

## 1.0 SCOPE

This Product Specification covers the performance requirement for the Milli-Grid 2 mm Grid Wire to Board Connector terminated with 24 to 30 AWG wire using Crimp technology.

## 2.0 PRODUCT DESCRIPTION

### 2.1 PRODUCT NAME AND SERIES NUMBER(S)

Series Number  
151192 series

Product Description  
Milli-Grid 2mm Wire to Board connector

This series mate with Molex:

- Header Assy 151117, 151118, 151119 and 151120 series
- Crimp terminal 50394 series

### 2.2 DIMENSIONS, MATERIALS AND MARKINGS

See the appropriate sales drawing(s) for information on dimensions, materials and markings

### 2.3 SAFETY AGENCY APPROVALS

2.2.1 UL File Number: UL E29179

2.2.2 CSA Number: 1585720 (LR 19980)



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.

<b>CSA (50ckt Fully loaded) NON-current interruption</b>
2.0 Amps @ 125V

### 2.4 Glow Wire

These series is glow wire capable. 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.

<b>REVISION:</b>  <b>A1</b>	<b>ECR/ECN INFORMATION:</b> EC No: 111981 DATE: 2015/11/25	<b>TITLE:</b> <b>“MILLI-GRID” 2mm GRID WIRE TO BOARD CONNECTOR</b>	<b>SHEET No.</b>  1 of 7
<b>DOCUMENT NUMBER:</b> <b>PS-151192-0001</b>		<b>CREATED / REVISED BY:</b> EAng 2017/01/04	<b>CHECKED BY:</b> CGoh
		<b>APPROVED BY:</b> KhLim	

### 3.0 APPLICABLE DOCUMENTS AND SPECIFICATIONS

Refer to the appropriate sales drawing(s) and other sections of this specification for the necessary referenced documents and specifications. In the event of conflict between the requirements of this specification and the product drawing(s), the product drawing(s) shall take precedence. In the event of conflict between the requirements of this specification and the reference documents, this specification shall take precedence.

### 4.0 RATINGS AND APPLICABLE WIRE

Item	Standard			
Rated Voltage (max.)	125V			AC (rms) / DC
Rated Current (max.) and applicable wires.	AW G	Fully loaded (50ckts)	Single Ckts	Crimp Terminal (AWG#24 ~ AWG#30) Insulation O.D. 1.4mm dia. max.
	#24	2.4 A	6.0 A	
	#26	2.2 A	5.4 A	
	#28	2.0 A	5.0 A	
	#30	1.8 A	4.4 A	
Operating Temperature	-40 deg.c to +105 deg.c			
Non-Operating Temperature	-40 deg.c to +105 deg.c			

Safety rating serves as a guideline for safe use to customer. The performance of the current rating varies at mating level. The connector must be evaluated in the customer end product for safe and proper used.

REVISION: <b>A1</b>	ECR/ECN INFORMATION: EC No: 111981 DATE: 2015/11/25	TITLE: <b>“MILLI-GRID” 2mm GRID WIRE TO BOARD CONNECTOR</b>	SHEET No. <b>2 of 7</b>
DOCUMENT NUMBER: <b>PS-151192-0001</b>	CREATED / REVISED BY: <b>EAng 2017/01/04</b>	CHECKED BY: <b>CGoh</b>	APPROVED BY: <b>KhLim</b>

## 5.0 PERFORMANCE

### 5.1 Electrical Performance

ITEM	DESCRIPTION	TEST CONDITION	REQUIREMENT
5.1.1	Low level Contact Resistance	Mate connectors, apply a maximum voltage of 20 mV, and a current of 100 mA (EIA-364-23).  Note: Wire resistance and traces shall be removed from the measured value.	40 mohm MAX.
5.1.2	Insulation Resistance	Mate connectors, apply 500VDC between adjacent terminal or ground (EIA-364-21)	1000 Mohms Min.
5.1.3	Dielectric Withstanding Voltage	Mate connectors, apply 500VAC for 1 minute between adjacent terminal (EIA-364-20)	No breakdown
5.1.4	Contact Resistance on Crimped Portion	Crimp the applicable wire onto the terminal, apply a maximum voltage of 20mV and a current of 100mA. (EIA-364-23)  Note: Wire resistance shall be removed from the measured value.	5 mohm MAX.

