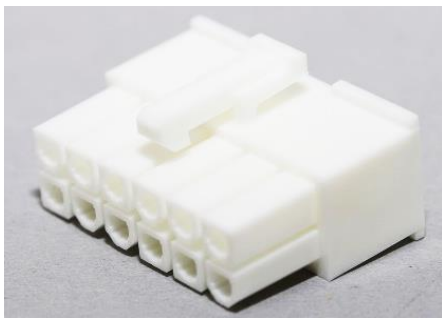


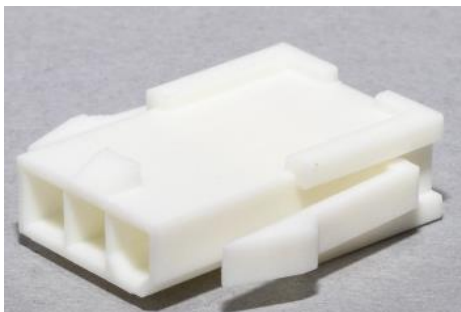
MINI-FIT PLUS HCS™

INTERCONNECT SYSTEM

Female Crimp Terminal	Male Crimp Terminal
	
Series: 45750	Series: 46012
Receptacle Housing (Single Row)	Receptacle Housing (Dual Row)
	
Series: 5557	Series: 5557

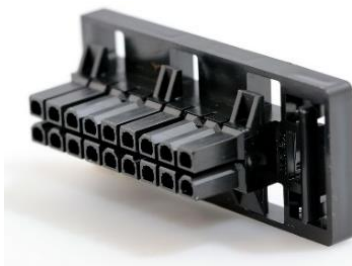
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Plug Housing (Single Row)

Series: [5559](#)
Plug Housing (Dual Row)

Series: [5559](#)
Panel Mount BMI Plug Housing

Series: [42475](#)
Panel Mount Receptacle Housing

Series: [42474](#)
**Panel Mount Receptacle Housing
Slide-and-Lock**

Series: [44516](#)
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Vertical BMI Header	Vertical SMC Header
	
Series: 46011	Series : 87427



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Right Angle BMI Header	Right Angle BMI SMC Header
	
Series: 42404	Series: 43810



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1.0 SCOPE

This Product Specification covers the electrical, mechanical and environmental performance requirements for the **Mini-Fit Plus HCS™** (High Current System) in 4.20 mm (.165 inch) pitch. The **Mini-Fit Plus HCS™** uses contacts stamped in High Performance Alloy for increased current carrying capacity, while maintaining properties at elevated operating temperatures. Options are available in Wire-Wire, Wire-Panel, Wire-Board, Panel-Panel, Panel-Board, and Board-Board configurations in Tin and Gold-plated systems. Crimp terminals accept 16 to 24 AWG stranded wire.

2.0 PRODUCT DESCRIPTION

2.1 DESCRIPTION, SERIES NUMBERS, AND LINKS

Product feature designations:

BMI Blind Mate Interface – lead - in features allow easier alignment in panel-to-board and board-to-board applications.

SMC Surface Mount Compatible – solder temperatures up to 240 °C.

RTC Reflow Temperature Compatible – reflow solder temperatures up to 260 °C.

TPA Terminal Position Assurance – helps ensure crimp terminals are fully inserted into their housing and prevents terminals from backing out in high vibration applications.

CPA Connector Position Assurance – assures receptacle housing cannot be inadvertently disengaged from mating header or plug housing.

