molex

PRODUCT SPECIFICATION

MEGA-FIT

WIRE-TO-BOARD CONNECTOR SYSTEM

Receptacle Terminal	Receptacle Housing
	
Series: 76823 , 172063	Series: 170001, 171692

Vertical Header, With Crush Pegs	Vertical Header, Without Crush Pegs
	
Series: 76829, 172065, 171597(MFBL)	Series: 76829, 172065

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REVISION:	ECR/ECN INFORMATION:	TITLE:	SHEET No.
E	EC No: 620872 DATE: 08/29/2019	PRODUCT SPECIFICATION FOR MEGA-FIT CONNECTOR SYSTEM	1 of 24

DOCUMENT NUMBER:	CREATED / REVISED BY:	CHECKED BY:	APPROVED BY:
PS-76823-100	ALEX LUO	JONNY ZHENG	ANSON YIN

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Right Angle Header	Back shell
	
Series: 172064,76825, 171596 (MFBL), 215038	Series: 200122

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1.0 SCOPE

This product specification covers the performance requirements and test methods of Mega-fit 5.70 mm pitch wire to board connector systems terminated with 16 to 12 AWG or 1.5 to 4.0mm2 stranded wire using crimp technology with tin or gold plating.

2.0 PRODUCT DESCRIPTION

2.1 PRODUCT NAME AND SERIES NUMBER (S)

Table 1 – WIRE-TO-BOARD	
Description	Series Number
Receptacle Crimp Terminal	76823, 172063
Receptacle Housing, Dual Row	170001, 171692, 204652
Vertical Header Dual Row (with crush pegs)	76829, 172065
Vertical Header Dual Row (without crush pegs)	76829, 172065
Vertical Header Dual Row with MFBL option	171597
Right Angle Header Dual Row	172064,76825, 204653, 215038
Right Angle Header Dual Row, with MFBL option	171596
Back Shell	200122

2.2 DIMENSIONS, MATERIALS, PLATING AND MARKINGS

Dimensions & Plating: See individual sales drawings.
Material: RoHS compliant materials.

2.3 SAFETY AGENCY APPROVALS

2.3.1 UL File Number: UL E29179

UL (12 ckt fully loaded) NON-current interruption	Current interruption per UL1977 Applies when using 170001 Series Only
23 Amps @ 600V (12 AWG or 4.0mm2 wire) 20 Amps @ 600V (14 AWG or 2.5mm2 wire) 18 Amps @ 600V (16 AWG or 1.5mm2 wire)	23 Amps @ 48V AC/DC (12 AWG wire)

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2.3.2 IEC License Number per IEC / EN 61984-2009: Certificate Number: 14000024

IEC (12 ckt fully loaded) NON-current interruption
23 Amps @ 600V (12 AWG or 4.0mm2 wire)

2.3.3 File Number*: LR-19980_A_000 CLASS 6233-01 and 6233-81

CSA approval meets following standards/test procedures:

a) CSA std. C22.2 No. 182.3-M1987
b) UL-1977

** "C" and "US" mark adjacent to CSA signifies that the product has been evaluated to the applicable CSA and ANSI/UL standards, for use in Canada and US respectively.*

CSA (single circuit) NON-current interruption
23 Amps @ 600V (12 AWG or 4.0mm2 wire)
20 Amps @ 600V (14 AWG or 2.5mm2 wire)
18 Amps @ 600V (16 AWG or 1.5mm2 wire)

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.

Mega-Fit Test Summary TS-76823-100-001
Mega-Fit Application Specification AS-76823-100-001
Molex Quality Crimping Handbook Order No. 63800-0029

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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 differs with Terminals. ATS shall be available in the respective Terminal part number page.*

3.2 INDUSTRY DOCUMENTS

EIA-364-1000.01
SAE/USCAR-2
UL-60950-1
UL-1977
CSA STD. C22.2 NO. 182.3-M1987
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

Maximum Insulation Diameter and Applicable Wire Gauges	Stranded copper 16 AWG: 3.18 mm / .125 Inches MAXIMUM
	Stranded copper 1.5 mm^2: 3.18 mm / .125 inches MAXIMUM
	Stranded copper 14 AWG: 3.66 mm / .144 inches MAXIMUM
	Stranded copper 2.5 mm^2: 3.75 mm / .148 inches MAXIMUM
	Stranded copper 12 AWG: 4.11 mm / .162 inches MAXIMUM
	Stranded copper 4.0 mm^2: 4.11 mm / .162 inches MAXIMUM

