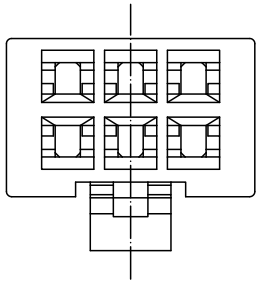
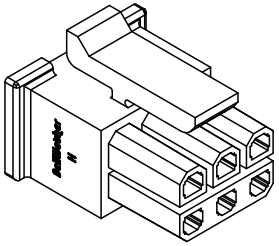
| REV | ECN No. | DATE | REMARK |
|---|---|---|---|
| A | EK2013-0200 | 20130918 | HISTORIC |
| A.1 | EK2014-0132 | 20140701 | ACTIVE |





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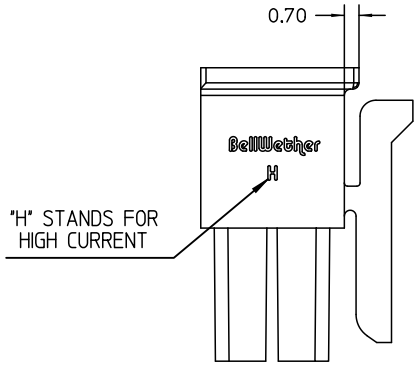
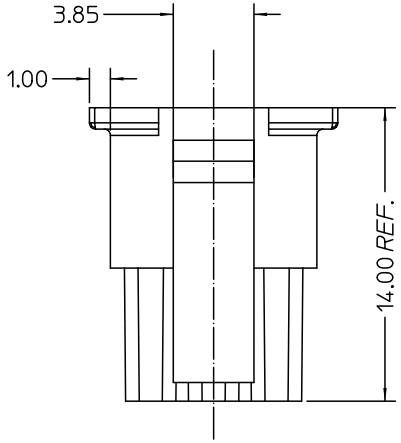
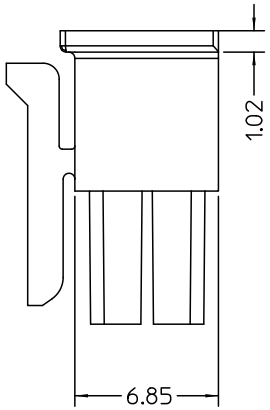
2014.07.16
正式发行

NOTES:
1. MATERIAL:UNFILLED NYLON
   UL94V-0,HALOGEN-FREE,
   COLOR BLACK
2. PRODUCT SPECIFICATION: PS-70094-001
3. PACKAGE SPECIFICATION: PK-70093-001
4. LEAD FREE AND ROHS COMPLIANT
5. THIS RECEPTACLE HOUSING TO BE USED
   WITH RECEPTACLE TERMINAL 70097 SERIES
6. MATING ENDS: 70094, 70095, 70096 SERIES

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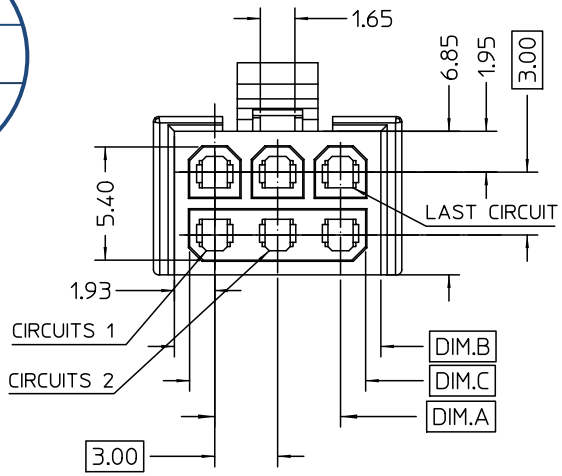