DESCRIPTION	SERIES NUMBER
Female Crimp Terminal	45750
Male Crimp Terminal	46012
Receptacle Housing	5557
Plug Housing	5559
Panel Mount BMI Plug Housing	42475
Foam-In-Plug Housing	45776
Panel Mount Receptacle Housing	42474
Panel Mount Receptacle Hsg 40 Ckt	43974
Panel Mount Receptacle Housing, Slide-and-Lock	44516
TPA Receptacle Housing	30067
Panel Mount TPA Plug Housing	30068
Vertical BMI SMC Header, solid pin	44068
Vertical PCB Receptacle Header	46010
Vertical BMI Header	46011
Vertical Header, single row	46014
Vertical Header, dual row	46015
RTC Hi-Temp Vertical Header in LCP	46207

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DESCRIPTION	SERIES NUMBER
Vertical Header, Single Row	172676
Vertical Header, Dual Row	172675
Vertical SMC Header	87427
Right Angle Header	5569
Right Angle Header with press-fit mounting pegs in LCP	5569
Right Angle TPA Header with mounting flanges	30070
Right Angle BMI Header	42404
Right Angle BMI SMC Header	43810
Right Angle Header, 40 Ckt	43973
Right Angle Header, 36 Ckt	45567
Right Angle Header	46991
Right Angle SMC Header	87427

2.2 DIMENSIONS, MATERIALS, PLATING AND MARKINGS

See sales drawings for details on dimensions, materials and platings.

2.3 ENVIRONMENTAL CONFORMANCE

To find product compliance information:

- [Go to molex.com](#)
- Enter the part number in the search field.
- At the bottom of the page go to "Environmental" to see compliance status.

2.4 SAFETY AGENCY APPROVAL

UL File: E29179
CSA Certificate : LR19980
IEC Certificate : IEC 61984

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3.0 APPLICABLE DOCUMENTS AND SPECIFICATIONS

3.1 MOLEX DOCUMENTS

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

[Mini-Fit Plus HCS Maximum Temperature Test Summary 457500003-TS-000](#)

[Molex Quality Crimping Handbook Order No. 63800-0029](#)

[Molex Solderability Specification SMES-152](#)

[Molex Heat Resistance Specification AS-40000-5013](#)

[Molex Moisture Technical Advisory AS-45499-001](#)

[Molex Package Handling Specification 454990100-PK](#)

*ATS – Application Tooling Specification

* Application Tooling Specification for terminals is not provided in this document. ATS for terminals can be available from respective terminal part number page in Molex.com.

3.2 INDUSTRY DOCUMENTS

EIA-364-1000

CSA STD. C22.2 NO.182.3-M1987

UL 60950-1

UL 1977

IEC / EN 61984

4.0 ELECTRICAL PERFORMANCE RATINGS

4.1 VOLTAGE*

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

*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

WIRE GAUGE	INSULATION DIAMETER
16 AWG, Stranded, Copper	1.80 - 3.15 millimeters / .071 - .124 inches
18-20 AWG, Stranded, Copper	1.65 - 2.95 millimeters / .065 - .116 inches
22-24 AWG, Stranded, Copper	1.22 - 2.38 millimeters / .048 - .094 inches

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4.3 MAXIMUM CURRENT RATING**

WIRE-TO-WIRE									
Wire Size	Single Row Circuit Sizes			Dual Row Circuit Sizes					
	3	4	5	2	4	6, 8	10, 12	14, 16, 18	20, 22, 24
16 AWG	13 A	12.5 A	12 A	13 A	12 A	11 A	10.5 A	10 A	9.5 A
18 AWG	11 A	10.5 A	10 A	11 A	10 A	9 A	8.5 A	8 A	7.5 A
20 AWG	9.5 A	9 A	9 A	9.5 A	8.5 A	8 A	7.5 A	7 A	6.5 A

WIRE-TO-BOARD									
Wire Size	Single Row Circuit Sizes			Dual Row Circuit Sizes					
	3	4	5	2	4	6, 8	10, 12	14, 16, 18	20, 22, 24
16 AWG	12.5 A	12 A	11.5 A	12.5 A	11.5 A	10 A	9 A	8.5 A	8.0 A
18 AWG	10.5 A	10 A	9.5 A	10.5 A	9.5 A	8.5 A	8 A	7.5 A	7 A
20 AWG	9 A	8.5 A	8.5 A	9 A	8 A	7 A	6.5 A	6 A	5.5 A

BOARD-TO-BOARD					
Dual Row Circuit Sizes					
2	4	6, 8	10, 12	14, 16, 18	20, 22, 24
11.5 A	11 A	9.5 A	8 A	6.5 A	5 A

NOTE: PCB trace design may greatly affect temperature rise results in Wire-to-Board applications.

