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1.0 INTRODUCTION

1.1 SCOPE

This document describes the functional and test requirements for the PCI Express™ card-edge connector. The connector is designed to meet the requirements of the PCI Express Card Electromechanical Specification and certain customer specifications not covered by the PCI-SIG document.

1.2 APPLICABLE DOCUMENTS

1.2.1 Solderability : BUS-19-002/A
1.2.2 PCI Express Card Electromechanical Specification
1.2.3 EIA-364-09,17,20,21,28,31,32,65,70,90,101,108,638. EIA-364-1000.01 test groups 1,2,3 and 4.
1.2.4 PCI Express Connector High Speed Electrical Test Procedure.
1.2.5 FCI drawing, PCI Express connector, inspection & customer copy.

1.3 DRAWING PRECEDENCE

In the event of conflict between this document and product prints, the product prints shall take precedence.

2.0 GENERAL REQUIREMENTS

2.1 The connector has the following characteristics: 1.00m(0.040") pitch, X1, X4, X8 sizes, surface mount configuration, rectangular outline, plastic peg or two holdowns requiring solder pad on PCB.
2.2 Visual examination, unless otherwise specified, shall be made at 7X.
2.3 Silicone compounds (mold releases, lubricants, etc.) May not be used in the manufacturing processes.
2.4 Flammability to be rated UL 94V-0.
2.5 Unless otherwise specified, tests that require the use of a pc edge card shall use the following

2.5.1 Card material: FR-4 glass epoxy.
2.5.2 Thickness: 1.57 +/- 0.13 (0.062 +/- 0.005 inch)
2.5.3 Trace material: 0.035 (0.0014 inches), copper.
2.5.4 Trace plating: 0.76 micrometers (30 microinches) minimum gold over 1.27 micrometers (50 microinches) minimum unbrushed nickel

2.5.5 Pad and trace design: pad and trace design shall follow PCI Express standard as depicted in customer drawing.

2.6 SOLDERTAIL TERMINATION

Tests requiring termination of the soldertails to a PC board shall be prepared as follows:

2.6.1 A 1.6 mm minimum thick FR-4 glass epoxy board having no internal ground planes with plated pads in the pattern specified in FCI customer drawing, shall be used.

2.6.2 For soldering soldertails, 0.09 mm minimum thickness solder paste should be used on PC board pads.

3.0 MECHANICAL REQUIREMENTS

3.1 EXAMINATION OF PRODUCT

Samples must comply to applicable FCI product prints.

3.2 INSERTION / WITHDRAWAL FORCE- ADD IN CARD
PER EIA-364-13
Mating cycle is with maximum/minimum thickness gauge at a rate of 25.4 mm/minute.

3.2.1 Maximum insertion force is 1.15 N max. per contact pair when measured with a 1.70 +0.00/-0.01(0.067 +0.000/ -0.004 inches) thick hardened steel card made to the dimensions shown for the PCI Express expansion board in the FCI customer drawing. The card has a R0.05 min., R0.10 max.(sharpedge)and the surface roughness in connector area to be 0.10 micrometers (4 microinches) maximum.

3.2.2 Withdrawal force is 0.15N minimum per contact pair when measured with a 1.44 +0.01/-0.00 (0.067 +0.004/-0.000 inches) thick hardened steel card made to the dimensions shown for the PCI Express expansion board in the FCI customer drawing. The card has a R0.05 min., R0.10 max (sharp edge) and the surface roughness in the connector area to be 0.10 micrometers (4 microinches) maximum.

3.3 CONTACT RETENTION

Minimum retention force of terminals in the connector housing to be 5N each. Pull rate to be 1.27 mm/min.

3.4 SOLDERABILITY

Per EIA -364-52
a. steam age for 1 hour
b. 220°C for 5 seconds(Tin/Lead plating);245°C for 5 seconds(Tin plating)
c. contact areas evaluated shall meet 95% minimum coverage.

