

# ENGINEERING CHANGE NOTICE

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## PART I

### **Brief description of the functional changes proposed:**

This ECR changes the power limit for x4 and x8 low profile add-in cards from 10W to 25W. In addition, the ECR defines a thermal interface point for system and add-in card

### **Specification(s) this proposed change is against:**

PCI Express Card Electromechanical Specification 1.1

### **Benefits as a result of the proposed changes:**

The proposed changes enable a number of proposed PCI Express applications for Raid controllers and communications cards. Existing 10W limit is too restrictive for x4 and x8 capable components.

### **An assessment of the impact to the existing revision and systems that currently conform to the PCI specification:**

Increase in power and thermal interface point will have impacts on both the add-in card and the system. The system will be impacted in its power delivery and thermal management.

### **An analysis of the hardware implications:**

All PCI Express x4/x8 Low profile cards will be allowed to consume up to 25W. They will also need to manage their power and thermal within the constraints of the system. The host system will need to deliver the added power and manage the thermal impacts

### **An analysis of the software implications:**

None

# ENGINEERING CHANGE REQUEST FORM

## PART II

THE FOLLOWING CRITERIA APPLIES TO DEFINING A RESERVED PIN ON THE PCI CONNECTOR OR TO REQUEST A NEW COMMAND:

- The function is deemed to be important for the Continued growth and long-term well being of PCI. (A shot-term fixes to a problem does not merit consideration, i.e., IDEIRZ14.)
- There is no other effective way for the function to be implemented except using a reserved pin or new command. (Is there a solution that can be implemented in configuration space?)

<b>Describe how the new function (on an Add-in Card) works with an existing system and other existing Add-in Cards?</b>
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N/A
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<b>Describe how existing Add-in Cards work when added into a system with the new function?</b>
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N/A
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<b>Are there any combinations not addressed by the previous two items? If yes, specify them and describe the interaction between new device and existing devices.</b>
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N/A
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## Why the proposed change is needed

Market data and analysis of key applications has shown that the 10W limit for Low Profile x4 and x8 PCI Express add-in cards is too restrictive. A 25W limit already exists for low profile PCI and PCI-X. The full standard height PCI Express x4 and x8 cards also support 25W. Many of the components used for standard height cards are expected to also be used for low profile cards, therefore similar power limits are assumed.

Originally, the 10W limit was seen as necessary for small form factor systems and low profile rack systems. The concern was the ability of the system to support the 25W requirement.

This concern highlights the need to provide a thermal interface point within the specification. This point defines a practical internal thermal environment provided by the system enclosure and which the add-in card assumes in developing its thermal management scheme.

### Description of the proposed change:

1. Change Add-in Card Power Dissipation Table, Table 4-2, to increase power limit of the x4/x8 Low Profile Card from 10W to 25W
2. Add wording at the end of the paragraph to define assumed system environment to be 55°C max and natural convection.

### Note changes in red

**Table 0-1: Add-in Card Power Dissipation**

	X1		x4/x8	x16	
Standard height	10 W <sup>1</sup> (max)	25 W <sup>1</sup> (max)	25 W (max)	25 W <sup>2</sup> (max)	75 W <sup>2,4</sup> (max)
Low profile card <sup>3</sup>	10 W (max)		25 W (max)	25 W (max)	

#### Notes:

1. A standard height x1 add-in card intended for desktop applications is limited in length to a half-length add-in card and 10 W maximum power dissipation. A standard height x1 add-in card intended for server I/O applications with 25 W maximum power dissipation must be greater than or equal to 177.80 mm (7.0 inches) in length, but must not exceed a full-length add-in card. See Table 6-1 for add-in card size definitions. The same server I/O add-in card must, at initial power-up, not exceed 10 W of power dissipation, until configured as a high power device, at which time it must not exceed 25 W of power dissipation. Refer to Chapter 6 of the *PCI Express Base Specification, Revision 1.1* for information on the power configuration mechanism.
2. A standard height x16 add-in card intended for server I/O applications must limit its power dissipation to 25 W. A standard height x16 add-in card intended for graphics applications must, at initial power-up, not exceed 25 W of power dissipation, until configured as a high power device, at which time it must not exceed 75 W of power dissipation. Refer to Chapter 6 of the *PCI Express Base Specification, Revision 1.1* for information on the power configuration mechanism.
3. All low profile add-in cards are limited in length to a half-length add-in card and must not exceed the power dissipation values shown in Table 4-2.
4. A x16 graphics card is limited to 60 W. The 60 W maximum can be drawn via the combination of +12V and +3.3V rails, but each rail draw is limited as defined in Table 4-1, and the sum of the draw on the two rails cannot exceed 60 W.

The power limits for respective connector widths, x1, x4/x8, and x16, represent the add-in card and system capacity to provide cooling for the slot. The 10 W limit assumes natural convection cooling in a system that provides air exchanges. The 25 W and above add-in card power limits assume that sufficient cooling is provided to the slot by the cards in the present chassis environment. In general, the power limits above assume a chassis environment with a maximum internal temperature of 55°C on the primary component side of the add-in card and natural convection cooling in a system that provides air exchanges. Implementations of other chassis environments should pay special attention to system level thermal requirements.

PCI Express allows for higher maximum power for graphics cards than AGP. In case such a graphics card is used in a system, implementers should pay special attention to system level thermal, acoustic, structure, and power delivery requirements.

**Why the proposed change is adequate**

The increase in power for the low profile card aligns with power projections and existing requirements for x4 and x8 devices. The change also aligns power requirements for similar components on both standard height and low profile cards. The thermal interface point insures that both system and card developers use the same set of assumptions for thermal management to insure interoperability of cards to chassis.