**Ratings shown represent MAXIMUM current carrying capacity of a fully loaded connector with all circuits powered. Ratings are based on a 30°C maximum temperature rise limit over ambient (room temperature). Testing conducted with tinned copper conductor stranded wire. Above charts are intended as a guideline. Current rating is application dependent. Appropriate de-rating is required depending on factors such as higher ambient temperature, smaller copper weight of PCB traces, gross heating from adjacent modules or components and other factors that influence connector performance.

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Minimum temperature (operating* and non-operating): - 40°C
Maximum temperature¹ (operating* and non-operating):

Housing Type	Terminal Type	
	Select Gold Plated	Tin Plated
Glow Wire Capable ²	125°C	105°C
RTC Header ³	125°C	
Standard Nylon	105°C	

*Operating values include 30 °c temperature rise at rated current

Field Temperature and Field Life: 65 °C for 10 years (based on EIA-364-1000, table 8)

Note: Temperature life test duration (section 6.3 item 1) is based on assumption that the contact spends its entire life at the rated field maximum temperature (based on EIA-364-1000, table 8)

Tin plated: 100 mating cycles
Gold plated: 250 mating cycles

Durability ratings established as tested per Durability Test Procedures described by EIA-364-09C and meet requirements for low level contact resistance and DWV as prescribed per EIA-364-1000 Test Sequence Group 7.

The following series are glow capable: 46992, 46993, 46994, 172646, 172648, 172675, 172676, 46207, 46991. 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 QUALIFICATION

Laboratory conditions and sample selection are in accordance with EIA-364-1000

¹ UL approval of product usage above 105°C pending

² See section 5.7 for applicable series

³ See section 2.1 for applicable series

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6.0 PERFORMANCE

6.1 ELECTRICAL PERFORMANCE

ITEM	DESCRIPTION	TEST CONDITION	REQUIREMENT
6.1.1	Initial Contact Resistance (Low Level)	EIA-364-23: 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 mΩ Maximum Initial resistance for each test sequence. Resistance measurements for subsequent tests are the Maximum change from Initial as specified.
6.1.2	Insulation Resistance	Mate connectors: apply a voltage of 500 VDC between adjacent terminals and between terminals to ground.	1000 Megohms MINIMUM
6.1.3	Dielectric Withstanding Voltage	EIA-364-20: Apply a voltage of 2200 VAC for 1 minute between adjacent contacts.	No breakdown. Current leakage < 5 mA
6.1.4	Temperature Rise (via Current Cycling)	EIA-364-70 (Temperature Rise) & EIA-364-55 (Current Cycling): Measure the T-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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ITEM	DESCRIPTION	TEST CONDITION	REQUIREMENT
6.2.1	Terminal Mate / Unmate Forces Per Circuit for: Wire – Wire; Wire – Board (formed pin header); and Wire – Board (solid pin header)	Mate and unmate female to male crimp terminal or female terminal to header at a rate of 25 ± 6 mm ($1 \pm \frac{1}{4}$ inch) per minute. Testing to be conducted with individual (single) circuit. Measure and record the maximum mate and unmate forces with latch disabled.	Tin, W-W & W-B (formed pin): Mate : 15.6 N (3.50 lbf) MAX. Unmate : 13.8N (3.10 lbf) MAX.
			Gold, W-W & W-B (formed pin): Mate : 4.9 N (1.10 lbf) MAX. Unmate : 4.0 N (0.91 lbf) MAX.
			Tin, W-B (solid pin): Mate : 13.3 N (3.0 lbf) MAX. Unmate : 11.0 N (2.47 lbf) MAX.
			Gold, W-B (solid pin): Mate : 3.4 N (0.77 lbf) MAX. Unmate : 2.8 N (0.63 lbf) MAX.
6.2.2	Normal Force	Apply a perpendicular force simultaneously to each beam until the desired total deflection is achieved. Return to original size, then deflect beams a second time and measure normal force.	3.5 N (360 g) MINIMUM (Reference Only)
6.2.3	Durability	Per EIA-364-09 C, mate connectors 100 cycles for tin plated product, 250 cycles for gold plated product at a maximum rate of 10 cycles per minute based on mated pairs of 30μ" Au or 100μ" tin at the contact interface.	10 mΩ Max. chg. from Initial; Visual: No Damage
6.2.4	Durability (preconditioning)	Mate connectors by hand, 20 cycles for tin plated product, 50 cycles for gold as required prior to environmental test sequence as indicated.	Visual: no damage
6.2.5	Reseating	Unmate / mate connectors by hand three cycles.	Visual: no damage

