

**SPEC. NO.:** PS-51748-XXXXX-XXX

**REVISION:** A

**PRODUCT NAME:** PCI Express M.2 CONNECTOR

**PRODUCT NO:** 51748 SERIES

<b>PREPARED:</b>  <b>XuJinJun</b>  <b>DATE:</b> <b>2021/03/20</b>	<b>CHECKED:</b>  <b>XuZhiYong</b>  <b>DATE:</b> <b>2021/03/20</b>	<b>APPROVED:</b>  <b>XuZhiYong</b>  <b>DATE:</b> <b>2021/03/20</b>
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ECN No: **ECN-002706**

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### 1 Revision History

Rev.	ECN #	Revision Description	Prepared	Date
<b>A</b>	<b>ECN-002706</b>	<b>NEW PRODUCT RELEASE</b>	<b>XUJINJUN</b>	<b>2021/03/20</b>

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## 2 SCOPE

This specification covers performance, tests and quality requirements for **PCI Express M.2 Connector**

## 3 APPLICABLE DOCUMENTS

The following documents from a part of this specification to the extent specified herein. Unless otherwise specified, latest edition of the specification applies, In the event of conflict between requirement of this specification and product drawing, product drawing shall take precedence.

### 3.1 Commercial standards, specification and report.

3.1.1 EIA-364

## 4 REQUIREMENTS

### 4.1 Design and Construction

- 4.1.1 Product shall be of design, construction and physical dimensions specified on applicable product drawing.
- 4.1.2 All materials conform to R.o.H.S. and the standard depends on TQ-WI-140101.

### 4.2 Materials and Finish

- 4.2.1 Contact: High performance copper alloy (**Phosphor Bronze**)  
Finish: (a) Contact Area: **Refer to the drawing.**  
(b) Under plate: **Refer to the drawing.**  
(c) Solder area: **Refer to the drawing.**
- 4.2.2 Housing: Thermoplastic or Thermoplastic High Temp., UL94V-0
- 4.2.3 Fitting Nail: Stainless Steel  
Finish: (a) Under plate: **Refer to the drawing.**  
(b) Solder area: **Refer to the drawing.**

### 4.3 Ratings

- 4.3.1 Working Voltage Less than **36 Volts AC (per pin)**
- 4.3.2 Voltage: **50 Volts AC (rms)**
- 4.3.3 Current: **0.5 Amperes (per pin)**
- 4.3.4 Operating Temperature : **-40°C to +80°C** (Humidity range 85%RH MAX)  
This includes the temperature rise generated by conducting electricity.

### 4.4 Performance and test description

Product is designed to meet electrical, mechanical and environmental performance requirements specified in paragraph . All tests are performed at ambient environmental conditions per EIA-364-TS-1000.01 unless otherwise specified .