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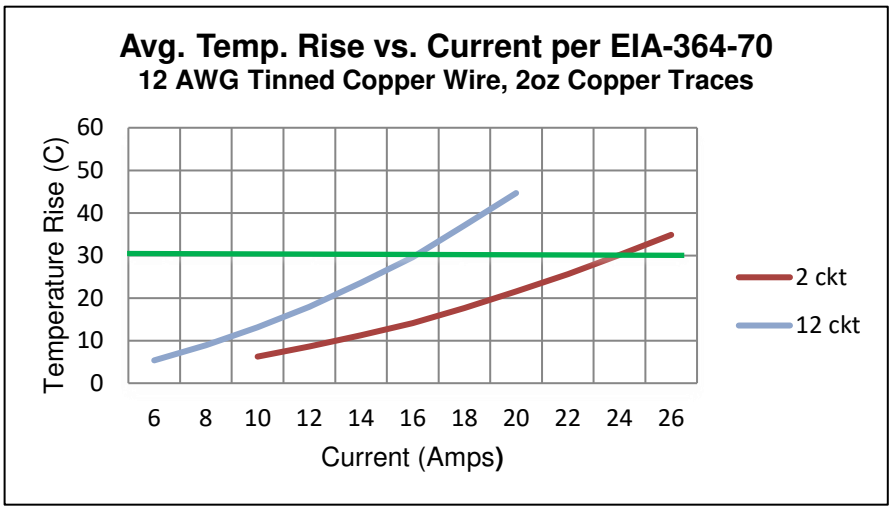
4.3 MAXIMUM CURRENT RATING

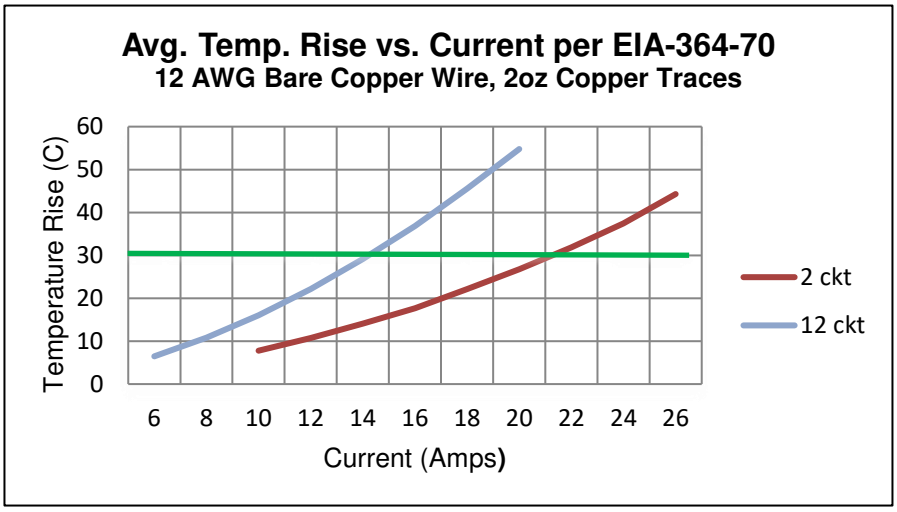
Current rating is application dependent and may be affected by the wire rating such as listed in UL-60950-1. Each application should be evaluated by the end user for compliance to specific safety agency requirements. The ratings listed in the chart below are per Molex test method based on a 30° C maximum 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 length & crimp quality are other factors that influence current rating.

Wire to Board Current Rating (Amp Max.) (As tested with tinned awg copper wire and tin or gold-plated terminals)				
Connector fully loaded with all circuits Powered				
Ckt. Size / AWG & metric Wire Size	**2**	**4**	**6**	**8-12**
12 AWG, 4.0mm^2	23	20	18	16
14 AWG, 2.5mm^2	21	17	15	13
16 AWG, 1.5mm^2	17	15	13	12

Wire to Board Current Rating (Amp Max.) (As tested with bare awg copper wire and tin or gold-plated terminals)				
Connector fully loaded with all circuits Powered				
Ckt. Size / AWG & metric Wire Size	**2**	**4**	**6**	**8-12**
12 AWG, 4.0mm^2	21	18	16	14
14 AWG, 2.5mm^2	19	15	13	11
16 AWG, 1.5mm^2	15	13	11	10

