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PRODUCT SPECIFICATION

1.0 SCOPE

This product specification covers the 2.54 mm (0.100 inch) centerline (pitch) dual row STAC64 unsealed wire to board connection system terminated with 22 to 20 AWG wire using crimp technology.

2.0 PRODUCT DESCRIPTION

2.1 PRODUCT NAME AND SERIES NUMBERS

Product Name	Series
20 Way Right Angle Header Assembly	34691
16 Way Right Angle Header Assembly	34691
12 Way Right Angle Header Assembly	34691
8 Way Right Angle Header Assembly	34691
20 Way Vertical Header Assembly	34690
16 Way Vertical Header Assembly	34690
12 Way Vertical Header Assembly	34690
8 Way Vertical Header Assembly	34690
20 Way Receptacle Connector Assembly	34729
16 Way Receptacle Connector Assembly	34729
12 Way Receptacle Connector Assembly	34729
8 Way Receptacle Connector Assembly	34729

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PRODUCT SPECIFICATION

2.2 ASSOCIATED TERMINALS

Product Description	Vendor Part Number
Molex CTX Large Grip CTX Female Receptacle Terminal (20ga)	34803-3212
Molex CTX Small Grip Female Receptacle Terminal (22ga)	34803-3211

2.2 DIMENSIONS, MATERIALS, PLATINGS AND MARKINGS

Harness Housings: 30% glass fiber polyester

TPAs: 30% glass fiber polyester

Header Housing: 30% glass fiber SPS

Pins: Copper alloy C26000

DEVICION. FOR/ECN INFORMATION. TITLE.

Tin Plating: Overall Tin with Nickel under-plate

2.3 SAFETY AGENCY APPROVALS

UL File Number	Not Applicable
CSA File Number	Not Applicable
TUV License number	Not Applicable

3.0 APPLICABLE DOCUMENTS AND SPECIFICATIONS

Description	Document Number
8,12,16, & 20 way right angle sales drawing	SD-34691-100
(charted)	
8,12,16,& 20 way vertical sales drawing	SD-34690-100
(charted)	
8-20 way harness sales drawing (charted)	CU5T-14489-DA
Female 'CTX' Terminal Molex Sales	SD-502306-001
Drawing (charted)	
Tray packaging specification	PK-31300-892
Tube packaging specification	PK-31301-063
Carton packaging specification	PK-31301-201
Application specification	AS-34729-020

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4.0 RATINGS

4.1 VOLTAGE

500 VDC MAXIMUM; Per GMW3191, All measured isolation resistances shall be >100MΩ 14 VDC MAXIMUM; Per NDS24012, An initial leak current of ≤ 10µA and a post endurance leak current of ≤ 1 mA.

4.2 CURRENT AND APPLICABLE WIRES

Current is dependent on connector size, ambient temperature, blade size and related factors. Actual maximum current rating is application dependent and should be evaluated for each use.

The current listed below is expected to cause a 40°C average temperature rise in a fully populated 20 circuit connection system per RSA 36-05-019 Rev. G requirement.

AWG	Amperes	Wire range Insulation Diameter
20	6.1	1.40 - 1.90 mm (0.055 - 0.075 inch)
22	5.8	1.50 - 1.65 mm (0.059 - 0.065 inch)

4.3 TEMPERATURE

Operating: $-40 \text{ C}^{\circ} \text{ to} + 105 \text{ C}^{\circ}$ Non-operating: $-40 \text{ C}^{\circ} \text{ to} + 105 \text{ C}^{\circ}$

5.0 PERFORMANCE

5.1 ELECTRICAL PERFORMANCE

ITEM	DESCRIPTION	TEST CONDITION	REQUIREMENT
1	Contact Resistance (Low Level)	Mate connectors: limiting the open circuit voltage of 20 mV and a maximum current of 100 mA.	6 milliohms MAXIMUM
2	Contact Resistance @ Rated Current (Voltage Drop)	Mate connectors: apply a 5 ampere/ 1.0 mm ² current	10 milliohms MAXIMUM
3	Isolation Resistance	Apply a voltage of 500 VDC between adjacent terminals and between terminals to ground.	100 Meg ohms MINIMUM
4	Temperature Rise (via Current Cycling)	Mate terminals: measure the temperature rise at the rated current after: 1008 hours of bench top testing (45 minutes ON and 15 minutes OFF per hour)	Temperature rise over Ambient: +40 C° MAXIMUM

