108-115001

USB 3.0 Plug & Receptacle

1. Scope:

1.1 Contents:

This specification covers the requirements for product performance, test methods and quality requirements of Tyco Electronics Universal Serial Bus (USB) consortium plug and receptacle connectors. These connectors are mounted plug and printed circuit board mounted receptacle connectors. Lead free version

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.

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 this specification and the product drawing, the product drawing shall take precedence. In the event of conflict between the requirements this specification and referenced documents, this specification shall take precedence.

2.1 Tyco Electronics Specifications:

A. 109-1: General Requirements for Test Specification

B. 109 Series: Test Specification as indicated in Figure 1. (Comply with MIL-STD-202, MIL-STD-1344 and EIA TS-1000.01)

C. Corporate Bulletin 401-76: Cross-reference between Tyco Electronics test Specification and Government or Commercial Documents

D. 501-115002: Qualification Test Report

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PRELIMINARY REV: E

LTR	REVISION RECORD	DR	DATE
E	Add resistance to reflow Soldering Heat	F.L	31OCT 12
D	Change durability to 5000cycles and MFG time to 7days	F.L	27Apr 2012
C	Detail solderability requirement	F.L	29Mar 2011
B	Cancel preludial declaration	F.L	2Jun 2010

DR Francis Lee
CHK Martin Li
APP Steven Yao

TE Connectivity Shanghai Ltd

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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:

A. Contact:

（1） Plug: Copper alloy, Gold flashed over Pd-Ni or Gold plating on contact area, both over nickel on entire stock, Matte tin plating on solder tails.

（2） Receptacle: Copper alloy, Gold flashed over Pd-Ni or Gold plating on contact area, both over nickel on entire stock; Matte tin plating on solder tails.

B. Housing:

(1) Plug: Thermoplast

(2) Receptacle: Thermoplastic

C. Shell:

(1) Plug: Steel, Ni plating over Cu underplating over all

(2) Receptacle: Copper alloy, Matte tin over all nickel under over all

3.3 Rating

A. Voltage Rating: 100 VAC/DC

B. Current Rating: 1.8A applied to Vbus pin and its corresponding GND pin (pin1, pin4 pin7)

0.25A applied to all other pins (pin2, pin3, pin5, pin6, pin8, pin9)

C. Temperature Rating: -55℃ to +105℃

The upper limit of the temperature includes the temperature rising resulted by the energized electrical current.

3.4 Performance Requirements and Test Descriptions:

The product shall be designed to meet the electrical, mechanical and environmental performance requirements specified in Fig. 2. All tests shall be performed in the room temperature unless otherwise specified.

3.5 Test Requirements and Procedures Summary: Follow EIA-364-1000.01 except Group 6.

Para.	Test Items	Requirements	Procedures
3.5.1	Examination of Product	Meets requirements of product drawing	Visual inspection No physical damage
Electrical Requirements			
3.5.2	Low level contact resistance	30 mΩ Max initial for VBUS and GND contacts (pin1, pin4, pin7) 50 mΩ Max. initial for all other contacts(pin2, pin3, pin5,pin6,pin8, pin9) Maximum change (delta) of +10mΩ after environmental stresses	EIA 364-23 Subject mated contacts assembled in housing to 20 mV Max. open circuit at 10 mA
3.5.3	Dielectric withstanding voltage	No creeping discharge nor flashover shall occur.	EIA 364-20 0.1k VAC for 1 minute. Current leakage: 5 mA Max. Test between adjacent contacts of unmated and mated connectors.
3.5.4	Insulation Resistance	A minimum of 100MΩ insulation resistance	EIA 364-21 Test between adjacent contacts of unmated and mated connectors
3.5.5	Contact Current Rating	The current is applied to the contacts, the delta temperature shall not exceed +30℃ at any point on the USB 3.0 connectors under test, when measured at an ambient temperature of 25℃ .	EIA 364-70,Method 2 A current of 1.8A shall be applied to V_{BUS} pin and its corresponding GND pin (pin1, pin4, pin7]. Additionally, a minimum current of 0.25A shall be applied to all the other contacts (pin2, pin3, pin5, pin6, pin8, pin9)
Mechanical Requirements			
3.5.6	Durability	No physical damage to any part of the Connectors and the cable assembly shall Occur.	EIA-364-09 Mate and unmate samples for 5000 cycles at maximum rate of 200 cycles per hour
3.5.7	Vibration	No electrical discontinuities greater than 1 microsecond shall occur. No evidence of physical damage. See Note	EIA-364-28,test condition Ⅶ ,test condition letter D, Subject mated connectors.15 minutes in each of 3 mutually perpendicular planes.
3.5.8	Physical Shock	No electrical discontinuity greater than 1 microsecond shall occur.	EIA-364-27,test condition H, Except 30 G's subject mated connectors to 30G's half-sine shock pulses of 11 millisecond duration applied along the 3 mutually perpendicular planes, total 18 shocks
3.5.9	Mating Force	35N maximum	EIA-364-13 ,Method A Measure force necessary to mate samples at maximum rate of 12.5mm a minute.

