ECR #: 2
Title: Buffer V-I Equations
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Impact: Clarification
Spec Version: A.G.P. 1.0

Summary:

Equations included in figure 4-17 (V-I curves) did not agree with the curves shown in the figure. Also, the usage of these equations was unclear, as the table explaining them (as per PCI spec) was omitted.

Background:

Figure 4-5 and Table 4-4 from the PCI spec (rev 2.0) illustrates the omission.

Change Current Specification as follows:

Modify the equations to agree with the equations shown on the following page (change the coefficients to 54 and 141, respectively). Also add the attached table to the DC Characteristics section of chapter 4.

The following figure replaces figure 4-17 on page 79 of the rev 1.0 spec:
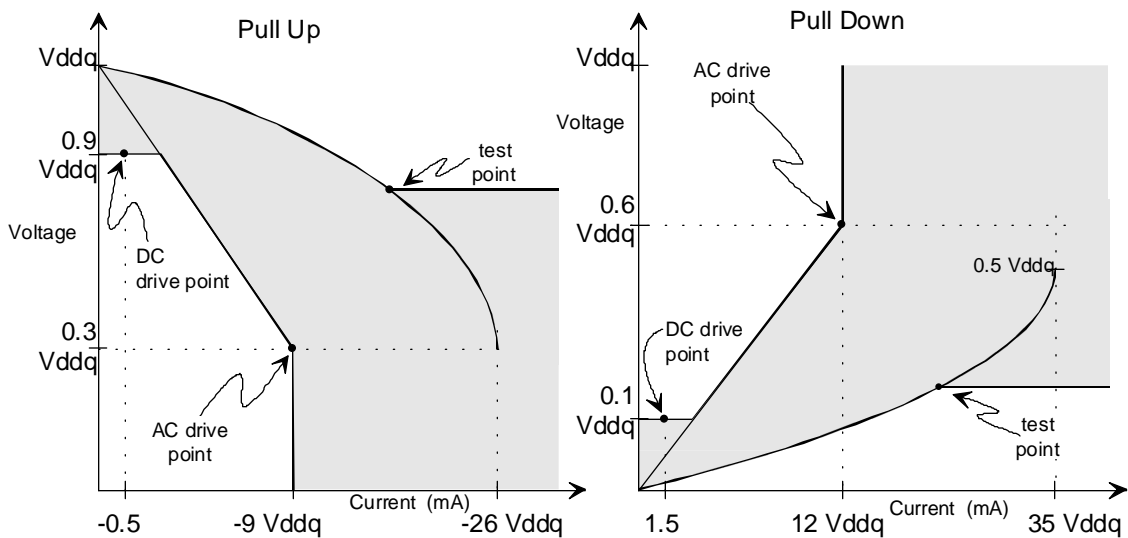
Equation A:

$$I_{oh} = (54.0/Vddq)*(V_{out}-Vddq)*(V_{out}+0.4Vddq)$$

for $Vddq > V_{out} > 0.7\ Vddq$

Equation B:

$$I_{ol} = (141/Vddq)*V_{out}*(Vddq-V_{out})$$

for $0v < V_{out} < 0.18\ Vddq$

Figure 0-1 V/I Curves for 3.3V Signaling

The following table is inserted at the end of section 4.2.4.

Table 4-??: AC Specifications for AGP Signaling

Symbol	Parameter	Condition	Min	Max	Units	Notes
$I_{oh(AC)}$	Switching	$0<V_{out}\leq0.3V_{ddq}$	$-9V_{ddq}$		mA	1
	Current High	$0.3V_{ddq}<V_{out}<0.9V_{ddq}$	$-13(V_{ddq}-V_{out})$	Eqt'n A	mA	1,2
	(Test Point)	$V_{out} = 0.7V_{ddq}$		$-18V_{ddq}$	mA	2
$I_{ol(AC)}$	Switching	$V_{ddq}>V_{out}\geq0.6V_{ddq}$	$12V_{ddq}$		mA	1
	Current Low	$0.6V_{ddq}>V_{out}>0.1V_{ddq}$	$20V_{out}$	Eqt'n B	mA	1,2
	(Test Point)	$V_{out} = 0.18V_{ddq}$		$21V_{ddq}$	mA	2
I_{cl}	Low Clamp Current	$-3<V_{in} \leq -1$	$-25+(V_{in}+1)/0.015$		mA	
I_{ch}	High Clamp Current	$V_{ddq}+4>V_{in} \geq V_{ddq}+1$	$25+(V_{in}-V_{ddq}-1)/0.015$		mA	
$slew_r$	Output Rise Slew Rate	$0.2V_{ddq} - 0.6V_{ddq}$ l load	1.5	4	V/ns	3
$slew_f$	Output Fall Slew Rate	$0.6V_{ddq} - 0.2V_{ddq}$ l load	1.5	4	V/ns	3

NOTES:

1. Refer to the V/I curves in Figure 4-17.

2. Equations defining these maximums (A and B) are provided with the respective diagrams in Figure 4-17. The equation defined maxima should be met by design. In order to facilitate component testing, a maximum current test point is defined for each side of the output driver.

3. This parameter is to be interpreted as the cumulative edge rate across the specified range, rather than the instantaneous rate at any point within the transition range. The specified load (Figure 4-16) is optional; i.e., the designer may elect to meet this parameter with an unloaded output. However, adherence to both maximum and minimum parameters is required (the maximum is not simply a guideline). Rise slew rate does not apply to open drain outputs.

The last paragraph needs to be modified to reference the above table. This sentence should be added to the end of the paragraph: "The clamp diode characteristics are given in the following table."