



Surface Mount Technology (SMT) Hermaphroditic Blade and Receptacle Connector Tin and Select Gold Plated Assemblies

1. SCOPE

1.1. Content

This specification defines performance, tests, and quality requirements for TE Connectivity (TE) SMT Hermaphroditic blade and receptacle connector assembly.

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. Successful qualification testing on the subject product line was completed in July 2009 and July 2016. The Qualification Test report numbers for the testing are 501-705 and 501-134059.

2. APPLICABLE DOCUMENTS

The following documents form a part of this specification to the extent specified herein. Unless otherwise specified, the latest edition of the document applies. In the event of conflict between the requirements of this specification and the product drawing, 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 Documents

- [TEC-109-201](#) Component Heat Resistance to Lead-Free Reflow Soldering
- [114-13225](#) Hermaphroditic Blade and Receptacle Connector
- [501-705](#) SMT Hermaphroditic Blade and Receptacle Connector Tin Plated Assemblies
- [501-134059](#) SMT Hermaphroditic Blade and Receptacle Connector Select Gold Plated Assemblies

2.2. Industry Documents

EIA-364, "Electrical Connector/Socket Test Procedures Including Environmental Classifications"

3. REQUIREMENTS

3.1. Design and Construction

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

3.2. Materials

Materials used in the construction of this product shall be as specified on the applicable product drawing.

3.3. Ratings

Voltage: 125 volts AC rms, 125 volts DC
Current: 6 amperes maximum
Temperature: -40 to 105°C

3.4. Performance and Test Description

Product is designed to meet the electrical, mechanical, and environmental performance requirements specified in Figure 1. Unless otherwise specified, all tests shall be performed at ambient environmental conditions.

3.5. Test Requirements and Procedures Summary

Test Description	Requirement	Procedure
Initial Examination of Product	Meets requirements of product drawing and Application Specification 114-13225.	EIA-364-18 Visual and dimensional (C of C) inspection per product drawing.
Final Examination of Product	Meets visual requirements.	EIA-364-18 Visual inspection
Electrical		
Low Level Contact Resistance (LLCR)	18 milliohms maximum initial. ΔR 5 milliohms maximum.	EIA-364-23 Subject specimens to 100 milliamperes maximum and 20 millivolts maximum open circuit voltage. See Figure 4.
Insulation Resistance	1 megohm minimum.	EIA-364-21 500 volts DC, 2-minute hold. Test between adjacent contacts of unmated specimens.
Withstanding Voltage	One-minute hold with no breakdown or flashover.	EIA-364-20, Condition I 1500 volts AC at sea level. Test between adjacent contacts of unmated specimens.
Temperature Rise vs Current	30°C maximum temperature rise at specified current.	EIA-364-70, Method 1 Stabilize at a single current level until 3 readings at 5-minute intervals are within 1°C. Energize 100% of the circuit.
Mechanical		
Resistance to Reflow Soldering Heat	Connectors shall meet both visual and dimensional inspections. See Note.	TEC-109-201, Method A, Condition B
Random Vibration	No discontinuities of 1 microsecond or longer duration. See Note.	<u>Tin Plated:</u> EIA-364-28, Test Condition VII, Condition Letter D Subject mated specimens to 3.10 G's rms between 20 to 500 Hz. Fifteen minutes in each of 3 mutually perpendicular planes. See Figure 5. <u>Select Gold Plated:</u> EIA-364-28, Test Condition VII, Condition Letter E Subject mated specimens to 4.90 G's rms between 20 to 500 Hz. Fifteen minutes in each of 3 mutually perpendicular planes. See Figure 5.
Mechanical Shock	No discontinuities of 1 microsecond or longer duration. See Note.	EIA-364-27, Condition H Subject mated specimens to 30 G's half-sine shock pulses of 11 milliseconds duration. Three shocks in each direction applied along 3 mutually perpendicular planes, 18 total shocks. See Figure 5.