Para.	Test Items	Requirements	Procedures
3.5.10	Unmating Force	10N minimum initial and 8N after the specified mate / unmate or durability cycles	EIA-364-13 ,Method A Measure force necessary to unmate samples at maximum rate of 12.5mm per minute.
3.5.11	Solder ability	Solder shall cover a minimum of 95% of the surface being immersed ,when soldered at a temperature 255℃+/-5℃ for an immersion duration of 5s.	EIA-364-52 Subject surface mount samples to solder ability
3.5.12	Reseating	No evidence of physical damage	Manually unplug/plug the connector .Perform 3 such cycles
3.5.13	Cable Flexing	No physical damage or discontinuity over 1 ms	EIA 364-41 ,Condition I during flexing shall occur to the cable assembly with Dimension X=3.7 times the cable diameter and 100 cycles in each of two planes
3.5.14	Cable Pull-Out	No physical damage to the cable assembly shall occur	EIA 364-38 Condition A Its subjected to a 40N axial load for minimum of 1 minute while clamping one of the cable plug
3.5.15	Resistance to Reflow Soldering Heat	No physical damage shall occur.	Pre-soak condition, 85℃/85％RH for 168 hours. Pre Heat：150~200℃, 60~180sec. Heat：217℃ Min., 60~150sec. Peak Temp.：260+0/-5℃, 20~40sec. Duration：3 cycles Tyco spec. 109-201, Condition B
		Environmental Requirements	
3.5.16	Thermal Shock	30 mΩ Max initial for VBUS and GND contacts (pin1 ,pin4 ,pin7) 50 mΩ Max. initial for all other contacts,(pin2,pin3,pin5,pin6,pin8,pin9) Maximum change (delta) of +10mΩ after environmental stresses	EIA 364-32 Condition I Subject mated samples to 25 cycles between -55℃ and +85℃
3.5.17	Temperature Life	30 mΩ Max initial for VBUS and GND contacts (pin1 ,pin4 ,pin7) 50 mΩ Max. initial for all other contacts,(pin2,pin3,pin5,pin6,pin8,pin9) Maximum change (delta) of +10mΩ after environmental stresses	EIA 364-17 ,Method A Subject mated samples to temperature life at 105℃ for 120 hours
3.5.18	Cyclic temperature & humidity	30 mΩ Max initial for VBUS and GND contacts (pin1 ,pin4 ,pin7) 50 mΩ Max. initial for all other contacts,(pin2,pin3,pin5,pin6,pin8,pin9) Maximum change (delta) of +10mΩ after environmental stresses	EIA 364-31 ,Method II Subject samples to between 25℃±3℃ at 80% ±3% RH and 65℃±3℃ at 50%±3% RH, ramp times should be 0.1 hour. And dwell times should be 1.0 hour. dwell times start when the temperature and humidity have stabilized within the specified levels. Perform 24 such cycles

3.5.19	Thermal disturbance	30 mΩ Max initial for VBUS and GND contacts (pin1 ,pin4 ,pin7) 50 mΩ Max. initial for all other contacts,(pin2,pin3,pin5,pin6,pin8,pin9) Maximum change (delta) of +10m Ω after environmental stresses	Cycle samples to between 15℃±3℃ and 85℃ ±3℃,as measured on the part. ramps should be a minimum of 2℃ per minute,. And dwell times should insure that the contacts reach the temperature extremes (a minimum of 5 minutes). Humidity is not controlled .perform 10 such cycles.
3.5.20	Thermal Cycling	30 mΩ Max initial for VBUS and GND contacts (pin1 ,pin4 ,pin7) 50 mΩ Max. initial for all other contacts,(pin2,pin3,pin5,pin6,pin8,pin9) Maximum change (delta) of +10m Ω after environmental stresses	Cycle samples to between 15℃±3℃ and 85℃ ±3℃,as measured on the part. ramps should be a minimum of 2℃ per minute,. And dwell times should insure that the contacts reach the temperature extremes (a minimum of 5 minutes). Humidity is not controlled .perform 500 such cycles.
3.5.21	Mixed flowing gas	30 mΩ Max initial for VBUS and GND contacts (pin1 ,pin4 ,pin7) 50 mΩ Max. initial for all other contacts,(pin2,pin3,pin5,pin6,pin8,pin9) Maximum change (delta) of +10m Ω after environmental stresses	EIA 364-65 ,class IIA Subject samples to environmental, class IIA for 7 days. Final LLCR should be measured after 1 hour from the end of test, Detail request see NOTE

Figure 1 (end)

NOTE: 1) Expose all plugs and receptacles unmated for 2/3 of the test duration;

2) Mate each piece to the same piece that it was mated to during temperature life (preconditioning);

3) Expose for the remainder of the test duration;

3.6 Product Qualification Test Sequence.

Test of Examination	Test Group								
	1	2	3	4	5	6	7	8	9
	Test Sequence								
Examination of Product	1,12	1,10	1,9	1	1,10	1,3	1,7	1,5	1,3
Low level contact resistance	2,7,9	2,5,7,9	2,5,8	2,5,7,9,11	2,5,7,9		3,5		
Dielectric Withstanding Voltage							2,6		
Insulation Resistance								2	
Contact current rating						2			
Durability	5	3(a)	3(a)	3(a)	3(a)		4		
Vibration			6						
Physical Shock			7						
Mating force	3,10								
Unmating force	4,11								
Solder ability									2
Reseating	8	8		8	8				
Cable flexing								3	
Cable Pull-Out								4	
Thermal Shock		4							
Temperature Life	6		4(b)	4(b)	4(b)				
Cyclic Temperature &Humidity		6							
Thermal Disturbance				10					
Thermal Cycliing					6				
Mixed Flowing Gas				6					

(a) Proconditioning 5 cycles

(b) Proconditioning 105℃ for 72 hours

Figure 2

4. Quality Assurance Provisions

4.1 Qualification Testing

Sample Selection

Connector housing and contacts shall be prepared in accordance with applicable instruction sheets. They shall be selected at random from current production.

4.2 Test Environment:

All the tests shall be performed under following conditions, unless otherwise specified.

Temperature:	15 ~ 35 ºC
Relative Humidity:	45 ~ 75%
Atmosphere pressure:	86.7 ~ 107 kPa (650 ~ 800 mmHg)