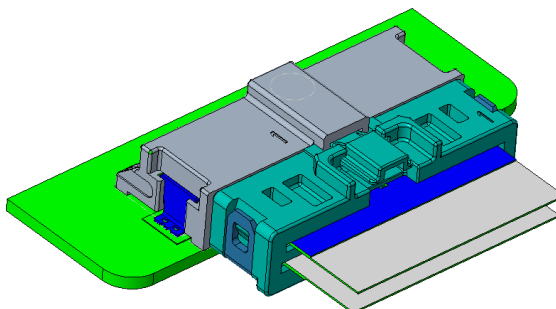


The product described in this document has not been fully tested to ensure conformance to the requirements outlined below. Therefore, TE Connectivity (TE) makes no representation or warranty, express or implied, that the product will comply with these requirements. Further, TE may change these requirements based on the results of additional testing and evaluation. Contact TE Engineering for further details.

AMPFOIL ULTRA Connector System



1. SCOPE

1.1. Content

This specification covers performance, tests, and quality requirements for the TE Connectivity (TE) AMPFOIL ULTRA Connector System. This system is a connector for the header assembly and receptacle housing with FFC/FPC. The connector system consists of a header assembly of contact pin and 2 pad pins, and the receptacle housing with spacer and FFC/FPC. The position contains 40pos/ 36pos/ 32pos/ 28pos/ 24pos. Each position has 4 code (code A/B/C/D).

1.2. Qualification

When tests are performed on the subject product line, procedures specified in Figure 1 shall be used. All inspections shall be performed using the applicable inspection plan and product drawing.

1.3. Qualification Test Results

Qualification testing on the subject product line has not been completed. The Qualification Test Report number will be issued upon completion of qualification testing.

2. APPLICABLE DOCUMENTS AND FORMS

The following documents constitute a part of this specification to the extent specified herein. Unless otherwise indicated, the latest edition of the document applies.

2.1. TE Documents

- Customer drawing for Header assembly
- Customer drawing for Receptacle housing
- Customer drawing for Spacer housing
- 501-137689: Qualification Test Report

2.2. Industry Documents

- EIA-364

2.3. Reference Document

- [109-197](#) Test Specification (TE Test Specification vs EIA and IEC Test Methods)

3. REQUIREMENTS

3.1. Design and Construction

Product shall be of the design, construction, materials, and physical dimensions specified on the applicable product drawings.

3.2. Materials

A. Contact:

Material: Copper Alloy

Finish: Tin plating over Nickel Plating on the Solder area, gold plating over Nickel Plating on the Contact area

B. Housing:

Material: high temperature thermoplastic material

Color: Black

Flammability: UL 94V-0

C. Retention Leg:

Material: Copper Alloy

Finish: Tin plating over Nickel Plating

3.3. Ratings

Current	Contact Type	Temperature
1A	Signal	-40°C to 125°C

3.4. Performance and Test Description

Product is designed to meet the electrical, mechanical, and environmental performance requirements specified. Unless otherwise specified, all tests shall be performed at ambient environmental conditions and tests as below :

Temperature : 15~35°C

Relative humidity : 25%RH~75%RH

The storage temperature : -40°C to 85°C, 85%RH or less

3.5. Test Requirements and Procedures Summary.

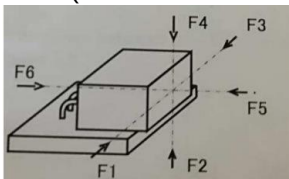
TEST DESCRIPTION	REQUIREMENT	PROCEDURE
Initial examination of product	Meets requirements of product drawing.	EIA-364-18. Visual and dimensional inspection per product drawing.
Final examination of product	Meets visual requirements.	EIA-364-18. Visual inspection.

ELECTRICAL

Contact Resistance	30mΩ maximum	EIA-364-23 Test between contact pin and FFC/FPC gold finger.
Insulation Resistance.	100 meg-ohms minimum	EIA-364-21. 500 volts DC, 1 minute's hold. Test between adjacent contacts of mated specimens.
Withstanding Voltage	One minute 45-60Hz sinusoidal wave hold with no breakdown or flashover.	EIA-364-20, Condition I.