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4.4 TEMPERATURE

TIN plated

Max. operating temperature range (including T-rise from applied current) is -40°C to 105°C.
Field temperatures and field life: Tested per EIA 364-1000.01 to meet field temperature of 65°C for 10 years life per table-8 in EIA-364-1000.01

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GOLD plated
Max. operating temperature range (including T-rise from applied current) is -40°C to 120°C, based on test sequence Group VIII, thermal aging at 120°C for 1000 hours.
Field temperatures and field life: Tested per EIA 364-1000.01 to exceed a field temperature of 65°C for 10 years life per table-8 in EIA-364-1000.01

4.5 DURABILITY

Tin plated: 25 mating cycles
Gold plated: 200 mating cycles
As tested in accordance with EIA-364-1000.01 test method (see Sec. 7.0 of this specification). Durability per EIA-364-09.

4.6 CURENT INTERRUPTION (Applies when using 170001 Series ONLY)

48 Volt AC/DC @ 23 Amp

Tested 250 cycles at 48 Volt DC with a test current of 34.5 Amp hot-plug test conducted with all circuits powered with 12 AWG wire per UL 1977 with tin plated contacts in a 12-circuit housing fully populated.

4.7 GLOW WIRE

The Following Series are Glow Wire Capable: 170001,76825,76829,172064,172065,171596,171597. 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 / IRC 60335-1 750C/2 sec with no flaming. VDE Test report available upon request.

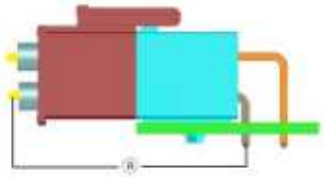
5.0 QUALIFICATION

Laboratory conditions and sample selection are in accordance with EIA-364-1000.01

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6.0 PERFORMANCE

6.1 ELECTRICAL PERFORMANCE

DESCRIPTION	TEST CONDITION	REQUIREMENT
Initial Contact Resistance (Low Level)  Resistance Measure Points	Mate connectors apply a maximum voltage of 20 mV and a current of 100 mA (measurement locations shown) Per EIA-364-23 Wire resistance and traces shall be removed from the measured value.	Maximum (Initial): Tin: 2 mΩ 15µ" & 30µ" Gold: 2 mΩ
Contact Resistance @Rated Current (Voltage Drop)	Mate connectors; apply the rated current. Per EIA-364-70	Maximum: Tin: 10 mΩ 15µ" & 30µ" Gold: 5 mΩ
Insulation Resistance	Apply 500 VDC between adjacent terminals or ground. Per EIA-364-21	1,000 M Ω minimum
Dielectric Withstanding Voltage	Apply 2200 VAC for 1 minute between adjacent terminals. Per EIA-364-20	No breakdown Current leakage <5mA
Temperature Rise	Mate connectors, measure T- Rise @ Rated Current After 96 Hours Per EIA-364-70	Temperature rise: 30°C maximum

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6.2 MECHANICAL PERFORMANCE

ITEM	TEST CONDITION	REQUIREMENT
Connector Mating Force (latch disabled)	Mate connectors at a rate of 25.4 +/- 6 mm per minute. Per EIA-364-37	Tin plated: 6.8 N MAX. initial mate force per circuit 15µ" & 30µ" Gold plated: 6.0 N MAX. per circuit
Connector Un-mating Force (latch disabled)	Un-mate connectors with latch disabled at a rate of 25.4 +/- 6 mm per minute. Per EIA-364-37	Tin plated: 6.5 N MAX. initial un-mate force per circuit 15µ" & 30µ" Gold plated: 5.6 N MAX. per circuit
Thumb Latch Yield Strength (Initial)	Mate loaded connectors fully. Pull connectors apart at a rate of 25.4 +/- 6 mm per minute.	68 N MIN.
Durability	Mate connectors 25 cycles for tin plated and 200 cycles for gold plated connectors at a maximum rate of 10 cycles per minute. Per EIA-364-09	Maximum change from initial: Tin: 2 mΩ 15µ" & 30µ" Gold: 2 mΩ
Durability with Environment (Preconditioning)	Mate connectors 5 cycles for tin plated and 20 cycles for gold plated connecters at a maximum rate of 10 cycles per minute. Per EIA-364-09.	Maximum change from initial: Tin: 2 mΩ 15µ" & 30µ" Gold: 2 mΩ
Header Pin Retention Force in Housing Vertical Header	Axial pull force on the vertical header housing away from the PCB at a rate of 25.4 +/- 6 mm per minute.	89 N min per pin

