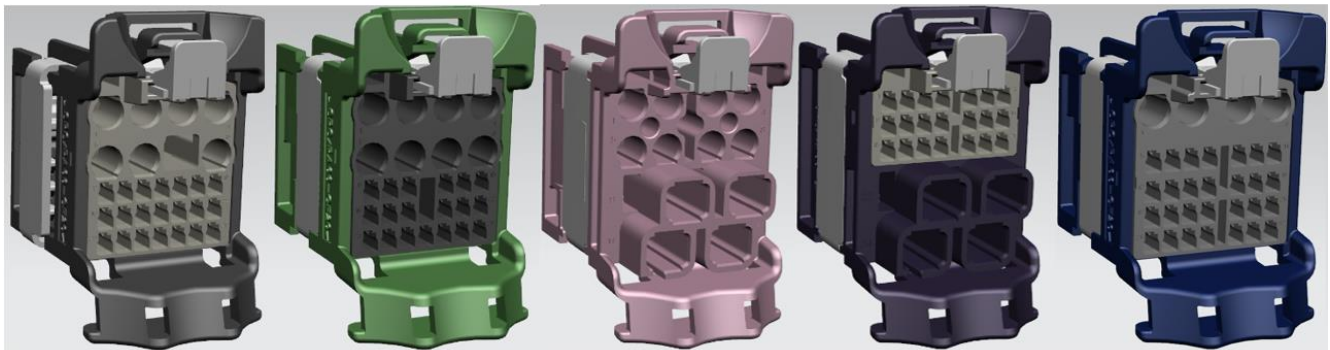


stAK50h Receptacle Connector System

1.0 SCOPE

This product specification covers the *stAK50h Family* of unsealed hybrid receptacle connectors. This connection system offers a range of circuit configurations to meet a wide variety of needs all packaged in a small, hand-mate connector. Hybrid configurations consist of 0.5mm, 1.2mm, and 2.8mm terminal systems. These receptacle connectors are direct mate, unsealed connectors offered with an independent secondary lock (ISL), connector position assurance device (CPA) and optional wire dress covers (WDC).

2.0 PRODUCT DESCRIPTION



28way

27way

12way

25way

32way

2.1 PRODUCT NAME AND SERIES NUMBERS

Product Name	Series
28 Way Receptacle Connector	160014
27 Way Receptacle Connector	160029
12 Way Receptacle Connector	160026
25 Way Receptacle Connector	160027
32 Way Receptacle Connector	160028

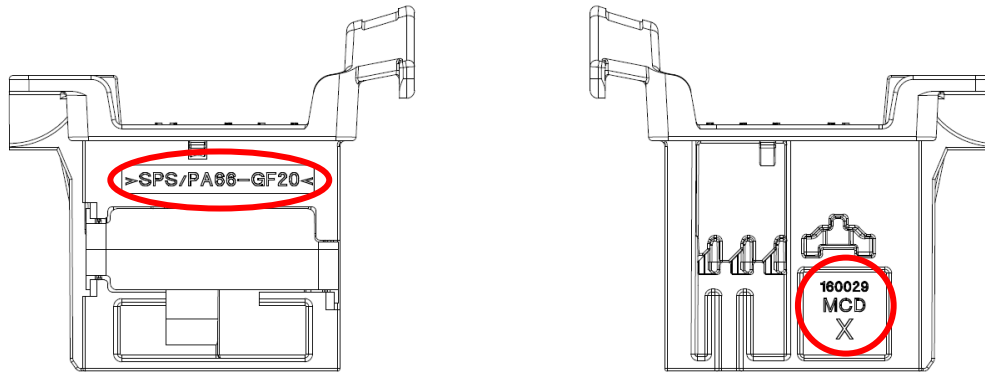
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2.2 PRODUCT WIRE DRESS COVER OPTIONS

DESCRIPTION	DRAWING	PART NUMBER
90-Degree Wire Exit (27w/28w/32w)	1600300002 SD	1600300002
90-Degree Wire Exit (12w/25w)	1600300003 SD	1600300003
180-Degree Wire Exit (27w/28w/32w)	1600300008 SD	1600300008
180-Degree Wire Exit (12w/25w)	1600300009 SD	1600300009

2.3 DIMENSIONS, MATERIALS, PLATINGS AND MARKINGS

- 0.5mm terminals are on a 2.0mm centerline pitch
- 1.2mm terminals are on a 4.0mm centerline pitch
- 2.8mm terminals are on a 7.2mm centerline pitch

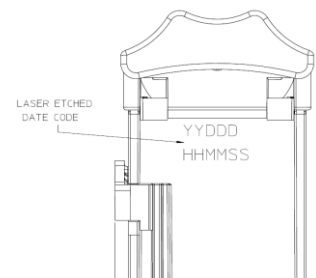


Connector Outer Housing: 20% Glass Filled PA66 Nylon/SPS Blend
 Connector Inner Housing: 20% Glass Filled PA66 Nylon/SPS Blend
 ISL: 30% Glass Filled SPS
 CPA: 50% Glass Filled PA66 Nylon
 WDC (optional): 35% Glass Filled PA66 Nylon

Molded-In Material Recycling Code, Series Number, Manufacturing Code, Mold Cavity I.D.