### 5.2 Mechanical Performance

ITEM	DESCRIPTION	TEST CONDITION	REQUIREMENT
5.2.1	Connector Mating and Unmating Force	Mating and Unmating connectors at a rate of 25+/-3 mm/min.	Mating force: <b>3.50 N / CKT</b> MAX. Unmating force: <b>0.392 N / CKT</b> Min.
5.2.2	Crimp Terminal Insertion Force	Insertion the crimped terminal into the housing.	<b>9.8 N</b> MAX.
5.2.3	Crimp Terminal Housing Retention Force	Apply axial pull out force at a rate of 25 mm/min. on the terminal assembled in the housing.	<b>9.8 N</b> MIN.
5.2.4	Crimping Pull Out Force	Fix the crimped terminal, apply axial pull out force on the wire at the speed rate of 25 mm/min. (based on JIS C5402 6.8)	AWG#24= <b>29.4MIN. N</b> AWG#26= <b>19.6MIN. N</b> AWG#28= <b>9.8MIN. N</b> AWG#30= <b>4.9MIN. N</b>

REVISION: <b>A1</b>	ECR/ECN INFORMATION: EC No: 111981 DATE: 2015/11/25	TITLE: <b>“MILLI-GRID” 2mm GRID WIRE TO BOARD CONNECTOR</b>	SHEET No. <b>3 of 7</b>
DOCUMENT NUMBER: <b>PS-151192-0001</b>	CREATED / REVISED BY: <b>EAng 2017/01/04</b>	CHECKED BY: <b>CGoh</b>	APPROVED BY: <b>KhLim</b>

## 5.3 Environment Performance

ITEM	DESCRIPTION	TEST CONDITION	REQUIREMENT
5.3.1	Durability	Mate and unmate connectors with rate of <b>500 ±50 cycles/hr</b> for <b>50 cycles</b> for gold plated connector and <b>25cycles</b> for tin plated connector.  (EIA-364-09)	Contact Resistance: <b>60 mohms</b> Max.
5.3.2	Temperature Rise	Mate connectors and measure the temperature rise of contact when the maximum DC rated current is passed. (EIA-364-70, Method 1)	Temperature: <b>30 deg. c</b> Max.
5.3.3	Vibration	Mate connectors and subject to the following vibration conditions, for a period of 2 hours in each 3 mutually perpendicular axis.  Amplitude: <b>1.52mm</b> (.060 inch) peak to peak Test pulse: <b>Half Sine</b> Sweep: <b>10-&gt;55-&gt;10</b> Hz in 1 minute Duration: <b>2 hours</b> in each X-Y-Z axis.  (EIA-364-28, Test Condition I)	Appearance: No damage Contact resistance: <b>60 mohm</b> Max. Discontinuity: <b>1.0 µs</b> MAX.
5.3.4	Mechanical Shock	Mate connectors and subject to the following shock conditions, 3 shocks shall be applied along 3 mutually perpendicular axis. (Total of 18 shocks)  Peak value: <b>490 m/s sq. (50G)</b> Test pulse : <b>Half Sine</b> Duration : <b>11 ms</b> in each X-Y-Z axis  (EIA-364-27B Condition A)	Appearance: No damage.  Contact Resistance: <b>60 mohm</b> Max.  Discontinuity: <b>1.0 µs</b> Max.

REVISION: <b>A1</b>	ECR/ECN INFORMATION: EC No: 111981 DATE: 2015/11/25	TITLE: <b>"MILLI-GRID" 2mm GRID WIRE TO BOARD CONNECTOR</b>	SHEET No. <b>4 of 7</b>
DOCUMENT NUMBER: <b>PS-151192-0001</b>	CREATED / REVISED BY: <b>EAng 2017/01/04</b>	CHECKED BY: <b>CGoh</b>	APPROVED BY: <b>KhLim</b>

