



# PRODUCT SPECIFICATION

## 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 etc

#### 2.2 DIMENSIONS, MATERIALS, PLATINGS AND MARKINGS

See sales drawing: SD-105448-001, SD-105385-001, SD-105387-001, SD-105450-00,RSD-105454-001 etc

### 3.0 APPLICABLE DOCUMENTS AND SPECIFICATIONS

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  $V_{conn}$  (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

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## 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).

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## 5.2 MECHANICAL REQUIREMENTS

ITEM	DESCRIPTION	TEST CONDITION	REQUIREMENT
5.2.1	Inserting 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. from 1 to 1,000 cycles and within the range of 6 N to 20 N. from 1,000 to 10,000 cycles.
5.2.3	Durability (4/25 Cycles)	Perform 4/25 plug/unplug cycles. Cycle rate of 500+/-50cycles per hour Per EIA-364-09	No mechanical damage Contact resistance is not exceed +50 milliohms, Un-mating force: 8N~20N
5.2.4	Durability (9968Cycles)	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). Per EIA-364-09	No mechanical damage Contact resistance is not exceed +50 milliohms, Un-mating force: 6N~20N
5.2.5	Durability (preconditioning)	EIA-364-09 Perform 50 unplug/plug cycles.	No physical damage
5.2.6	Reseating	Manually mate and unmate the connector for 3 cycles. Rate: 5 cycles/min. max. EIA 364-09	No evidence of physical damage.
5.2.7	4-Axis Continuity Test	The plug should be with cable and overmold, receptacle should be mounted on a 2-layer PCB, PCB thickness is between 0.8 and 1.0mm, the PCB shall be clamped on either side of receptacle no further than 5mm away from the solder tail, 8N tensile force shall be applied to the cable in a Perpendicular direction from interface, period is at least 10 seconds, including 4 orientations. Refer to section 8.0	No any discontinuities or Shorting to shell greater than 1µs duration in any of four orientations

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## 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 <b>not exceed 50 milliohms</b> . 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 <b>resistance is not Exceed 50 milliohms</b> .
5.3.5	Vibration	Mate connectors, and subject to the following vibration conditions, Random vibration , <b>15 minutes in each of 3</b> 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 <b>not exceed 50 milliohms</b> . Signal discontinuity < 1 μs.

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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 <b>not exceed 50 milliohms.</b>
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 <b>not exceed 50 milliohms.</b> 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 <b>resistance not exceed 50 milliohms.</b>
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 <b>resistance is not exceed 50 milliohms.</b>
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 <b>resistance is not exceed 50 milliohms.</b>

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

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## 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				
5.2.5	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						
5.2.6	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				
5.2.4	Durability (9968cycles)					8				
5.3.1	Solderability								1	
5.3.2	resistance to soldering Heat testing									1
5.2.7	4-Axis Continuity Test						1			
	Sample Quantity	5	5	5	5	5	5	5	5	5

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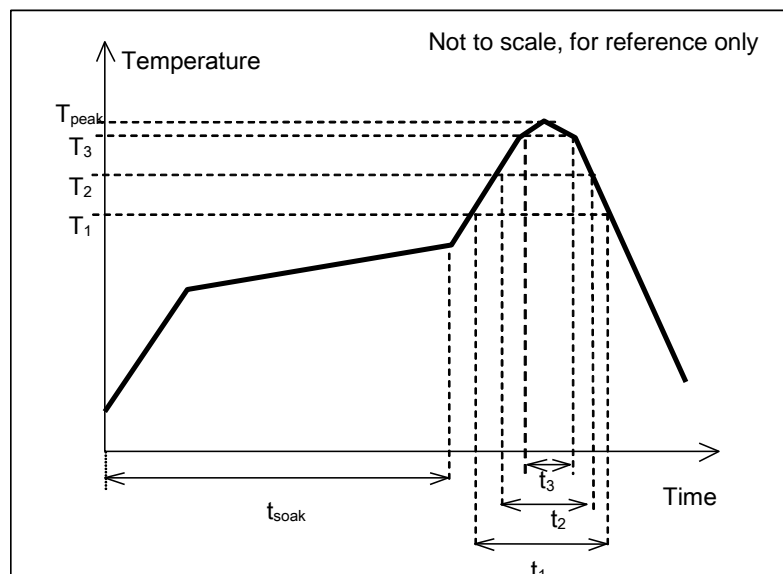
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## 6.0 PACKAGING

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

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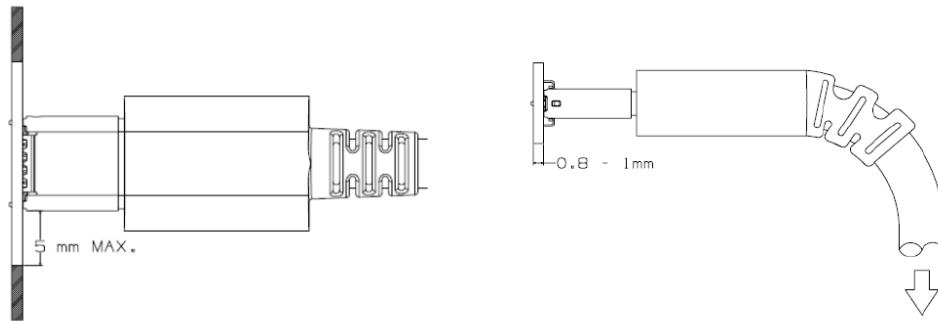
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## Notes:

- 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

Detailed information refer to USB Type-C industry standard or its compliance document.



## 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.

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