

TDP2004 IBIS-AMI Model User's Guide

Abstract

This document provides an IBIS-AMI model reference for the TDP2004 Four-Channel 20Gbps DisplayPort 2.1 Linear Redriver. It contains detailed information related to the TDP2004 IBIS-AMI model. The intended audience includes engineers working on signal integrity simulations. It is recommended that the reader be familiar with the [TDP2004 Four-Channel 20Gbps DisplayPort 2.1 Linear Redriver Datasheet](#). This document and all other collateral data related to the TDP2004 Redriver (application notes, programming guides, models, and so forth.) are available to download from TI website. Alternatively, contact your local Texas Instruments field sales representative.

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1 Introduction

This document is an IBIS-AMI model User's Guide for the TDP2004 Four-Channel 20Gbps DisplayPort 2.1 Linear Redriver. Table 1 below lists pertinent information related to the model.

Table 1. Model Information

Item	Value/Comment
TI Device	TDP2004 Four-Channel 20Gbps DisplayPort 2.1 Linear Redriver
IBIS Model Version	Compliant to IBIS Version 6.0
Supported Platforms	64-bit Windows 64-bit Linux
Model Package Files	TDP2004_IBISAMI_MODEL - TDP2004 Models - TDP2004_DualAlg.ibs - Tx_Gain_DualAlg.ami - Tx_Gain_DualAlg_x64.dll - Tx_Gain_DualAlg_x64.so - RX_Signal_Path_DualAlg.ami - RX_Signal_Path_DualAlg_x64.dll - RX_Signal_Path_DualAlg_x64.so - TDP2004 Package_Models - RX_PKG.s4p (1->2, 3->4) - TX_PKG.s4p (1->2, 3->4)



2 Model Parameters

Figure 1 shows input and output AMI parameters in the ADS tool from Keysight.

Note

All reserved parameters should not be adjusted. Additionally, only NLTV_RX_Signal_Path (non-linear time invariant) parameters should be modified. In ADS, bit-by-bit simulations use non-linear time invariant mode.

Figure 1: TDP2004 Specific IBIS-AMI Parameters in ADS Tool

Table 2 defines the TDP2004 IBIS-AMI model parameters.

Table 2: Model Parameters

Model Parameter	Description
Corner (0-2)	Model Corner Control 0: Typical 1: Strong 2: Weak
eq_bst	CTLE Boost Control 0: (Default) 4dB See Table 6-1 of the TDP2004 datasheet for specific EQ value for each eq_bst input parameter
drv_sel_gain	Driver Select Gain 5: (Default) 0dB See Table 6-2 of the TDP2004 datasheet for specific flat gain value for each drv_sel_gain input parameter

2.1 Model Equalization Control

Each channel of the TDP2004 features a continuous-time linear equalizer (CTLE) that applies high frequency boost and low frequency attenuation to help equalize the frequency-dependent insertion loss effects of the passive channel. The model equalization gain can be set using eq_bst model parameters. For a list of CTLE index settings and their corresponding CTLE boosts, please refer to Table 6-1 in the [TDP2004 Four-Channel 20Gbps DisplayPort 2.1 Linear Redriver Datasheet](#).

3 S-Parameter Models

Table 3 provides a description of the provided S-parameter model.

Table 3. S-parameter Models

Models	Description
RX_PKG.s4p	A nominal model of DS320PR410 package and termination on the receiver pins
TX_PKG.s4p	A nominal model of DS320PR410 package and termination on the transmitter pins

Note

All provided s-parameter package models have the port assignments as (1->2, 3->4).

4 Model Verification

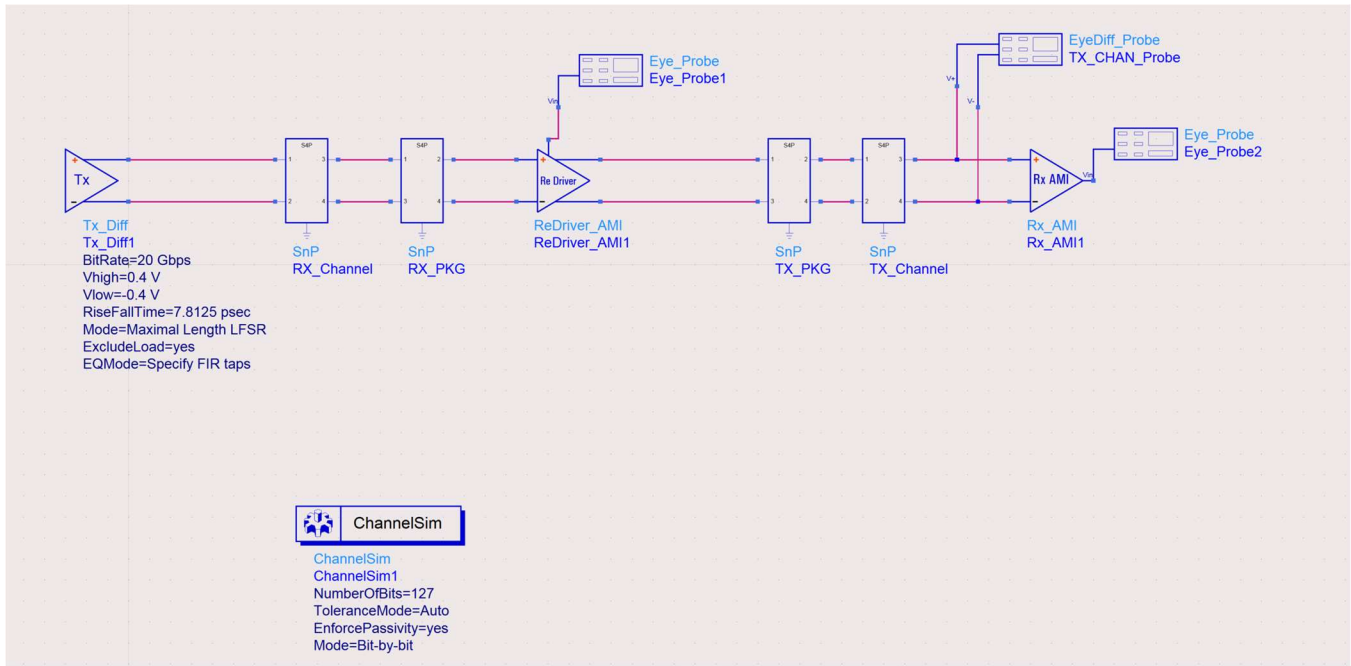
The functionality and accuracy of the model is optimized for transmission channels with up to 30 dB of attenuation at the Nyquist frequency. The CTLE function in this model must be set manually using the model parameters defined in Table 2.

4.1 Simulation Setup

Figure 4-1 is an example simulation setup. It consists of ideal Tx and Rx models, lossy channels, and the TDP2004 IBIS-AMI model.

The 20Gbps source is an ideal Tx_Diff model available in ADS's Signal Integrity - Common Components palette. RX_Channel is a measurement based model representing a lossy channel (differential transmission line).

The TDP2004 model consists of TDP2004_AMI IBIS-AMI model, TX and RX s-parameter models representing the device package and internal termination. Note that it is recommended to run signal integrity simulations with passivity enforced. This option helps ensure predictable behavior of the package S-parameter models. The example uses a Rx_AMI differential receiver included within the IBIS-AMI model.



Notes

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