



# PRODUCT SPECIFICATION

## TITLE

### 1.0 SCOPE

This Product Specification covers the requirement of the through hole type USB 3.0 connector.

### 2.0 PRODUCT DESCRIPTION

#### 2.1 PRODUCT NAME AND SERIES NUMBER

Product name: Through hole type USB 3.0 connector  
Series number: 48405.

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

See sales drawing SD-48405-001.

### 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

1.8 Amps MAX. for VBUS and GND( Pin1 and Pin4 for standard type)  
0.25 Amps MIN. for all other contact.

#### 4.3 TEMPERATURE

Operating: - 20°C to + 85°C  
Storage: - 45°C to + 60°C

#### 4.4 HUMIDITY

Storage : +15~70% RH  
Test : +40~85% RH

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## PERFORMANCE

### 5.1 ELECTRICAL REQUIREMENTS

ITEM	DESCRIPTION	TEST CONDITION	REQUIREMENT
5.1.1	<b>Visual &amp; Dimensional Inspection</b>	Meets requirements of product drawing Per EIA-364-18	Visual inspection No physical damage
	<b>Reseating</b>	Manually plug/unplug 3 times	No physical damage
5.1.2	<b>Low Level Contact Resistance</b>	Mate connectors with dry circuit (20mV, 100mA Max) at min. deflection position Per EIA-364-23	30 milliohms Max. for VBUS and GND contacts. 50 milliohms Max. for all other contacts. Maximum change of +10 milliohms after environmental stresses.
5.1.3	<b>Insulation Resistance</b>	Mate connectors, apply 100 VDC between adjacent terminal or ground. Per EIA-364-21	100Megohms Min.
5.1.4	<b>Dielectric Withstanding Voltage</b>	Mate connectors, apply 100 VAC(RMS) for 1 minute between adjacent terminal or ground. Per EIA-364-20	No breakdown
5.1.5	<b>Contact Capacitance</b>	Test between adjacent contacts, unmated connector at 1 KHz. Per EIA-364-30	2 pF maximum D+/D- contacts only.
5.1.6	<b>D+/D-Pair Attenuation</b>	12 to 400 MHz Per EIA-364-101	-0.67 dB Maximum @ 12 MHz -0.95 dB Maximum @ 24 MHz -1.35 dB Maximum @ 48 MHz -1.90 dB Maximum @ 96 MHz -3.20 dB Maximum @ 200.0 MHz -5.80 dB Maximum @ 400.0 MHz
5.1.7	<b>D+/D- pair Propagation Delay</b>	200 ps (10%-90%) rise time Per EIA-364-103	10ns maximum for a cable assembly attached with one or two Micro connectors and 26ns maximum for a cable assembly attached with no Micro connector.
5.1.8	<b>D+/D-pair Propagation Delay Skew</b>	200 ps (10%-90%) rise time Per EIA-364-103	D+/D- lines: 100 ps maximum
5.1.9	<b>Differential impedance (SS) of Mated Connectors</b>	50 ps (20%-80%) rise time Per EIA-364-108	75 $\Omega$ minimum 105 $\Omega$ maximum

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5.1.10	<b>Differential Insertion Loss (SS) of Mated Cable Assemblies</b>	100 MHz to 7.5 GHz Normalized to 90 ohm differential impedance Per EIA-364-101	The measured differential insertion loss of a mated cable assembly must not exceed the limit defined by the following vertices: (100 MHz, -1.5 dB), (1.25 GHz, -5.0 dB), (2.5 GHz, -7.5 dB), and (7.5 GHz, -25 dB). See Appendix C. SuperSpeed pairs only.
5.1.11	<b>Differential to Common Mode Conversion (SS) of Mated Cable Assembly</b>	100 MHz to 7.5 GHz Normalized to 90 ohm differential impedance Per EIA-364-101	<= -20 dB from 100 MHz to 7.5 GHz. SuperSpeed pairs only.
5.1.12	<b>Differential Near-End Crosstalk between SS Pairs</b>	50 ps (20-80%) rise time Per EIA-364-90	Must not exceed the limit defined below: • USB 3.0 Standard-B connector: 1.8% 50ps (20-80%) rise time of a differential TDT SuperSpeed pairs only.
5.1.13	<b>Differential Near-End and Far-End Crosstalk between SS and D+/D- Pairs</b>	500 ps (10-90%) rise time Per EIA-364-90	Must not exceed the limit defined below: • USB 3.0 Standard-B connector: 2% 500ps (10-90%) rise time of a differential TDT