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**5 Performance**

## 5.1. Test Requirements and Procedures Summary

Item	Requirement	Standard
Examination of Product	Product shall meet requirements of applicable product drawing and specification.	Visual, dimensional and functional per applicable quality inspection plan. (EIA-364-18)
<b>ELECTRICAL</b>		
Item	Requirement	Standard
Low Level Contact Resistance	Initial: <b>55 mΩ</b> Max. per contact After test: <b>20 mΩ</b> Max. change allowed	Mate connectors, measure by dry circuit, <b>100mA</b> Max. At open circuit voltage of <b>20mV</b> Max., (EIA-364-23)
Insulation Resistance	<b>500 MΩ</b> Min.	Unmated connectors, apply <b>500 V</b> DC for <b>1</b> minutes between adjacent terminals. (EIA-364-21)
Dielectric Withstanding Voltage	No Breakdown	<b>300 V AC</b> Min. at sea level for <b>1</b> minute. Test between adjacent contacts of unmated connectors. (EIA-364-20)
Differential Insertion Loss (DDIL)	$\geq -0.5\text{dB}$ up to 2.5GHz; $\geq -[0.8*(f-2.5)+0.5]\text{dB}$ for 2.5GHz $< f \leq 5\text{GHz}$ (for example, $\geq -2.5\text{dB}$ at $f=5\text{GHz}$ ); $\geq -[3.0*(f-5)+2.5]\text{dB}$ for 5GHz $< f \leq 12\text{GHz}$ (for example, $\geq -10\text{dB}$ at $f=7.5\text{GHz}$ );	Mated connector and module including solder pad and gold finger  The result shall be referenced to $85\Omega$ differential impedance {EIA 364-108}
Differential Insertion Loss (DDRL)	$\leq -15\text{dB}$ up to 3GHz; $\leq 5*f-30\text{dB}$ for 3GHz $< f \leq 5\text{GH}$ $\leq -1\text{dB}$ for 5GHz $< f \leq 12\text{GH}$	Mated connector and module including solder pad and gold finger The result shall be referenced to $85\Omega$ differential impedance {EIA 364-108}
Differential crosstalk Near end	$\leq -32\text{dB}$ up to 2.5GHz; $\leq -26\text{dB}$ for 2.5GHz $< f \leq 5\text{GHz}$ ; $\leq -20\text{dB}$ for 5GHz $< f \leq 10\text{GHz}$ ; $< -10\text{dB}$ for 10GHz $< f \leq 12\text{GHz}$	Mated connector and module including solder pad and gold finger The result shall be referenced to $85\Omega$ differential impedance, the crosstalk shall be pair-to-pair between any two differential pairs {EIA 364-90}
Differential crosstalk far end	$\leq -32\text{dB}$ up to 2.5GHz; $\leq -26\text{dB}$ for 2.5GHz $< f \leq 5\text{GHz}$ ; $\leq -20\text{dB}$ for 5GHz $< f \leq 10\text{GHz}$ ; $< -10\text{dB}$ for 10GHz $< f \leq 12\text{GHz}$	Mated connector and module including solder pad and gold finger The result shall be referenced to $85\Omega$ differential impedance, the crosstalk shall be pair-to-pair between any two differential pairs {EIA 364-90}

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Temperature Rise	30°C Max. Change allowed	Mate connectors: measure the temperature rise at rated current until temperature stable. The ambient condition is still air at 25°C (EIA-364-70,Method2)
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**MECHANICAL**

Item	Requirement	Standard
Durability	The sample should be mounted in the tester and fully mated and unmated the number of cycles. (EIA-364-09) Contact Resistance: $\Delta R=20m\Omega$ Max (Final.)	60 cycles Automatic Speed:500 cycles/hour Manual speed:250 cycles/hour (EIA-364-09)
Durability(precondition)	Perform 5 mate/unmate cycles if the application requires up to 25 over the life of the connector.20 cycles if the application requires 26~200;or,50 cycles if the application requires 201 or greater.	No evidence of physical damage (EIA-364-09)
Insertion Force Withdrawal Force	Insertion Force : 2.04 Kgf Max. Withdrawal Force: 2.55 Kgf Max Typical : 2.04 Kgf Max.	Measure the force required to mate/unmate connector. Speed: 25.4mm/minute (EIA-364-13 Method A)
Vibration	Contact Resistance : $\Delta R=20m\Omega$ Max (Final.) Discontinuity : 1 microsecond Max	15 minutes in each of 3mutually perpendicular directions. Both mating halves should be rigidly fixed so as not to contribute to the relative motion of one contact against another. The method of fixturing should be detailed in the test report. (EIA-364-28 Condition VII Condition letter D)
Shock (Mechanical)	Contact Resistance: $\Delta R=20m\Omega$ Max (Final.) Discontinuity : 1 microsecond Max	Mate connectors to 250G(Ultra-book) and 285 G(Tablet) Time:2 milliseconds (half sine waves.) Cycle:3 drops each to normal and reversed directions of X, Y, and Z axes ,totally 18 drops
Reseating	Appearance: No damage	Manually mated/unmated the connector or socket perform 3 cycles at the state without lubrication