Laser Etched Date Code

YYDD YY = Last two values of calendar year ('16' = 2016)
 DDD = Day of Year ('037' = Feb 6)
 HHMMSS Hour of Day, Minute of Hour, Second of Minute



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PRODUCT SPECIFICATION

2.4 SAFETY AGENCY APPROVALS

UL File Number	Not Applicable
CSA File Number	Not Applicable
TUV License number	Not Applicable
IMDS	Available Upon Request
Environmental Compliance	Available at molex.com

2.5 INDEXING/KEYING OPTIONS

Each connector offering is available in at least 4 different keyed options per circuit count. Each connector is keyed with both mechanical indexing features as well as discrete colors across the family.

Connector Description	Series Number	Discrete Keys	Interface Key	Connector Color
28 Way Receptacle Connector	160014	4	1	Dark Gray
			2	Light Green
			3	Light Gray
			4	Black
27 Way Receptacle Connector	160029	4	1	Black
			2	Light Green
			3	Light Blue
			4	Purple
32 Way Receptacle Connector	160028	6	1	Black
			2	Blue
			3	Dark Gray
			4	Purple
			5	Pink
25 Way Receptacle Connector	160027	6	6	Light Brown
			1	Light Green
			2	Stone Gray
			3	Black
			4	Dark Gray
			5	Dark Purple
12 Way Receptacle Connector	160026	4	6	Light Gray
			1	Black
			2	Light Green
			3	Light Purple
			4	Light Gray

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PRODUCT SPECIFICATION

3.0 APPLICABLE DOCUMENTS AND SPECIFICATIONS

Description	Document Number	Obsolete Document Number
27 Way Connector Sales Drawing	1600290011	SD-160014-0001
28 Way Connector Sales Drawing	1600140011	SD-160014-0001
32 Way Connector Sales Drawing	1600280011	SD-160028-0001
25 Way Connector Sales Drawing	1600270011	SD-160027-0001
12 Way Connector Sales Drawing	SD-160026-0001	
28 Way Interface Definition Drawing	SD-160014-002	
27 Way Interface Definition Drawing	SD-160029-002	
32 Way Interface Definition Drawing	SD-160028-002	
25 Way Interface Definition Drawing	SD-160027-002	
12 Way Interface Definition Drawing	SD-160026-002	
Wire Dress Cover (90° Exit) Option A	1600300002 PSD	
Wire Dress Cover (90° Exit) Option B	1600300003 PSD	
Wire Dress Cover (180° Exit) Option A	1600300008 PSD	
Wire Dress Cover (180° Exit) Option A	1600300009 PSD	
Packaging Specification (Bulk Pack)	PK-31302-266	
Application Specification	AS-160014-001	
Validation Test Summary	1600140000-TS	
TAK50 0.5 mm Terminal Product Specification	2000960000 PS	
Tak50 0.5 Terminal Drawing	2000960001 PSD	20009600001 PSD*
Stak50h 100Mb Ethernet Test Summary	1600140005	

200960001 PSD* 2000960004 PSD, Refer to PCN# 509803.

4.0 RATINGS

4.1 VOLTAGE

Maximum Classified System Voltage is 14 VDC

No Dielectric Breakdown under 1000V(AC) (per GMW3191 June 2012)

Isolation Resistance >100MΩ at 500V(DC) (per GMW3191 June 2012)

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4.2 CURRENT AND APPLICABLE WIRES

Current is dependent on connector size, ambient temperature, blade size, wire size, and related factors. Actual maximum current rating is application dependent and should be evaluated for each use. Chosen terminal suppliers' derating curves should be used for reference. See applicable Connector Sales Drawings for list of valid terminal part numbers for use.

Molex TAK50 or NanoMQS 0.5mm Locking Lance Terminal System

Wire section	Wire Range Insulation Diameter
0.13 mm ²	1.05 mm MAX (0.041 inch)
0.35 mm ²	1.30 mm MAX (0.051 inch)

MSA/OCS 1.2mm Clean Body Terminal System

Wire section	Wire Range Insulation Diameter
0.50 mm ²	1.90 mm MAX (0.075 inch)
1.50 mm ²	2.40 mm MAX (0.095 inch)

MCP/CTS 2.8mm Locking Lance Terminal System

Wire section	Wire Range Insulation Diameter
0.50 mm ²	1.90 mm MAX (0.075 inch)
2.50 mm ²	3.00 mm MAX (0.118 inch)

4.3 TEMPERATURE

Operating: - 40° C to + 85° C
Non-operating: - 40° C to + 85° C

4.4 FLAMMABILITY

All materials of the connectors are either UL 94 HB rated or equivalent, with burn rate not to exceed 100 mm/min.