		500 volts AC at 1 minute. Test performed between adjacent signal contacts of mated specimens.
temperature rise	≤30K	IEC60512-5-1

MECHANICAL

Random Vibration 1	No discontinuities of 1 microsecond or longer duration. Contact resistance: $\Delta R \leq 5m\Omega$ or $\leq 50\%R_i$.	According to LV214 S2 level
Mechanical Shock 1	No discontinuities of 1 microsecond or longer duration. Contact resistance: $\Delta R \leq 5m\Omega$ or $\leq 50\%R_i$.	According to LV214 S2 level
Random Vibration 2	Requirement: No mechanical damage No change to performance Contact resistance: $\Delta R \leq 5m\Omega$ or $\leq 50\%R_i$.	Frequency: 10~55~10Hz, Displacement: 1.64mm, 10g, 1Oct/min Test axis and test time: 2h/axis, X, Y and Z axis No discontinuity ≥ 1 microsecond.
Mechanical Shock 2	Requirement: No mechanical damage No change to performance Contact resistance: $\Delta R \leq 5m\Omega$ or $\leq 50\%R_i$.	Accelerated Velocity: 50g; Waveform: Half sine; Duration: 11ms. Number of drops: 3 drops each to 3 directions of X, Y and Z axes, totally 18 drops.
Durability.	Requirement: No mechanical damage No change to performance Contact resistance: $\Delta R \leq 5m\Omega$ or $\leq 50\%R_i$. See Note (a)	Mate and un-mate specimens in sliding direction 50 cycles by manual
Mating force	<45N	EIA-364-9. Mate specimens in sliding direction at 50mm/min, don't remove the latch
Pull out force	>80N	EIA-364-9. Un-mate specimens in sliding direction at 50mm/min, don't remove the latch
Per pin retention force	2N Min / Per Pin	EIA-364-9. Push the per pin from housing with rate 12.7±3mm/min
Connector Mounting Feature Mechanical Strength	Requirement: Min: 50 N (Direction of the force 1,3,5) Min: 110 N (Direction of the force 6) 	USCAR-2: 5.4.11

ENVIRONMENTAL

High temperature and high humid test	Requirement: No mechanical damage No change to performance Contact resistance: $\Delta R \leq 5m\Omega$ or $\leq 50\%R_i$. Insulation resistance: 100 M Ω Min. Withstanding Voltage: No breakdown.	Subject mated specimens at Temperature (+105 $\pm 3^\circ\text{C}$) and at 85 to 90% RH for 96H, Current=1A, the product shall be subjected to standard atmospheric condition for 1H, then measure the contact resistance
Low temperature	Requirement: No mechanical damage No change to performance Contact resistance: $\Delta R \leq 5m\Omega$ or $\leq 50\%R_i$. Insulation resistance: 100 M Ω Min. Withstanding Voltage: No breakdown.	Temperature (-40 $\pm 3^\circ\text{C}$), Time (96 hrs.) , the product shall be subjected to standard atmospheric condition for 1H, then measure the contact resistance.
High Temperature	Requirement: No mechanical damage No change to performance Contact resistance: $\Delta R \leq 5m\Omega$ or $\leq 50\%R_i$. Insulation resistance: 100 M Ω Min. Withstanding Voltage: No breakdown.	Temperature (+105 $\pm 3^\circ\text{C}$), Time (240 hrs.) , the product shall be subjected to standard atmospheric condition for 1H, then measure the contact resistance.
High Temperature Exposure	Requirement: No mechanical damage No change to performance Contact resistance: $R_i \leq 30m\Omega$ and Finally: $\Delta R \leq 5m\Omega$ or $\leq 50\%R_i$.	Step1: Mate and un-mate specimens 10 cycles; Step2: test Contact resistance; Step3: Temperature (+100 $\pm 5^\circ\text{C}$), Time (1008 hrs.) Step4: test Contact resistance;
Humidity and Temperature Cycling	Requirement: No mechanical damage No change to performance Contact resistance: $\Delta R \leq 5m\Omega$ or $\leq 50\%R_i$. Insulation resistance: 100 M Ω Min.	Step 1: Temperature (+50 $\pm 5^\circ\text{C}$), Time (24 hrs.) , Step 2: Temperature (+25 $\pm 5^\circ\text{C}$), Time (24 hrs.) , Step 3: Rise the temperature from 25 $^\circ\text{C}$ to 65 $^\circ\text{C}$ within 2.5H, the humidity is 90%~95%RH , and hold 3H Step 4: decline the temperature from 65 $^\circ\text{C}$ to 25 $^\circ\text{C}$ within 2.5H , the humidity is 80%~95%RH. Step 5: Rise the temperature from 25 $^\circ\text{C}$ to 65 $^\circ\text{C}$ within 2.5H, the humidity is 90%~95%RH , and hold 3H Step 6: decline the temperature from 65 $^\circ\text{C}$ to 25 $^\circ\text{C}$ within 2.5H , the humidity is 80%~95%RH, and hold 2H Step 7: decline the temperature from 25 $^\circ\text{C}$ to -25 $^\circ\text{C}$ within 10min, the humidity is 90%~95%RH, and hold 3H Step 8: rise the temperature to 25 $^\circ\text{C}$, the humidity is 90%~95%RH, and hold 3H The one cycle is 24H, total 7 cycle.
Thermal Shock	Requirement: No mechanical damage No change to performance Contact resistance: $\Delta R \leq 5m\Omega$ or $\leq 50\%R_i$. Insulation resistance: 100 M Ω Min. Withstanding Voltage: No breakdown.	Subject Mated specimens for 10 cycles with each cycle consisting of 30 minutes at each extreme temperature between - 40 $^\circ\text{C}$ and 105 $^\circ\text{C}$. The transition time between cold and hot temperatures is less than 5 minutes Max.
Salt	Requirement: Contact resistance: $\Delta R \leq 5m\Omega$ or $\leq 50\%R_i$.	Salt solution 5 $\pm 1\%$ by weight, at 35 $\pm 2^\circ\text{C}$ for 48H, the product shall be subjected to standard atmospheric condition for 1H, then measure the contact resistance