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5	Dielectric Strength	Apply an AC rms voltage of 1000V at 60 Hz across each adjacent cavity and between the terminals to ground	No dielectric breakdown or flash-over shall occur between cavities or between the cavities and the outside of a connector at any time during the test.
6	Connector Current Capability (Electrical)	Mate connectors per durability; Expose to 504 cycles of 45 minutes ON and 15 minutes OFF at 6.1 amps (20awg) and 5.8 amps (22awg) for 105°c. Perform Contact Resistance @ Rated Current (Voltage Drop) Expose to a second set of 504 cycles of 45 minutes ON and 15 minutes OFF at 6.1 amps (20awg) and 5.8 amps (22awg) for 105°c. Record Contact Resistance (Low Level) at least once a day, at the 30 th . Minute of the ON cycle Perform Contact Resistance @ Rated Current (Voltage Drop)	First 504 Cycles: The temperature measured on each connection shall not exceed 105°c Voltage Drop 20 milliohms MAXIMUM Second 504 Cycles: The value shall not exceed a Delta Temperature of 70°c Dry Circuit Resistance 10 milliohms MAXIMUM Voltage Drop 20 milliohms MAXIMUM
7	Connector Current Capability (Mechanical)	Subject connectors to Connector Current Capability (Electrical). Perform Terminal Retention Force (in Housing) for 20awg and 22awg	TPA in Final-Lock 80 Newtons MINIMUM 22awg wire breakage can occur at less than 80N*
8	Connector - Connector Leak Current	A pair of mated connectors shall be left in a Humidity Chamber for 1 hour at 60 ± 5 °C and 90 - 95 %RH. During the humidity exposure, power adjacent terminals to 14 VDC. Measure Initial Leak Current after 1 hour while still in chamber. After humidity exposure, power adjacent terminals to 14 VDC and measure post endurance leak current	Initial Leak Current Less than 10µA Post Endurance Leak Current Less than 1mA

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9	Connector - Connector Overcurrent Loading	time below through arbitrarily selected: Current (Amps)	current for the specified only one circuit that is (20awg) Time 60 Minutes 200 Seconds 5 Seconds 1 Second	Housing shall not start burning
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5.2 MECHANICAL REQUIREMENTS

ITEM	DESCRIPTION	TEST CONDITION	REQUIREMENT
			Mate 60 Newtons MAXIMUM
1	Connector Mate/ Unmate Forces	Mate and Unmate connector (male to female) at a rate of 50 ± 6 mm ($2 \pm \frac{1}{4}$ inch) per minute.	Unmate w/o latch 75 Newtons MAXIMUM
		minute.	Unmate w/latch 120 Newtons MINIMUM
2	Terminal Retention Force	Axial pullout force on the terminal in the housing at a rate of 50 ± 6 mm (2 ± ¼ inch)	TPA in Pre-Lock 60 Newtons MINIMUM
	(in Housing)	per minute.	TPA in Final-Lock 80 Newtons MINIMUM
3	Terminal Insertion Force (into Housing)	Apply an axial insertion force on the terminal at a rate of 50 ± 6 mm ($2 \pm \frac{1}{4}$ inch) per minute.	6 Newtons MAXIMUM
4	Connector Audible Feedback	The connector lock must provide audible feedback during connector mating at a rate of 50 ± 6 mm ($2 \pm \frac{1}{4}$ inch) per minute.	7 dB over Ambient (C scale)
		Connector must be polarized to prevent	120 Newtons MINIMUM
5	Polarization Feature Effectiveness	mating with similar connectors - 0° Misorientation for all possible header and receptacle configurations	110 Newton Minimum 12 Ckt: Pol C to Pol A
		The TPA is designed to resist seating during shipment and must be actuated by the operator in order to fully seat.	TPA Insertion w/o terminals: 180 Newtons MINIMUM
6	Terminal Position Assurance (TPA) Insertion Force (into	The force to either insert the TPA from the preload (as shipped) position to the final position or extract the TPA from final to	TPA Insertion with terminals: 20 Newtons MAXIMUM
	housing)	preload at a rate of 50 ± 6 mm ($2 \pm \frac{1}{4}$ inch) per minute.	TPA Extraction – 1 st Cycle: 15 Newtons MAXIMUM
		•	TPA Extraction – 2 nd Cycle: 20 Newtons MINIMUM

