



Production Specification

USB Type-C Connector

1 Scope:

1.1 Contents

This specification covers the requirements for product performance, test methods and quality assurance provisions of TE Connectivity USB type C connector.

Applicable product description and part numbers are as shown in Appendix 1.

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 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 Connectivity Specification:

- A. 109-5000: Test Specification, General Requirements for Test Methods
- B. 501-115167: Qualification Test Report

2.2 Commercial Standard and Specification:

- A. ANSI/EIA 364-C
- B. Universal Serial Bus Type-C Connector and Cables Assemblies Compliance Document Revision 0.9 Draft (Feb.5, 2015).

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 (Plug & Receptacle)
Material: Copper alloy
- B. Housing (Plug & Receptacle)
Thermo Plastic, UL 94 V-0
- C. Shell (Plug & Receptacle)
Material: Stainless steel

3.3 Ratings:

- A. Voltage Rating: 30 V Max.
- B. Current Rating:
 - (1). VBUS pins: 5A Max, GND pins: 6.25A
 - (2). VCONN pins: 1.25A Max.
 - (3). Signal pins contact: 0.25A Min.
- C. Temperature Rating: -30°C to 85°C (Including temperature rising)
- D. Storage Temperature: -30°C to 85°C

3.4 Performance Requirements and Test Descriptions:

The product shall be designed to meet the electrical, mechanical and environmental performance requirements specified in Fig.1. All tests shall be performed in the room temperature, unless otherwise specified.

Temperature: 15°C ~ 35°C

Humidity : 25% ~ 85% R.H.

Pressure : 650mmHg ~ 800mmHg

3.5 Test Requirements and Procedures Summary

Table.1

Test Item	Procedures	Requirements
Examination		
Visual examination of product 外观检查	EIA 364-18 Visual, dimensional and functional meets requirements of product drawing and applicable instructions on customer drawing, and application specification.	Meets requirements of product drawing and no defects. 无明显损坏
Electrical		
Low Level Contact Resistance 接触电阻	EIA 364-23 The low-level contact resistance (LLCR) measurement is made across the plug and receptacle mated contacts and does not include any internal paddle cards or substrates of the plug or receptacle. See Figure 1 Measure at 20mV (max) open circuit at 100 mA 测试标准: EIA-364-23, 最大 20mV DC 测试电压, 开路最大电流 100mA.	40 mΩ (Max) initial for VBUS, GND and all other contacts. Maximum change (delta) of +10 mΩ after environmental stresses. VBUS/GND PIN 初始接触电阻小于 40 mΩ, 机械和环境测试后变化量小于 10 mΩ
Continuity	See USB Type C Compliance Document Appendix E. See Figure 3	No discontinuities or shorts allowed.
Dielectric Withstanding Voltage 耐电压	EIA-364-20, Method B. Applicable to both receptacle and plug. 100VAC (rms) for 1 minute at sea level. 测试标准: EIA-364-20 施加 100V AC, 60Hz 电压于相邻端子, 端子 A2 to A11, B2 to B11 与铁壳/Mid-plate/GND pin(A1A12B1B12), 1 分钟	No break down shall occur when voltage is applied between adjacent contacts of unmated and mated connectors 无击穿, 漏电电流小于 0.5mA
Insulation Resistance 绝缘阻抗	EIA 364-21 Applicable to both receptacle and plug. Apply 500V DC Apply the above specified voltage between adjacent contacts for 1 minutes. 测试标准: EIA-364-21 施加 500V DC 电压于相邻端子, 端子与地面, 端子与铁壳, 1 分钟	>100 MΩ insulation resistance between adjacent contacts of unmated and mated connectors