GWEPT	Requirement: The gauze pad under the hot wire did not ignite	Subject completely assembled specimen to the temperature of 750°C and 1N, duration of glow-wire applied is 30 seconds																										
Solderability	Requirements: pin coating shall not be bubbling, discoloration, tin accumulation, and other phenomena The area with Sn >95% test area.	Subject specimens to the following conditions of lead-free solder (Sn-Ag-Cu): Soldering temperature: (245±5) °C; Immersion duration: (6~10) s. Flux: kester145 All specimens shall be subjected to 155 °C steam aging for 4 hours																										
UN38.3	Requirement: No mechanical damage No change to performance Contact resistance: ΔR≤5mΩ or ≤50%Ri.	UN38.3 test: Step 1: LLCR. Step 2: Temperature: 20±5 °C , Air pressure: 11.6 kPa, Dwell time: 6h. No discontinuities greater than 1 us. Step 3: thermal cycles -a) Temperature: -40°C , dwell time: 6 h -b) Temperature: 75°C , dwell time: 6 h -c) Temperature change time: ≤30min -d) Number of cycles: 10 -e) After testing, store at ambient temperature (20±5°C) for 24 hours. Step 4: LLCR; Step 5: Sinusoidal Vibration <table border="1"><thead><tr><th>Frequency (Hz)</th><th>Acceleration (g)</th><th>Displacement (mm)</th><th>Test axis</th><th>Test time</th></tr></thead><tbody><tr><td>7~18</td><td>1</td><td>/</td><td rowspan="3">X,Y,Z</td><td rowspan="3">3 hours/axis</td></tr><tr><td>18~50</td><td>/</td><td>1.6</td></tr><tr><td>50~200</td><td>8</td><td>/</td></tr></tbody></table> Step 6: LLCR; Step 7: Mechanical Shock <table border="1"><thead><tr><th>Half sine pulse</th><th>120g</th><th>5ms</th><th>Σ(Vx/Vy/Vz)</th><th>Number of shock</th></tr></thead><tbody><tr><td>Shock shape</td><td>Acceleration</td><td>Pulse width</td><td>Test direction</td><td>Number of shock</td></tr></tbody></table> Total number of shock: 18 times Step 8: LLCR;	Frequency (Hz)	Acceleration (g)	Displacement (mm)	Test axis	Test time	7~18	1	/	X,Y,Z	3 hours/axis	18~50	/	1.6	50~200	8	/	Half sine pulse	120g	5ms	Σ(Vx/Vy/Vz)	Number of shock	Shock shape	Acceleration	Pulse width	Test direction	Number of shock
Frequency (Hz)	Acceleration (g)	Displacement (mm)	Test axis	Test time																								
7~18	1	/	X,Y,Z	3 hours/axis																								
18~50	/	1.6																										
50~200	8	/																										
Half sine pulse	120g	5ms	Σ(Vx/Vy/Vz)	Number of shock																								
Shock shape	Acceleration	Pulse width	Test direction	Number of shock																								