| CIRCUITS | DIM.A | DIM.B | DIM.C | P/N |
|---|---|---|---|---|
| 24 | 33.00 | 36.85 | 35.40 | 70093-2400 |
| 22 | 30.00 | 33.85 | 32.40 | 70093-2200 |
| 20 | 27.00 | 30.85 | 29.40 | 70093-2000 |
| 18 | 24.00 | 27.85 | 26.40 | 70093-1800 |
| 16 | 21.00 | 24.85 | 23.40 | 70093-1600 |
| 14 | 18.00 | 21.85 | 20.40 | 70093-1400 |
| 12 | 15.00 | 18.85 | 17.40 | 70093-1200 |
| 10 | 12.00 | 15.85 | 14.40 | 70093-1000 |
| 8 | 9.00 | 12.85 | 11.40 | 70093-0800 |
| 6 | 6.00 | 9.85 | 8.40 | 70093-0600 |
| 4 | 3.00 | 6.85 | 5.40 | 70093-0400 |
| 2 | / | 3.85 | 2.40 | 70093-0200 |

ROHS COMPLIANT
LEAD&HALOGEN FREE

MATERIAL NO.:
70093 SERIES
REVIEW TABLE FOR DETAILS

QUALITY SYMBOL ▽ = 0 ▶ = 0

| GENERAL TOLERANCES (UNLESS SPECIFIED) | |
|---|---|
| x.xxxx | ± --- |
| x.xxx | ± --- |
| x.xx | ± 0.20 |
| x.x | ± 0.25 |
| ANGULAR | ±--° |



TITLE: MICRO-HI POWER CONNECTOR 3.00MM PITCH, 2XN CIRCUITS RECEPTACLE HOUSING

Bellwether Electronic Corp.