<p>Current Rating 额定电流 (Temperature rise 温升)</p>	<p>EIA 364-70, Method 2. See USB Type C Compliancy Document Appendix C. A current of 5.0 A shall be applied collectively to VBUS pins (i.e., pins A4, A9, B4, and B9) and 1.25 A applied to the VCONN pin (i.e., B5 of the plug connector) with the return path through the corresponding GND pins (i.e., pins A1, A12, B1, and B12). A minimum current of 0.25 A shall also be applied individually to all the other contacts. Allow to stabilize. Note: special T-rise test boards design per the guidelines in Appendix C of the USB Type C Compliancy Document are to be used.</p> <p>测试标准: EIA-364-70, Method 1., 信号和电源 Pin 在额定工作电流下 1. 4 对 Vbus 和 GND 并联同时工作时, 要求 1.5A/Pin (DC 9V), Vconn 和 CC2 通流 1.25A/Pin 2. 单对 Vbus 和 GND 回路单独工作时, 3A/Pin, 信号 Pin 0.25A/Pin 3. 满足温升测试要求 (DC 9V)</p>	<p>Temperature rise of the outside shell surface of the mated connector pair above the VBUS and GND contacts shall not exceed 30°C above ambient temperature.</p>
Mechanical		
<p>Insertion Force 插入力</p>	<p>EIA-364-13 Maximum rate 12.5mm/min 测试方法: EIA-364-13/ Method 20 13.1 of MIL-STD-1344A, 最大速度 12.5mm/分钟</p>	<p>Between 5N and 20N before and after durability. 插拔耐久测试前后: 插入力大于等于 5N, 小于等于 20N,</p>
<p>Extraction Force 拔出力</p>	<p>EIA-364-13 Maximum rate 12.5mm/min 测试方法: EIA-364-13 Test method: EIA-364-13B, 最大速度 12.5mm/分钟</p>	<p>Within the range of 8 N to 20 N, measured after a preconditioning of five insertion/extraction cycles (i.e., the sixth extraction). After an additional twenty-five insertion/extraction cycles, the extraction force shall be measured again (i.e., the thirty-second extraction) and the extraction force shall be within: a) 33 % of the initial reading, and b) within the range of 8 N to 20 N. The extraction force shall be within the range of 6 N to 20 N after 10,000 insertion/extraction cycles. 插拔耐久测试前后: 拔出力大于等于 8N(1000 次), 6N(10000 次)小于等于 20N</p>
<p>Durability 耐久性</p>	<p>EIA 364-09 10,000 cycles 测试方法: Test method: EIA-364-09C/ Method 2016 of MIL-STD-1344A 测试速度: 最大 200 次/小时</p>	<p>Meet insertion / Extraction force, no evidence of physical damage. 1. Machine insertion 10,000 times, Positive and negative 5,000 times 2. Manpower insertion 10,000 times, Positive and negative 5,000 times 插拔力满足规格要求, 舌片无明显破损情形 1. 机械插拔 10000 次, 正反各 5000 次 2. 人工插 10000 次, 正反各 5000 次</p>
<p>Durability (Preconditioning) 耐久性(预处理)</p>	<p>EIA 364-09 50 cycles</p>	<p>No evidence of physical damage</p>
<p>Reseating</p>	<p>Manually unplug/plug the connector. Perform 3 such cycles</p>	<p>No evidence of physical damage</p>