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## 5.2 MECHANICAL REQUIREMENTS

ITEM	DESCRIPTION	TEST CONDITION	REQUIREMENT
5.2.1	Insertion Force	At a maximum rate of 12.5mm (0.492") per minute. Per EIA-364-13	35N(3.5kgf) max.
5.2.2	Extraction force	At a maximum rate of 12.5mm (0.492") per minute. Per EIA-364-13	10 N minimum No burrs or sharp edges are allowed on top of locking latches (hook surfaces which will rub against receptacle shield.
5.2.3	Durability	Cycle rate of 200 cycles per hour manually or 500 cycles maximum automatically Per EIA-364-09	Durability Class: 5000 cycles
	Durability (preconditioning)		Durability Class: 50 cycles

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## 5.3 ENVIRONMENTAL REQUIREMENTS

ITEM	DESCRIPTION	TEST CONDITION	REQUIREMENT
5.3.1	<b>Solderability testing</b>	Samples to be passed through reflow oven according to temp profiles shown in Appendix 102 Per EIA-364-52	Solder coverage: 95% Min. No mechanical damage or change to appearance.
5.3.2	<b>Temperature Life</b>	Subject mated samples to temperature life at 105°C for 120 hours Per EIA-364-17	30 milliohms Max. for VBUS and GND contacts. 50 milliohms Max. for all other contacts. Maximum change of +10 milliohms after environmental stresses.
	<b>Temperature Life (preconditioning)</b>	Subject mated samples to temperature life at 105°C for 72 hours Per EIA-364-17	
5.3.3	<b>Vibration</b>	Mate connectors, and subject to the following vibration conditions, for period of 15 minute in each of 3 mutually perpendicular axes, passing DC 100mA during the test. Per EIA-364-28 condition V letter A	No mechanical damage Contact resistance not exceed 50 milliohms. Signal discontinuity < 1 μs.
5.3.4	<b>Thermal Shock</b>	Subject mated samples to 10 cycles between -55°C and 85°C Per EIA-364-32	30 milliohms Max. for VBUS and GND contacts. 50 milliohms Max. for all other contacts. Maximum change of +10 milliohms after environmental stresses.
5.3.5	<b>Cyclic Temperature and Humidity</b>	Subject samples to between 25°C±3°C at 80%±3% RH and 65°C±3°C at 50%±3% RH, Ramp times should be 0.5 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. Per EIA-364-31	30 milliohms Max. for VBUS and GND contacts. 50 milliohms Max. for all other contacts. Maximum change of +10 milliohms after environmental stresses.

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5.3.6	<b>Mixed flowing gas test</b>	<p>Mated connectors, and subject to the mixed flowing gas conditions  30u'gold or Gold flash&amp; 30u'Pd-Nickel plating for 7 days.  15u'gold for 5 days.  Gold flash for 3 days.  Note: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 reconditioning); and, 3) expose for the remainder of the test duration.  Per EIA-364-65 class II</p>	<p>No mechanical damage and visible corrosion.  Contact resistance change not exceed 10 milliohms.</p>
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The meaning of text “**mechanical damage**” in the table above is:

- a. No dimension change (over specification)
- b. No significant corrosion at contact area
- c. No adhesion problem of plating
- d. No blistering of plating
- e. No flaking of plating
- f. No loosen parts
- g. No cracks on any parts

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## 5.0 TEST GROUPINGS

Note: each group test needs 5pcs samples.