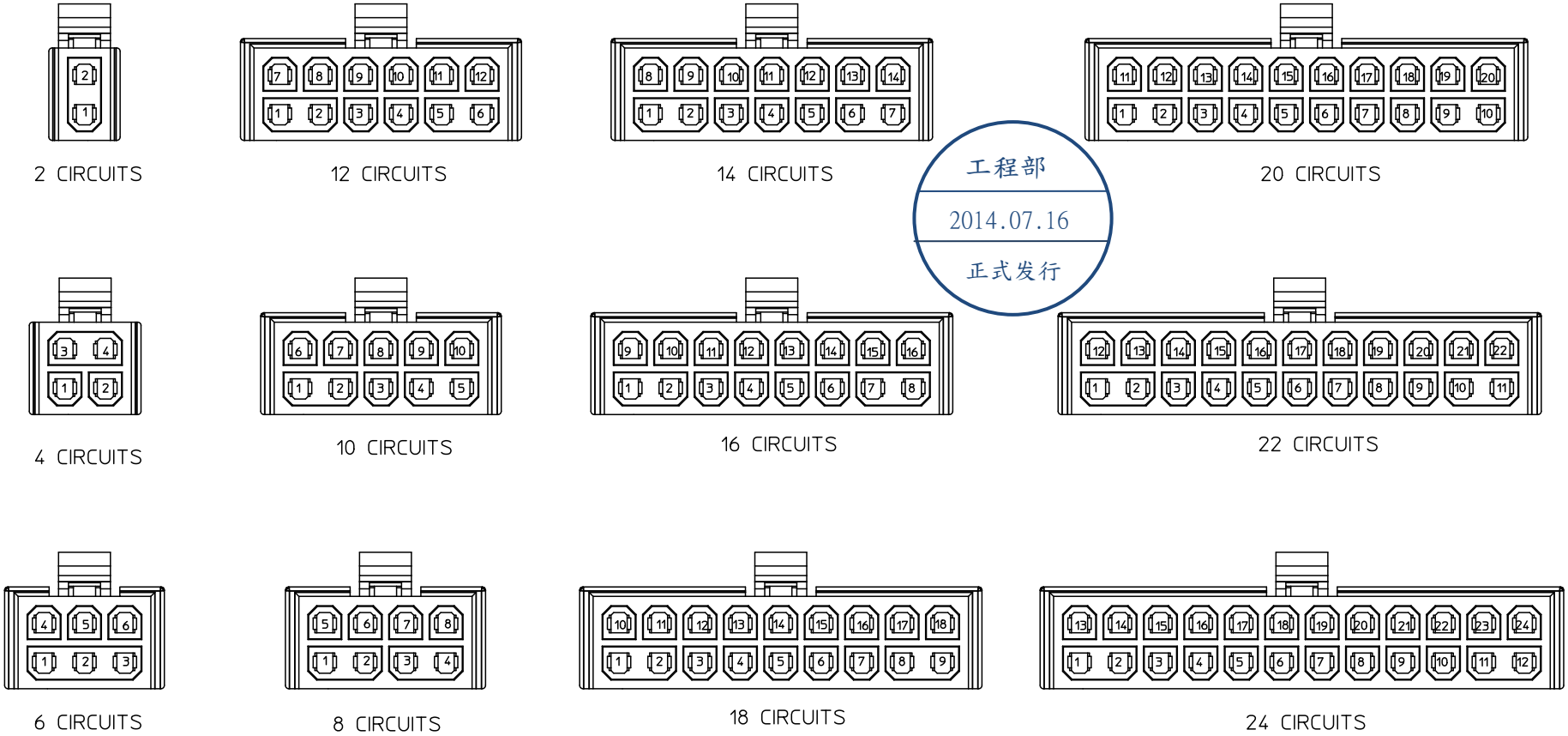
ECN DESCRIPTION: UPDATE

| | | |
|---|---|---|
| DRAWN BY | JAMES SUN | DATE 20140701 |
| CHECKED BY | RAINY ZHU | DATE 20140701 |
| APPROVED BY | LARRY CHEN | DATE 20140701 |

DOCUMENT NO. SD-70093-001 | SHEET NO. 1 OF 2

DIMENSION STYLE: MM ONLY | DESIGN UNITS: METRIC | SCALE: 4:1 | THIRD ANGLE PROJECTION

frame size: A4
QR-QP025-06 REV:A

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# POLARIZATION LAYOUT

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工程出图章

ROHS COMPLIANT
LEAD&HALOGEN FREE

MATERIAL NO.:
70093 SERIES
REVIEW TABLE FOR DETAILS

QUALITY SYMBOL ▶ = 0 ▽ = 0

| GENERAL TOLERANCES (UNLESS SPECIFIED) | |
|---|---|
| x.xxxx | ± --- |
| x.xxx | ± --- |
| x.xx | ± 0.20 |
| x.x | ± 0.25 |
| ANGULAR | ±--° |



TITLE: MICRO-HI POWER CONNECTOR 3.00MM PITCH, 2XN CIRCUITS RECEPTACLE HOUSING

Bellwether Electronic Corp.

ECN DESCRIPTION: SEE SHEET 1

| | | |
|---|---|---|
| DRAWN BY | JAMES SUN | DATE 20140701 |
| CHECKED BY | RAINY ZHU | DATE 20140701 |
| APPROVED BY | LARRY CHEN | DATE 20140701 |

DOCUMENT NO. SD-70093-001 | SHEET NO. 2 OF 2

| DIMENSION STYLE | DESIGN UNITS | SCALE |
|---|---|---|
| MM ONLY | METRIC | 1:1 |

THIRD ANGLE PROJECTION

frame size: A4
QR-QP025-06 REV.:A

## PRODUCT DESCRIPTION:

MICRO-HI POWER CONNECTOR

## PRODUCT NUMBER:

PCB SIDE:

70094 SERIES
70095 SERIES
70096 SERIES

HOUSING FOR CABLE SIDE:

70093 SERIES
70189 SERIES

TERMINAL FOR CABLE SIDE:

70097 SERIES

## 1.0 SCOPE

This Product Specification covers the 3.00 mm (.118 inch) centerline (pitch) square pin headers when mated with either printed circuit board (PCB) connector.

## 2.0 APPLICABLE DOCUMENTS

The following documents form a part of this specification to the extent specified herein. In the event of conflict between the requirements of this specification and the product drawing, the product drawing shall take precedence. In the event of conflict between the requirements of this specification and the referenced documents, this specification shall take precedence.

