Mini Dynamic Connector

1. Purpose:

This is qualification test. The purpose of this test is to evaluate the performance of Mini Dynamic connector. Testing was performed on below products to determine it compliance with below requirements:

A. DIN/IEC 60512 Electromechanical components for electronic equipments, 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. Scope:

This is test report for Mini Dynamic connector. Testing was performed at TE Connectivity Shanghai Electrical Components Test Laboratory.

3. Conclusion:

The product met the electrical, mechanical, and environmental performance requirements of TE product specification. Test result can cover part numbers that position numbers are equal to or less than 44 POS.

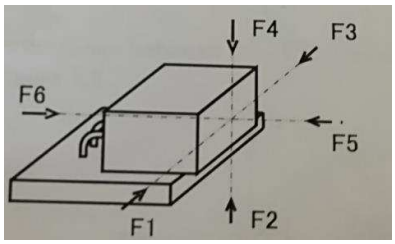
4. Test samples:

Samples were taken randomly from current production. The following part numbers were used for test.

Description	Product Part No.
Mini Dynamic Connector	4-2834465-4 (44 POS, Header, 1.80mm Pitch) 3-2834465-2 (32 POS, Header, 1.80mm Pitch) 4-2834461-4 (44 POS, Receptacle Assy, 1.80mm Pitch) 3-2834461-2 (32 POS, Receptacle Assy, 1.80mm Pitch) 2834464-5 (Receptacle Terminal, 26 AWG) 2834464-6 (Receptacle Terminal, 22/24 AWG)

5. Test Method:

Para.	Test items	Requirements	Procedures
MECHANICAL TEST			
5.1	Visual Inspection	No damage	Acc. DIN EN 60512-1-1

5.2	Header Pin retention force	≥Minimum displacement force 15N, within 0.2mm displacement.	Acc. USCARD-2:5.7.1
5.3	Connector-to-Connector mating Force	75N Max	Operation Speed: 25mm/min. Measure the force required to mate connector. It should be measured without Housing Lock. EIA 364-13
5.4	Connector-to-Connector Un-mating Force	75N Max	Operation Speed: 25mm/min. Measure the force required to unmate connector. It should be measured without Housing Lock. EIA 364-13
5.5	Polarizing/Key-ing	For 12/16/20 Pos: Keying/Polarizing efficiency>3 times the insertion force (equipped housing), but at least 80N For 24 to 44 Pos: Keying/Polarizing efficiency> 80N	Acc. LV214 2010-03 E7.1 DIN EN 60512-13-5
5.6	Retention force of the housing latch/lock	The retention force must>60N	Acc. LV214 2018-10 TG7 DIN EN 60512-15-6
5.7	Contact Insertion force and Retention force	Contact Insertion Force F≤ 5N Contact Retention Force Primary Locking: FPRIM ≥ 30N Primary Locking +Secondary Locking: FSEK+ FPRIM ≥ 50N	DIN ITEC 60512-8, Test 15B Testing speed: 25mm/Min
5.8	Conductor Pull-out Strength	26 AWG: 19.6 N MIN 24AWG: 29.4 N MIN 22 AWG: 49.0 N MIN	Apply an axial pull-off load to crimped wire of contact secured on the tester. Subjects take insulation barrel away. Operation Speed: 100 mm/min. EIA 364-08
5.9	Connector Mounting Feature Mechanical Strength	F1 TO F5 DIRECTION: 50N MIN F6 DIRECTION: 110N MIN 	USCAR-2: 5.4.11

5.10	Terminal bend resistance	FBend = 3N The TUT must not tear when subjected to the applied force. If the TUT was bent from its original position during the test, it much not tear or crack when straightened to its original position	SAE/USCAR-2 5.2.2