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MECHANICAL PERFORMANCE (CONTD)		
ITEM	**TEST CONDITION**	**REQUIREMENT**
Header Pin Retention Force in Housing Right Angle Header	Axial push force on the pin in the housing at a rate of 25.4 +/- 6 mm per minute.	9.81 N min per pin
PCB Peg Engagement Force (Nominal PCB hole diameter & location)	Insert a header at a rate of 25.4±6 mm/minute. (Applies to parts with PCB retention pegs only)	Header with 2 pegs: 85 N max insertion force Headers with 1 peg: 45 N max insertion force
Crimp Terminal Retention Force (in housing)	Axial pullout force on the terminal in the housing at a rate of 25 ± 6 mm per minute. Per EIA-364-29	30 N MINIMUM retention forces
Wire Pull Out Force from Terminal (Axial)	Apply an axial pullout force on the wire at a rate of 25 ± 6 mm per minute.	4.0mm² = 220 N Min. 12 Awg = 220 N Min. 2.5mm² = 220 N Min. 14 Awg = 220 N Min. 1.5mm² = 220 N Min. 16 Awg = 200 N Min. Values may vary depending on crimp tooling. Refer to Molex Applicator Tooling specification.
Vibration (Random)	Mate connectors and vibrate per EIA-364-28 test condition VII-D Tin: 15 minutes each axis. Gold: 1.5 hours each axis.	Maximum Change from Initial: Tin: 2 mΩ 15µ" & 30µ" Gold: 2 mΩ Discontinuity < 1 microsecond

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MECHANICAL PERFORMANCE (CONTD)		
ITEM	**TEST CONDITION**	**REQUIREMENT**
Special Vibration (Random)	Mate connectors and vibrate test procedure per EIA-364-28 Special test condition: 10~1000Hz; 3.10Grms; Gold: 8 hours each axis.	Maximum Change from Initial: 15µ" Gold: 2 mΩ Discontinuity < 1 microsecond
Reseating	Unmate/Mate connectors by hand three cycles	Maximum Change from Initial: Tin: 2 mΩ Except for After Thermal Cycling: Tin: 10 mΩ 15µ" & 30µ" Gold: 2 mΩ
Vibration/Mechanical Shock (SAE/USCAR-2) Tin Plated only	USCAR-2 Rev 6 per sequence M per section 5.9.6, Classification: V1, S1, T2 Shock: 35 G's, 10 shocks per axis Vibration: 8 hours per axis, 1.81 g	No discontinuity of 7 Ω or more for 1 microsecond maximum during Vibration & Shock Total Connector Resistance: Tin: 16.13 Ω Max (less conductor resistance) Voltage drop was not evaluated

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6.3 ENVIRONMENTAL PERFORMANCE*

ITEM	TEST CONDITION	REQUIREMENT
Thermal Shock	Mate connectors expose to 10 cycles from -55°C to 85°C Per EIA-364-32 method A, condition 1	Maximum Change from Initial: Tin: 2 mΩ 15μ" & 30μ" Gold: 2 mΩ
Thermal Aging	Mate Connectors expose to 240 hours at 105°C Per EIA-364-17 Method A	Maximum Change from Initial: Tin: 2 mΩ 15μ" & 30μ" Gold: 2 mΩ
Thermal Aging Gold Plated Only	Mate Connectors expose to 1000 hours at 120°C Per EIA-364-17 Method A	Maximum Change from Initial: 15μ" Gold: 6 mΩ 30μ" Gold: 2 mΩ
Thermal Aging (Preconditioning)	Mate Connectors expose to 120 hours at 105°C Per EIA-364-17 Method A	Maximum Change from Initial: Tin: 2 mΩ 15μ" & 30μ" Gold: 2 mΩ
Cyclic Temperature And Humidity	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	Maximum Change from Initial: Tin: 2 mΩ 15μ" & 30μ" Gold: 2 mΩ
Solderability Dip Test	Per Molex test method: SMES-152	Solder area shall have MIN. of 95% solder coverage



