: F_{pull} > 30N 0.35mm²: F_{pull} > 50N	0.13mm² / 0.22mm² / 0.35mm² wires according to ISO 6722-1
PG 11 **Insertion and removal forces, mating cycle frequency**		
E 0.1 Visual inspection		DIN EN 60512-1-1
E 11.1 Plugging and removal force	Mating force 1. cycle: Sn: F_{mate} ≤ 5N Unmating force 1. cycle:	

	Sn: F_{unmate} ≤ 5N	
B 11.1 Mating cycle frequency	Mating cycle frequency Sn: min. 20 cycles	
PG15 Electri-cal stress test		
E 0.1 Visual inspection	Drawing conformity	DIN EN 60512-1-1
B 15.1 The DUTs are inserted and disconnected 2 times		Specimen are inserted and disconnected 2 times before
E 0.2 Contact resistance	See PG0	DIN EN 60512-2-1
B 15.2 Temperature current cycle endurance test	Test current: 0.13mm²: I_{test} = 1A 0.22mm²: I_{test} = 2A 0.35mm²: I_{test} = 3A	
B 15.3 Humid heat, cyclic		DIN EN 60068-2-30
B 15.2 Temperature current cycle endurance test	0.13mm²: I_{test} = 1A 0.22mm²: I_{test} = 2A 0.35mm²: I_{test} = 3A	
E 0.2 Contact resistance	R_{max} ≤ 30mΩ	DIN EN 60512-2-1
PG17 Dynamic load	Severity 2	
E 0.1 Visual inspection		DIN EN 60512-1-1
E 0.2 Contact resistance	See PG0	DIN EN 60512-2-1
B 17.2 Dynamic load, broad-band , random vibration	Severity2	DIN EN 60068-2-64
B 17.3 Endurance shock test	Severity2	DIN EN 60068-2-27
E 0.2 Contact resistance	R_{max} ≤ 30mΩ	DIN EN 60512-2-1
PG18A Coastal climate load		
E 0.1 Visual inspection		DIN EN 60512-1-1
B 18.1 The DUTs are inserted 2 times		Specimen are inserted and disconnected 2 times before
E 0.2 Contact resistance	See PG0	DIN EN 60512-2-1
B 18.2 Salt spray, cyclic	Severity 3	DIN EN 60068-2-52
E 0.2 Contact resistance	R_{max} ≤ 30mΩ	DIN EN 60512-2-1
PG19 Environmental simulation		
E 0.1 Visual inspection		DIN EN 60512-1-1
E 0.2 Contact resistance	See PG0	DIN EN 60512-2-1
B 19.0 Inserting and removing		
B 19.1 Temperature shock		DIN EN 60068-2-14
B 19.2 Temperature cycle		DIN EN 60068-2-14
B 19.3 Aging in dry heat		DIN EN 60068-2-2
B 19.4 Industrial climate		DIN EN 60512-11-14
B 19.5 Humid heat, cyclic		DIN EN 60068-2-30
B 19.6 Dynamic load, broad-band random vibration		DIN EN 60068-2-64
B 19.7 Mechanical shocks		DIN EN 60068-2-27
E 0.2 Contact resistance	R_{max} ≤ 30mΩ	DIN EN 60512-2-1

PG20 Climate Load of the housing **E 0.1 Visual inspection** **E 0.3 Insulation resistance** **B 20.1 Aging in dry heat 130ºC, 120h** **B20.2 Humid head 40ºC, 95%, 10d** **E 0.3 Insulation resistance** **B 20.3 Low-temperature aging -40 ºC, 48h** **B 20.4 Aging in dry heat 80ºC, 48h** **B 20.5 Aging in dry heat** **B 6. Drop test in the unplugged state**		DIN EN 60512-1-1 DIN EN 60512-3-1 DIN EN 60068-2-2 DIN EN 60068-2-30
PG21 Long-term temperature aging **E 0.1 Visual inspection** **E 0.2 Contact resistance** **B 21.1 Long term aging dry heat** **E 0.2 Contact resistance** **E21.1 Fuctional test with both grous** **B6.1 Drop test (group 1)** **E8.2 Contact pull-out force of all cotacts of group2**	 See PG0 $R_{max} \leq 30m\Omega$	 DIN EN 60512-1-1 DIN EN 60512-2-1 DIN EN 60068-2-2 DIN EN 60512-2-1 DIN EN 60068-2-31