Environmental		
Temperature Life 温度寿命	EIA-364-17, Method A 105°C, 120hrs 测试标准: EIA-364-17A, Method A, condition 4 105°C, 120 小时, 公母配插	No evidence of physical damages Meet LLCR requirement Insulation > 100MΩ Min. 外观无明显损坏, 接触电阻满足要求, 绝缘电阻>100MΩ
Temperature Life (Preconditioning) 温度寿命(预处理)	EIA-364-17, Method A 105°C, 72hrs 测试标准: EIA-364-17A, Method A, condition 4 105°C, 72 小时, 公母配插	No evidence of physical damages Meet LLCR requirement Insulation > 100MΩ Min. 外观无明显损坏, 接触电阻满足要求, 绝缘电阻>100MΩ
Thermal Shock 温度冲击	EIA-364-32, Method A, Condition I, duration A-4 (-55°~+85°C, 10 cycles) 测试标准: EIA-364-32D, test condition 1, -55°C~85°C, 交替循环 10 次, 常温下恢复 1-2 小时进行测试 -55°C+0/-3°C: 30 分钟, 25°C+/-10°C: 5 分钟 Max +85°C+3/-0°C: 30 分钟 25°C+/-10°C: 5 分钟 Max	No evidence of physical damages Meet LLCR requirement Insulation > 100MΩ Min. 外观无明显损坏, 接触电阻满足要求, 绝缘电阻>100MΩ
Cyclic Temperature and Humidity 温湿度循环	EIA-364-31, Method III, w/o optional cold shock and vibration. Exceptions per EIA-364-1000: - Cycle between 25°C/80%RH and 65°C/50%RH. - Ramp 0.5hr, dwell 1hr, dwell starts when conditions are stabilized. - 24 cycles total - Allowable variation ±3°C and ±3%RH 测试标准: EIA-364-31, Method III, 25°C~65°C; 95% RH, 交替变更, 持续 240 小时 S1. 25°C~65°C, 90-98%RH, 2.5Hr S2. 65°C, 90-98%RH, 3Hr S3. 65°C~25°C, 80-98%RH, 2.5Hr S4. 25°C~65°C, 90-98%RH, 2.5Hr S5. 65°C, 90-98%RH, 3Hr S6. 65°C~25°C, 80-98%RH, 2.5Hr S7. 25°C, 2HR, 90-98%RH S7a. -10°C, 3HR S7. 25°C, 3HR, 90-98%RH S1 – S7 1 cycle 24Hr, 10 cycle (240Hr)	No evidence of physical damages Meet LLCR requirement Insulation > 100MΩ Min. 外观无明显损坏, 接触电阻满足要求, 绝缘电阻>100MΩ
Vibration 机械振动	EIA-364-28, Condition VII-D, 15min in each of 3 mutually perpendicular directions. Both mating halves should be fixed rigidly. (Power Spectral Density 0.02g ² /Hz, Overall rms 3.10g)  测试方法: EIA-364-28, condition VII, test letter D; 0.02 g ² /Hz, overall rms: 3.10, 每个轴向(X、Y、Z) 2 小时, 总共 6 小时	No evidence of physical damages and no discontinuity longer than 1 microsecond. 外观无明显损坏, 瞬断<1us No visual destroy and discontinuities < 1μsec



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<p>Mixed Flowing Gas</p> <p>混合气体测试</p>	<p>EIA-364-65, class IIA, 120hrs unmated, 120hrs mated (240hrs total).</p> <p>测试标准: EIA-364-65,Class IIA, 10 天, 5 天非配插, 5 天配插, RH% 70+/-2, Temp. 30+/-1, Cl2: 10+/-3 ppb, NO2: 200+/-50 ppb, H2S: 10+/-5 ppb, SO2: 100+/-20 ppb</p>	<p>No evidence of physical damages Meet LLCR requirement Insulation > 100MΩ Min.</p> <p>端子镀金区域无腐蚀点, 接触电阻满足要求</p>
<p>Thermal Disturbance</p> <p>端子镀金区域无腐蚀点, 接触电阻满足要求</p>	<p>EIA-364-32, cycle the mated connector pair 10 times between 15°C and 85°C.</p> <ul style="list-style-type: none"> - ramp > 2°C/min - dwell > 5 mins (ensure contacts reach temperature) - Humidity not controlled <p>测试标准: EIA-364-32 -15+/-3 °C~85+/-3°C, 交替循环 10 次, 温度以 2 度最小/分钟变化, 极限温度停留时间最小 5 分钟, 湿度不做要求;</p>	<p>No evidence of physical damages Meet LLCR requirement Insulation > 100MΩ Min.</p> <p>外观无明显损坏, 接触电阻满足要求, 绝缘电阻>100MΩ</p>
<p>Other</p>		
<p>Solderability</p> <p>可焊性</p>	<p>EIA-364-52. Category 3 Steam Age RMA Class 1 flux immerse in molten solder at a temperature of +255°C ± 5°C at rate of 25.4 mm ± 6.35 mm per second.</p> <p>Hold in solder for 5 +0/-0.5 seconds. To include solder pins and mounting pads.</p> <p>测试标准: EIA-364-52, 锡炉温度: 255°C+/-5°C, 浸锡时间: 5+/-0.5 秒</p>	<p>Solderable area shall have a minimum of 95% solder coverage.</p> <p>焊锡覆盖面积>95%以上</p>

3.6 Product Qualification Test Sequence

Table.2

Test	A-1	A-2	A-3	A-4	A-7	B-6	B-7	C-1 ¹
Visual Inspection	1, 8	1, 10	1, 8	1, 12	1, 13	1, 3	1, 4	1, 3
Low Level Contact Resistance	2, 5, 7	2, 5, 7, 9	2, 5, 7	2, 5, 7, 9, 11	3, 10			
Durability					7			
Durability (Preconditioning)	3	3	3	3				
Insertion Force					5, 8			
Extraction Force					6, 9			
Temperature Life	4							
Temperature Life (Preconditioning)			4	4				
Reseating	6	8		10	4			
Thermal Shock		4						
Cyclic Temperature and Humidity		6						
Vibration			6					
Mixed Flowing Gas				6				
Thermal Disturbance				8				
Continuity							2	
Dielectric Withstanding Voltage					2, 11		3	
Insulation Resistance					12			
Current Rating						2		
Solderability								2

Signal Integrity Testing

Test Requirements and Test Sequence as per USB Type C Compliance Document.