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ENVIRONMENTAL PERFORMANCE (CONT..)		
ITEM	**TEST CONDITION**	**REQUIREMENT**
Reflow Solder Resistance	Convection reflow solder process 260°C Max per AS-40000-5013	Visual: No damage
Wave Solder Resistance	Dip header terminal tails in solder: Duration: 10±0.5 seconds Solder temperature: 260±5° C Per AS-40000-5013	Visual: No damage
Thermal Cycling Tin Plated Only	Per EIA-364-1000.01 Test Group 5: Cycle mated 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 contacts reach the temperature extremes (minimum of 5 minutes). Humidity is not controlled. Perform 500 cycles.	Maximum Change from Initial: Tin: 10 mΩ

**Environmental tests have been performed based on EIA-364-1000.01*

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7.0 TEST SEQUENCE GROUPS

Reliability Test Sequences Based on EIA-364-1000.01 & USCAR-2

Group I	Group II	Group III	Group V
Temperature Life 144 contacts tin 144 contacts gold	Thermal Shock 144 contacts tin 144 contacts gold	Vibration 144 contacts tin 144 contacts gold	Thermal Cycling 144 contacts tin (tin plated only)
Initial Contact Resistance EIA-364-23	Initial Contact Resistance EIA-364-23	Initial Contact Resistance EIA-364-23	Initial Contact Resistance EIA-364-23
Durability Tin plated: 5 cycles Gold plated: 20 cycles EIA-364-09	Durability Tin plated: 5 cycles Gold plated: 20 cycles EIA-364-09	Durability Tin plated: 5 cycles Gold plated: 20 cycles EIA-364-09	Durability 5 cycles EIA-364-09
Contact Resistance	Contact Resistance	Contact Resistance	Contact Resistance
Thermal Aging 105°C, 240 hrs 10 Yrs @ 65°C EIA-364-17	Thermal Shock 10 cycles -55°C and +85°C EIA-364-32	Thermal Aging 105°C, 120 hours 10 Yrs @ 65°C EIA-364-17	Thermal Aging 105°C, 120 hours 10 Yrs @ 65°C EIA-364-17
Contact Resistance	Contact Resistance	Contact Resistance	Contact Resistance
Reseating 3 cycles	Cyclic Temperature and Humidity EIA-364-31	Random Vibration EIA-364-28 Condition VIID	Thermal Cycling EIA-364-1000.01
Contact Resistance	Contact Resistance	Contact Resistance	Contact Resistance
	Reseating 3 cycles		Reseating 3 cycles
	Contact Resistance		Contact Resistance

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Group VI Dust 144 contacts tin (tin plated only)	Group VII Durability 144 contacts tin 144 contacts gold	Group VII Temperature Life 144 contacts gold (gold plated only)	Group IX Uscar-2 Vibration and Shock 144 contacts tin (tin plated only)	Individual Tests
Initial Contact Resistance EIA-364-23	DWV EIA-364-20	Initial Contact Resistance EIA-364-23	Visual Inspection / Initial Contact Resistance EIA-364-23	Connector Mating / Unmating Force
Durability 5 cycles EIA-364-09	Initial Contact Resistance EIA-364-23	Durability 5 cycles EIA-364-09	Durability 10 cycles	Temperature Rise / Voltage Drop
Dust EIA-364-91	Durability Tin plated: 25 cycles Gold plated: 200 cycles EIA-364-09	Contact Resistance	Contact Resistance	Wire pullout force from terminal (axial)
Contact Resistance	Contact Resistance	Thermal Aging 120°C, 250 hrs EIA-364-17	Mechanical shock w/ continuity monitoring	Header Pin Retention in Housing
Thermal Disturbance EIA-364-1000.01	DWV EIA-364-20	Contact Resistance	Random vibration w/ continuity monitoring	Crimped Terminal Retention Force in Housing
Contact Resistance		Thermal Aging 120°C, 250 hrs EIA-364-17	Contact Resistance	Wave / Reflow Solder Resistance
Reseating 3 cycles		Contact Resistance	Voltage drop was not conducted due to test setup	Solderability
Contact Resistance		Thermal Aging 120°C, 250 hrs EIA-364-17		Insulation Resistance
		Contact Resistance		PCB Peg Engagement Forces
		Thermal Aging 120°C, 250 hrs EIA-364-17		Thumb Latch yield strength
		Contact Resistance		
		Crimped terminal retention force in housing		