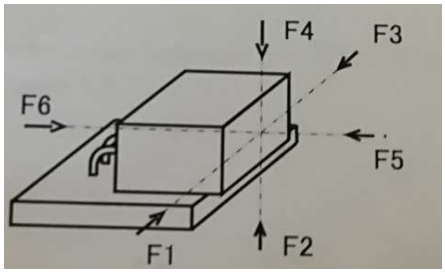
TEST ITEM	**TEST GROUP**							
	PG0 Receiving inspection	**PG7 Functional Reliability of the Housings**	**PG8 Insertion and retention forces of terminals in housing**	**PG10 Conductor pull-out strength**	**PG11 Insertion and removal forces, mating cycle frequency**	**PG15 Electrical stress test**		
Visual Inspection	1,4	1, 4	1,4	1,3	1,3	1,10		
Contact resistance	2					3,8		
Insulation resistance	3							
Contact insertion force			2					
Contact retention force			3					
Conductor pull-out strength				2				
Insertion and removal forces, mating cycle frequency					2			
Derating						4,9		
Aging in dry heat								
Contact resistance continuous (testing current)						5,7		

Temperature cycle endurance test, current cycle endurance test						5, 7		
Humid heat, cyclic						6		
Keying/ Polarization Force		2						
Positive-Locking Retention Force / Mating/Unmating Force		3						
Mating an Unamting						2		

TEST ITEM	**TEST GROUP**						
	PG17 Dynamic load	**PG18A Coastal climate load**	**PG19 Environmental simulation**	**PG20 Long-term temperature storage**	**PG21 Long-term temperature storage**		
Visual Inspection	1,4,6	1,6	1,14	1,10	1,8		
Contact resistance	2,7	3,5	2,4,13		2; 4		
Insulation resistance				2,5			
Derating							
Contact resistance continuous (testing current)	3,5		5,6,7,9, 10,11				
Humid heat, cyclic			9	4			
Dynamic load, broad band random vibration	3		10				
Endurance shock test	5		11				
Salt spray, cyclic (SL3)		4					
Temperature shock			5				
Temperature cycling			6				
Resonance frequency of the contact assembly	8						
Aging in dry heat			7	3,8	3		
Industrial climate (multiple-component climate) /			8				
Mating and Unmating		2	3,12		5		

Drop test				9	6		
Conductor pull-out strength					7		
Low-temperature aging				6			
Removal and insertion at -20 ℃				7			

3.5.2 SAE/USCAR-2 Test Items:

3.5.1 Connector Mounting Feature Mechanical Strength	F1 TO F5 DIRECTION: 50N MIN F6 DIRECTION: 110N MIN	USCAR-2: 5.4.11 
3.5.2 Header Pin retention force	15N Min within 0.2mm displacement	USCARD-2:5.7.1
3.5.3 Connector cycling	Mate and un-mate each connector 0times	SAE/USCAR-2 5.1.7
3.5.4 Circuit continuity monitoring	No exceeds 7.0Ω for more than 1 microsecond	SAE/USCAR-2 5.1.9
3.5.5 Vibration/Mechanical Shock	Depend on subsequence	SAE/USCAR-2 5.4.6 Severity: V2 As appendix fig. 2 shown
3.5.6 Voltage Drop	50mv Max	SAE/USCAR-2 5.3.2

