TITLE

1.0 SCOPE

This Product Specification covers the requirement of USB type C receptacle.

2.0 PRODUCT DESCRIPTION

2.1 PRODUCT NAME AND SERIES NUMBER

Product name: USB type C receptacle
Series number: 105448, 105385, 105387, 105450,105454，105455，204711，205714

2.2 DIMENSIONS, MATERIALS, PLATINGS AND MARKINGS

See sales drawing

3.0 APPLICABLE DOCUMENTS AND SPECIFICATIONS

Industry Standard Reference: Universal Serial Bus Type-C Cable and Connector Specification, Revision 1.2,
Test compliant reference: Universal Serial Bus Type-C Connectors and Cable Assemblies Compliance Document
Test standard reference: EIA-364 series.
See sales drawings and other sections of this specification for the relevant reference documents. In cases where the specification differs from the drawings, the sales drawings take precedence.

4.0 RATINGS

4.1 VOLTAGE

30 Volts DC/AC Max.

4.2 CURRENT

5 Amps MAX. for total V_{BUS} pins (Pin A4, A9, B4, B9),
1.25 Amps MAX. for Vconn (B5 of plug) with return path through the corresponding GND pins(Pin A1, A12, B1, B12).
0.25 Amps MIN. for all other contact.

4.3 TEMPERATURE

Operating: - 30°C to + 85°C
Storage: - 45°C to + 85°C

5.1 ELECTRICAL REQUIREMENTS

ITEM	DESCRIPTION	TEST CONDITION	REQUIREMENT
5.1.1	Low Level Contact Resistance(LLCR)	The solder tail to the solder tail or cable attachment point of the plug, including any internal contacts and paddle card.Measure at 20 mV (max) open circuit at 100 mA. Per EIA-364-23	40 milliohms Max initial. Is not Exceed 50 milliohms after environmental test.
5.1.2	Insulation Resistance	Mate connectors, apply 100 VDC between adjacent terminal or ground. Per EIA-364-21	100Megohms Min.
5.1.3	Dielectric Withstanding Voltage	Mate connectors, apply 100 VAC(RMS) for 1 minute between adjacent terminal or ground. Per EIA-364-20 ,Method B.	No breakdown
5.1.4	Temperature Rise	Mate connectors, and measure the temperature rise of contact when the maximum rate current is passed per section 4.2. Per EIA-364-70,Method 2	Temperature change 30°C Max at the outside surface of the shell receptacle.
5.1.5	Differential Impedance (Informative)	The mated connector impedance target is specified to minimize reflection from the connector.	For D+/D-: 75~105Ω, 40ps rise time (20%-80%)
			For SS pairs: 85±9Ω, 40ps rise time(20%~80%)
5.1.6	Differential Insertion Loss (Informative)	Mated connector, measure by Network Analyzer.	Vertices: (100MHz, -0.25dB), (2.5GHz, -0.35dB), (5GHz, -0.45dB), (10GHz, -0.75dB), (15GHz, -1.85dB)
5.1.7	Differential Return Loss(Informative)	Mated connector, measure by Network Analyzer.	Vertices: (100MHz, -20dB), (5GHz, -20dB), (10GHz, -13dB), (15GHz, -6dB)
5.1.8	Cross Talk (Informative)	Mated connector, measure the differential Near-End and Far-End Crosstalk between Supper Speed Pairs.	Vertices that define the DDNEXT limit: (100MHz, -40dB), (5GHz, -40dB), (10GHz, -36dB), (15GHz, -30dB)
		Mated connector, Measure the differential Crosstalk Between D+/D- and Super Speed Pairs	Vertices that define the DDNEXT and DDFEXT limit: (100MHz, -40dB), (5GHz, -40dB), (7.5GHz, -36dB)
5.1.9	Differential-to-Common-Mode Conversion (Informative)	Mated connector pairs	vertices: (100 MHz, -30 dB), (6 GHz, -30 dB), and (10 GHz, -25 dB).