Para.	Test items	Requirements	Procedures
ELECTRICAL TEST			
5.11	Contact resistance	Dry Circuit Resistance Initial: 10 mΩ max Final: 30 mΩ max	Acc. LV214 2018-10 Appendix D Table D.1 Acc. DIN EN 60512-2-1 10 mV AC max. 0.1mA
5.12	Insulation resistance	1000 MΩ Min. (Initial) 100 MΩ Min. (Final)	Impressed voltage 500 V DC. Test between adjacent circuits of mated connectors. EIA 364-21
5.13	Dielectric withstanding Voltage	Neither creeping discharge nor flashover shall occur. Current leakage: 0.5 mA Max.	650V AC for 1 minute. Test between adjacent circuits of mated connectors. EIA 364-20
5.14	Vibration (High Frequency)	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 7Ω. Interruptions are not permissible. 30 mΩ Max. (Final)	Acc. LV214 PG 17 E14.0 DIN EN 60068-2-6 Measurement frequency: 1 measured value per min Severity: see below table 2) "Body" sealed / 0 min/20 °C, 60 min/-40 °C, 150 min/-40 °C, 300 min/120 °C, 420 min/120 °C, 480 min/20 °C / 20 h per axis, RMS value of acceleration 27,8 m/s² / No sine wave / A = 30 g, T = 6 ms sinusoidal half-wave, No. of shocks: 6 000 Hz: 10 (m/s²)²/Hz: 20; 55: 6,5; 180: 0,25; 300: 0,25; 360: 0,14; 1 000: 0,14 Sweep speed: 1 oct./min
5.15	Physical Shock	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 7Ω. Interruptions are not permissible. 30 mΩ Max. (Final)	Acc. LV214 PG 17 E14.0 DIN EN 60068-2-27 Severity: see below table 2) "Body" sealed / 0 min/20 °C, 60 min/-40 °C, 150 min/-40 °C, 300 min/120 °C, 420 min/120 °C, 480 min/20 °C / 20 h per axis, RMS value of acceleration 27,8 m/s² / No sine wave / A = 30 g, T = 6 ms sinusoidal half-wave, No. of shocks: 6 000 Hz: 10 (m/s²)²/Hz: 20; 55: 6,5; 180: 0,25; 300: 0,25; 360: 0,14; 1 000: 0,14

5.16	Temperature Rise	30℃ Max. under loaded specified current or rating current.	Install Contact in the housing, energize, and measure the rise in heat by energizing. The measurement is measured on the condition of not receiving the influence of the convection of air. The thermo-couple is measured attaching to Crimp of the wire barrel of Contact. EIA 364-7
5.17	Aging in dry heat (120h,130℃)	No function-relevant damage must occur Circuit interruption monitoring takes place during the test. Permissible circuit interruption <1000ns.	Acc. DIN EN 60068-2-2 Test B Duration: 120h Temperature: 130℃
5.18	Humid heat, constant	Relative humidity: 95% constant Duration: 10 cycles of 24 h each Temperatures: Tu = 25 °C, To = 55 °C Tu = lower cycle temperature To = upper cycle temperature	Acc. DIN EN 60068-2-30 Variant 2 Relative humidity: 95% constant Duration: 10 cycles of 24 h each Temperatures: Tu = 25 °C, To = 55 °C Tu = lower cycle temperature To = upper cycle temperature
5.19	Low temperature aging	Duration: 48h Temperature: -40℃	Acc. DIN EN 60068-2-1 Duration: 48h Temperature: -40℃
5.20	Removal and insertion at -20℃	It must be possible to open and re-close the connector even at -20℃Any latch elements present must not break off or crack upon actuation	Acc. LV214 2010-03 PG20 B 20.4
5.21	Long-term aging in dry heat	Duration: 1000h Temperature: 130℃ Subsequent aging: 48h at RT 30 mΩ Max. (Final)	Acc. DIN EN 60068-2-2 Test B Duration: 1000h Temperature: 130℃ Subsequent aging: 48h at RT
5.22	Aging in dry heat (48h,80℃)	Duration: 48h Temperature: 80℃	LV214 2010-03 PG20 B20.5 DIN EN 60068-2-2 Test B Duration: 48h Temperature: 80℃
5.23	Salt Spray	30 mΩ Max. (Final) No corrosion influence performance.	Subject mated/unmated connectors to 5±1% salt concentration for 48 hours. The measurement is held after remove the salt and dry up at indoor. EIA 364-26 Condition
5.24	Solderability	No deformation for plastic part Plating surface no crack/bubble/color change, Immersion surface coverage ratio of Tin at least 95%	IEC 60068-2-58 Td1 Method 2