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**ENVIRONMENTAL**

Item	Requirement	Standard
Resistance to <b>Reflow</b> Soldering Heat	Appearance: No damage	Test connector on PCB board Pre Heat : 150°C~180°C, 60~120sec. Heat : 230°C Min., 20~40sec Peak Temp. : 260°C Max, 3~5sec
Thermal Shock	Contact Resistance: $\Delta R=20m\Omega$ Max (Final.)	Mate module and subject to follow condition for 10 cycles. 1 cycles: -55 +0/-3 °C, 30 minutes. +85 +3/-0 °C, 30 minutes. (EIA-364-32, method A test condition I)
Thermal Cyclic	Contact Resistance: $\Delta R=20m\Omega$ Max (Final.)	Cycle the connector or socket 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 that the contacts reach the temperature extremes (a minimum of 5 minutes). humidity is not 500 such cycles.
Humidity-Temperature Cyclic	Contact Resistance: $\Delta R=20m\Omega$ Max (Final.)	Cycle the connector or socket between 25°C±3°C at 80±3% RH and 65°C±3°C at 50%±3% RH. Ramp times should be 0.5hour. and dwell times should be 1.0 hour. Dwell times start when the temperature and humidity have stabilized within the specified levels. Perform 24 such cycles. (EIA-364-31, Method III)
Temperature Life	Contact Resistance: $\Delta R=20m\Omega$ Max (Final.)	Subject mated connectors to temperature life at 105°C±2°C for 96 hours. (EIA-364-17, method A)
Temperature Life (precondition)	No physical damage	Subject mated connectors to temperature life at 105°C for 72 hours. (EIA-364-17, method A)
Salt Spray (Only For Gold Plating)	Contact Resistance: $\Delta R=20m\Omega$ Max (Final.)	Subject mated connectors to 5% salt-solution concentration, 35°C±2°C (I) Gold flash for 8 hours (II) Gold plating ≤ 5 u" for 48hours. (III) Gold plating > 5 u" for 96 hours. (EIA-364-26)

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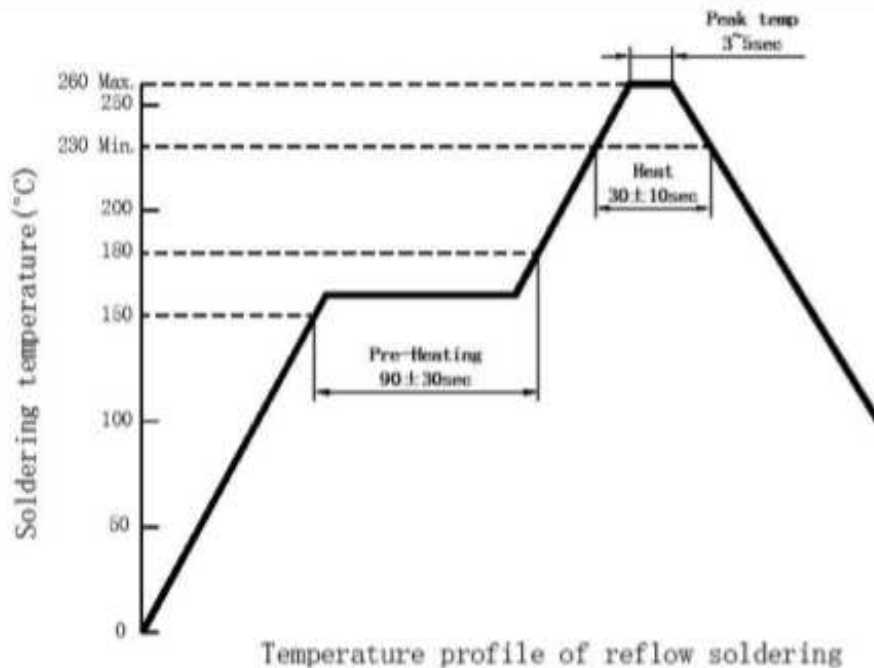
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Solder Ability	<p>Tin plating: Solder able area shall have minimum of 95% solder coverage. 10X the magnifying glass of view</p> <p>Gold plating: Solder able area shall have minimum of 75% solder coverage 10X the magnifying glass of view</p>	<p>Add then into solder bath, Temperature at <math>245 \pm 5^{\circ}\text{C}</math>, for 4-5 sec. (EIA-364-52)</p>
Thermal Disturbance	<p>Contact Resistance: <math>\Delta R=20\text{m}\Omega</math> Max (Final.)</p>	<p>Cycle the mated connector between <math>15^{\circ}\text{C} \pm 3^{\circ}\text{C}</math> and <math>85^{\circ}\text{C} \pm 3^{\circ}\text{C}</math>, as measured on the part. Ramps should be a minimum of <math>2^{\circ}\text{C}</math> per minute, and dwell times should insure that the contacts reach the temperature extremes (a minimum of 5 minutes). Humidity is not controlled. Perform 10 such cycles.</p>
Mixed flowing gas	<p>Contact Resistance: <math>\Delta R=20\text{m}\Omega</math> Max (Final.)</p>	<p>Mated connectors Duration: 120 hours (EIA-364-65) class IIA</p>