5.3.5	Temperature Life	<p>Mate connector and expose to 105+/-2 deg. C for 96 hours. Upon completion of the exposure period, the test specimens shall be conditioned at ambient room conditions for 1 to 2 hours, after which the specified measurements shall be performed</p> <p>(EIA-364-17, Method A, condition 4)</p>	<p>Appearance: No damage.</p> <p>Contact Resistance: <b>60 mohm</b> Max.</p>
5.3.6	Low Temperature Test	<p>Mate connector and expose to -55+/-3 deg. C for 96 hours. Upon completion of the exposure period, the test specimens shall be conditioned at ambient room conditions for 1 to 2 hours, after which the specified measurements shall be performed</p> <p>(EIA-364-59A)</p>	<p>Appearance: No damage.</p> <p>Contact Resistance: <b>60 mohm</b> Max.</p>
5.3.7	Extensive Durability (30µ" Gold Plated)	<p>Mate and unmate connectors for <b>500 cycles</b> with rate of <b>500 ± 50 cycles/hr.</b></p> <p>(EIA-364-09)</p>	<p>Appearance: No Damage</p> <p>Contact Resistance: <b>60 mohm</b> Max.</p>
5.3.8	Reseating	<p>Manually mate and unmate the connector with mating half for <b>3 cycles</b> with rate of <b>5 cycles/min</b> maximum.</p> <p>(EIA-364-09)</p>	<p>Appearance: No Damage</p> <p>Contact Resistance: <b>60 mohm</b> Max.</p>

<u>REVISION:</u>  <b>A1</b>	<u>ECR/ECN INFORMATION:</u> <u>EC No:</u> 111981 <u>DATE:</u> 2015/11/25	<u>TITLE:</u> <b>"MILLI-GRID" 2mm GRID WIRE TO BOARD CONNECTOR</b>	<u>SHEET No.</u>  <b>5 of 7</b>
<u>DOCUMENT NUMBER:</u> <b>PS-151192-0001</b>	<u>CREATED / REVISED BY:</u> <b>EAng 2017/01/04</b>	<u>CHECKED BY:</u> <b>CGoh</b>	<u>APPROVED BY:</u> <b>KhLim</b>

### 5.3 Environment Performance (continued)

ITEM	DESCRIPTION	TEST CONDITION	REQUIREMENT
5.3.9	Cyclic Temperature and Humidity	<p>Mate connector and expose to:-</p> <p>Temperature: <b>25°C+10/-2°C to +65°C± 2°C</b></p> <p>Humidity: <b>90% to 98% RH</b></p> <p>Duration: <b>10 cycles (240 hours)</b></p> <p>(EIA-364-31B, method III)</p>	<p>Appearance: No damage.</p> <p>Contact Resistance: <b>60 mohm</b> Max.</p> <p>Dielectric Withstanding Voltage: No Breakdown</p> <p>Insulation Resistance: <b>100 Mohm</b> Min.</p>
5.3.10	Thermal Shock	<p>Mate connectors and subject to the following conditions for 5 cycles. Upon completion of the exposure period, the test specimens shall be conditioned at ambient room conditions for 1 to 2 hours, after which the specified measurements shall be performed.</p> <p>1 cycle:</p> <p>a) -55+/-3 deg C 30 min.</p> <p>b) +105+/-2 deg C 30 min.</p> <p>(EIA-364-32G Method A, Condition VII)</p>	<p>Appearance: No damage.</p> <p>Contact Resistance: <b>60 mohm</b> Max.</p>
5.3.11	Thermal Cycling (Tin Plated only)	<p>Cycle the connector between 15 °C ± 3°C. and 85 °C ±3 °C, as measured on the part.</p> <p>Ramps should be a minimum of 2 °C per minute, and dwell times should insure that the contacts reach the temperature extremes (a minimum of 5 minutes).</p> <p>Humidity is not controlled. Perform 500 such cycles.</p> <p>(EIA-364-110)</p>	<p>Appearance: No damage.</p> <p>Contact Resistance: <b>60 mohm</b> Max.</p>

REVISION:	ECR/ECN INFORMATION:	TITLE:	SHEET No.
<b>A1</b>	EC No: 111981 DATE: 2015/11/25	<b>"MILLI-GRID" 2mm GRID WIRE TO BOARD CONNECTOR</b>	<b>6 of 7</b>
DOCUMENT NUMBER:	CREATED / REVISED BY:	CHECKED BY:	APPROVED BY:
<b>PS-151192-0001</b>	<b>EAng 2017/01/04</b>	<b>CGoh</b>	<b>KhLim</b>