5.2 MECHANICAL REQUIREMENTS

ITEM	DESCRIPTION	TEST CONDITION	REQUIREMENT
5.2.1	Insertion force	Mate connector, at maximum rate 12.5mm/min. Per EIA-364-13	Insertion force: 5~20N
5.2.2	Extraction force	Un-mate connector, at maximum rate 12.5mm/min. Per EIA-364-13	Within the range of 8 N to 20 N, measured after a preconditioning of five insertion/extraction cycles. After an additional twenty-five insertion/extraction cycles, the extraction force shall be measured again 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.
5.2.3	Durability (10000 Cycles)	Perform 4 plug/unplug cycles. Cycle rate of 500+/-50cycles per hour in test **Group4**	Within the range of 8 N to 20 N. Initial reading
		Perform 25 plug/unplug cycles. Cycle rate of 500+/-50cycles per hour in test **Group4**	Within: a).33% off the initial reading, and b).8 N to 20 N.
		Perform 2468 plug/unplug cycles. Rotate the receptacle or plug 180° and perform 2,500 plug/unplug cycles. Rotate the receptacle or plug 180° and perform 2,500 plug/unplug cycles. Rotate the receptacle or plug 180 and perform 2,500 plug/unplug cycles. Cycle rate of 500+/-50 cycles per hour (total of 10,000 plug/unplug cycles, flipping every 2,500 cycles) in test **Group4,** Per EIA-364-09	No mechanical damage Contact resistance is not exceed +50 milliohms; Dielectric Withstanding Voltage meet 100 VAC; Extraction force: 6N~20N.
5.2.4	Durability (preconditioning)	EIA-364-09 Perform 50 unplug/plug cycles.	No physical damage
5.2.5	Reseating	Manually mate and unmate the connector for 3 cycles. Rate: 5 cycles/min. max. EIA 364-09	No evidence of physical damage.
5.2.6	4-Axis Continuity Test	Plug and Receptacle: Subject the mating interface to the moments defined in Section 8 for at least 10 seconds.	No discontinuities greater than 1 microsecond duration in any of the four orientations tested.

5.3 ENVIRONMENTAL REQUIREMENTS

ITEM	DESCRIPTION	TEST CONDITION	REQUIREMENT
5.3.1	Solderability	Unmated connector. Dip solder tails into the molten solder(held at 240-250°C) up to for in immersion duration 6s. Per EIA 364-52,	Solder coverage: 95% Min. No mechanical damage or change to appearance.
5.3.2	Resistance to soldering Heat	Peak temperature in reflow:255°C (–0/+5°C) .Pb-free reflow profile refer to Section 7.0 ,two cycles. Per EIA 364-56	No mechanical damage or change to appearance s.
5.3.3	Cyclic Temperature and Humidity	Mate connectors And expose to 40±2°C, relative humidity 90 to 95 % for 96 hours. Upon completion of the exposure period, the test specimens shall be conditioned at ambient room conditions for 1 to 2 hours, after which the specified measurements shall be performed. Per EIA-364-31	No mechanical damage. Contact resistance is not exceed 50 milliohms. Insulation resistance not less than 100 Megaohms. Dielectric strength must meet Item 5.1.2
5.3.4	Thermal Shock	Test Condition I 10 Cycles –55 degree C and +85degree C. Mate Connector Per EIA 364-32,	No mechanical damage. Contact resistance is not Exceed 50 milliohms.
5.3.5	Vibration	Mate connectors, and subject to the following vibration conditions, Random vibration , 15 minutes in each of 3 mutually perpendicular axes,10~2000Hz, 0.02 g2/Hz 20 minutes per plane Per EIA-364-28 condition VII, Test letter D	No mechanical damage Contact resistance is not exceed 50 milliohms. Signal discontinuity < 1 μs.

ITEM	DESCRIPTION	TEST CONDITION	REQUIREMENT
5.3.6	Thermal Disturbance	Cycle the connector between 15°C±3°C and 85°C±3°C, as measured on the part. Ramps should be a minimum of 2°C per minute, and dwell times should insure that contacts reach temperature extreme for a minimum of 5minutes. No humidity control. 10 cycles total.	Contact resistance is not exceed 50 milliohms.
5.3.7	Vibration	Mate connectors, and subject to the following vibration conditions, Random vibration 3 mutually perpendicular axes, 10~2000Hz, 0.02g2/Hz 20 minutes per plane Per EIA-364-28 condition VII, Test letter D	No mechanical damage Contact resistance is not exceed 50 milliohms. Signal discontinuity < 1 μs.
5.3.8	Mixed flowing gas test	Mate connectors, and subject to the mixed flowing gas conditions. 1) expose 1/2 of the specimens unmated for 2/3 of the test duration; 2) mate each specimen to the same plug that it was mated to during temperature life (preconditioning); and, 3) expose for the remainder of the test duration. 30u'gold or Gold flash& 30u'Pd-Nickel plating for 7 days.15u'gold for 5 days. Gold flash for 3 days. Note: Per EIA-364-65 class II condition A	No mechanical damage and visible corrosion. Contact resistance not exceed 50 milliohms.
5.3.9	Temperature life	Mate connectors, and subject to the conditions of 105°C for 120 hours. Per EIA-364-17 condition A	No mechanical damage and visible corrosion. Contact resistance is not exceed 50 milliohms.
5.3.10	Temperature life (precondition)	Mate connectors, and subject to the conditions of 105°C for 72 hours. Per EIA-364-17 condition A	No mechanical damage and visible corrosion. Contact resistance is not exceed 50 milliohms.