**Note.** Flowing Mixed Gas shall be conducted by customer request.

**6 INFRARED REFLOW CONDITION**





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**7 PRODUCT QUALIFICATION AND TEST SEQUENCE**

Test or Examination	Test Group										
	1	2	3	4	5	6	7	8	9	10	11
	Test Sequence										
Examination of Product	1,8	1,12	1,10	1,10	1,12	1,3	1,8	1,6	1,3	1,3	1,5
Low Level Contact Resistance	2,4,7	2,7,11,9	2,5,7,9	2,5,7,9	2,5,7,9,11		2,7				2,4
Insulation Resistance		3									
Dielectric Withstanding Voltage		4									
Differential Insertion Loss								2			
Differential Return Loss								3			
Differential Near end crosstalk								4			
Differential far end crosstalk								5			
Temperature Rise						2					
Durability							4				
Durability(Precondition)	3	5	3	3	3						
Insertion Force Withdrawal Force							3,6				
Vibration			6								
Shock (Mechanical)			8								
Reseating	6	10		8	10		5				
Resistance to Soldering Heat										2	
Thermal Shock		6									
Thermal Cyclic				6							
Humidity -Temperature Cyclic		8									
Temperature Life	5										
Temperature Life Precondition			4	4	4						
Salt Spray											3
Solder Ability								2			

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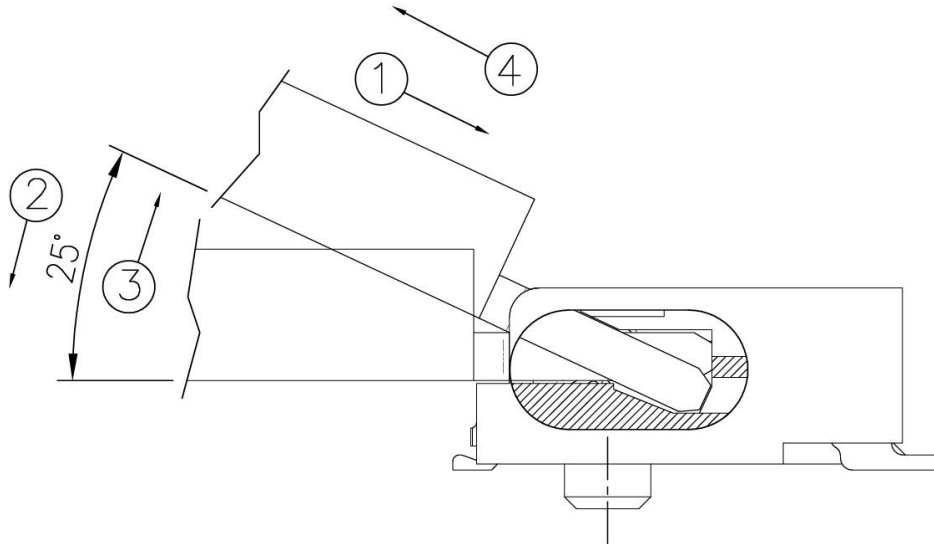
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<b>Thermal Disturbance</b>					<b>8</b>						
<b>Mixed flowing gas</b>					<b>6</b>						
<b>Sample Size</b>	<b>4</b>	<b>4</b>	<b>4</b>	<b>4</b>	<b>4</b>	<b>4</b>	<b>4</b>	<b>4</b>	<b>4</b>	<b>4</b>	<b>4</b>

### 8 MODULE CARD OPERATION

Exercise care when handling connectors. Follow recommendations given below.

8-1 Angled insertion is allowable.



MATE: 1→2  
UNMATE: 3→4

8-2 Prohibition with angles mate/unmates the module card.

