

**MINI-FIT JR.**

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**1.0 SCOPE**

This Product Specification covers performance requirements for the MINI-FIT JR. 4.20 mm (.165 inch) centerline (pitch) printed circuit board (PCB) connector series with Tin or 30µ” Gold plating, and the MINI-FIT JR. connector series terminated with 16 to 28 AWG stranded, copper wire using Crimp technology with Tin or 30µ” Gold plating.

**2.0 PRODUCT DESCRIPTION**

**2.1 PRODUCT NAME AND SERIES NUMBER (S)**

<b>Table 1 – WIRE-TO-WIRE</b>				
Description	Series Number	UL(600V)	CSA(600V)	IEC(250V)
Female Crimp Terminal	5556	n/a	n/a	Yes
Receptacle Housing	5557	Yes	Yes	Yes
Male Crimp Terminal	5558	n/a	n/a	Yes
Plug Housing	5559	Yes	Yes	Yes
Plug Housing	45776	Yes	Yes	Yes
Receptacle Housing	46992/46994	Yes	Yes	Yes
Plug housing	46993/172646	Yes	Yes	Yes

<b>Table 2 – WIRE-TO-BOARD</b>				
Description	Series Number	UL(600V)	CSA(600V)	IEC(250V)
Female Crimp Terminal	5556	n/a	n/a	Yes
Receptacle Housing	5557	Yes	Yes	Yes
Vertical Header	5566	Yes	Yes	Yes
Right Angle Header	5569	Yes	Yes	Yes
Receptacle Housing	46992/46994	Yes	Yes	Yes
Vertical Header	172447/172647	Yes	Yes	Yes
Right Angle Header	172448/172648	Yes	Yes	Yes

Other products conforming to this specification are noted on the individual drawings.

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**2.2 DIMENSIONS, MATERIALS, PLATINGS AND MARKINGS**

See the appropriate sales drawings for the information on dimensions, materials, platings and markings.

**2.3 SAFETY AGENCY APPROVALS**

UL File: E29179

CSA Certificate: LR 19980

IEC 61984 Certification : Tested to and found in compliance with IEC 61984. NRTL type examination certificate available upon request. Contact Molex Safety team for questions regarding certification on specific part numbers.

**3.0 APPLICABLE DOCUMENTS AND SPECIFICATIONS**

See sales drawings and the other sections of this specification for the necessary referenced documents and specifications.

Application Specification: AS-45499-001 (moisturizing nylon parts)

Test Summary: TS-5556-002

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**4.0 RATINGS**

**4.1 VOLTAGE**

600 Volts AC (RMS) (or 600 Volts DC)

\*Voltage rating based on UL 1977. Maximum voltage allowed may vary dependent upon “End Use Application”. Refer to the applicable end use standard for additional information on Voltage, Creepage and Clearance requirements.

**4.2 APPLICABLE WIRES**

<b>Maximum Insulation Diameter and Applicable Wire Gauges</b>	16 AWG Standard, Copper: 3.15 mm / .124 inches MAXIMUM
	18-24 AWG Standard, Copper: 3.10 mm / .122 inches MAXIMUM
	22-28 AWG Standard, Copper: 1.80 mm / .071 inches MAXIMUM

**4.3 MAXIMUM CURRENT RATING (Amperes)\*\***

<b>Table 3 - MAXIMUM CURRENT RATING (Amperes) Wire-to-Wire and Wire-to-Board</b>										
<b>Brass</b>					<b>Phosphor Bronze</b>					
Wire \ Ckt. Size	2 & 3	4 - 6	7 - 10	12 - 24	Wire \ Ckt. Size	2 & 3	4 - 6	7 - 10	12 - 24	
AWG #16	9	8	7	6	AWG #16	8	7	6	5	
AWG #18	9	8	7	6	AWG #18	8	7	6	5	
AWG #20	7	6	5	5	AWG #20	6	5	4	4	
AWG #22	5	4	4	4	AWG #22	4	3	3	3	
AWG #24	4	3	3	3	AWG #24	3	2	2	2	
AWG #26	3	2	2	2	AWG #26	2	1	1	1	
AWG #28	2	1	1	1	AWG #28	1	1	1	1	

