



## PCI-SIG ENGINEERING CHANGE REQUEST

<b>TITLE:</b>	CEM Support Power
<b>DATE:</b>	September 8, 2009
<b>AFFECTED DOCUMENT:</b>	PCI Express CEM Specification version 2.0
<b>SPONSOR:</b>	Hewlett-Packard

### **Part I**

#### **1. Summary of the Functional Changes**

ECR covers proposed modification of Section 4.2 Power Consumption within the CEM Specification version 2.0.

Proposal does not change default maximum power allowed per slot or add-in card – neither slots nor add-in cards are required to support beyond today's current maximum power levels. Slots and add-in cards currently compliant with version 2.0 would continue to interoperate per the existing specifications.

Proposal optionally removes the hard limits placed on add-in cards and slots as a function of connector width. This will allow higher power to be provisioned / consumed on all connector widths.

#### **2. Benefits as a Result of the Changes**

This change will allow PCI-SIG specifications to track industry trends to reduce cost / foot print of connectors. This will also enable a wider range of device types which may require more than today's default power maximums to be deployed in more operating environments thereby helping PCI-SIG members increase their use of PCIe technology.

#### **3. Assessment of the Impact**

The proposed specification change does not impact existing products – they will continue to interoperate per the existing CEM 2.0 specification. The proposed specification change will not impact future 3.0 products or the ability of CEM 2.0 add-in cards to interoperate with future 3.0 slots.

The proposed specification change will only be applicable to new slots that provision the added power and to new add-in cards that can take advantage of the added power.

The PCI Express Label specification comprehends both default maximum and optional maximum power for slots and add-in cards. No change is required in the specification to enable members to properly label slots and add-in cards to accommodate this change.

#### **4. Analysis of the Hardware Implications**

No impact to existing hardware. Only new hardware that supports the additional power is impacted.

#### **5. Analysis of the Software Implications**

No impact.

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**6. Analysis of the C&I Test Implications**

No impact.

**Part II**

**Detailed Description of the change**

<Replaces section 4.2 with the following>

This specification supports multiple card sizes for system implementation. For each size (see Table 6-1 for card size definitions), the maximum power consumption is limited at power on until software configures it for high power – see the Section 6.9 of the *PCI Express Base Specification* for information on the power configuration mechanism. The maximum power dissipation for each size is specified as follows:

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- A x1 standard height, half-length card is limited to a 10W maximum power dissipation.
- A x1 low profile card is limited to a 10W maximum power dissipation.
- A x1 standard height, full-length card is limited to a 10W maximum power dissipation at initial power up. When the card is configured for high power, by default, it must not exceed a 25W maximum power dissipation or optionally it must not exceed a 75W maximum power dissipation. A x4/x8 or a x16 standard height or low profile card is limited to a 25W maximum power dissipation at initial power up. When a card is configured for high power, it must not exceed a 75W maximum power dissipation.

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Additional Power Considerations:

- Power for cards that support a 75W maximum power dissipation can be drawn via a 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 75W.
- The card power limits represent the associated system power and cooling capacity for the slot.
  - The 10W limit assumes natural convection cooling in a system that provides air exchanges.
  - The 25W and above 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 card and natural convection cooling in system that provides air exchanges. Implementation of other chassis environments should pay special attention to system level thermal requirements.
  - PCI Express specifies support for 150-300W cards. For such solutions, implementers should pay special attention to the system level thermal, acoustic, structure, and power delivery requirements.

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 **IMPLEMENTATION NOTE**

Implementers should pay special attention to the following:

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- Implementers should read Section 6.9 Slot Power Limit Control of the *PCI Express Base Specification* to comprehend how software can control the maximum power provided per slot that a card can consume.

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- After a card is reset, the initial slot power limit value may be lower than the previous one.
- High-power implementations may result in increased card weight. Implementations should use appropriately sized connectors to insure connector mechanical integrity is not compromised.
- To insure optimum performance, it is recommended that card and system implementers refer to the associated PCI Express high-power thermal and mechanical guidelines. Implementers should also refer to the latest versions of the *PCI Express x16 Graphics 150W-ATX Specification* (including the supplemental power cable) and the *PCI Express 225W/300W High Power Card Electromechanical Specification* for additional information.
- Implementers should read the latest version of the *PCI Express Label Specification* to comprehend how to appropriately label slots and cards to communicate their maximum power capabilities.

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