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7	Terminal Position Assurance (TPA) Extraction Force (in housing)	The force to completely extract the TPA from preload (as shipped) position at a rate of 50 ± 6 mm (2 ± ½ inch) per minute.	50 Newtons MINIMUM	
8	Header Pin Retention Force (in Vertical & Right Angle Housing)	Axial pushout force on the terminal in the housing at a rate of 50 ± 6 mm ($2 \pm \frac{1}{4}$ inch) per minute.	15 Newtons MINIMUM	
9	Insertion / Removal Feeling	Insert and remove the terminal or the connector, while checking the correctness of the insertion/removal feeling	Connector shall be free of detrimental cracking, rust, play, flaw, deformation, and other defects. Terminal shat be free of catching and / or other abnormality.	
10	Force-to-Seat Header to PCB (No Solder)	The force to completely seat the Header to the PCB traveling a distance of 1.3mm	100 N Max	
11	Force-to-Remove Header from PCB (No Solder)	The force to completely remove the Header from the PCB without solder	10 N Min	
12	Pry Resistance	A pair of connectors shall have one of them secured and the other inserted. Under these conditions, they shall be pried axially, rectangularity, front and rear and right and left around the top with a force of 78 N After prying the connectors to two stages of fitting, pull them out. This is one cycle.	While being tested, the connectors shall not have any problem in being made electrically alive Voltage Drop 10 milliohms MAXIMUM	
		Subject connectors to 10 cycles and Perform Contact Resistance @ Rated Current (Voltage Drop) and Connector Mate/Unmate Forces (with latch only)	78 Newtons MAXIMUM Unmate w/latch 110 Newtons MINIMUM	
13	Pry Resistance II	Pull the female connector wire at a 45° angle in the direction which minimizes the male and female terminal contact at a speed of 5mm/min to 100N. Then decrease the pulling load at the same speed to 0N (No Force)	There shall be no interruptions in the waveform	
14	Connector Drop Test	System Assembly (Mated & Fully populated) – Subject the assembly to a fall of 1 meter on each face, except for electrical wire side, onto a concrete floor	No damage or incipient rupture shall be observed.	

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Connector Assembly (Unmated & Fully	
Populated) - Subject the assembly to a fall of	No damage or incipient
1 meter on each face, except for electrical wire side, onto a concrete floor	rupture shall be observed.

5.3 ENVIROMENTAL REQUIREMENTS

ITEM	DESCRIPTION	TEST CONDITION	REQUIREMENT
1	Durability	Mate connectors up to 10 cycles prior to environmental tests.	20 milliohms MAXIMUM
2	Thermal Shock (Electrical)	Mate connectors per durability; expose to 600 cycles of: Temperature C ⁰ Duration (Minutes) -40 +0/-3 30 +105 +3/-0 30 Perform Contact Resistance (Low Level)	Dry Circuit Resistance 10 milliohms MAXIMUM & Discontinuity < 1 microsecond
Thermal Shock (Physical)		Mate connectors per durability; expose to 300 cycles of: Temperature C° Duration (Minutes) -40 +0/-3 30 +105 +3/-0 30 Apply a voltage of 500 VDC per Isolation Resistance	100 Meg ohms MINIMUM
		Apply an AC rms voltage of 1000V at 60 Hz per Dielectric Strength	No dielectric breakdown or flash-over shall occur between cavities or between the cavities and the outside of a connector at any time during the test.
4	Thermal Shock (Mechanical)	Mate connectors per durability; expose to 1000 cycles of: Temperature C° Duration (Minutes) -40 +0/-3 30 +105 +3/-0 30 Unmate connector per Connector Mate/ Unmate Forces	Unmate w/latch 85 Newtons MINIMUM

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		Mate connectors per durability; expose to 1000 cycles of: Temperature C° Duration (Minutes) -40 +0/-3 30 +105 +3/-0 30 Extract terminal from housing per Terminal Retention Force (in Housing) Mate connectors per durability. Perform Contact Resistance (Low Level)	TPA in Final-Lock 85 Newtons MINIMUM Dry Circuit Resistance 6 milliohms MAXIMUM
5	Random Vibration / Mechanical Shock (Not Coupled to Engine - Electrical)	Connector assembly shall be subject to the following vibration profile: Mechanical Shock: Acceleration: 25 Gs Nominal Shock Duration: 15ms Nominal Shock Shape: Half Sine Number of shocks per axis: 792 Random Vibration with Thermal Cycling Temperature Range: -40/+105°C Test Duration: 24h for each X,Y,Z axis of the parts RMS Acceleration = 20.9m/s^2 Perform Contact Resistance (Low Level) Perform Contact Resistance @ Rated Current (Voltage Drop)	No instantaneous disconnection of 7 Ω or more for 1 μs Max No instantaneous disconnection of 7 Ω or more for 1 μs Max Dry Circuit Resistance 15 milliohms MAXIMUM Voltage Drop 15 milliohms MAXIMUM
6	Random Vibration with Thermal Cycling / Mechanical Shock (Not Coupled to Engine - Electrical)	Mate connectors per durability. Perform Contact Resistance (Low Level) Condition parts for 48h at the maximum temperature of 4h@-40 and 6.5h@105°C. Subject connectors to 16h vibration per axis in all 3 axes. Perform Contact Resistance (Low Level) Maintain for 12h at 85°C and 75% humidity Perform Contact Resistance (Low Level) Perform Contact Resistance (Low Level) Perform Contact Resistance @ Rated Current (Voltage Drop)	Dry Circuit Resistance 6 milliohms MAXIMUM Delta Dry Circuit Resistance 5 milliohms MAXIMUM Delta Final Dry Circuit Resistance 7 milliohms MAXIMUM Voltage Drop 10 milliohms MAXIMUM