5.25	Resistance to reflow soldering heat	No Functional issue for plastic part, additional warpage fulfills drawing spec. Plating surface no crack/bubble/color change,	Pb-free Solder – Surface mount process simulation test for more details Requirements: 95% minimum wetting Test Method: IPC/ECA J-STD-002 Test S1
5.26	Industrial Gas (SO2)	30 mΩ Max. (Final) No corrosion influence performance	Mated/unmated connector SO2Gas:10 ppm, 95% R.H. 25℃、96 hours
5.27	Temperature cycle	30 mΩ Max. (Final)	TEMPERATURE- 40 →ROOM TEMP →120 ℃→ ROOM TEMP TIME 30 → 5 → 30 → 5 min UNDER 1000 Cycles. Acc: EIA-364-32
5.28	Humidity-Temperature Cycling	Termination resistance: 30 mΩ Max. (Final) Insulation resistance: 100 MΩ Min. (Final) Dielectric withstanding Voltage: Neither creeping discharge nor flashover shall occur. flashover shall occur. Current leakage: 0.5 mA Max. 650V AC for 1 minute	Mated and unmated connector, 25～65℃, 80～95％ R.H. Cold shock –10℃(not)performed 10 cycles 1cycle=24hours.The measurement is held after being left indoor for 3 hours. MIL-STD-202 Method 106
5.29	Latch Functional test	No Functional issue, Latch no crack/disfunction	Connection of the connector housings until complete latching, Opening of the lock and complete disconnection of the connector housings Number of cycles: 5 LV214 2010-03: E21.1

6. Test Sequence:

SAMPLE QUANTITIES										
Test or examination	TEST GROUP									
	1	2	3	4	5	6	7	8	9	10
	Test Sequence									
5.1 Visual Inspection	1,3	1,4	1,5	1,4	1,3	1,3	1,5	1,4	1,8	1,3
5.2 Header Pin retention force	4									
5.3 Connector-to-Connector Mating force							3			
5.4 Connector-to-Connector Un-mating Force							4			
5.5 Polarizing/Key-ing				2						
5.6 Retention force of the housing latch/lock				3						
5.7 Contact Insertion force and Retention force					2					
5.8 Conductor Pull-out Strength						2				

5.9 Connector Mounting Feature Mechanical Strength		3								
5.10 Terminal bend resistance										2
5.11 Contact resistance			3						3,5	
5.12 Insulation resistance			4						6	
5.13 Dielectric withstanding Voltage									7	
5.14 Vibration (High Frequency) Humid heat, constant										
5.15 Physical Shock										
5.16 Temperature Rise								3		
5.17 Aging in dry heat (120h,130℃)										
5.18 Humid heat, constant										
5.19 Low temperature aging										
5.20 Removal and insertion at -20℃										
5.21 Long-term aging in dry heat										
5.22 Aging in dry heat (48h,80℃)										
5.23 Salt Spray										
5.24 Solderability										
5.25 Resistance to reflow soldering heat	2	2	2				2	2	2	
5.26 Industrial Gas (SO2)										
5.27 Temperature cycle										
5.28 Humidity-Temperature Cycling									4	
5.29 Latch Functional test										
Sample size	5	5	5	5	5	5	5	5	5	5

SAMPLE QUANTITIES											
Test or examination	**TEST GROUP**										
	11	12	13	14	15	16	17				
	Test Sequence										
5.1 Visual Inspection	1,3	1,6	1,6	1,7,10 ,12	1,8	1,6	1,6				
5.2 Header Pin retention force											
5.3 Connector-to-Connector Mating force											
5.4 Connector-to-Connector Un-mating Force											
5.5 Polarizing/Key-ing											
5.6 Retention force of the housing latch/lock											
5.7 Contact Insertion force and Retention force											