**Note:** PCB trace design may greatly affect temperature rise results in Wire-to-Board Applications.

\*\* Current rating is application dependent and may be affected by the wire rating such as listed in UL-60950-1. Each application should be evaluated by the end user for compliance to specific safety agency requirements. The ratings listed in the chart above represents the MAXIMUM current carrying capacity of a fully loaded connector with all circuits powered using tinned copper conductor stranded wire per Molex test method based on a 30° C maximum temperature rise over ambient temperature and are provided as a guideline. Appropriate de-rating is required based on circuit size, ambient temperature, copper trace size on the PCB, gross heating from adjacent modules/components and other factors that influence connector performance. Wire size & stranding, tin coated or bare copper wire, wire length & crimp quality are other factors that influence current rating.

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**4.4 TEMPERATURE**

	Brass	Phos Bronze Terminals
Operating: *	- 40°C to + 80°C	- 40°C to + 105°C
Nonoperating:	- 40°C to + 80°C	- 40°C to + 105°C

*\*Including 30°C terminal temperature at rated current*

**4.5 WAVE SOLDER PROCESS TEMPERATURE**

Headers with pegs: 240°C Maximum

Headers without pegs: 260°C Maximum and with Matte Tin over Nickel plating

Headers with Bright Tin over Nickel plating: 240°C Maximum

Headers with Tin over Copper plating: 240°C Maximum

Headers in Glow Wire series 172447, 172647, 172448, 172648 with pegs: 220°C Maximum

For Headers: Matte tin over Nickel plating is recommended for new applications.

**4.6 Glow Wire**

The following series are glow capable: 46992, 46993, 46994, 172646, 172447, 172448, 172648, 45776. Representative samples were tested and found compliant with EN 60695-2-11-2001 / IEC 60695-2-11-2000 Glow Wire Test Methods for End-Products. These were additionally investigated for compliance with EN 60335-1 / IEC 60335-1 750C / 2 sec with no flaming. VDE Test report available upon request.

**5.0 WIRE-TO-WIRE PERFORMANCE**

**5.1 ELECTRICAL REQUIREMENTS**

ITEM	DESCRIPTION	TEST CONDITION	REQUIREMENT
1	<b>Contact Resistance (Low Level)</b>	Mate connectors: apply a maximum voltage of 20 mV and a current of 100 mA. Wire resistance shall be removed from the measured value.	10 milliohms MAXIMUM [initial]
2	<b>Insulation Resistance</b>	Mate connectors: apply a voltage of 500 VDC between adjacent terminals and between terminals to ground.	1000 Megohms MINIMUM
3	<b>Dielectric Withstanding Voltage</b>	Mate connectors: apply a voltage of 2200 VAC for 1 minute between adjacent terminals and between terminals to ground.	No breakdown. Current leakage < 5 mA
4	<b>Temperature Rise (via Current Cycling)</b>	Mate connectors. Measure the temperature rise at the rated current after 96 hours, during current cycling (45 minutes ON and 15 minutes OFF per hour) for 240 hours, and after final 96-hour steady state.	Temperature rise: +30°C MAXIMUM

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**5.2 MECHANICAL REQUIREMENTS**