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		Perform Unmate portion only of Connector Mate/Unmate Forces	Unmate w/latch 100 Newtons MINIMUM
7	Temperature/ Humidity Cycling (Electrical)	Mate connectors per durability. Subject connector system to 10 cycles of: 60% RH 4 hours @ 23 C°; 97% RH 10 hours @ 55 C°, 2 hour @ -40 C°; 2 hours @ 105 C° Perform Contact Resistance (Low Level) Perform Contact Resistance @ Rated Current (Voltage Drop)	Dry Circuit Resistance 10 milliohms MAXIMUM Voltage Drop 10 milliohms MAXIMUM
Temperature/ 8 Humidity Cycling		Mate connectors per durability. Subject connector system to 10 cycles of: 60% RH 4 hours @ 23 C°; 97% RH 10 hours @ 55 C°, 2 hour @ -40 C°; 2 hours @ 105 C° Apply a voltage of 500 VDC per Isolation Resistance	100 Meg ohms MINIMUM
	(Physical)	Apply an AC rms voltage of 1000V at 60 Hz per Dielectric Strength	No dielectric breakdown or flash-over shall occur between cavities or between the cavities and the outside of a connector at any time during the test.
	Temperature/	Mate connectors per durability. Subject connector system to 10 cycles of: 60% RH 4 hours @ 23 C°; 97% RH 10 hours @ 55 C°, 2 hour @ -40 C°; 2 hours @ 105 C° Unmate connector per Connector Mate/ Unmate Forces	Unmate w/latch 85 Newtons MINIMUM
9	Humidity Cycling (Mechanical)	Mate connectors per durability. Subject connector system to 10 cycles of: 60% RH 4 hours @ 23 C°; 97% RH 10 hours @ 55 C°, 2 hour @ -40 C°; 2 hours @ 105 C° Extract terminal from housing per Terminal Retention Force (in Housing)	TPA in Final-Lock 85 Newtons MINIMUM
10	High Temperature Exposure (Electrical)	Mate connectors per durability. Subject connector system to 105 Co for 1008 hours. Perform Contact Resistance (Low Level) Perform Contact Resistance @ Rated Current (Voltage Drop) Dry Circuit Resistance 10 milliohms MAX	
11	High Temperature Exposure (Physical)	Mate connectors per durability. Subject connector system to 105 C° for 1008 hours. Apply a voltage of 500 VDC per Isolation Resistance post 1008 hours	

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		Apply an AC rms voltage of 1000V at 60 Hz per Dielectric Strength			No dielectric breakdown or flash-over shall occur between cavities or between the cavities and the outside of a connector at any time during the test.
High Temperature Exposure (Mechanical)		Mate connectors per durability. Subject connector system to 105 C° for 1008 hours. Apply a force of 98N to wire bundle and pull on wire bundle in the following directions: Straight, +45° Vertical, -45° Vertical, +45° Horizontal, & -45° Horizontal		No breakage or electrical discontinuities at 98N or less	
		Mate connectors posture to connector system to Extract terminal from Retention Force (in	to 105 C ^o for m housing po	TPA in Final-Lock 85 Newtons MINIMUM	
13	Chemical Resistance (Electrical)	Expose connectors the specified durati Resistance To Fluids: Automatic Transmission Oil: Zinc Chloride: Engine Coolant: Windshield Washer Fluid: Perform Contact Rand Contact Resis (Voltage Drop).	s to the follow on of soak at Time / Temp. in Fluid 15 Seconds @ 23°C 15 Seconds @ 23°C 7 Days @ 23°C 5 Minutes @ 23°C 5 Minutes @ 23°C	ring fluids for nd dry time: Time / Temp. Drying 24 Hours @ 105°C 24 Hours @ 23°C 7 Days @ 23°C 48 Hours @ 50°C 48 Hours @ 50°C 48 Hours @ 50°C Level)	No deformation or cracks shall be observed in connector Delta Dry Circuit Resistance 6 milliohms MAXIMUM Voltage Drop 8 milliohms MAXIMUM