EIA-364

UL Safety Agency Approval File Numbers: E346898

## 3.0 CONSTRUCTION AND MATERIAL

Housings:
LCP (Header);
Nylon (Receptacle);

Header Terminal:
Copper Alloy

Receptacle Terminal:
Copper Alloy

## 4.0 RATINGS

**4.1** UL Safety Agency Ratings
Agency Voltage Rating: 600V (AC/DC)
Agency Current Rating: 12.5A (Single Circuit) (Amps)

**4.2** VOLTAGE RATING: 600V

**4.3** CURRENT DERATING AND APPLICABLE WIRES

Current is dependent on connector size, contact material, plating, ambient temperature, printed circuit board characteristics and related factors. Actual current rating is application dependent and should be evaluated for each application.

| AWG | Outside Insulation Diameter |
|---|---|
| 16 | 2.40 mm |
| 18 | 2.10 mm |
| 20 | 1.85 mm |
| 22 | 1.85 mm |
| 24 | 1.85 mm |
| 26 | 1.27 mm |
| 28 | 1.27 mm |
| 30 | 1.27 mm |

| CURRENT DERATING REFERENCE INFORMATION (A/PER PIN) | | | | | | | |
|---|---|---|---|---|---|---|---|
| Circuit Size | 2 | 4 | 6,8 | 10 | 12 | 14,16,18 | 20,22,24 |
| 16 AWG (A/PER PIN) | 12.5A | 12A | 10.5A | 10.5A | 9.0A | 8.5A | 8.0A |
| 18 AWG (A/PER PIN) | 10.5A | 9.5A | 8.5A | 8.0A | 8.0A | 7.5A | 7.0A |
| 20 AWG (A/PER PIN) | 9.0A | 9.0A | 7.0A | 6.5A | 6.5A | 6.0A | 5.5A |
| 22 AWG (A/PER PIN) | 6.0A | 5.0A | 4.5A | 4.0A | 4.0A | 3.5A | 3.5A |
| 24 AWG (A/PER PIN) | 5.5A | 5.0A | 4.5A | 4.0A | 3.5A | 3.5A | 3.0A |
| 26 AWG (A/PER PIN) | 4.5A | 4.0A | 4.0A | 3.5A | 3.5A | 3.0A | 2.5A |
| 28 AWG (A/PER PIN) | 4.0A | 3.5A | 3.0A | 3.0A | 3.0A | 2.5A | 2.0A |
| 30 AWG (A/PER PIN) | 3.5A | 3.0A | 3.0A | 2.5A | 2.5A | 1.5A | 1.0A |

1) Values are for reference only.
2) Current deratings are based on not exceeding 30°C Temperature Rise.
3) PCB trace design can greatly affect temperature rise results in Wire-to-Board applications.
4) Data is for all circuits powered.
5) * indicates interpolated information.

**4.4** Service temperature: -40°C to 105°C；Storage temperature: -40°C to 105°C

## 5.0 PERFORMANCE, TEST REQUIREMENT AND PROCEDURES SUMMARY

### 5.1 APPEARANCE REQUIREMENTS

| Item | Test Description | Test Method | Reference Standard |
|---|---|---|---|
| 1 | Examination of product | Visual according to applicable quality inspection plan. | Meet the requirements of product |

### 5.2 ELECTRICAL REQUIREMENTS

| Item | Test Description | Test Method | Reference Standard |
|---|---|---|---|
| 2 | Contact Resistance (Low Level) | Mate connectors: apply a maximum voltage of 20 mV and a current of 100 mA. (Does not include wire resistance) | 5 milliohms MAXIMUM [initial] |
| 3 | Insulation Resistance | Unmate & unmount connectors: apply a voltage of 500 VDC between adjacent terminals and between terminals to ground. | 1000 Megohms MINIMUM |
| 4 | Dielectric Withstanding Voltage | Unmate connectors: apply a voltage of {two times the rated voltage plus 1000 volts} VAC for 1 minute between adjacent terminals and between terminals to ground. | No breakdown; current leakage < 5 mA |
| 5 | Temperature Rise | Mate connectors, measure the temperature rise at the rated current. The ambient condition is still air at 25°C, Per EIA-364-70 method 2. | Temperature rise: +30°C MAXIMUM |