ITEM	DESCRIPTION	TEST CONDITION	REQUIREMENT
1	<b>Terminal Mate and Unmate Forces Per Circuit</b>	Insert and withdraw terminal (male to female) at a rate of 25 ± 6 mm (1 ± ¼ inch) per minute with latch disabled.	14.7 N (3.30 lbf) MAXIMUM insertion force and 0.5 N (0.11 lbf) MINIMUM withdrawal force
2	<b>Crimp Terminal Retention Force (in Housing)</b>	Axial pullout force on the terminal in the housing at a rate of 25 ± 6 mm (1 ± ¼ inch) per minute.	30 N (6.74 lbf) MINIMUM retention force
3	<b>Durability</b>	Mate connectors up to 30 cycles at a maximum rate of 10 cycles per minute Based on mated pairs of 30µ" Au or 50µ" tin at the contact interface.	20 milliohms maximum (change from initial)
4	<b>Vibration (Random)</b>	Mate connectors and vibrate per EIA 364-28, test condition VII, letter D. Test Duration: 15 minutes in each axis.	20 milliohms MAXIMUM (change from initial) and Discontinuity < 1 microsecond
5	<b>Shock (Mechanical)</b>	Mate connectors and shock at 50 g's with ½ sine wave (11 milliseconds) shocks in the ±X, ±Y, ±Z axes, (18 shocks total).	20 milliohms MAXIMUM (change from initial) and Discontinuity < 1 microsecond
6	<b>Wire Pullout Force (Axial)</b>	Apply an axial pullout force on the wire at a rate of 25 ± 6 mm (1 ± ¼ inch) without influence from the insulation crimp. Wire pullout force is applicator dependent. Refer to relevant Molex Applicator Tooling specification.	16 Awg = 68.4 N (15.4 lbf) Min. 18 Awg = 88.0 N (19.8 lbf) Min. 20 Awg = 58.7 N (13.2 lbf) Min. 22 Awg = 39.1 N (8.8 lbf) Min. 24 Awg = 29.3 N (6.6 lbf) Min. 26 Awg = 19.6 N (4.4 lbf) Min. 28 Awg = 9.8 N (2.2 lbf) Min.
7	<b>Crimp Terminal Insertion Force (into Housing)</b>	Apply an axial insertion force on the terminal at a rate of 25 ± 6 mm (1 ± ¼ inch) per minute.	15.0 N (3.37 lbf) MAXIMUM insertion force

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**5.2 MECHANICAL REQUIREMENTS (continued)**

ITEM	DESCRIPTION	TEST CONDITION	REQUIREMENT	
8	Normal Force	Apply a perpendicular force to contacts.	Sn	1.47 N (150 grams) MINIMUM
			Au	0.49 N (50 grams) MINIMUM
9	Panel Insertion and Withdrawl Forces (5559, 46993, 172646 Series)	Insert and withdraw a connector at a rate of 25 ± 6 mm (1 ± ¼ inch) per minute. Applies only to plugs with panel retention features.	225 N (50.7 lbf) MAXIMUM insertion force and Dual Row: 157 N (35.3 lbf) Single Row: 133 N (29.9 lbf) MINIMUM withdrawl force	
10	Panel Insertion and Withdrawl Forces (45776 Series)	Insert and withdraw a connector at a rate of 25 ± 6 mm (1 ± ¼ inch) per minute.	225 N (50.7 lbf) MAXIMUM insertion force and 133 N (29.9 lbf) MINIMUM withdrawl force	
11	Thumb latch Operation Force	Depress latch at a speed rate of 25 ± 6 mm (1 ± ¼ inch) per minute.	22.24 N (5.0 lbf) MAXIMUM	
12	Thumb latch Yield Strength	Mate loaded connectors fully. Pull connectors apart at a speed rate of 25 ± 6 mm (1 ± ¼ inch) per minute. (after 1 <sup>st</sup> mate)	68 N (15.3 lbf) MINIMUM	

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**5.3 ENVIRONMENTAL REQUIREMENTS**