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Special Vibration
48 contacts gold
(gold plated only)

Initial Contact Resistance
EIA-364-23

Special Random Vibration
Test Procedure Per EIA-364-28
10~1000Hz; 3.10Grms;
Gold: 8 hours each axis

Contact Resistance

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8.0 SOLDER INFORMATION

8.1 SOLDER PROCESS TEMPERATURES

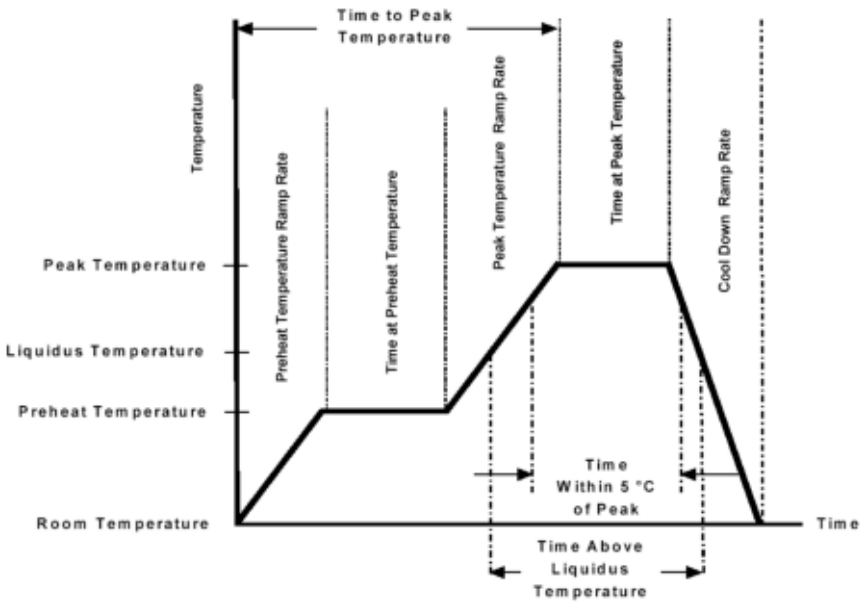
Wave Solder: 265°C Max
Reflow Solder: 260°C Max

Molex Solderability Specification SMES-152
(Click Here)

8.2 REFLOW SOLDERING PROFILE

Molex Connector Heat Resistance Specification
AS-40000-5013
(Click Here)

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



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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

Notes:

1. Temperature indicated refers to the PCB surface temperature at solder tail area.
2. Connector can withstand 1 reflow cycle.
3. 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.

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 CABLE TIE AND/OR WIRE TWIST LOCATION

Circuit Sizes	Dimension T Minimum
2	.50” (12.7 mm)
4-6	.75” (19.1 mm
8	1.00” (25.4 mm
10-12	1.25” (31.75 mm

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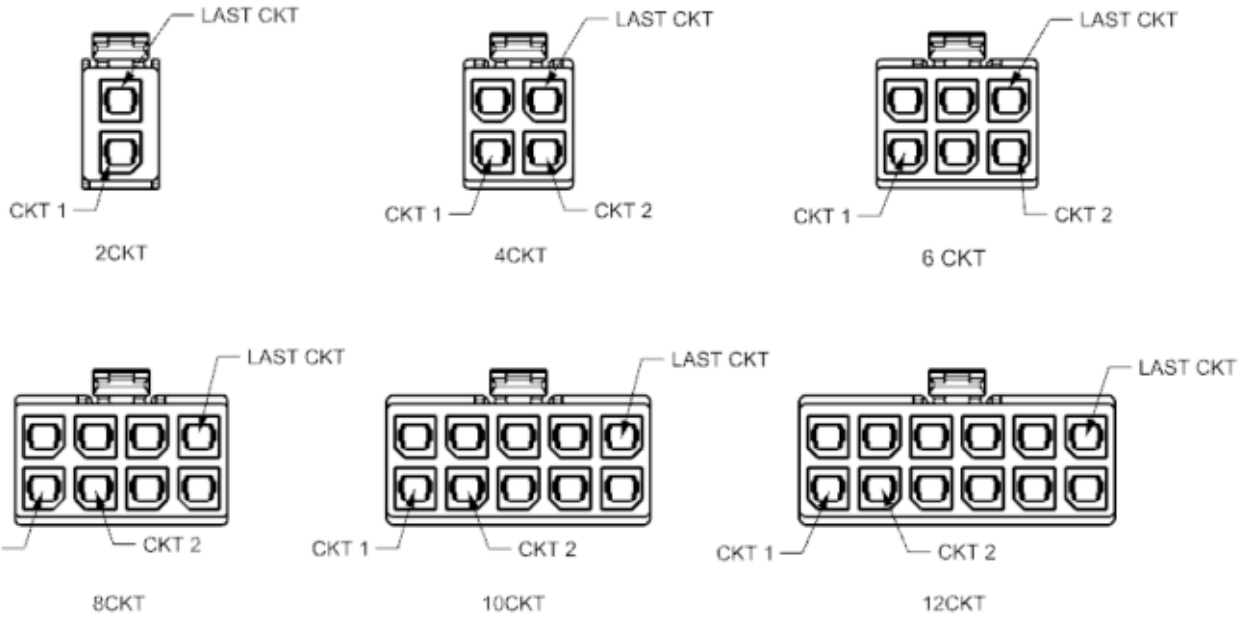