Durability	See Note.	EIA-364-9 Manually mate and unmate specimens for 10 cycles.
Mating Force	See Figure 6 & 7.	EIA-364-13 Measure force necessary to mate specimens at a maximum rate of 12.7 mm [.5 in.] per minute.
Unmating Force	See Figure 6 & 7.	EIA-364-13 Measure force necessary to unmate the specimens at a maximum rate of 12.7 mm [.5 in.] per minute.
Environmental		
Thermal Shock	See Note.	<u>Tin Plated:</u> EIA-364-32, Test Condition VII Subject unmated tin plated specimens to 25 cycles between -40° and 105°C with 30 minute dwells at temperature extremes and 1-minute transition between temperatures. <u>Select Gold Plated:</u> EIA-364-32G, Test Condition VII Subject unmated select gold plated specimens to 250 cycles between -40° and 105°C with 30 minute dwells at temperature extremes and 1-minute transition between temperatures.
Humidity/Temperature Cycling	See Note.	<u>Tin Plated:</u> EIA-364-31D, Method III Subject mated and unmated specimens to 10 cycles (10 days) between 25° and 65°C at 80 to 100% RH. <u>Select Gold Plated:</u> EIA-364-31D, Method III Subject unmated specimens to 10 cycles (10 days) between 25° and 65°C at 80 to 100% RH.
Temperature Life	See Note.	<u>Tin Plated:</u> EIA-364-17C, Method A, Test Condition 4 Subject mated specimens to 105°C for 548 hours. <u>Select Gold Plated:</u> EIA-364-17C, Method A, Test Condition 4 Subject mated gold plated specimens to 130°C for 500 hours

Mixed Flowing Gas (Select Gold Plated)	No corrosion influencing performance.	EIA-364-65B, Class IIA Subject mated specimens to a 4 gas environment for 14 days.
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i **NOTE** Shall meet visual requirements, show no physical damage, and meet requirements of additional tests as specified in the product qualification and re-qualification test sequence given in Figure 2 & 3.

Figure 1

3.6 Product Qualification and Re-Qualification Test Sequence for the tin plated assemblies.

TEST OR EXAMINATION	TEST GROUP (a)			
	1	2	3	4
	TEST SEQUENCE (b)			
Initial Examination of Product	1	1	1	1
LLCR	3,7	2,7		
Insulation Resistance			2,6	
Withstanding Voltage			3,7	
Temperature Rise vs Current		3,8(c)		
Resistance to Reflow Soldering Heat				2
Random Vibration	5	6		
Mechanical Shock	6			
Durability	4			
Mating Force	2(d)			
Unmating Force	8(e)			
Thermal Shock			4	
Humidity/Temperature Cycling		4(f)	5(g)	
Temperature Life		5		
Final Examination of Product	9	9	8	3

- (a) See paragraph 4.1.A.
- (b) Numbers indicate sequence in which tests are performed.
- (c) Five specimens of each position (2, 4, and 6) shall be used for initial temperature rise, while the other 5 specimens from each position will run through the entire test sequence.
- (d) Mate 5 specimens of each position (2, 4, and 6) in the vertical direction and 5 specimens of each position (2, 4, and 6) in the horizontal direction.
- (e) Unmate 5 specimens of each position (2, 4, and 6) in the vertical direction and 5 specimens of each position (2, 4, and 6) in the horizontal direction.
- (f) Mated specimens.
- (g) Unmated specimens.

Figure 2

Product Qualification and Re-Qualification Test Sequence for the select gold plated assemblies.

TEST OR EXAMINATION	TEST GROUP (a)			
	1	2	3	4
	TEST SEQUENCE (b)			
Initial Examination of Product	1	1	1	1
LLCR	3,7	3,6,8,10,12		
Insulation Resistance			2,6	
Withstanding Voltage			3,7	
Temperature Rise vs Current		4,11(c)		
Resistance to Reflow Soldering Heat				2
Random Vibration	5	10 (f)		
Mechanical Shock	6			
Durability	4			
Mating Force	2(d)	2		
Unmating Force	8(e)	13		
Thermal Shock		9	4	
Humidity/Temperature Cycling			5(g)	
Temperature Life		7		
Mixed Flowing Gas		5(h,i)		
Final Examination of Product	9	14	8	3

- (a) See paragraph 4.1.A.
- (b) Numbers indicate sequence in which tests are performed.
- (c) Five specimens of each position (2, 4, and 6) shall be used for initial temperature rise, while the other 5 specimens from each position will run through the entire test sequence.
- (d) Mate 5 specimens of each position (2, 4, and 6) in the vertical direction and 5 specimens of each position (2, 4, and 6) in the horizontal direction.
- (e) Unmate 5 specimens of each position (2, 4, and 6) in the vertical direction and 5 specimens of each position (2, 4, and 6) in the horizontal direction.
- (f) Energized to 18°C.
- (g) Unmated specimens.
- (h) Mated specimens.
- (i) Mixed flowing gas for Gold per EIA-364-65, Class IIA (4 gas) for 14 days.