5.0 PERFORMANCE

Product family is validated to *GMW3191 Revision: June 2012*

- Temperature Class (T1)
- Sealing Class (S1)
- Vibration Class (V1)
- Target Life (2X)
- Mating Force Class per USCAR-25 (3)
- WDC required for USCAR-25 Ergonomic compliance
- Any/All exceptions to the specification stated below.
- Additional circuit sizes added to the product family are validated per USCAR-2 Rev. 6 Appendix D.
- Additional capacity added to the product family are validated per USCAR-2 Rev. 6 Appendix C.
- See the following Test Summary document(s) for test performance data:
 - 1600140000-TS

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PRODUCT SPECIFICATION

5.1 ELECTRICAL PERFORMANCE REQUIREMENTS

ITEM	DESCRIPTION	TEST CONDITION	TYPE	PERFORMANCE
1	Contact Resistance (Low Level)	Mate connectors: limiting the open circuit voltage of 20 mV and a maximum current of 100 mA .	0.5 Terminals	25 milliohms MAXIMUM
			1.2 Terminals	13 milliohms MAXIMUM
			2.8 Terminals	5 milliohms MAXIMUM
2	Isolation Resistance	Mate connector pairs, apply a voltage of 500 VDC between adjacent terminals and between terminals to ground.	ALL	100 MEGAOHMS MINIMUM

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PRODUCT SPECIFICATION

5.2 MECHANICAL PERFORMANCE DEVIATIONS FROM SPECIFICATION

ITEM	DESCRIPTION	TEST CONDITION	TYPE	PERFORMANCE
3	Connector Mate Forces (Hand Plug Connector)	Mate connector (male to female) at a rate of 50 ± 10 mm per minute.	12 Circuit	75 N MAXIMUM
			25 Circuit	90 N MAXIMUM
			27 Circuit	75 N MAXIMUM
			28 Circuit	75 N MAXIMUM
			32 Circuit	75 N MAXIMUM
4	Terminal from Connector Extraction Force (Primary Lock Only)	Axial pullout force on the terminal in the housing at a rate of 50 ± 6 mm ($2 \pm \frac{1}{4}$ inch) per minute.	0.5 Terminals	10 N MINIMUM
5	Connector Position Assurance (CPA) – Lock to Pre-Stage Force	Open the CPA at a rate of 50 ± 10 mm per minute until fully opened.	All	3 N Minimum 30 N Maximum
6	Connector Position Assurance (CPA) – Closing Force on Unmated Connectors	Using an unmated connector, close the CPA at a rate of 50 ± 10 mm per minute until fully seated and locked.	Post Moisture-Conditioning	55 N Minimum
			Room Ambient Conditions	85 N Minimum
7	Connector Position Assurance (CPA) – Closing Force on Partially-Mated Connectors	Using a partial-mated connector, close the CPA at a rate of 50 ± 10 mm per minute until fully seated and locked. <i>Test designed to simulate pushing CPA while mating connector</i>	Partially Seated Connector (Not Latched)	125 N Minimum
8	Terminal-to-Connector Engagement Force – ISL Fully Seated	With ISL fully seated, insert a terminal at a rate of 50 ± 10 mm per minute until it is fully locked.	2.8 Terminals [12 Circuit & 25 Circuit Only]	35 N Minimum
9	Independent Secondary Lock – Pre-Lock to Lock Force	With ISL in Pre-Lock position, push ISL at a rate of 50 ± 10 mm per minute to its final locked position.	All	15 N Minimum 45 N Maximum
10	Independent Secondary Lock – Lock to Pre-Lock Force	With fully seated ISL in connector, pull ISL at a rate of 50 ± 10 mm per minute to its pre-stage position.	All	20 N Minimum 60 N Maximum

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11	Polarization Feature Effectiveness	Populated connector are engaged at a rate of 50 ± 10 mm/minute until a minimum force of 150N. Note whether electrical contact is made.	28ckt - Key 4 Connector to Key 2 Header interface	124 N Minimum
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5.3 ENVIRONMENTAL REQUIREMENTS

