

# **User's Guide**

## **DS280MBxxx IBIS-AMI Model**

Version 2  
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## 1 Document Revision History

<b>Revision</b>	<b>Comment</b>	<b>Date</b>
1	<ul style="list-style-type: none"><li>Initial creation of User's Guide.</li></ul>	02-August-2016
2	<ul style="list-style-type: none"><li>Updated .so files.</li></ul>	27-Oct-2016

## 2 Overview

This document is a User's Guide for the DS280MBxxx Linear Repeater with integrated 2x2 crosspoint. Table 1 below lists pertinent information related to the model.

**Table 1: Model information**

Item	Value/Comment
TI device models included	<a href="#">DS280MB810 Linear Repeater with 2x2 Crosspoint</a>
IBIS version	Compliant to <a href="#">IBIS version 6.0</a> .
Supported platforms	<ul style="list-style-type: none"> <li>• 32-bit Windows</li> <li>• 64-bit Windows</li> <li>• 64-bit Linux</li> </ul>
Release package files	<pre> TI_DS280MBxxx_IBIS_AMI_vN   +-- Example_Projects           +-- Keysight_ADS.7zads   +-- Model           +-- TI_DS280MB810_IBIS_AMI_User_Guide.pdf     +-- DS280MB810.ibs     +-- DS280MB810_tx_10_2015.ami     +-- DS280MB810_rx_10_2015.ami     +-- DS280MB810_tx_10_2015.dll     +-- DS280MB810_rx_10_2015.dll     +-- DS280MB810_tx_10_2015_x64.dll     +-- DS280MB810_rx_10_2015_x64.dll     +-- DS280MB810_tx_10_2016_x64.so     +-- DS280MB810_rx_10_2016_x64.so     +-- PKG_ZBL_RX*.s4p     +-- PKG_ZBL_TX*.s4p     +-- rx_term.s4p     +-- tx_term.s4p           </pre>

### 3 Receiver Model Parameters

The DS280MBxxx receiver model includes the following model-specific parameters:

1. **bst\_stage1\_boost**: This parameter sets the Repeater's CTLE boost stage 1 level. This is a coarse boost setting. Valid values are integers from -1 to 7. A value of -1 bypasses stage 1, a value of 0 produces the smallest boost, and a value of 7 produces the largest boost.
2. **bst\_stage2\_boost**: This parameter sets the Repeater's CTLE boost stage 2 level. This is a finer boost setting. Valid values are integers from 0 to 7. A value of 0 produces the smallest boost, and 7 produces the largest boost.
3. **bst\_buffer\_strength**: buffer strength (also known as bandwidth, BW) between stages one and two. This has a relatively small effect on the overall bandwidth. Valid values are integers from 0 to 3. A value of 3 produces the highest bandwidth, and 0 produces the smallest bandwidth.

Refer to the DS280MB810 Programming Guide for more information regarding the boost magnitude for different stage 1, stage 2, and BW settings.

4. **eq\_gain**: Equalizer DC gain mode. A value of 1 represents high-gain mode, and a value of 0 represents low-gain mode. This affects the wide-band amplitude gain through the CTLE.

Refer to the DS280MB810 Programming Guide for more information regarding the EQ high- and low-gain mode.

5. **LTI\_Mode**: This parameter determines whether the model's AMI\_Init() function returns a modified impulse response (for LTI simulations) or an unmodified impulse response (for non-LTI simulations). Regardless, the model has GetWave\_Exists=True and therefore all behavior (LTI and non-LTI) will be represented in time domain simulations.

**Note:** Not all EDA tools support pure statistical simulations for Redrivers/Retimers. Nevertheless, LTI mode can still be used.

<b>LTI_mode</b>	<b>Description</b>
0	Non-linear-time-invariant (non-LTI) mode. The AMI_Init() function does not modify the impulse response. <i>Not recommended.</i>
1 (default)	Linear time-invariant (LTI) mode. The AMI_Init() function does modify the impulse response based on the LTI approximation of the RX model's equalization. <i>Recommended.</i>

## 4 Transmitter Model Parameters

The DS280MB810 transmitter model includes the following model-specific parameters:

1. **vod**: This parameter affects the DC gain through the driver. Note that the total output peak-to-peak voltage of the Repeater will depend on the input voltage. This parameter can be used to adjust the output voltage, but it will not guarantee a specific output peak-to-peak swing. The high-frequency peaking achieved in the repeater is **in addition** to this DC gain. Valid values for this parameter are integers from 0 (smallest DC gain) to 3 (largest DC gain).

Refer to the DS280MB810 Programming Guide for more information regarding the DC gain for different VOD settings.

2. **sel\_fir**: RESERVED. Default is 0.
3. **C0**: RESERVED. Default is 0.
4. **Cn1**: RESERVED. Default is 0.
5. **Cp1**: RESERVED. Default is 0.
6. **LTI\_mode**: This parameter determines whether the model's AMI\_Init() function returns a modified impulse response (for LTI simulations) or an unmodified impulse response (for non-LTI simulations). Regardless, the model has GetWave\_Exists=True and therefore all behavior (LTI and non-LTI) will be represented in time domain simulations.

**Note:** Not all EDA tools support pure statistical simulations for Redrivers/Retimers.

<b>LTI_mode</b>	<b>Description</b>
0	Non-linear-time-invariant (non-LTI) mode. The AMI_Init() function does not modify the impulse response. <i>Not recommended.</i>
1 (default)	Linear time-invariant (LTI) mode. The AMI_Init() function does modify the impulse response based on the LTI approximation of the TX model's equalization. <i>Recommended.</i>

## 5 Model Usage Tips

1. **How to set the samples per UI in the simulator.** Samples per UI should be chosen such that the sample time (UI divided by samples per UI) should be less than 10E-12 for accurate results. Typical recommended values for different bit rates are as follows:

Bit rate	Recommended samples per UI setting
≥ 1 Gbps	≥ 128 samples per UI
≥ 4 Gbps	≥ 64 samples per UI
≥ 8 Gbps	≥ 32 samples per UI

2. **Note on [Repeater Pin].** The [Repeater Pin] key word in the IBIS file is used to define the Rx input pin and Tx output pin pairs which form repeaters. At the time this document was written, this was not yet part of the official IBIS standard and hence the IBIS parser throws an 'Invalid Keyword' error upon encountering the [Repeater Pin] keyword. Please ignore this error as the model runs fine in most EDA tools (SiSoft QCD and Agilent ADS to name a few). In fact, the [Repeater Pin] definition is necessary to simulate 'Repeater' models in SiSoft QCD. If the model needs to be run in other tools which do not support this keyword (like Mentor Graphics Hyperlynx), the [Repeater Pin] definition can be deleted without any change in the functionality of the model.
3. **Note on IBIS Version 6.0.** Not all tools support IBIS Version 6.0 features such as AMI\_Version and Repeater\_Type reserved parameters. Check with your tool vendor. If the tool does not support IBIS version 6.0, it is safe to remove the AMI\_Version and Repeater\_Type parameters in the .ami files and change the [IBIS Ver] from 6.0 to 5.1.