The “T” dimension defines a “free” length of wire, or a length of wire that is not subject to significant bias by external factors such as a wire tie, wire twisting, or other means of bending or deforming of the wires that repositions them from their natural relaxed state or location where they enter 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.

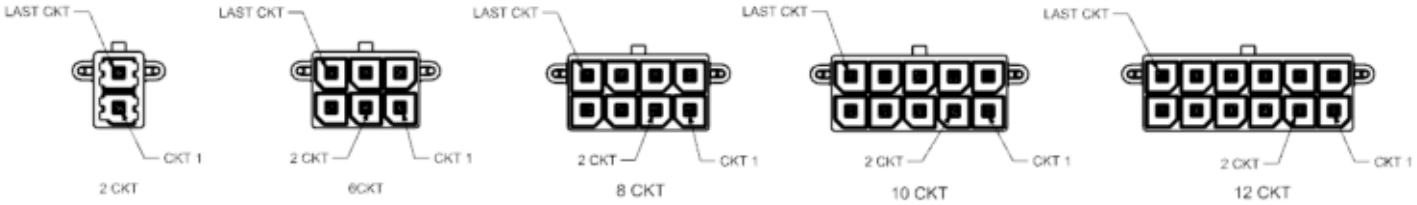
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11.0 POLARIZATION AND KEYING OPTIONS