ITEM	DESCRIPTION	TEST CONDITION	REQUIREMENT
1	<b>Thermal Shock</b>	Mate connectors: expose for 5 cycles Between temperatures $-55$ and $105^{\circ}\text{C}$ ; Dwell 0.5 hours at each temperature.	20 milliohms MAXIMUM (change from initial) Visual: No Damage Dielectric Strength per 5.1.3 except 1500VAC test voltage Insulation Resistance per 5.1.2
2	<b>Thermal Aging</b>	Mate connectors; expose to: 96 hours at $105 \pm 2^{\circ}\text{C}$	20 milliohms MAXIMUM (change from initial) and Visual: No Damage
3	<b>Humidity (Steady State)</b>	Mate connectors: expose to a temperature of $60 \pm 2^{\circ}\text{C}$ with a relative humidity of 90-95% for 96 hours. Remove surface moisture and air dry for 1 hour prior to measurements.	20 milliohms MAXIMUM Visual: No Damage Dielectric Strength per 5.1.3 except 1500VAC test voltage Insulation Resistance per 5.1.2
4	<b>Cold Resistance</b>	Mate connectors: Duration: 96 hours; Temperature: $-40 \pm 3^{\circ}\text{C}$	20 milliohms MAXIMUM (change from initial) and Visual: No Damage
5	<b>Mixed Flowing Gas</b>	EIA-364-65 with Class IIa Gas concentrations 10 days mated (30 $\mu$ " Gold plated only)	20 milliohms MAXIMUM (change from initial) and Visual: No Damage
6	<b>Cyclic Temperature And Humidity</b>	Mate connectors: expose to 24 cycles from $25^{\circ}\text{C} / 80\% \text{RH}$ to $65^{\circ}\text{C} / 50\% \text{RH}$ ramp time: 0.5hr dwell time: 1hr Per EIA-364-1000.01	20 milliohms MAXIMUM (change from initial) and Visual: No Damage

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**6.0 WIRE-TO-BOARD PERFORMANCE**

**6.1 ELECTRICAL REQUIREMENTS**

ITEM	DESCRIPTION	TEST CONDITION	REQUIREMENT
1	<b>Contact Resistance (Low Level)</b>	Mate connectors: apply a maximum voltage of 20 mV and a current of 100 mA. Wire resistance shall be removed from the measured value.	10 milliohms MAXIMUM [initial]
2	<b>Insulation Resistance</b>	Mate connectors: apply a voltage of 500 VDC between adjacent terminals and between terminals to ground.	1000 Megohms MINIMUM
3	<b>Dielectric Withstanding Voltage</b>	Mate connectors: apply a voltage of 2200 VAC for 1 minute between adjacent terminals and between terminals to ground.	No breakdown. Current leakage < 5 mA
4	<b>Temperature Rise (via Current Cycling)</b>	Mate connectors. Measure the temperature rise at the rated current after 96 hours, during current cycling (45 minutes ON and 15 minutes OFF per hour) for 240 hours, and after final 96-hour steady state.	Temperature rise: +30°C MAXIMUM

**6.2 MECHANICAL REQUIREMENTS**

ITEM	DESCRIPTION	TEST CONDITION	REQUIREMENT
1	<b>Terminal Mate and Unmate Forces Per Circuit</b>	Insert and withdraw terminal (male to female) at a rate of 25 ± 6 mm (1 ± ¼ inch) per minute with latch disabled.	14.7 N (3.30 lbf) MAXIMUM insertion force and 0.5 N (0.11 lbf) MINIMUM withdrawal force
2	<b>Crimp Terminal Retention Force (in Housing)</b>	Axial pullout force on the terminal in the housing at a rate of 25 ± 6 mm (1 ± ¼ inch) per minute.	30 N (6.74 lbf) MINIMUM retention force
3	<b>Durability</b>	Mate connectors up to 30 cycles at a maximum rate of 10 cycles per minute Based on mated pairs of 30µ" Au or 50µ" tin at the contact interface	20 milliohms maximum (change from initial)
4	<b>Vibration (Random)</b>	Mate connectors and vibrate per EIA 364-28, test condition VII, letter D. Test Duration: 15 minutes in each axis.	20 milliohms MAXIMUM (change from initial) and Discontinuity < 1 microsecond