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			Expose connectors to the following fluids for		
		the specified durati			
		Resistance To	Time /	Time /	
		Fluids:	Temp. in	Temp.	
		Atooti-o	Fluid	Drying	
		Automatic Transmission	15 Seconds	24 Hours	No deformation or cracks shall
		Oil:	@ 23°C	@ 105°C	be observed in connector
		Zinc Chloride:	15	0411-	
	Chemical		Seconds	24 Hours @ 23°C	Unmate w/latch
14	Resistance		@ 23°C	@ 23 C	(hand evaluation) shall show
	(Mechanical)	Fuel:	7 Days @ 23°C	7 Days @ 23°C	no signs of functional degradation.
		Engine	5 Minutes	48 Hours	
		Coolant:	@ 23°C	@ 50°C	TPA in Final-Lock
		Windshield	5 Minutes	48 Hours	80 Newtons MINIMUM
		Washer Fluid:	@ 23°C	@ 50°C	
		Unmate connector	•		
		Unmate Forces. (H		,	
		terminal from hous	• .	inal	
		Retention Force (in	n Housing)		
			Expose connectors to the following fluids for		
	Chemical Resistance (Physical)	the specified duration of soak and dry time:		No deformation or cracks shall	
		Resistance To	Time /	Time /	be observed in connector
		Fluids:	Temp. in Fluid	Temp.	be observed in connector
		Automatic	15	Drying	
		Transmission	Seconds	24 Hours	100 Meg ohms
		Oil:	@ 23°C	@ 105°C	MINIMUM
		Zinc Chloride:	15	04110	
			Seconds	24 Hours @ 23°C	NOT MET
			@ 23°C		Zinc Chloride and Engine
45		Fuel:	7 Days @	7 Days @	Coolant
15		——————	23°C	23°C	
		Engine Coolant:	5 Minutes @ 23°C	48 Hours	
		Windshield	⊕ ∠3 C 5 Minutes	@ 50°C 48 Hours	
		Washer Fluid:	@ 23°C	@ 50°C	
		Apply a voltage of 500 VDC per Isolation			
		Resistance post 1008 hours			
		Apply an AC rms voltage of 1000V at 60 Hz		No dielectric breakdown or flash-over shall occur between	
			per Dielectric Strength		cavities or between the cavities and the outside of a connector at any time during the test.

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16	Solderability	Steam-age samples for 8 hours (Category 3), set at ambient for at least one hour, and its pins were dipped in ROL1 flux and 63/37 tin lead solder at 234°C per procedure of SMES-152 Paragraph 5.3.4 Dip Coated. Criteria for passing visual was SMES-152 Rev E Paragraph 5.4.1.	Solder coverage: 95% MINIMUM (per SMES-152)
17	IR Process Soldering	Molex IR Profile: ES-40000-5013 Maximum Temperature: 260°C	Dimensional: Conformance to Sales Drawing requirements & Visual: SEE SECTION 8.0 OTHER INFORMATION

6.0 PACKAGING

Parts shall be packaged to protect against damage during handling, transit and storage. TPAs may become seated during transit, please refer to PS-34646-001 for more information.

7.0 GAGES AND FIXTURES

All applicable gages and fixtures are referenced in the appropriate control plans.

8.0 OTHER INFORMATION

Products conform to the following environmental ratings:

Temperature: 105°C Vibration: On-Body Sealing: Un-Sealed

To ensure compliance with our product validation, it is imperative that our product meet the print dimensions. Any non-conformance with the true position of the PCB pins or mating interface will create performance failures that include; PCB installation, increased mate/unmate forces and electrical discontinuities.

To this effect, Molex does not recommend or endorse the ganging of individual Stac64 header assemblies by our distribution partners or customers. We have developed a repeatable and efficient method of producing 2, 3, and 4 bay header assemblies that meet the print requirements to optimize product performance.

For IR Reflow applications, part numbers 34691-6XXX (Plastic pin alignment plate or "PAP") headers should be used. The use of part numbers 34691-0XXX (Mylar PAP) has been reported to cause soldering issues.

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