**BUFFER ISSUE RESOLUTION DOCUMENT (BIRD)**

**BIRD NUMBER:** 212

**ISSUE TITLE:** Clarification of PAM4\_UpperThreshold, PAM4\_CenterThreshold,

PAM4\_LowerThreshold

**REQUESTOR:**  Hansel Desmond Dsilva, Achronix Semiconductor

**DATE SUBMITTED:** April 13, 2021

**DATE REVISED:**

**DATE ACCEPTED:** May 14, 2021

**DEFINITION OF THE ISSUE:**

The definition of “PAM4 threshold” should mention “zero voltage-centered” signal.

When utilizing IBIS for single-ended signaling with a DC offset, the signal passed to the executable (.dll/ .so) is a zero voltage-centered signal. The mention of “signal” in the definition of **PAM4\_UpperThreshold, PAM4\_CenterThreshold, PAM4\_LowerThreshold** raises the possibility of model developers assuming a signal which is not zero voltage-centered. This will help adaptation of IBIS for single-ended PAM4 signaling.

**SOLUTION REQUIREMENTS:**

The mention of “signal” in the definition of **PAM4\_UpperThreshold, PAM4\_CenterThreshold, PAM4\_LowerThreshold** raises the possibility of model developers assuming a signal which is not zero voltage-centered. The proposed editorial change in mentioning “zero voltage-centered signal” will help adaptation of IBIS for single-ended PAM4 signaling.

SUMMARY OF PROPOSED CHANGES:

Editorial change in the Usage Rules of PAM4\_UpperThreshold, PAM4\_CenterThreshold, PAM4\_LowerThreshold in mentioning, “zero voltage-centered signal is sampled” instead of “signal is sampled”. Highlighed below is the needed editorial change.

PROPOSED CHANGES:

*Usage Rules:* The EDA tool uses these voltages in conjunction with Rx clock information to detect which of the four PAM4 symbols a waveform represents when the zero voltage-centered signal is sampled:

**BACKGROUND INFORMATION/HISTORY:**

The introduction of DC\_Offset may lead to confusion in the usage rules of PAM4 thresholds. The mention of zero voltage-centered signal helps avoid this confusion.