### 5.3 MECHANICAL REQUIREMENTS

| Item | Test Description | Test Method | Reference Standard |
|---|---|---|---|
| 6 | Connector Mate And Unmate Forces | Mate and unmate connector (male to female) at a rate of 25 ± 6 mm per minute. (Per circuit) | 8.0 N (1.8 lbf) MAXIMUM insertion force & 2.0 N (0.45lbf) MINIMUM withdrawal force (Tin plated)<br><br>5.6 N (1.26 lbf) MAXIMUM insertion force & 1.5 N (0.34lbf) MINIMUM withdrawal force (Gold plated) |
| 7 | Terminal Retention Force (in Housing) | Axial pullout force on the terminal in the housing at a rate of 25 ± 6 mm per minute. | 24.5 N (5.5 lbf) MINIMUM retention force |

| | | | |
|---|---|---|---|
| 8 | Terminal Insertion Force (into Housing) | Apply an axial insertion force on the terminal at a rate of 25 ± 6 mm per minute. | 14.7 N (3.3 lbf) MAXIMUM insertion force |
| 9 | Durability | Mate connectors up to 30 cycles at a maximum rate of 10 cycles per minute prior to Environmental Tests. | 6 milliohms MAXIMUM |
| 10 | Vibration (Random) | Mate connectors and vibrate per EIA 364-28,test condition VII, Letter D. Test Duration: 15 minutes each axis. | 6 milliohms MAXIMUM & Discontinuity < 1 microsecond |
| 11 | Shock (Mechanical) | Mate connectors and shock at 50 g' s with ½ sine wave (11 milliseconds) shocks in the ±X,±Y,±Z axes (18 shocks total). | 6 milliohms MAXIMUM & Discontinuity < 1 microsecond |
| 12 | Wire Pullout Force (Axial) (Wire from Terminal) | Apply an axial pullout force on the wire at a rate of 25 ± 6 mm per minute. | MINIMUM pullout force<br>16 Awg: 88.0 N (19.8 lbf)<br>18 Awg: 88.0 N (19.8 lbf)<br>20 Awg: 57.8 N (13.0 lbf)<br>22 Awg: 35.5 N (8.0 lbf)<br>24 Awg: 26.6 N (6.0 lbf)<br>26 Awg: 13.3 N (3.0 lbf)<br>28 Awg: 8.9 N (2.0 lbf)<br>30 Awg: 6.6 N (1.5 lbf) |
| 13 | Pin to Header Retention | Apply axial push force to pin at a rate of 25 ±6 mm per minute. | 13.7 N (3.1 lbf) MINIMUM pushout force |
| 14 | Thumb Latch to Ramp Yield Strength | Full mate and then Unmate the connectors at a rate of 25 ± 6 mm per minute. | 45 N (10.125 lbf) MINIMUM Yield Strength |