Test Item	Description	Requirement
<b>Group A-1</b>		
5.1.1	Examination	Visual inspection; No physical damage
5.1.2	LLCR	30 mΩ Max. for VBUS and GND contacts. 50 mΩ Max. for all other contacts.
5.2.3	Durability (preconditioning)	50 cycles; No damage
5.3.2	Temperature Life	No damage
5.1.2	LLCR	<b>Maximum change of +10 mΩ</b>
5.1.1	Reseating	No physical damage
5.1.2	LLCR	<b>Maximum change of +10 mΩ Final</b>
5.1.1	Examination	<b>Visual inspection; No physical damage</b>
<b>Group A-2</b>		
5.1.1	Examination	Visual inspection; No physical damage
5.1.2	LLCR	30 mΩ Max. for VBUS and GND contacts. 50 mΩ Max. for all other contacts.
5.2.3	Durability (preconditioning)	50 cycles; No damage
5.3.4	Thermal Shock	No damage
5.1.2	LLCR	Maximum change of +10 mΩ
5.3.5	Humidity	No damage
5.1.2	LLCR	<b>Maximum change of +10 mΩ</b>
5.1.1	Reseating	No physical damage
5.1.2	LLCR	<b>Maximum change of +10 mΩ Final</b>
5.1.1	Examination	Visual inspection; No physical damage
<b>Group A-3</b>		
5.1.1	Examination	Visual inspection; No physical damage
5.1.2	LLCR	30 mΩ Max. for VBUS and GND contacts. 50 mΩ Max. for all other contacts.
5.2.3	Durability (preconditioning)	50 cycles; No damage
5.3.2	Temperature Life (preconditioning)	No damage
5.1.2	LLCR	Maximum change of +10 mΩ
5.3.3	Vibration	Discontinuity less than 1μs
5.1.2	LLCR	Maximum change of +10 mΩ Final
5.1.1	Examination	Visual inspection; No physical damage
<b>Group A-4</b>		
5.1.1	Examination	Visual inspection; No physical damage
5.1.2	LLCR	30 mΩ Max. for VBUS and GND contacts. 50 mΩ Max. for all other contacts.

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5.2.3	Durability (preconditioning)	50 cycles ;No damage
5.3.2	Temperature Life (preconditioning)	No damage
5.1.2	LLCR	Maximum change of +10 mΩ
5.3.6	MFG	No damage
5.1.2	LLCR	Maximum change of +10 mΩ
5.1.1	Reseating	No physical damage
5.1.2	LLCR	Maximum change of +10 mΩ Final
5.1.1	Examination	Visual inspection; No physical damage
<b>Group A-5</b>		
5.1.1	Examination	Visual inspection; No physical damage
5.1.4	DWV	No breakdown or flashover
5.1.2	LLCR	30 mΩ Max. for VBUS and GND contacts. 50 mΩ Max. for all other contacts.
5.2.1	Insertion Force	35N(3.5kgf) max.
5.2.2	Extraction force	10 N minimum
5.2.3	Durability	No damage
5.2.2	Extraction force	8 N minimum Final
5.1.2	LLCR	Maximum change of +10 mΩ Final
5.1.4	DWV	No breakdown or flashover
5.1.1	Examination	Visual inspection; No physical damage
<b>Group B-1</b>		
5.1.1	Examination	Visual inspection; No physical damage
5.1.5	Capacitance	2 pF max.
5.1.3	Insulation Resistance	100 MΩ Min.
5.1.1	Examination	Visual inspection; No physical damage
<b>Group B-2</b>		
5.1.1	Examination	Visual inspection; No physical damage
5.3.1	Solderability	Solder coverage: 95% Min.
5.1.1	Examination	Visual inspection; No physical damage
<b>Group B-3</b>		
5.1.1	Examination	Visual inspection; No physical damage
5.1.6	D+/D-Pair Attenuation	-0.67 dB Maximum @ 12 MHz -0.95 dB Maximum @ 24 MHz -1.35 dB Maximum @ 48 MHz -1.90 dB Maximum @ 96 MHz -3.20 dB Maximum @ 200.0 MHz <b>-5.80 dB Maximum @ 400.0 MHz</b>
5.1.7	D+/D- pair	26ns max for a cable assembly attached with no micro