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**6.2 MECHANICAL REQUIREMENTS (continued)**

ITEM	DESCRIPTION	TEST CONDITION	REQUIREMENT
5	<b>Shock (Mechanical)</b>	Mate connectors and shock at 50 g's with ½ sine wave (11 milliseconds) shocks in the ±X, ±Y, ±Z axes, (18 shocks total).	20 milliohms MAXIMUM (change from initial) and Discontinuity < 1 microsecond
6	<b>Wire Pullout Force (Axial)</b>	Apply an axial pullout force on the wire at a rate of 25 ± 6 mm (1 ± ¼ inch) without influence from the insulation crimp. Wire pullout force is applicator dependent. Refer to relevant Molex Applicator Tooling specification.	16 Awg = 68.4 N (15.4 lbf) Min. 18 Awg = 88.0 N (19.8 lbf) Min. 20 Awg = 58.7 N (13.2 lbf) Min. 22 Awg = 39.1 N (8.8 lbf) Min. 24 Awg = 29.3 N (6.6 lbf) Min. 26 Awg = 19.6 N (4.4 lbf) Min. 28 Awg = 9.8 N (2.2 lbf) Min.
7	<b>Crimp Terminal Insertion Force (into Housing)</b>	Apply an axial insertion force on the terminal at a rate of 25 ± 6 mm (1 ± ¼ inch) per minute.	15.0 N (3.37 lbf) MAXIMUM insertion force
8	<b>Normal Force</b>	Apply a perpendicular force to contacts.	Sn   1.47 N (150 grams) MINIMUM
			Au   0.49 N (50 grams) MINIMUM
9	<b>PCB Engagement Forces</b>	Engage a connector at a rate of 25 ± 6 mm (1 ± ¼ inch) per minute. Applies to parts with PCB retention features only with PCB holes at nominal diameter and location. Values will vary with PCB material & PCB fabrication and peg type.	For 5569, 172448, 172648: 26.7 to 66.7 N (6.0 to 15.0 lbf) For 5566, 172447, 172647: 4.4 to 44.5 N (1.0 TO 10.0 lbf) Typical insertion force per peg. For Reference ONLY
10	<b>Solid PC Tail Header Pin Retention Force (in housing) (5569, 172448, 172648 Series)</b>	Apply axial push force on the terminal in the housing at a rate of 25 ± 6mm (1 ± ¼ inch) per minute.	9.81 N (2.20 lbf) MINIMUM RETENTION FORCE
11	<b>Stamped PC Tail Terminal Retention Force (in housing) (5566, 172447, 172647 Series)</b>	Apply axial push force on the terminal in the housing at a rate of 25 ± 6mm (1 ± ¼ inch) per minute.	9.81 N (2.20 lbf) MINIMUM RETENTION FORCE
12	<b>Thumb latch Operation Force</b>	Depress latch at a speed rate of 25 ± 6 mm (1 ± ¼ inch) per minute.	22.24 N (5.0 lbf) MAXIMUM
13	<b>Thumb latch Yield Strength</b>	Mate loaded connectors fully. Pull connectors apart at a speed rate of 25 ± 6 mm (1 ± ¼ inch) per minute. (after 1 <sup>st</sup> mate)	68 N (15.3 lbf) MINIMUM

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**6.3 ENVIRONMENTAL REQUIREMENTS**

