# PCI EXPRESS M.2 Connector

## 1. SCOPE

### 1.1. Contents

This specification covers the performance, tests and quality requirements for the PCI Express M.2 connector.

### 1.2. Qualification

When tests are performed on the subject product line, the procedures specified in Umax series specifications shall be used. All inspections shall be performed using the applicable inspection plan and product drawing.

## 2. APPLICABLE DOCUMENT

The following documents form a part of this specification to the extent specified herein. Unless otherwise specified, the latest edition of the document applies. 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.

## 3. REQUIREMENTS

### 3.1. Design and Construction

Product shall be of the design, construction and physical dimensions specified on the applicable product drawing.

### 3.2. Materials

Materials used in the construction of this product shall be as specified on the applicable product drawing.

### 3.3. Ratings

A. Working voltage less than 36 volts AC (per pin).
B. Voltage: 50 volts AC (per pin).
C. Current: 0.5 amperes (per pin).
D. Operating Temperature: -40°C to 80°

### 3.4. Performance Requirement and Test Description

Product is designed to meet the electrical, mechanical and environmental performance requirements specified in Figure1. Unless otherwise specified, all tests shall be performed at ambient environmental conditions per EIA-364.

3.5. Test Requirements and Procedures Summary

| Test Description | Requirement | Procedure |
|---|---|---|
| Examination of product. | Meets requirements of product drawing. | Visual and dimensional inspection per product drawing. |
| **ELECTRICAL** | | |
| Low Level Contact resistance | Initial : 55 mΩ max (per pin)<br>Final : 20 mΩ max chang allowed | EIA-364-23<br>Mate connectors, measure by dry circuit, 20mV MAX.,100mA MAX. |
| Insulation resistance | 500 MΩ min. | EIA-364-21<br>Unmated connectors, apply 500V DC between adjacent terminals. |
| Dielectric withstanding voltage | No Breakdown.<br>Current leakage: 1 mA max. | EIA-364-20<br>300V AC min. at sea level for 1 minute. Test between adjacent terminals of unmated connectors. |
| **MECHANICAL** | | |
| Mating Force | 2.55 Kgf Max. | EIA-364-13, Method A<br>Measure the force required to mate/unmate connector. |
| Reseating | Appearance: No damage | Manually mated/unmated the connector or socket perform 3 cycles. |
| Durability | 60 mate/unmate cycles for 15u" & 30u" Au plating; 25 mate/unmate cycles for gold flash plating | EIA-364-09<br>The sample should be mounted in the tester and fully mated and unmated the number of cycles |
| Durability (precondition) | Perform 5 mate/unmate cycles | EIA-364-09<br>No evidence of physical damage |
| **ENVIRONMENTAL** | | |
| Temperature Rise | 0.5A / power contact with 30 °C MAX. change allowed | EIA-364-70, Method2<br>Mate connectors: measure the temperature rise at rated current until temperature stable. The ambient condition is still air at 25°C |

| | | |
|---|---|---|
| Vibration | 1.0 microsecond max | EIA-364-28 Condition VII Condition letter D 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. |
| Shock (Mechanical) | 1.0 microsecond max | Mate connectors to 250 G (Ultrabook) and 285 G (Tablet) at 2 milliseconds half sine on all six axis. |
| Cyclic Temperature & Humidity | See Product Qualification and Test Sequence Group 2 | EIA-364-31, Method III<br>Cycle the connector or socket between 25 ± 3°C, at 80 ± 3% RH and 65± 3°C at 50 ± 3% RH.<br>Ramp times should be 0.5 hours and dwell times should be 1.0 hours. Dwell times start when the temperature and humidity have stabilized within the specified levels. Perform 24 such cycles. |
| Thermal Shock | See Product Qualification and Test Sequence Group 2 | EIA-364-32, method A test condition I<br>Mate module and subject to follow condition for 10 cycles.<br>1 cycles:<br>-55 +0/-3°C, 30 minutes.<br>+85 +3/-0°C, 30 minutes. |
| Temperature Life | See Product Qualification and Test Sequence Group 1 | EIA-364-17, method A<br>Subject mated connectors to temperature life at 105°C for 120 hours. |
| Temperature Life (precondition) | No physical damage | EIA-364-17, method A<br>Subject mated connectors to temperature life at 105°C for 72 hours. |
| MFG | No physical damage and functional failed | Per EIA364-65 class IIA 7 days to simulate a 5 year field life |
| Thermal Disturbance | See Product Qualification and Test Sequence Group 8 | Cycle the mated connector between 15±3°C and 85±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 controlled. Perform 10 such cycles. |
| Solderability. | Tin plating: Solder able area shall have min. of 95% solder coverage. Gold plating: Solder able area shall have min. of 75% solder coverage | EIA-364-52<br>Add then into solder bath, Temperature at 245 ±5°C, for 4-5 sec. |

| | | |
|---|---|---|
| Hand Soldering Temperature Resistance | Appearance: No damage | T≧350°C, 3 sec. at least. |
| Resistance to reflow soldering heat. | See Product Qualification and Test Sequence Group 10 (Lead Free) | Pre Heat: 150~180°C, 60~120 sec.<br>Heat: 230°C Min., 40 sec. Min.<br>Peak Temp.: 260°C Max., 10 sec. Max.<br>Perform 2 reflow cycles |

NOTE Shall meet visual requirements, show no physical damage, and meet requirements of additional tests as specified in the Product Qualification and Requalification Test Sequence shown in Figure 2.

