# ECR #: 14
# Title: USB Overcurrent Pin
# Release Date: Feb. 10, 1997
# Impact: Change
# Spec Version: A.G.P. 1.0

**Summary:** An OVERCURRENT pin needs to be added to the A.G.P. connector to detect when current from the USB power pin has exceeded limits. Also added some general comments on USB design considerations for add-in cards.

**Background:** The USB spec requires that self-powered hubs be able to report when an overcurrent condition has occurred on the power pins. Since AGP supports USB on the add-in card and provides a 5.0 volt source for the USB power, it must support a means to report the overcurrent condition. Also, the spec should mention that overcurrent protection should be included on the add-in cards that support USB. Such protection usually takes the form of a self resetting fuse. In order to allow the 5 volt power to be used most flexibly, the two pins should be tied together on the add-in card. Those boards which use USB or provide power to the $I^2C$ interface need to provide overcurrent protection on the card. A connector pin must be dedicated to the overcurrent indication.

## Change Current Specification as shown:

1. Add an OVRCNT# indicator pin to the AGP connector diagram in chapter 5 on pin B1.

Add to Chapter 3 after table 3-9.

| Table x-y USB Signals | | |
|---|---|---|
| Name | Type | Description |
| **USB+** | t/s | *USB Positive Differential Data Line*,used to send USB data and control packets to external peripheral devices (typically a USB capable video monitor in this application). For complete details on the USB signaling characteristics and requirements, see the "Universal Serial Bus Specification," Revision 1.0, January 19, 1996. |
| **USB-** | t/s | *USB Negative Differential Data Line*. See above reference. |
| **OVRCNT#** | Note 1 | *USB Overcurrent Indicator*is low when too much current has been taken from the 5 volt power supply (Vbus) line on the monitor connector. Otherwise the line is between 2.4 volts and Vddq. |

Notes

1. Overcurrent indication can be provided either by an active sense circuit or by a passive sensing of the USB power out (Vbus) after a fuse. An example of such a passive sensing circuit is a resistor divider of 10 KΩ±5% from Vbus to **OVRCNT#**and 15 KΩ±5% from **OVRCNT#**to ground. Implementations may vary. Boards which do not provide power to the monitor cable must pull this line to Vddq through a pull-up resistor.

In Chapter 4:

1. Add to bottom of Table 4-1:

| Symbol | Parameter | Condition | Min | Max | Units | Notes |
|---|---|---|---|---|---|---|
| $V_{ol}$ | Output Low on OVRCNT# | $I_{out}$ = 20µA | | 0.4 | V | |
| $V_{oh}$ | Output High on OVRCNT# | $I_{out}$ = -20µA | 2.4 | 3.6 | V | |

4. Add section 4.4.3.6:

"**4.4.3.6 USB DESIGN CONSIDERATIONS**

When USB is included on the add-in card, there are two key issues that must be addressed: signaling and power delivery. The USB signal lines on the add-in card need to be designed to 45 ±15% to match the impedance of the USB drivers and cable in order to preserve the signal integrity. The power lines should be properly bypassed to decouple noise. If the USB port has to support hot attach, then the power lines have to have sufficient bulk capacitance to filter the surge currents. Refer to the "Universal Serial Bus Specification," version 1.0, January 19, 1996, for more details.

Any system that delivers power to a cable (i.e. for $I^2C$ and USB), will need to provide overcurrent protection on the card to comply with regulatory safety requirements (UL, CSA, etc.). This can take the form of active current limiting circuits or a simple self-resetting fuse. The overcurrent protection should be set to limit the current available to the cable at 2 amperes. Additionally, USB requires that this condition be reported on the **OVRCNT#** pin. The overcurrent indication can be taken from the active limiting circuit or by a simple monitoring of the power condition on the cable side of the fuse. In the latter case, the cable voltage must be reduced to be within the Voh spec range. A simple resistive divider, taking account of load current, is sufficient. If the card does not provide power to the cable, then the **OVRCNT#** pin should be tied to 3.3 volts via a pull-up resistor."