FIGURE 3

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. Each test group shall consist of a minimum of 5 specimens soldered to FR-4 printed circuit boards.

B. Test Sequence

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

Qualification inspection shall be verified by testing select gold plated specimens as specified in Figure 3.

4.2. Re-Qualification Testing

If changes that significantly affecting form, fit, or function are made to the product or manufacturing process, product assurance shall coordinate re-qualification 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 re-submitted for qualification. Testing to confirm corrective action is required before re-submittal.

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.

LLCR Measurement Points

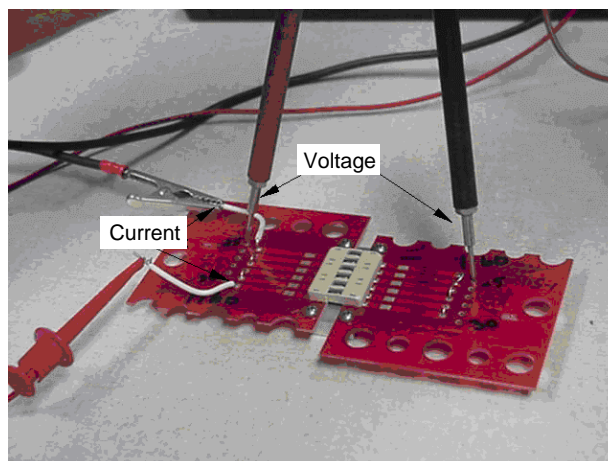


Figure 4

Vibration and Mechanical Shock Mounting Fixture

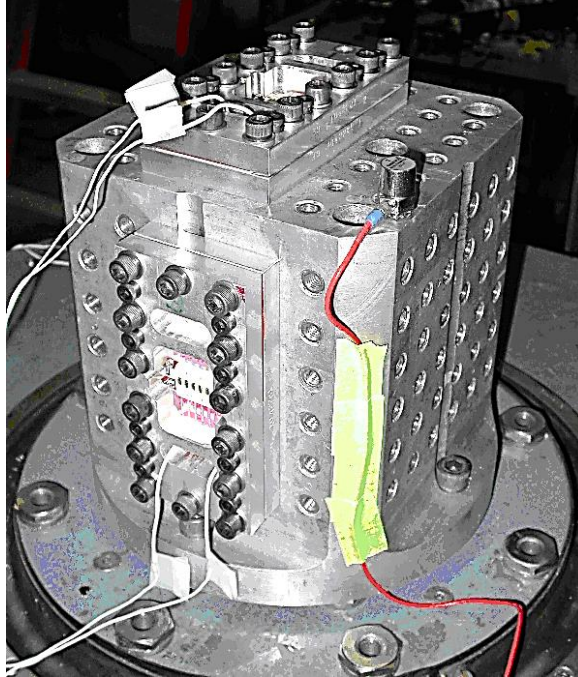


Figure 5

Mating/Unmating Force Requirements for Tin Plated Assemblies

Position	Mating Force (N [lbf]) Maximum		Unmating Force (N [lbf]) Minimum	
	Vertical	Horizontal	Vertical	Horizontal
2	9.96 [2.24]	9.47 [2.13]	6.09 [1.37]	8.18 [1.84]
4	16.81 [3.78]	15.08 [3.39]	11.30 [2.54]	11.39 [2.56]
6	26.60 [5.98]	23.75 [5.34]	18.19 [4.09]	20.42 [4.59]

Figure 6

Mating/Unmating Force Requirements for Select Gold Plated Assemblies

Position	Mating Force (N [lbf]) Maximum		Unmating Force (N [lbf]) Minimum	
	Vertical	Horizontal	Vertical	Horizontal
2	1.95 [0.44]	1.90 [0.43]	0.30 [0.07]	0.20 [0.04]
4	4.10 [0.92]	3.85 [0.87]	1.35 [0.30]	1.40 [0.31]
6	7.00 [1.57]	5.75 [1.30]	1.65 [0.37]	1.75 [0.39]

Figure 7