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6.2 MECHANICAL PERFORMANCE CONTINUED

ITEM	DESCRIPTION	TEST CONDITION	REQUIREMENT
6.2.6	Vibration (Random)	Mate connectors and vibrate per EIA 364-28, test condition VII, letter D. Test Duration: 15 minutes in each axis.	10 mΩ Max. chg. from Initial; Discontinuity < 1 microsecond
6.2.7	Crimp Terminal Insertion Force (into housing)	Apply an axial insertion force on the terminal at a rate of 25 ± 6 mm (1 ± ¼ inches).	15.0 N (3.37 lbf) MAXIMUM insertion force
6.2.8	Crimp Terminal Retention Force (in housing)	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
6.2.9	Wire Crimp Retention	Apply an axial pullout force on the wire at a rate of 25 ± 6 mm (1 ± ¼ inch) per minute 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 = 68.4 N (15.4 lbf) Min. 20 Awg = 58.7 N (13.2 lbf) Min.
6.2.10	Thumb Latch Operation Force	Depress latch at a rate of 25 ± 6mm (1 ± ¼ inches) per minute.	22.2 N (5.0 lbf) MAXIMUM.
6.2.11	Thumb Latch Yield Strength	Mate loaded connectors fully. Pull connectors apart at a rate of 25 ± 6 mm (1 ± ¼ inch) per minute. (after 1 st mate)	68 N (15.3 lbf) MINIMUM.
6.2.12	Solid PC Tail Header Pin Retention Force (in housing) (5569, 172448, 172648 Series)	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
6.2.13	Stamped PC Tail Terminal Retention Force (in housing) (5566, 172447, 172647 Series)	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
6.2.14	PCB Engagement Forces	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

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6.3 ENVIRONMENTAL PERFORMANCE

ITEM	TEST	TEST PROCEDURE	REQUIREMENT
6.3.1	Temperature Life Group 1	Per EIA-364-17, method A: mate connectors. Expose tin plated terminals to 240 hours at 105 ± 2 °C. Expose gold plated terminals to 1000 hours at 125 ± 2 °C (see 457500003-TS).	10 mΩ Max. chg. from Initial; Visual: No Damage
6.3.2	Temperature Life (preconditioning) Group 3	Per EIA-364-17, method A: mate connectors and expose to 120 hours at 105 ± 2 °C.	10 mΩ Max. chg. from Initial; Visual: No Damage
6.3.3	Thermal Shock	Per EIA-364-32, method A, test condition I, test duration A-4: mate connectors and expose for 10 cycles between -55 °C and 105 °C; dwell 0.5 hours at each temperature.	10 mΩ Max. chg. from Initial; Visual: No Damage Dielectric Strength per 6.1.3 Insulation Resistance per 6.1.2
6.3.4	Cyclic Temperature & Humidity	Per EIA-364-31, method III w/o conditioning, initial measurements, cold shock and vibration. Cycle mated connectors between 25 °C ± 3 °C @ $80\% \pm 3\%$ RH and 65 °C ± 3 °C @ $50\% \pm 3$ RH. Ramp time: 0.5 hr; dwell time: 1 hr. Perform 24 cycles. Remove surface moisture and air dry for 1 hour prior to measurements	10 mΩ Max. chg. from Initial; Visual: No Damage
6.3.5	Solderability	Molex Test Method: Per SMES-152	Solder coverage: 95% MINIMUM
6.3.6	Reflow Solder Resistance (46991, 46207 Series)	Convection reflow solder process 260 °C Maximum per AS-40000-5013	Visual: No Damage
6.3.7	Wave Solder Resistance	Dip connector terminals tail in solder: Solder Duration: 5 ± 0.5 seconds; Solder Temperature: Use maximum solder temperature from Section 8.1	Visual: No Damage to insulator housing material