4.0 ELECTRICAL REQUIREMENTS

Unless otherwise specified, all measurements should be performed in the following ambients:

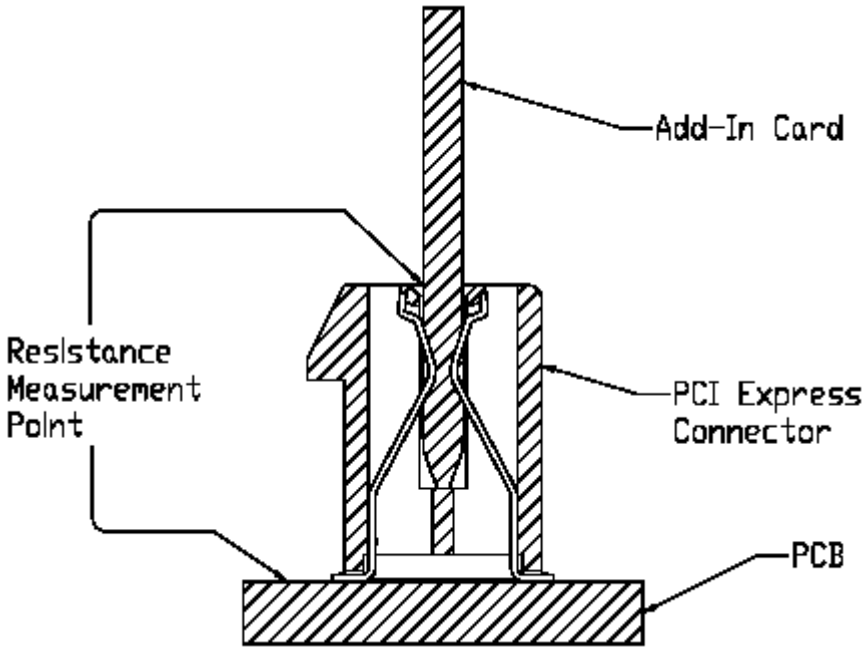
relative humidity: 50% or less
temperature: 25°C +/- 5°c
barometric pressure: 711 to 812 mm mercury (at sea level)

4.1 LOW LEVEL CONTACT RESISTANCE EIA-364-23

4.1.1 Solder connector to pc board per section 2.6 and insert card per section 2.5

4.1.2 Resistance measurements should be made from the underside of the pc board to the PTH in the add-in card above the contact pad. The test current shall be 100 milliampere d.c. max. with a maximum open circuit voltage of 20 millivolts D.C. See figure 1.0 for attachment of current and voltage leads.

4.1.3 Requirement is 30 milliohms maximum initial, with change of 10 milliohms maximum after exposure testing.



CONTACT RESISTANCE TEST SET UP
SMT TYPE
FIGURE 1.0

4.2 INSULATION RESISTANCE

Requirement is 1000 megohm minimum at 100 + / - 10% vdc when tested to EIA-364-21 per spec. The connector shall not be mated during insulation resistance measurement.

4.3 DIELECTRIC WITHSTANDING

Per EIA-364-20 method B per spec. Test potential to be 300 VAC RMS, 60 HZ, and applied for 1 minute. No breakdown should occur. Test is performed with connector unmated.

4.4 CONTACT CURRENT RATING

1.1 amp per contact minimum per EIA-364—70, method 2 and *PCI Express Connector High Speed Electrical Test Procedure.* The temperature rise shall not exceed 30 degree C. Ambient condition is still air at 25°C.

4.5 INSERTION LOSS

Per EIA-364-101 and PCI Express Connector High Speed Electrical Test Procedure.
Requirements:
Less than or equal to 1dB up to 1.25 GHz
Less than or equal to 1.6 x (F-1.25)+1) db between 1.25GHz and 3.75GHz.
Less than or equal to 5 dB at 3.75 GHz

4.6 RETURN LOSS

Per EIA-364-108 and *PCI Express Connector High Speed Electrical Test Procedure.*
Requirements:
Less than or equal to -12dB up to 1.3 GHz
Less than or equal to -7dB up to 2.0 GHz
Less than or equal to -4dB up to 3.75 GHz

4.7 CROSSTALK: NEXT

Per EIA-90 and *PCI Express Connector High Speed Electrical Test Procedure.*
Requirements:
Less than or equal to -32 dB max up to 1.25 GHz
Less than or equal to –(32 – 2.4 x (F-1.25)) db between 1.25 GHz and 3.75GHz.
Less than or equal to -26 dB max up to 3.75 GHz

4.8 JITTER:

10 ps maximum. By design; measurement not required.

4.9 INTRA-PAIR SKEW:

5 ps maximum. By design; measurement not required.