### 5.3 Environment Performance (continued)

ITEM	DESCRIPTION	TEST CONDITION	REQUIREMENT
5.3.12	Salt Spray	<p>Expose the mated connectors to the following salt mist condition:</p> <p>Concentration : <b>5 ±1%</b>            Temperature : <b>35 +1/-2°C</b>            Test time : <b>48hour</b></p> <p>(Note: Immediately after exposure, the test specimens shall be dipped in running tap (<math>\leq 38^{\circ}\text{C}</math>) for 5mins max and dried for 16hour max in a circulating air oven at <math>38^{\circ}\text{C} \pm 3^{\circ}\text{C}</math>. Sample examination done in room temperature.</p> <p>(EIA-364-26C, Condition B)</p>	<p>Appearance: No damage.</p> <p>Contact Resistance: <b>60 mohm</b> Max.</p>
5.3.13	S02 Gas (Gold plated only)	<p>Mate connectors and expose to:</p> <p>SO<sub>2</sub> gas density: <b>50 ±5ppm</b>            Temperature: <b>40 ±2 °C</b>            Duration: <b>24 hours</b></p>	<p>Appearance: No damage.</p> <p>Contact Resistance: <b>60 mohm</b> Max.</p>

### 6.0 PACKAGING

Parts shall be packaged and protected against damage during handling, transportation and storage.

REVISION: <b>A1</b>	ECR/ECN INFORMATION: EC No: 111981 DATE: 2015/11/25	TITLE: <b>“MILLI-GRID” 2mm GRID WIRE TO BOARD CONNECTOR</b>	SHEET No. <b>7 of 7</b>
DOCUMENT NUMBER: <b>PS-151192-0001</b>	CREATED / REVISED BY: <b>EAng 2017/01/04</b>	CHECKED BY: <b>CGoh</b>	APPROVED BY: <b>KhLim</b>

## 7.0 TEST SEQUENCE

Test Group	Full Qualification Test										Screen Test		
	1	2	3	4	5	6	7	8	9	10	11	12	13
Examination of Connector	1	1	1	1	1	1	1	1	1	1	1,4	1,4	1
Low Level Contact resistance	2, 5, 7	2, 5, 7, 9	2, 5, 7, 9		2, 4	2, 5, 7, 9	2, 4	2, 4	2, 4				3,7
Insulation resistance				2, 6									
Dielectric Withstanding Voltage				3, 7									
Contact Resistance on crimped Portion												2	
Connector Insertion Force													2,6
Connector Withdrawal Force													4,8
Crimp Terminal Housing Insertion Force											2		
Crimp Terminal Housing Retention Force											3		
Crimping Pull out Force												3	
Durability	3(a)	3(a)	3(a)			3(a)							5
Extensive Durability (30µ" Gold Plated)							3						
Reseating	6	8				8							
Temperature Rise										2			
Vibration			6										
Mechanical Shock			8										
Temperature Life	4		4(a)			4(a)							
Low Temperature Test					3								
Cyclic Temperature and Humidity		6		5									
Thermal Shock		4		4									
Thermal Cycling (Tin Plated)						6							
Salt Spray									3				
SO2 Gas (Gold plated)								3					
Sample Size per Test Group	5	5	5	5	5	5	5	5	5	5	5	5	5

Note:

(a) Preconditioning

- Durability: 20cycles for gold plated and 5cycles for tin plated.
- Temperature life: duration is 48 hours.

REVISION: <b>A1</b>	ECR/ECN INFORMATION: EC No: 111981 DATE: 2015/11/25	TITLE: <b>"MILLI-GRID" 2mm GRID WIRE TO BOARD CONNECTOR</b>	SHEET No. <b>8 of 7</b>
DOCUMENT NUMBER: <b>PS-151192-0001</b>	CREATED / REVISED BY: <b>EAng 2017/01/04</b>	CHECKED BY: <b>CGoh</b>	APPROVED BY: <b>KhLim</b>