ITEM	DESCRIPTION	TEST CONDITION	TYPE	REQUIREMENT						
12	Thermal Shock (Electrical)	Mate connectors per durability; expose to 100 cycles of: <table border="1"> <tr> <td><u>Temperature C°</u></td> <td><u>Duration (Mins)</u></td> </tr> <tr> <td>-40 +0/-3</td> <td>30</td> </tr> <tr> <td>+85 +3/-0</td> <td>30</td> </tr> </table>	<u>Temperature C°</u>	<u>Duration (Mins)</u>	-40 +0/-3	30	+85 +3/-0	30	0.5 Terminals	25 milliohms MAX Discontinuity < 1 μ s
			<u>Temperature C°</u>	<u>Duration (Mins)</u>						
			-40 +0/-3	30						
+85 +3/-0	30									
1.2 Terminals	13 milliohms MAX Discontinuity < 1 μ s									
2.8 Terminals	5 milliohms MAX Discontinuity < 1 μ s									
13	High Temperature Exposure (Electrical)	Mate connectors per durability and expose to 1008 hours at $85 \pm 2^\circ\text{C}$	All	Isolation Resistance 100 MΩ @ 500VDC						
			0.5 Terminals	25 milliohms MAX Discontinuity < 1 μ s						
			1.2 Terminals	13 milliohms MAX Discontinuity < 1 μ s						
			2.8 Terminals	5 milliohms MAX Discontinuity < 1 μ s						
14	Humid Heat Cycling (HHC) (Electrical)	Mate connectors per durability and expose connector system to five 48 -hour cycles of combined heating and humidity exposure between -10°C and 65°C and 80% to 93% RH	All	Isolation Resistance 100 MΩ @ 500VDC						
			0.5 Terminals	25 milliohms MAX Discontinuity < 1 μ s						
			1.2 Terminals	13 milliohms MAX Discontinuity < 1 μ s						
			2.8 Terminals	5 milliohms MAX Discontinuity < 1 μ s						
15	Humid Heat Constant (HHCO) (Electrical)	Mate connectors per durability and expose connector system to 10 days of constant exposure at $85 \pm 3^\circ\text{C}$ at 90\pm 5% RH	All	Isolation Resistance 100 MΩ @ 500VDC						
			0.5 Terminals	25 milliohms MAX Discontinuity < 1 μ s						
			1.2 Terminals	13 milliohms MAX Discontinuity < 1 μ s						
			2.8 Terminals	5 milliohms MAX Discontinuity < 1 μ s						

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16	Mechanical Shock and Vibration with Thermal Cycling (Electrical)	Mate connectors per durability. Connector assembly shall be vibrated for 2X Life (16 hours per axis) after 792 shocks @ 25G per axis and 18 shocks @ 100G per axis for on-body sprung mass not coupled to engine.	0.5 Terminals	25 milliohms MAX Discontinuity < 1µs
			1.2 Terminals	13 milliohms MAX Discontinuity < 1µs
			2.8 Terminals	5 milliohms MAX Discontinuity < 1µs

5.4 ETHERNET 100BASE-T1 REQUIREMENTS PER OPEN ALLIANCE BROADR-REACH 2.0

ITEM	DESCRIPTION	TEST CONDITION	TYPE	REQUIREMENT
1	Impedance	As defined in Open Alliance BroadR-Reach Definitions for Communication Channel 2.0 Section 5.1.3.	0.5 Terminals	Please contact Molex for additional information.
2	Insertion Loss	As defined in Open Alliance BroadR-Reach Definitions for Communication Channel 2.0 Section 5.1.3.	0.5 Terminals	1 MHz: 1.0 dB 10 MHz: 2.6 dB 33 MHz: 4.9 dB 66 MHz: 7.2 dB
3	Return Loss	As defined in Open Alliance BroadR-Reach Definitions for Communication Channel 2.0 Section 5.1.3.	0.5 Terminals	1 MHz: 18.0 dB 20 MHz: 18.0 dB 66 MHz: 12.8 dB
4	LCL LCTL	As defined in Open Alliance BroadR-Reach Definitions for Communication Channel 2.0 Section 5.1.3.	0.5 Terminals	1 MHz: 43.0 dB 33 MHz: 43.0 dB 50 MHz: 39.4 dB 200 MHz: 27.3 dB
5	Near and Far End Cross Talk (NEXT & FEXT)	As defined in Open Alliance BroadR-Reach Definitions for Communication Channel 2.0 Section 5.2.3, PSANEXT .	0.5 Terminals	1 MHz: 51.5 dB 100 MHz: 31.5 dB

6.0 PACKAGING

Parts shall be packaged to protect against damage during handling, transit and storage.
Packaging per Molex specification: PK-31302-266

7.0 GAGES AND FIXTURES

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

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Revision	Description	Responsible	Date
C7	1. Added reference to Stak50h SI Test summary, page 4. 2. Added SI requirements Section 5.4, page 9.	Rob Carlson	01/05/2022

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