Look into IBIS buffer curves

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Outlines

- Buffer Structures
- Buffer Curves in IBIS
- HIGH, LOW, OPEN States
- Loadlines
- Relationship between V-I and V-T Curves
- On-Die Termination using IBIS Submodel
- Conclusions
Basic I/O Buffer Structure

Output / Driver 输出

- Pull-up Device
- Diodes
- Pad Capacitance

Input / Receiver 输入

- Pull-down Device
- Diodes

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IBIS Buffer Structure

All curve data are independent with own voltage references

PU – Pullup
PD – Pulldown
PC – Power Clamp
GC – Ground Clamp

Output/Input

Plus V(t)
V-I Curves in IBIS model

Reference @ 1.8 v

Reference @ 0 v

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IBIS V-I Curves using the same reference voltages

All Curves Reference @ 0 v
IBIS V-I Curves @ High, Low, Open
IBIS Curves @ High, Low, Open (Details)
Loadline Crossing

Loadlines

IBIS Curves @ High, Low, Open

IBIS V-T Curves, V_fixture @ 1.8 v & 0 v

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The IBIS Curves to check

- Individual V-I Curves
- Combined V-I Curves
- V-T Curves
Individual V-I Curves

It is **NECESSARY** to check the curves with the **SAME** reference voltage.
Combined V-I Curves

These are the curves that simulator uses. **HIGH, LOW, OPEN**

Shown for I/O Buffer. Other types may not have all the states
V-T Curves

Insure the timing related FACT
On-die terminations using IBIS Submodel

V-I Curves using Submodel

Driving case only

Current (mA)

Voltage (V)

OPEN@Typ@0.0V
LOW@Typ@0.0V
HIGH@Typ@0.0V
SUB
HIGH@Typ@0.0V
OPEN@Typ@0.0V+SUB
LOW@Typ@0.0V+SUB
Conclusions

- IBIS buffer curves are individual and using different reference voltage points
- It is necessary to convert all the curves using the same reference voltage points for checking
- Combined curves for HIGH, LOW, OPEN states are important for validations
- Make sure your V-I and V-T curves are correlated with loadlines
- On-die termination using Submodel needs to be considered for IBIS validations
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