The meaning of text "**mechanical damage**" in the table above is:

a. No significant corrosion at contact area
b. No adhesion problem of plating
c. No blistering of plating
d. No flaking of plating

e. No loosen parts
f. No cracks on any parts

5.0 TEST GROUPINGS

Note: All test specimens (except group 5) shall pass the reflow process for 2 times.

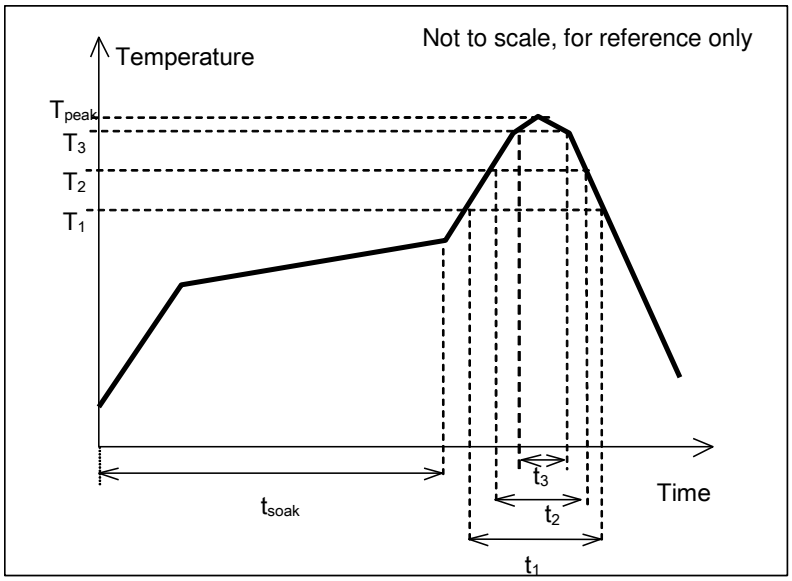
Test Item	Description	Group1	Group2	Group3	Group4	Group5	Group6	Group7	Group8	Group9
5.1.1	Low level contact resistance	1,4,6	1,4,6,8	1,4,6	1,4,6,8 ,10	2,10				
5.2.4	Durability (preconditioning)	2	2	2	2					
5.1.2	Insulation resistance					12				
5.1.3	Dielectric withstanding voltage					1,11				
5.3.10	Temperature life (Preconditioning)			3	3					
5.3.9	Temperature life	3								
5.3.4	Thermal shock		3							
5.3.6	Thermal disturbance				7					
5.3.3	Cyclic temperature & humidity		5							
5.3.8	Mixed flowing gas				5					
5.3.7	Vibration			5						
5.2.5	Reseating	5	7		9					
5.1.4	Temperature rise							1		
5.2.1	Insertion force					4				
5.2.2	Extraction force					5,7,9				
5.2.3	Durability (4 cycles)					3				
	Durability (25cycles)					6				
	Durability (9968 cycles)					8				
5.3.1	Solderability								1	
5.3.2	resistance to soldering Heat testing									1
5.2.6	4-Axis Continuity Test						1			
	Sample Quantity	5	5	5	5	5	5	5	5	5

6.0 PACKAGING

Parts shall be packaged to protect against damage during handling, transit and storage. The parts shall be carried in tape & reels inside boxes. For details refer to packaging spec.