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	Propagation Delay	connector
5.1.8	D+/D-pair Propagation Delay Skew	D+/D- lines: 100 ps maximum
5.1.9	Differential Impedance (SS) of Mated Connectors	75 $\Omega$ minimum 105 $\Omega$ maximum
5.1.10	Differential Insertion Loss (SS) of Mated Cable Assemblies	The measured differential insertion loss of a mated cable assembly must not exceed the limit defined by the following vertices: (100 MHz, -1.5 dB), (1.25 GHz, -5.0 dB), (2.5 GHz, -7.5 dB), and (7.5 GHz, -25 dB). See Appendix C. SuperSpeed pairs only.
5.1.11	Differential to Common Mode Conversion (SS) of Mated Cable Assembly	$\leq -20$ dB from 100 MHz to 7.5 GHz. SuperSpeed pairs only.
5.1.12	Differential Near-End Crosstalk between SS Pairs	Must not exceed the limit defined below: • USB 3.0 Standard-B connector: 1.8% 50ps (20-80%) rise time of a differential TDT SuperSpeed pairs only.
5.1.13	Differential Near-End and Far-End Crosstalk between SS and D+/D- Pairs	Must not exceed the limit defined below: • USB 3.0 Standard-B connector: 2% 500ps (10-90%) rise time of a differential TDT
5.1.1	Examination	Visual inspection; No physical damage

## 6.0 PACKAGING

Parts shall be packaged to protect against damage during handling, transit and storage. For details refer to packaging spec.

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

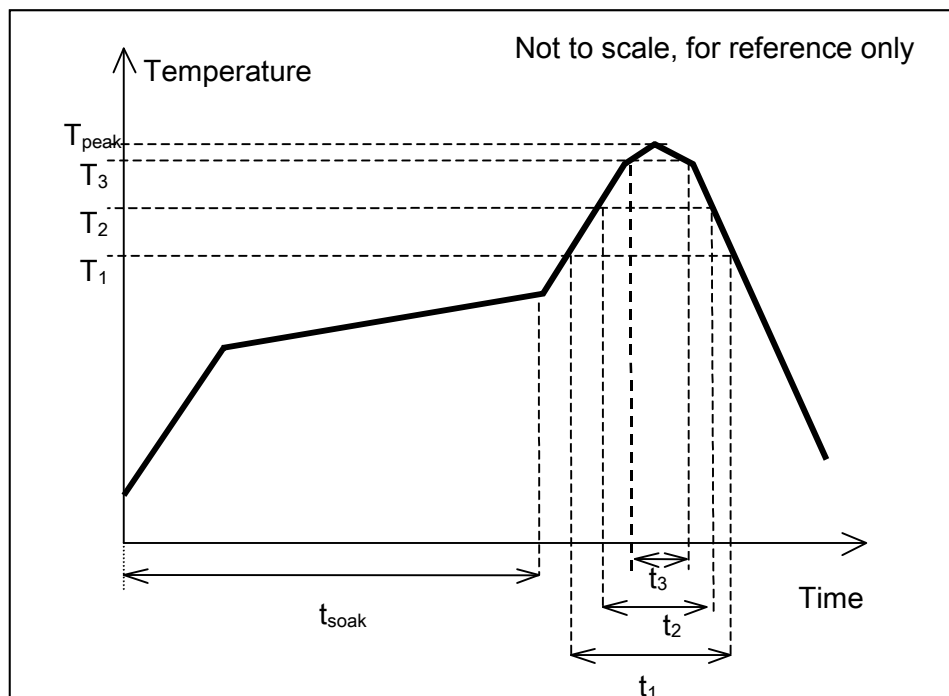
The reflow profile specified in this section describes expected maximum heat exposure of components during the reflow process. Temperature is measured on top of component. All components have to tolerate at least this profile two times (2x) without affecting electrical performance, mechanical performance or reliability.

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Pb-free reflow profile requirements for soldering heat resistance		
Parameter	Reference	Specification
Average temperature gradient in preheating		2.5°C/s
Soak time	$t_{\text{soak}}$	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	$T_{\text{peak}}$	255°C (-0/+5°C)
Temperature gradient in cooling		Max -5°C/s



Reflow profile for soldering heat resistance testing.

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