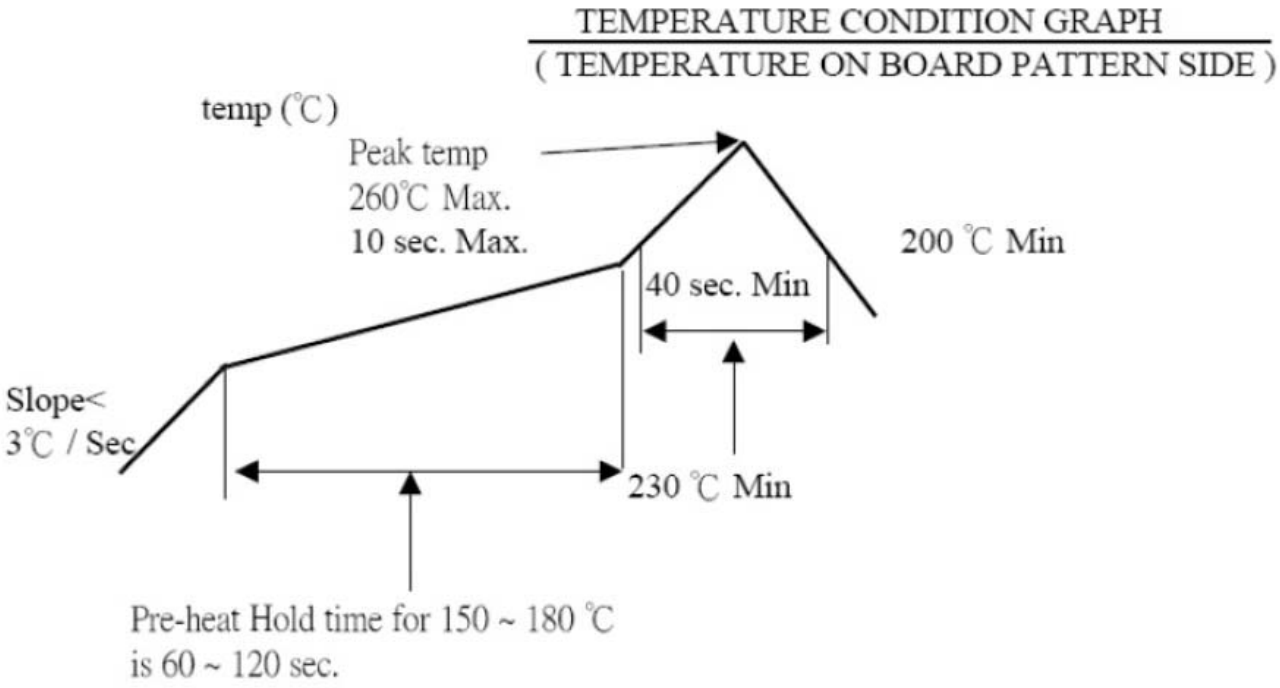


Figure 1 Recommended temperature profile of infrared reflow

3.6. Product Qualification and Requalification Test Sequence

| Test or Examination | Test Group | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| | Test Sequence (a) | | | | | | | | | |
| Examination of product. | 1, 6, 9 | 1, 6, 9, 12 | 1, 6, 9 | 1, 7 | 1, 4 | 1, 3 | 1, 7 | 1, 12 | 1, 3 | 1, 3 |
| Low level contact resistance. | 2, 5, 8 | 2, 5, 8, 11 | 2, 5, 8 | 2, 6 | | | 2, 4, 6 | 2, 5, 7, 9, 11 | | |
| Insulation resistance. | | | | | 2 | | | | | |
| Dielectric withstanding voltage. | | | | | 3 | | | | | |
| Mating / Unmating Force | | | | 3, 5 | | | | | | |
| Durability. | | | | 4 | | | | | | |
| Durability (precondition) | 3 | 3 | 3 | | | | 3 | 3 | | |
| Temperature Rise | | | | | | 2 | | | | |
| Vibration | | | 7 | | | | | | | |
| Shock (Mechanical) | | | | | | | 5 | | | |
| Reseating | 7 | 10 | | | | | | 10 | | |
| Thermal Shock | | 4 | | | | | | | | |
| Cyclic Temperature & Humidity | | 7 | | | | | | | | |
| Temperature Life | 4 | | | | | | | | | |
| Temperature Life (precondition) | | | 4 | | | | | 4 | | |
| MFG | | | | | | | | 6 | | |
| Solderability. | | | | | | | | | 2 | |
| Thermal Disturbance | | | | | | | | 8 | | |
| Resistance to reflow soldering heat. | | | | | | | | | | 2 |

NOTE (a) Numbers indicate sequence in which test are performed.

Figure 2