¹ Additional test, not part of USB Type C Compliance Requirements

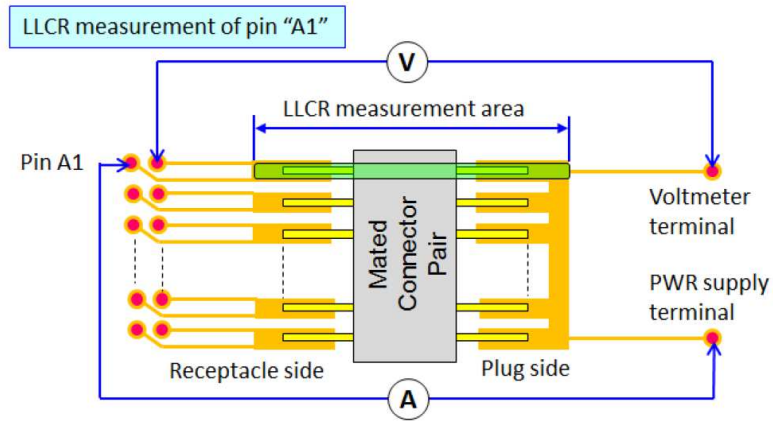


Figure 1: Typical Contact Resistance Measurement

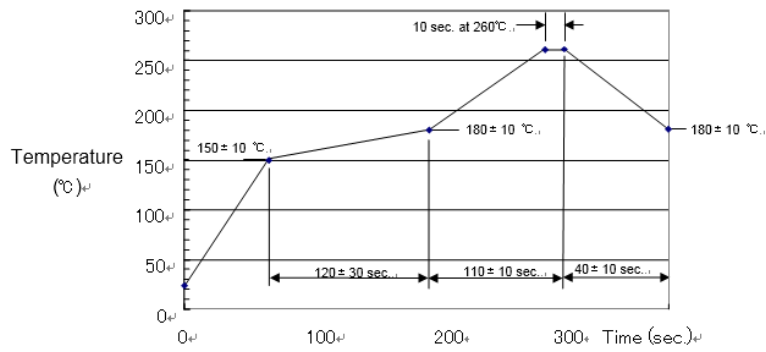


Figure 2. Recommended reflow temp profile

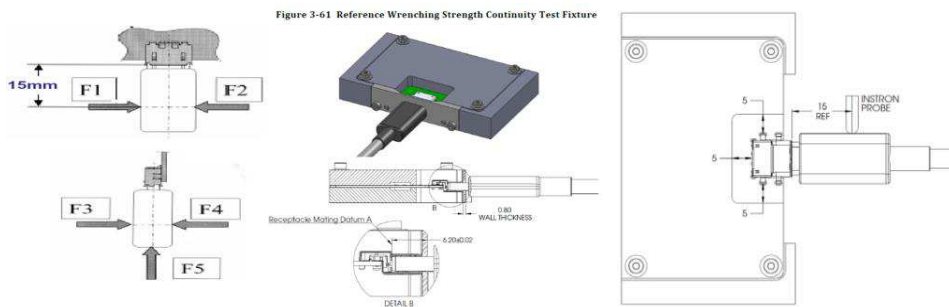


Figure 3. Reference Continuity Test Fixture
(F1, F2, F3, F4, F5 are test force direction)



Production Specification

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The applicable product descriptions and part numbers are as shown in Appendix.1.

Product Part No.	Description
2338792-*	USB TYPE C 3.1 CONN REV TOP MOUNT WITH 1.60 OFFSET

(Prepared by) Rambo Zhang

Date
19-Oct-2018

(Checked by) Richard Ma

Date
19-Oct-2018

(Approved by) Simon Li

Date
19-Oct-2018

LTR	REVISION RECORD	ECN	DR	CHK	APP	DATE
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