### 5.4 ENVIRONMENTAL REQUIREMENTS

| Item | Test Description | Test Method | Reference Standard |
|---|---|---|---|
| 15 | Thermal Aging | Mate connectors; expose to: 240 hours at 105 ± 2°C or 500 hours at 85 ± 2°C | 6 milliohms MAXIMUM |
| 16 | Humidity (Steady State) | Mate connectors: expose to a temperature of 40 ± 2°C with a relative humidity of 90-95% for 96 hours.<br>Note: Remove surface moisture and air dry for 1 hour prior to measurements. | 6 milliohms MAXIMUM<br>&<br>Dielectric Withstanding Voltage:<br>No Breakdown at 500 VAC<br>&<br>Insulation Resistance:<br>1000 Megohms MINIMUM |
| 17 | Solder ability | Immerse the solder pin of the connector in the solder bath at 260°C +/-5°C for 5+/-0.5 seconds After dipped the pin in the flux of RAM or R type for 5 seconds MIL-STD-202 METHOD 208 | Solder coverage:<br>95% MINIMUM |
| 18 | Solder Resistance | A) Wave Solder Process<br>Dip connector terminal tails in solder;<br>Solder Duration: 10 seconds MAX<br>Solder Temperature: 260°C MAX<br><br>B) Convection Reflow Solder Process 235°C MAX<br>Parts identified with a green dot on the primary shipping carton label and all parts with a manufacturing date after 11/1/2007: 260°C MAX | Visual :No Damage to insulator material |
| 19 | Cold Resistance | Mate connectors:<br>Duration: 96 hours;<br>Temperature: -40 ± 3°C | 6 milliohms MAXIMUM |
| 20 | Thermal Shock | Test cycles: 5cycles<br>Temperature range :<br>-55±3°C→30 minute<br>85±2°C→30 minute | No Damage |