NOTE (a):

Shall meet visual requirements, show no physical damage, and meet requirements of additional tests as specified in the Product Qualification and Requalification Test Sequence shown in Figure 2.

Figure 1 (end)

3.6. Product Qualification and Requalification Test Sequence

TEST OR EXAMINATION	TEST GROUP											
	A	B	C	D	E	F	G	H	I	J	K	L
	TEST SEQUENCE											

Initial examination of product	1	1	1	1	1	1	1	1	1	1	1	1
Final examination of product	6	4	3	5	5		7	7	7	7	7	5
Contact Resistance	2, 4			2, 4	2, 4		2, 4	2, 4	2, 4	2, 4	2, 4	2, 4
Insulation Resistance							5	5	5	5	5	
Withstanding Voltage							6	6	6	6	6	
temperature rise			2									
Random Vibration 2				3								
Mechanical Shock 2					3							
Durability	3											
Mating force		2										
Pull out force		3										
Per pin retention force						2						
high temperature and high humid test							3					
Low temperature								3				
High Temperature									3			
Humidity and Temperature Cycling										3		
Thermal Shock											3	
Salt Spray												3
GWEPT	5											
Solderability test						3						
Test Group Quantity (Minimum)	6	6	6	6	6	6	6	6	6	6	6	6

Additional Test Sequence :

- 1, vibration and mechanical shock of the LV214 S2 , test group quantity is 6 pcs.
- 2, Connector Mounting Feature Mechanical Strength, test group quantity is 4 pcs.
- 3, Temperature Exposure, test group quantity is 6 pcs.
- 4, UN38.3, test group quantity is 6 pcs.



NOTE

- (a) See paragraph 4.1.A
- (b) Numbers indicate sequence in which tests are performed.
- (c) Pre-condition with 5 durability cycles.

FIGURE 2

4. QUALITY ASSURANCE PROVISIONS

4.1. Qualification Testing

A. Specimen selection

Specimens shall be prepared in accordance with applicable Instruction Sheets and shall be selected at random from current production. Minimum specimen quantities are shown in Figure 2.

B. Test Sequence

Qualification inspection shall be verified by testing specimens as specified in Figure 2.

4.2. Requalification testing

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

4.3. Acceptance

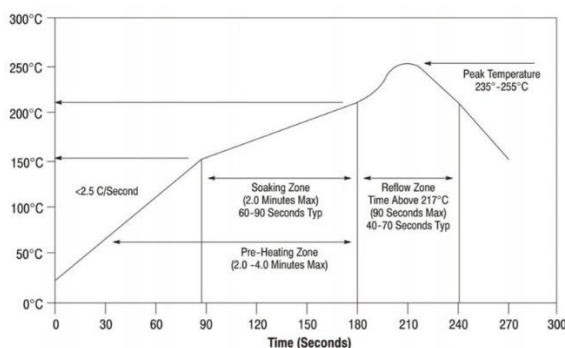
Acceptance is based on verification that the product meets the requirements of Figure 1. Failures attributed to equipment, test setup or operator deficiencies shall not disqualify the product. If product failure occurs, corrective action shall be taken, and specimens resubmitted for qualification. Testing to confirm corrective action is required before resubmittal.

4.4. Quality Conformance Inspection

The applicable quality inspection plan shall 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. SOLDERING

5.1 Reflow curve.



5.2 Manual soldering

Temperature: 370 to 400°C; Duration: 5 to 10 seconds.

6. TEST CARD

6.1 Test layout for header (40POS as shown) and FFC.



7.1 the storage conditions before packing opening:

35°C, 55%RH or less, within 6 months

the storage conditions after packing opening:

25°C, 55%RH or less, within 1 months

It isn't dry packing.

It shall be kept in the place which isn't exposed to direct sunlight.