5.8 Conductor Pull-out Strength					7						
5.9 Connector Mounting Feature Mechanical Strength											
5.10 Terminal bend resistance											
5.11 Contact resistance		3,7	3,5		3,5	3,5	3,5				
5.12 Insulation resistance				3,6							
5.13 Dielectric withstanding Voltage											
5.14 Vibration (High Frequency) Humid heat, constant		4									
5.15 Physical Shock		5									
5.16 Temperature Rise											
5.17 Aging in dry heat (120h,130℃)				4							
5.18 Humid heat, constant				5							
5.19 Low temperature aging				8							
5.20 Removal and insertion at -20℃				9							
5.21 Long-term aging in dry heat					4						
5.22 Aging in dry heat (48h,80℃)				11							
5.23 Salt Spray			4								
5.24 Solderability	2										
5.25 Resistance to reflow soldering heat		2	2	2	2	2	2				
5.26 Industrial Gas (SO2)							4				
5.27 Temperature cycle						4					
5.28 Humidity-Temperature Cycling											
5.29 Latch Functional test					6						
Sample Size	5	5	5	5	5	5	5				

7. Test Result

Test Group	Test Items			Unit	Result			Spec.	Judgment
					Max	Min	Ave		
1	Header Pin retention force			N	30.8	21.2	26.6	15N Min	Acceptable
2	Connector Mounting Feature Mechanical Strength			N	PASS			F1:50N Min	Acceptable
					PASS			F2:50N Min	Acceptable
					PASS			F3:50N Min	Acceptable
					PASS			F4:50N Min	Acceptable
					PASS			F5:50N Min	Acceptable
					PASS			F6:110N Min	Acceptable
3	Inspection of as-receive d condition	Contact resistance		mΩ	4.87	2.61	3.45	10 mΩ Max	Acceptable
		Insulation resistance		Ω	2.76E12	0.44E12	2.23E12	100MΩMin	Acceptable
4	Handling and functional reliability of the housing	Polarizing/Key-ing		N	PASS			80N Min	Acceptable
		Retention force of the housing latch/lock		N	127.8	124.3	126	60N Min	Acceptable
5	Insertion and retention forces of the contact parts in the housing	Insertion force		N	2.8	1.9	2.3	5N Max	Acceptable
		Retention force first lock			PASS			30N Min	Acceptable
		Retention force first and second lock			PASS			50N Min	Acceptable
6	Conductor Pull-out Strength		AWG #22	N	87.4	81.3	83.5	50N Min	Acceptable
			AWG #24		56.7	54.8	56.2	29.4N Min	Acceptable
			AWG #26		42.3	35.0	40.1	19.6N Min	Acceptable
7	Connector Mating and Unmating Force	Connector Mating Force		N	PASS			75N MAX	Acceptable
		Connector Unmating Force			PASS			75N MAX	Acceptable
8	Temperature rise			℃	PASS			30 ℃ Max	Acceptable
9	Dielectric withstanding Voltage			V AC	PASS			650V AC	Acceptable
10	Terminal bend resistance			N	PASS			NO TEAR AND CRACK	Acceptable
11	Solderability			95%	PASS			95%	Acceptable
12	Dynamic load	Contact resistance AWG #22/24/26	Initial	mΩ	6.62	2.19	3.08	10 mΩ Max	Acceptable
			Final		11.23	2.75	5.46	30 mΩ Max	Acceptable

13	Coastal climate load	Contact resistance AWG #22/24/26	Initial		mΩ	4.67	2.65	3.95	10 mΩ Max	Acceptable
			Final			20.31	3.22	6.67	30 mΩ Max	Acceptable
14	Climate load of the housing	Insulation resistance AWG #22/24/26	Initial		Ω	2.97E12	1.82E12	2.45E12	1000MΩMin	Acceptable
			Final			12.7E10	3.8E10	6.5E10	100MΩMin	Acceptable
15	Long-term temperature aging	Contact resistance	AWG #22/24/26	Initial	mΩ	6.44	4.30	5.16	10 mΩ Max	Acceptable
				Final		3.06	30.0	10.08	30 mΩ Max	Acceptable
		Conductor Pull-out Strength	AWG#22		N	91.1	86.4	89.7	50N Min	Acceptable
16	Industrial Gas (SO2)	Contact resistance AWG #22/24/26	Initial		mΩ	5.92	3.63	4.10	10 mΩ Max	Acceptable
			Final			14.46	3.75	6.59	30 mΩ Max	Acceptable
17	Temperature cycle	Contact resistance	Initial		mΩ	8.93	3.35	4.84	10 mΩ Max	Acceptable
			Final			18.96	3.65	6.65	30 mΩ Max	Acceptable

END