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Reliability test sequences as per EIA-364-1000

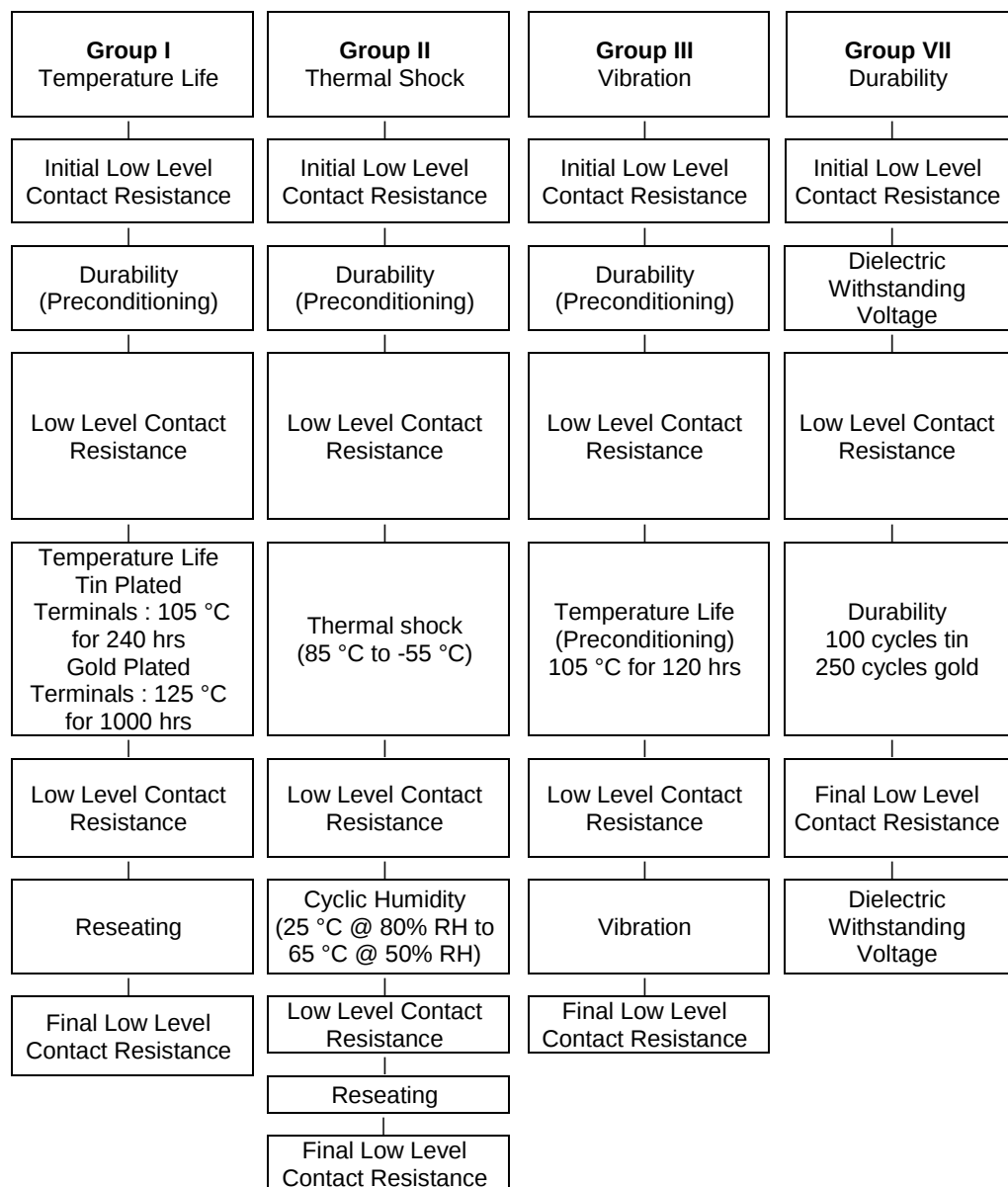


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Thumb latch Yield Strength

T-Rise Profiling

Steady State Temperature Rise

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8.1 SOLDER PROCESS TEMPERATURES