11.1 Receptacle Housing (Series: 170001 and 171692)

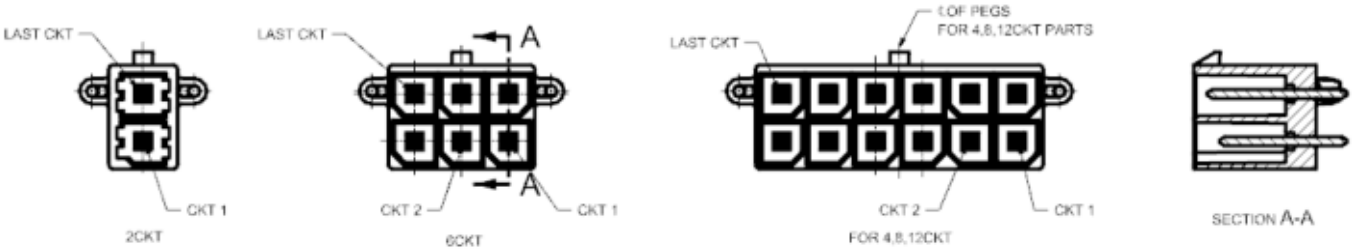


11.2 Vertical Header Dual Row With Crush Pegs (Series:76829 and 172065)

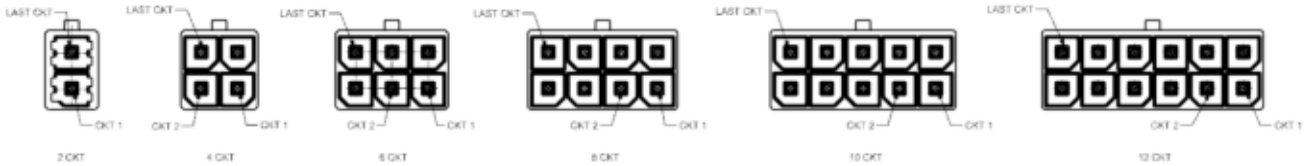


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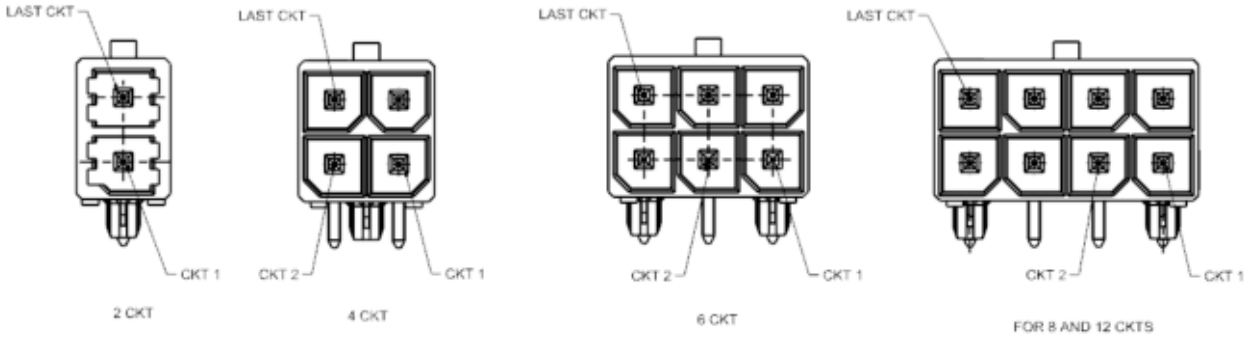
11.3 Vertical Header Dual Row With Crush Pegs & MFBL (Series: 171597)



11.4 Vertical Header Dual Row Without Crush Pegs (Series:76829 and 172065)

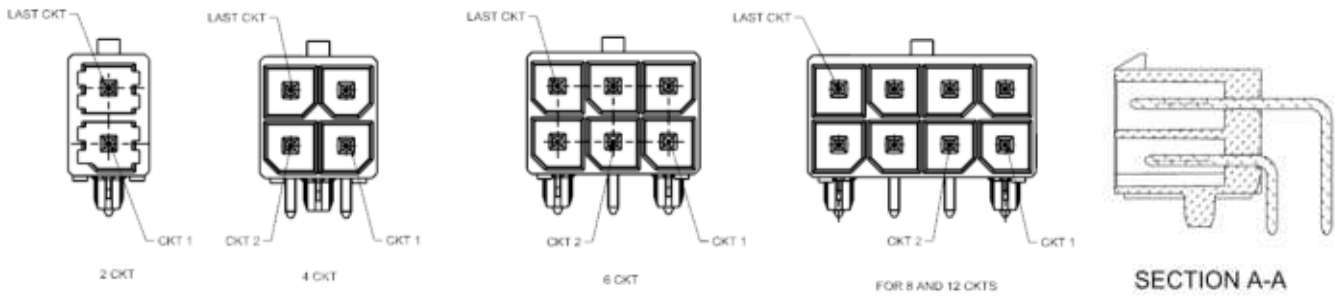


11.5 Right Angle Header Dual Row (Series:76825 and 172064)

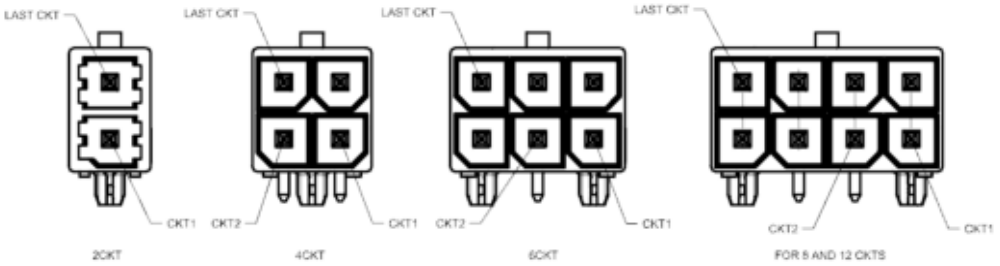


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11.6 Right Angle Header Dual Row Solder with MFBL (Series: 171596)



11.7 RIGHT ANGLE HEADER DUAL ROW (Series: 215038)



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