TEST ITEM		TEST GROUP							
		Mounting Feature Mechanical Strength	Header Pin retention	Vibration/Mechanical Shock					
E 0.1	Visual inspection	1,3	1,3	1,7					
E 0.2	Contact resistance			3,6					
3.5.1	Connector Mounting Feature Mechanical Strength	2							
3.5.2	Header Pin retention force		2						
3.5.3	Connector cycling			2					
3.5.4	Circuit continuity monitoring			4					
3.5.5	Vibration/Mechanical Shock			5					
3.5.6	Voltage Drop			6					

3.6 Appendix

3.6.1 Reflow condition.

preheat temperature：150-200℃; preheat time：60 to 120 seconds; Peak temperature: 260℃

Peak temperature time：5+/-5. seconds; Time 25℃ to peak：8 minutes maximum; Per J-STD-020, Table 5-2, Pb-Free.

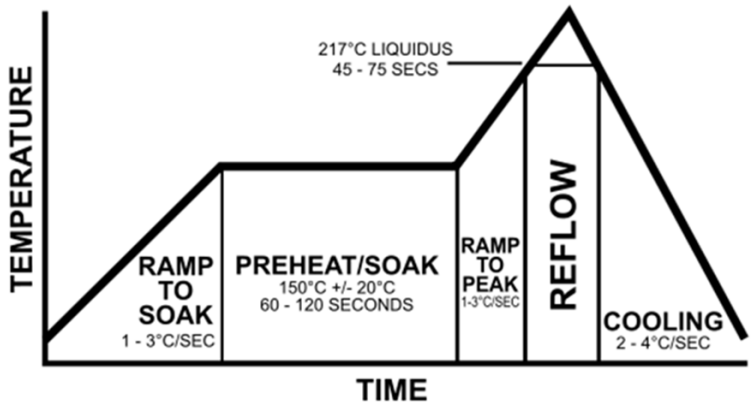


Fig 1. Reflow Profile

3.6.2 USCAR Vibration and shock condition.

Class Schedule for Shock

Vibration Class	Shocks per Axis		Wave Shape	Direction (+/-)	Duration (ms)	Acceleration (g)
V1	10		Half Sine Wave	Positive	5 ~ 10	35
V2	10		Half Sine Wave	Positive	5 ~ 10	35
V3 V4 V5 (Perform Both Tests	1	132 x 6 =792	Half Sine Wave	Positive/Negative	15	25
	2	3 x 6 =18	Half Sine Wave	Positive/Negative	11	100

Table 1. Class schedule for Shock for USCAR-2

Vibration Duration by Vibration Class

Vibration Class	Sine Duration (Hrs./axis)	Random Duration (Hrs./axis)	Thermal Cycling
V1	n/a	8	n/a
V2	n/a	8	n/a
V3	22	22	Per 5.4.6.3 #6
V4	32	50	Per 5.4.6.3 #6
V5	n/a	22	n/a

Table 2. Class schedule for Vibration for USCAR-2

V2 - Random

F (Hz)	PSD[1]	PSD g^2/Hz
60.0	0.096	0.00100
200.0	144	1.50000
210.0	9.60	0.10000
1200.0	9.60	0.10000
g_{rms}	**119**	**12.1 g**

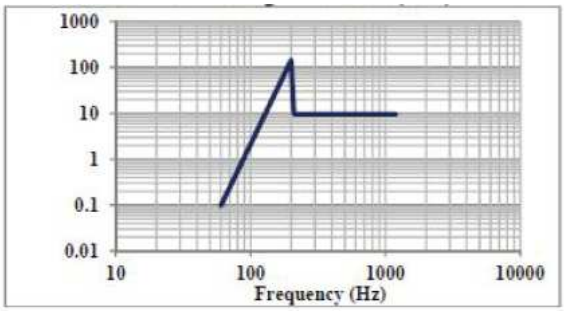


Fig 2. Vibration test profile for USCAR-2