Header Type	Plating Type			
	Select Gold over Nickel	Matte Tin over Nickel	Bright Tin over Nickel	Tin over Copper
With Molded Pegs	240 °C	240 °C	240 °C	240 °C
Without Molded Pegs	260 °C	260 °C	240 °C	240 °C
RTC & SMC Headers: 44068, 43810, 46207, 46991, 87427	260 °C	260 °C	240 °C	240 °C
Glow Wire with Pegs Series: 172675, 172676	220 °C	220 °C	N/A	N/A

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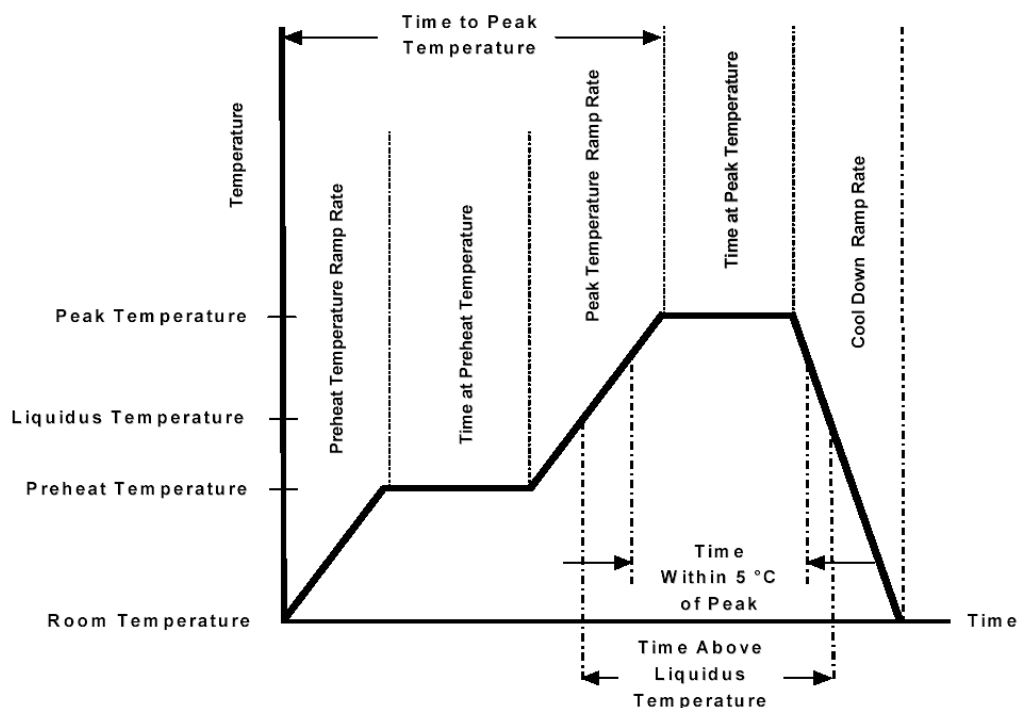


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8.2 REFLOW SOLDERING PROFILE

(This profile is per AS-40000-5013 and is provided as a guideline only. Please see notes for additional information)

[Molex Connector Heat Resistance Specification AS-40000-5013 \(Click Here\)](#)



Description	Requirement
Average Ramp Rate	3°C/sec Max
Preheat Temperature	150°C Min to 200°C Max
Preheat Time	60 to 180 sec
Ramp to Peak	3°C/sec Max
Time over Liquidus (217°C)	60 to 150 sec
Peak Temperature	260 +0/-5°C
Time within 5°C of Peak	20 to 40 sec
Ramp - Cool Down	6°C/sec Max
Time 25°C to Peak	8 min Max

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9.0 PACKAGING

Parts shall be packaged to protect against damage during normal handling, transit and storage. Refer Molex.com specific part number webpage to get the exact packaging document for that item.