5.0 ENVIRONMENTAL REQUIREMENTS (Per EIA-364-1000.01)

5.1 THERMAL SHOCK

Per EIA-364-32, test condition I. Cycle the connector –55 to +85 Degree C . Dwell time of 30 minutes at extreme temperature. Transfer time 5 minutes Max. No damage after 10 cycles.

5.2 CYCLIC TEMPERATURE AND HUMIDITY

Per EIA-364-31. Cycle the connector between 25 • ± 3• at 90% RH and 65 • ± 3• at 95% RH. Ramp times should be 2 hours and dwell times should be 2 hours. Dwell times start when the temperature

and humidity have stabilized within the specified levels. Perform 24 such cycles.

5.3 TEMPERATURE LIFE (Pre-conditioning)

Per EIA-364-17, method A, 92 hours at 105°C

5.4 TEMPERATURE LIFE

Per EIA-364-17, method A, 168 hours at 105°C

5.5 VIBRATION

Per EIA-364-28, test condition VII, test condition letter D.1 hour in each of three mutually perpendicular directions.
Requirements: no evidence of physical damage

5.6 DURABILITY (Pre-conditioning)
CYCLE RATE : 500 MATING / HOUR
Per EIA-364-09, 20 cycles

5.7 DURABILITY
CYCLE RATE : 500 MATING / HOUR
Per EIA-364-09, 50 cycles

5.8 MIXED FLOWING GAS

Per EIA-364-65, class IIA, 10 days exposure. Expose connectors unmated for 2/3 of the total duration. Mate each connector to the same add-in card that it was mated to in temperature life (preconditioning) and expose for the remainder of the test duration.

5.9 RESEATING

Manually plug/unplug the connector with add-in card, 3 cycles.

5.10 RESISTANCE TO SOLDERING HEAT

Per EIA-364-56 procedure 3, test condition C.

260°±5°C 10±2 seconds

Requirements: no evidence of physical damage

6.0 Test Matrix for 1X,4X,8X

TABLE 1 - QUALIFICATION TESTING MATRIX

		TEST GROUP	TEST GROUP	TEST GROUP	TEST GROUP	TEST GROUP	TEST GROUP	TEST GROUP	TEST GROUP	TEST GROUP
		1	2	3	4	5	6	7	8	9
TEST	**PARA**	**TEST SEQUENCE**								
Examination of Product	3.1	1	1	1	1	1	1	1	1	1
Insertion/Withdrawal Force - Add In Card	3.2					2				
Contact Retention	3.3					4				
Solderability	3.4					3				
Low Level Contact Resistance	4.1	2,5,7	2,5,8, 10	2,5,7	2,5,7,9 ,11			3,5		
Insulation Resistance	4.2		7							
DWV	4.3							2,6		
Contact Current Rating	4.4								2	
Insertion Loss	4.5						2			
Return Loss	4.6						3			
Crosstalk	4.7						4			
Thermal Shock	5.1		4		8					
Cyclic Temp and Humidity	5.2		6							
Temperature Life (pre-conditioning)	5.3			4	4					
Temperature Life	5.4	4								
Vibration	5.5			6						
Durability (pre-conditioning)	5.6	3	3	3	3					
Durability	5.7							4		
Mixed Flowing Gas	5.8				6					
Reseating	5.9	6	9		10					
Resistance to soldering heat	5.10									2
Sample Quantity / Group		**16X-5 (1)**	**16X-5**	**16X-5**	**16X-5 (2)**	**16X-5, 4X-5,1X-5 (1)**	**4X-3**	**16X-5 (3)**	**8X-4 (4)**	**16X-5 8X-5**

Notes:

1. samples for test groups 1,2,3,4,5 & 9 have metal hold downs, phos bronze contacts and 0.076 micrometers (3 u") gold plate, and black housings.

2. samples for test group 4:
   a. 5 samples, same as above except with 0.076 micrometers (3u") gold plate.

3. samples for test group 7:
   a. 5 samples, same as above except with 0.076 micrometers (3U") gold plate.

4. samples for test group 8:
   a. 2 samples, as note above except with 0.076 micrometers (3U") gold plate.

REVISION RECORD

REV	PAGE	DESCRIPTION	ECR #	DATE
A	ALL	RELEASED	T06-0131	01/24/2007