ITEM	DESCRIPTION	TEST CONDITION	REQUIREMENT
1	<b>Thermal Shock</b>	Mate connectors: expose for 5 cycles Between temperatures -55 and 105° C; Dwell 0.5 hours at each temperature.	20 milliohms MAXIMUM (change from initial) Visual: No Damage Dielectric Strength per 6.1.3 except 1500VAC test voltage Insulation Resistance per 6.1.2
2	<b>Thermal Aging</b>	Mate connectors; expose to: 96 hours at 105 ± 2°C	20 milliohms MAXIMUM (change from initial) and Visual: No Damage
3	<b>Humidity (Steady State)</b>	Mate connectors: expose to a temperature of 60 ± 2°C with a relative humidity of 90-95% for 96 hours. Remove surface moisture and air dry for 1 hour prior to measurements.	20 milliohms MAXIMUM (change from initial) Visual: No Damage Dielectric Strength per 6.1.3 except 1500VAC test voltage Insulation Resistance per 6.1.2
4	<b>Solderability</b>	Per SMES-152	Solder coverage: 95% MINIMUM (per SMES-152)
5	<b>Solder Resistance</b>	Dip connector terminals tail in solder: Solder Duration: 5 ± 0.5 seconds; Solder Temperature: Use Max solder temp from 4.5	Visual: No Damage to insulator housing material
6	<b>Cold Resistance</b>	Mate connectors: Duration; 96 hours; Temperature: -40 ± 3°C	20 milliohms MAXIMUM (change from initial) and Visual: No Damage
7	<b>Mixed Flowing Gas</b>	EIA-364-65 with Class IIa Gas concentrations 10 days mated (30µ" Gold plated only)	20 milliohms MAXIMUM (change from initial) and Visual: No Damage
8	<b>Cyclic Temperature and Humidity</b>	Mate connectors: expose to 24 cycles from 25 °C / 80% RH to 65 °C / 50% RH ramp time: 0.5hr dwell time: 1hr Per EIA-364-1000.01	20 milliohms MAXIMUM (change from initial) and Visual: No Damage

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**7.0 TEST SEQUENCES**

Testing sequences to be performed in accordance with EIA-364-1000.01

**8.0 PACKAGING**

Parts shall be packaged to protect against damage during handling, transit and storage. Nylon parts should remain in there original packaging until ready for use to prevent moisture loss or gain. Nylon will absorb moisture which causes dimensions to increase. Excess moisture gain can result in dimensions exceeding specification.

**9.0 OTHER INFORMATION**

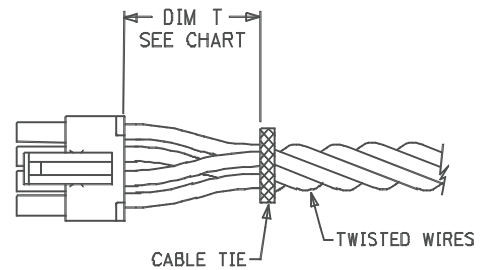
**9.1 GAGES AND FIXTURES**

It is recommended that test plugs (Series 44281) be used for continuity testing of receptacles. Standard mating parts should not be used for harness testing.

NOTE: The use of unauthorized testing devices and/or probes with a Molex product may cause damage to and affect functionality of the Molex product, and such use may void any and all warranties, expressed or implied.

**9.2 CABLE TIE AND OR WIRE TWIST LOCATION**

Circuit Sizes		Dim T Min.
Dual Row	Single Row	
2-6	2-3	.50" (12.7 mm)
8	4	.75" (19.1 mm)
10-12	5-6	1.00" (25.4 mm)
14-16	7-8	1.25" (31.75 mm)
18-20	9-10	1.50"(38.09 mm)
22-24	11-12	1.75" (44.45 mm)



The "T" dimension defines a "free" length of wire, or a length of wire that is not subject to significant bias by external factors such as a wire tie, wire twisting, or other means of bending or deforming of the wires that repositions them from their natural relaxed state or location where they enter the housing. Wires are to be dressed in such a manner to allow the terminals to float freely in the pocket. This dimension is a general recommendation and may need to be adjusted for different wire gauges and wire type and insulation thickness and insulation material.

REVISION: <b>E8</b>	ECR/ECN INFORMATION: EC No: <b>UCP2016-4279</b> DATE: <b>2016/05/09</b>	TITLE: <b>PRODUCT SPECIFICATION FOR MINI-FIT JR. CONNECTOR SYSTEM</b>	SHEET No. <b>12 of 12</b>
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