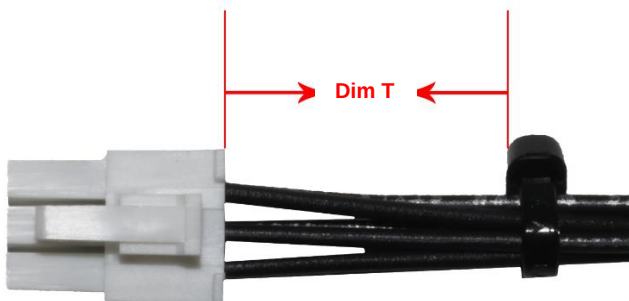
10.0 GAGES AND FIXTURES

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.

11.0 CABLE TIE AND/OR WIRE TWIST LOCATION

Circuit Sizes		Dimension T Min.
Dual Row	Single Row	
2-6	2-3	0.50" (12.7 mm)
8	4	0.75" (19.1 mm)
10-12	5-6	1.00" (25.40 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 general recommendation and may need to be adjusted for different wire gauges and wire type and insulation thickness and insulation material.

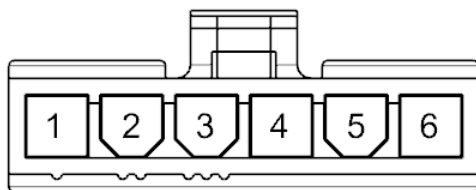
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12.1 Single Row Receptacle (Series: [5557](#))



A schematic diagram of a 6-bit shift register. It consists of six rectangular cells arranged horizontally, labeled 6, 5, 4, 3, 2, and 1 from left to right. Each cell has a small rectangular input on its top edge. The cells are connected in a chain, with the output of one cell feeding into the input of the next. The entire register is enclosed in a larger rectangular frame with input/output ports on the left and right sides.

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A diagram of a 5-bit shift register. It consists of five rectangular cells labeled 1, 2, 3, 4, and 5 from left to right. Above cell 1 is a feedback loop that connects to the input of cell 1. Below cell 3 is a feedback loop that connects to the input of cell 3. Below cell 5 is a feedback loop that connects to the input of cell 1.



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A diagram of a 5-bit shift register. It consists of a horizontal bar with five rectangular cells labeled 5, 4, 3, 2, and 1 from left to right. Below each cell is a pin. Pins 5, 4, and 3 are single pins, while pins 2 and 1 are double pins. Above the bar, there is a small rectangular input on the left and a small semi-circular input on the right.

The diagram shows a 24-bit parallel adder implemented using two 12-bit adders. The top row of inputs is labeled 24, 23, 22, 21, 20, 19, 18, 17, 16, 15, 14, 13. The bottom row of inputs is labeled 12, 11, 10, 9, 8, 7, 6, 5, 4, 3, 2, 1. The two 12-bit adders are connected in parallel to process these 24 inputs. The outputs of the adders are shown as a series of vertical lines at the bottom.



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A top-down view of a 40-pin Dual In-Line Package (DIP). The package is rectangular with a notch at the top center. The pins are arranged in two rows of 20 pins each. The top row of pins is numbered 40, 39, 38, 37, 36, 35, 34, 33, 32, 31, 30, 29, 28, 27, 26, 25, 24, 23, 22, 21 from left to right. The bottom row of pins is numbered 20, 19, 18, 17, 16, 15, 14, 13, 12, 11, 10, 9, 8, 7, 6, 5, 4, 3, 2, 1 from left to right. The package is shown with a white background and black outlines.

Diagram of a 24-pin D-sub connector. The pins are numbered 1 through 24. Pins 1 through 12 are on the top row, and pins 13 through 24 are on the bottom row. The connector is shown with a shield and a ground pin.



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