7.0 Recommended reflow profile

Pb-free reflow profile requirements for soldering heat resistance		
Parameter	**Reference**	**Specification**
Average temperature gradient in preheating		2.5°C/s
Soak time	t_{soak}	2-3 minutes
Time above 217°C	t_1	Max 60 s
Time above 230°C	t_2	Max 50 s
Time above 255°C±5°C	t_3	Min 5 s
Peak temperature in reflow	T_{peak}	255°C (–0/+5°C)
Temperature gradient in cooling		Max -5°C/s



Reflow profile for soldering heat resistance testing

Notes:

1: Reflow soldering profile for solderability testing and soldering heat resistance testing

2: Temperature indicated refers to the PCB surface temperature at soldertail area.

3: Connector can withstand up to 2 reflow cycles with a cool-down to room temperature in-between.

4: Actual reflow profile also depends on equipment, solder paste, PCB thickness, and other components on the board. Please consult your solder paste & reflow equipment manufacturer for their recommendations to adopt a suitable process.

8.0 4-Axis Continuity Test

The USB Type-C connector family shall be tested for continuity under stress using a test fixture, Detailed information refer to USB Type-C industry standard and its compliance document.

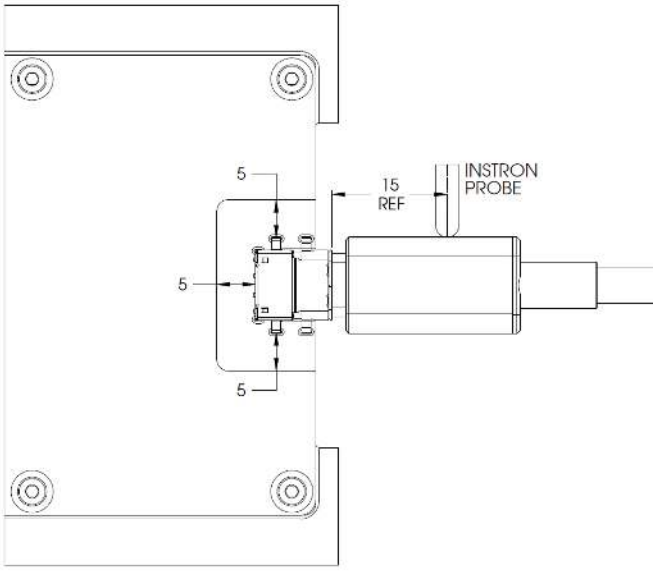


Figure D-1 Example of 4-AxIs Continuity Test Fixture

Plugs shall be supplied with a representative overmold or mounted on a 2-layer printed circuit board (PCB) between 0.8 mm and 1.0 mm thickness as applicable. A USB Type-C receptacle shall be mounted on a 2-layer PCB between 0.8 mm and 1.0 mm thickness. The PCB shall be clamped on three sides of the receptacle no further than 5 mm away from the receptacle outline. The receptacle PCB shall initially be placed in a horizontal plane, and a perpendicular moment shall be applied to the plug with a 5 mm ball tipped probe for a period of at least 10 seconds at a distance of 15 mm from the mating edge of the receptacle shell in a downward direction, perpendicular to the axis of insertion. See Table D-1 for the force and moment to be applied.

Receptacle configuration with respect to mounting surface	Force at 15 mm from receptacle shell mating edge (N)	Moment with respect to receptacle shell mating edge (Nm)
Right angle	20	0.30
Vertical	8	0.12

Table D-1 Force and Moment Requirements

The continuity across each contact shall be measured throughout the application of the tensile force. Each non-ground contact shall also be tested to confirm that it does not short to the shell during the stresses. The PCB shall then be rotated 90 degrees such that the cable is still inserted horizontally and the tensile force in Table D-1 shall be applied again in the downward direction and continuity measured as before. This test is repeated for 180 degree and 270 degree rotations. Passing parts shall not exhibit any discontinuities or shorting to the shell greater than 1 µs duration in any of the four orientations.
One method for measuring the continuity through the contacts is to short all the wires at the end of the cable pigtail and apply a voltage through a pull-up to each of V_{BUS}, USB D+, USB D−, SBU, CC, and USB SuperSpeed pins, with the GND pins connected to ground. Alternate methods are allowed to verify continuity through all pins.

Appendices:

The signal integrity of the mated Connector is normative in the USB type C specification. And Type C compliance document tell that receptacle compliance testing includes dimensional inspection, mechanical, environmental and DC electrical tests but it does not cover signal integrity and shielding effectiveness. A receptacle is considered part of the host/device from signal integrity and shielding effectiveness perspective. So the test group of signal integrity is not shown in this specification but only show its requirement.