## 6.0 TESTING SEQUENCE

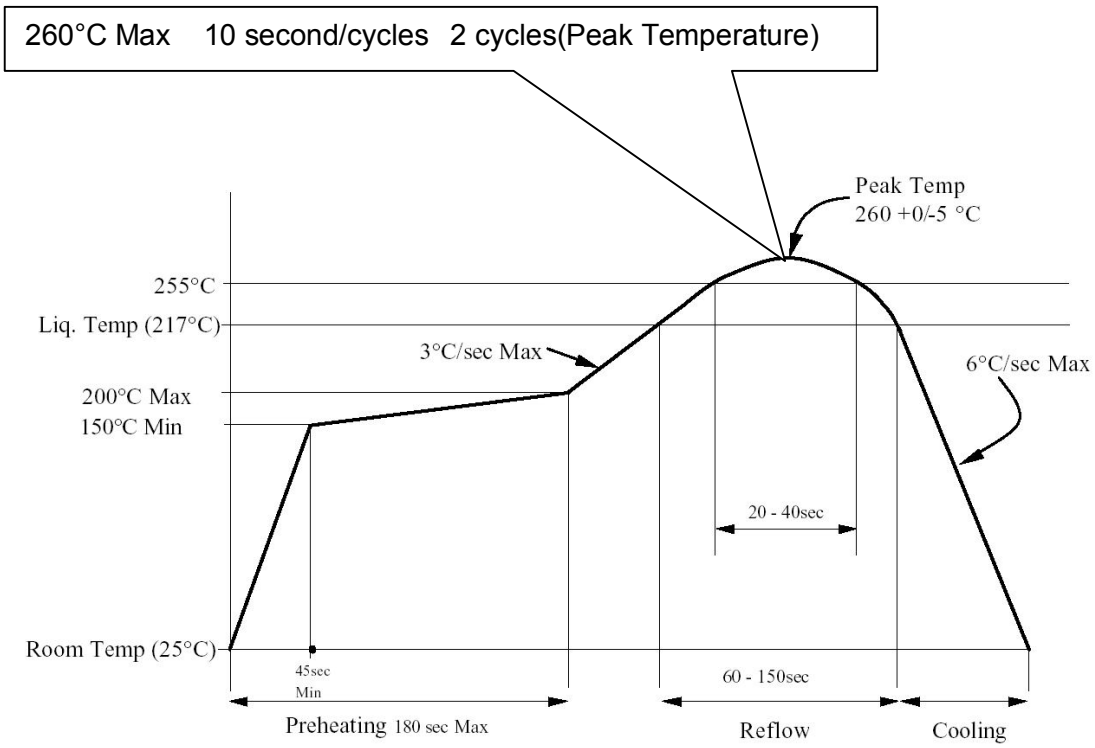
### 6.1 TEST GROUP

| Test of Examination | Test Group | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | A | B | C | D | E | F | G | H | I | J |
| | Test Sequence | | | | | | | | | |
| Examination of Product | 1 | 1 | 1,4,6 | 1,7 | 1 | 1 | 1 | 1 | 1 | 1 |
| Low Level Contact Resistance | 2,4,6 | 2,4,6 | 10 | 2,4 | 4 | 2,5 | | | | |
| Insulation Resistance | | | 2, 8 | | | | | | | |
| Dielectric Withstanding Voltage | | | 3, 9 | | | | | | | |
| Temperature Rise | | | | | 2 | | | | | |
| Connector Mate And Unmate Forces | | | | | | 3 | | | | |
| Terminal Retention Force (in Housing) | | | | | | | | 3 | | |
| Terminal Insertion Force (into Housing) | | | | | | | | 2 | | |
| Durability | | | | | | 4 | | | | |
| Vibration (Random) | 3 | | | | | | | | | |
| Shock (Mechanical) | 5 | | | | | | | | | |
| Wire Pullout Force (Axial) (Wire from Terminal) | | | | | | | | | 2 | |
| Pin to Header Retention | | | | | | | 2 | | | |
| Thumb Latch to Ramp Yield Strength | | | | | | | | | | 2 |
| Thermal Aging | | | | 3 | | | | | | |
| Humidity (Steady State) | | 5 | 7 | | | | | | | |
| Solder ability | | | | 5 | | | | | | |
| Solder Resistance | | | | 6 | | | | | | |
| Cold Resistance | | | | | 3 | | | | | |
| Thermal Shock | | 3 | 5 | | | | | | | |
| Sample size | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |

### 6.2 IR PROFILE

Recommended Reflow Pre-Solder Process and Profile.

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.



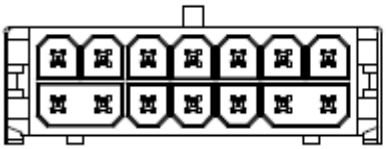

**LEAD-FREE PROFILE FOR PEAK REFLOW - 260°C**

Notes :

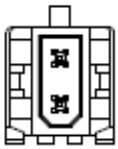
1. Reflow solder preheat at 3°C/s to 150°C.
2. Reflow at 255°C for 30s per figure.
3. Peak temperature to be at 260 +0/-5°C.

## 7.0 OTHER INFORMATION

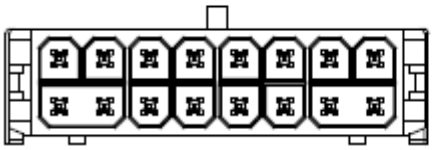
### 7.1 STANDARD POLARIZATION FOR HEADERS



CIRCUITS SIZE: 14

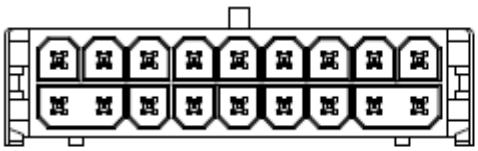


CIRCUITS SIZE: 2

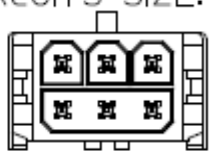


CIRCUITS SIZE: 16

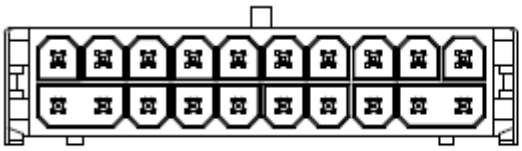
CIRCUITS SIZE: 4



CIRCUITS SIZE: 18

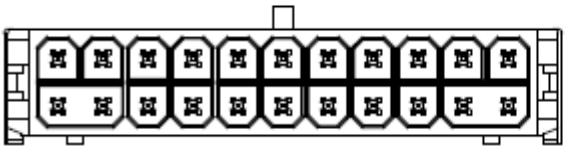


CIRCUITS SIZE: 6

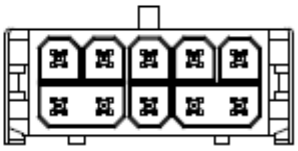


CIRCUITS SIZE: 20

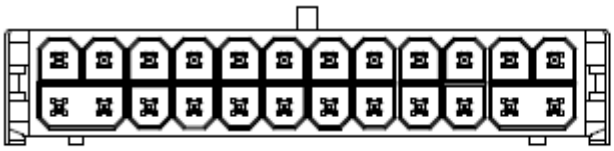
CIRCUITS SIZE: 8



CIRCUITS SIZE: 22



CIRCUITS SIZE: 10



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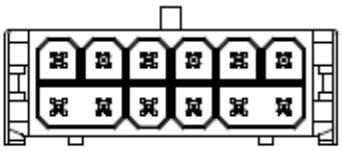
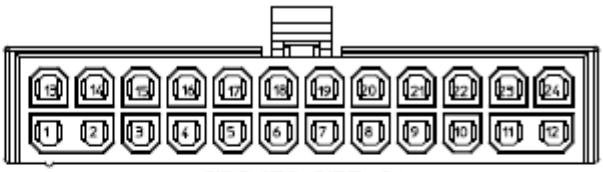


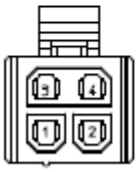
CIRCUITS SIZE: 12

## 7.2 STANDARD POLARIZATION FOR RECEPTACLES

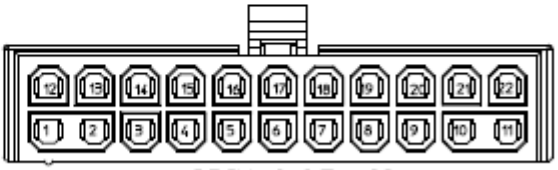
CIRCUITS SIZE: 2



CIRCUITS SIZE: 24

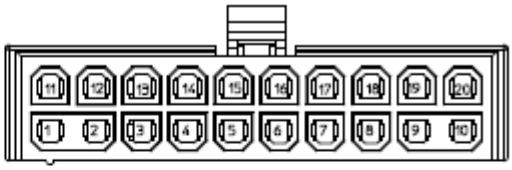


CIRCUITS SIZE: 4

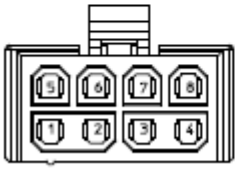


CIRCUITS SIZE: 22

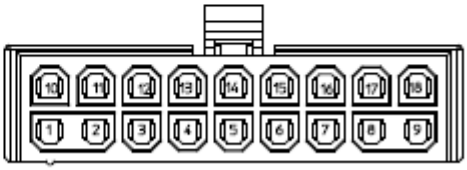
CIRCUITS SIZE: 6



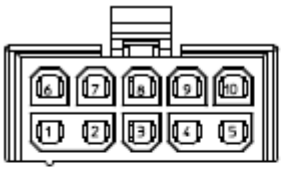
CIRCUITS SIZE: 20



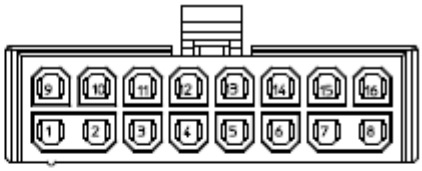
CIRCUITS SIZE: 8



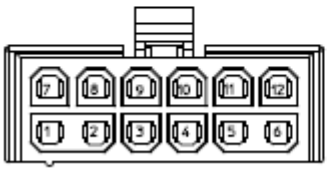
CIRCUITS SIZE: 18



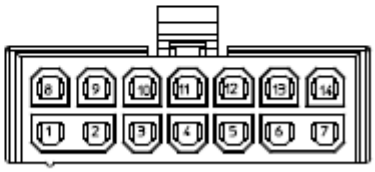
CIRCUITS SIZE: 10



CIRCUITS SIZE: 16



CIRCUITS SIZE: 12



CIRCUITS SIZE: 14