

SiSoft™



# Can IBIS Accurately Model SSO ?

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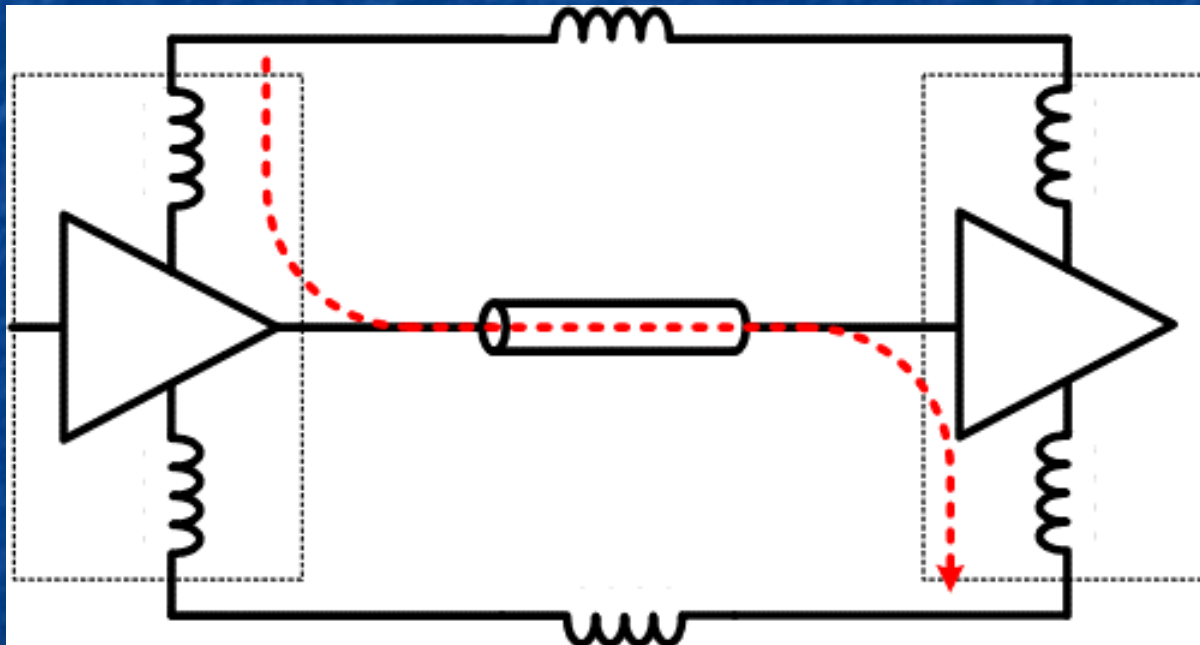
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# Can IBIS Accurately Model SSO ?

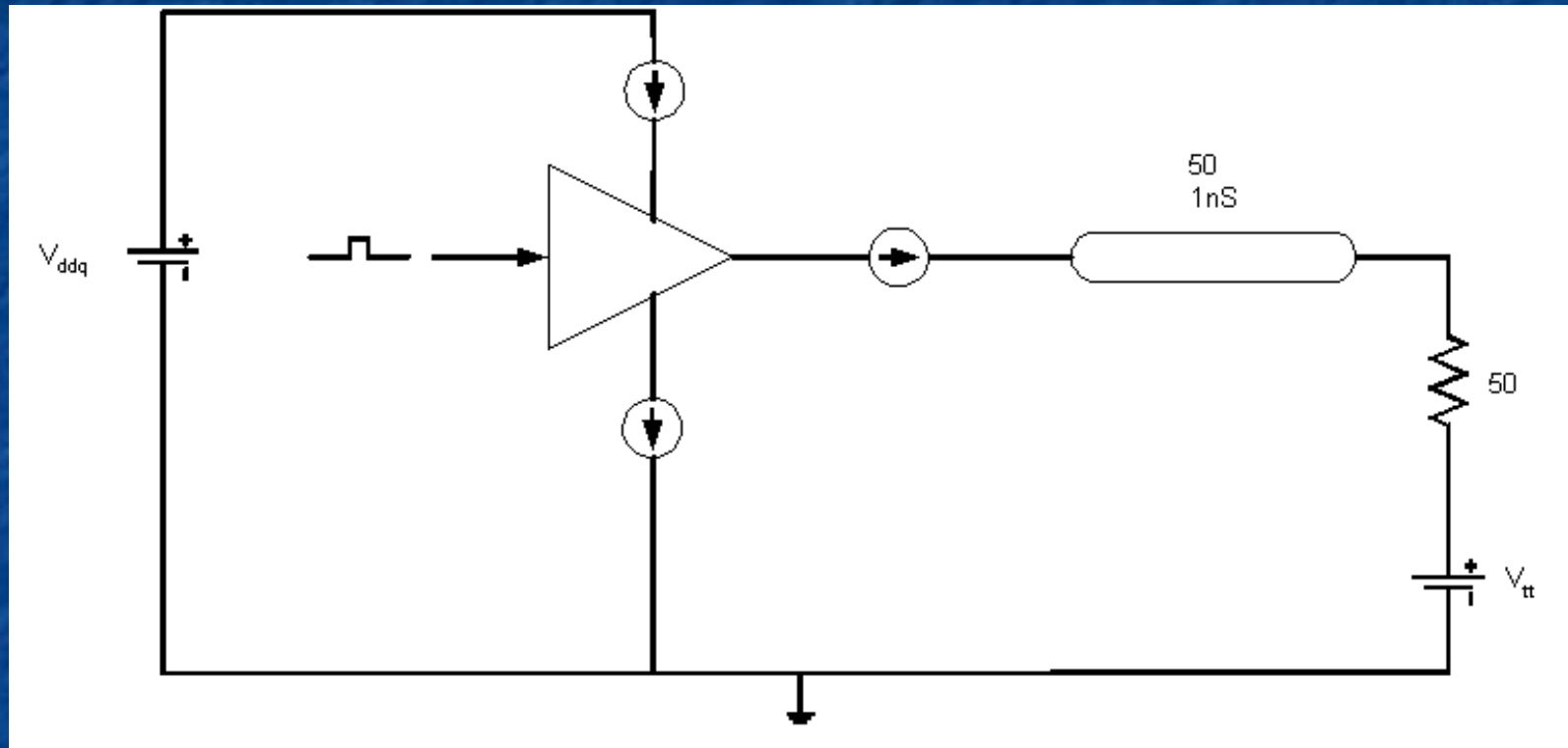
- Sometimes ...
- Issues Include
  - Accurate IBIS model
  - Accurate Package model
  - What does Simulator do with crossover current ?
    - Voltage/Current on IO Pin can be correct
    - Voltage/Current on Power Node ?
    - Voltage/Current on Ground Node ?
- Do we need IT tables ?
  - Added complexity
  - May be difficult to bench characterize
  - Contains required current information

# What Is SSO

- Two major contributors to Simultaneous Switching Outputs
  - Inductance in Power/Ground of Package causes rails collapse
  - Coupling in Package Signal path can also cause pull-in or push-out

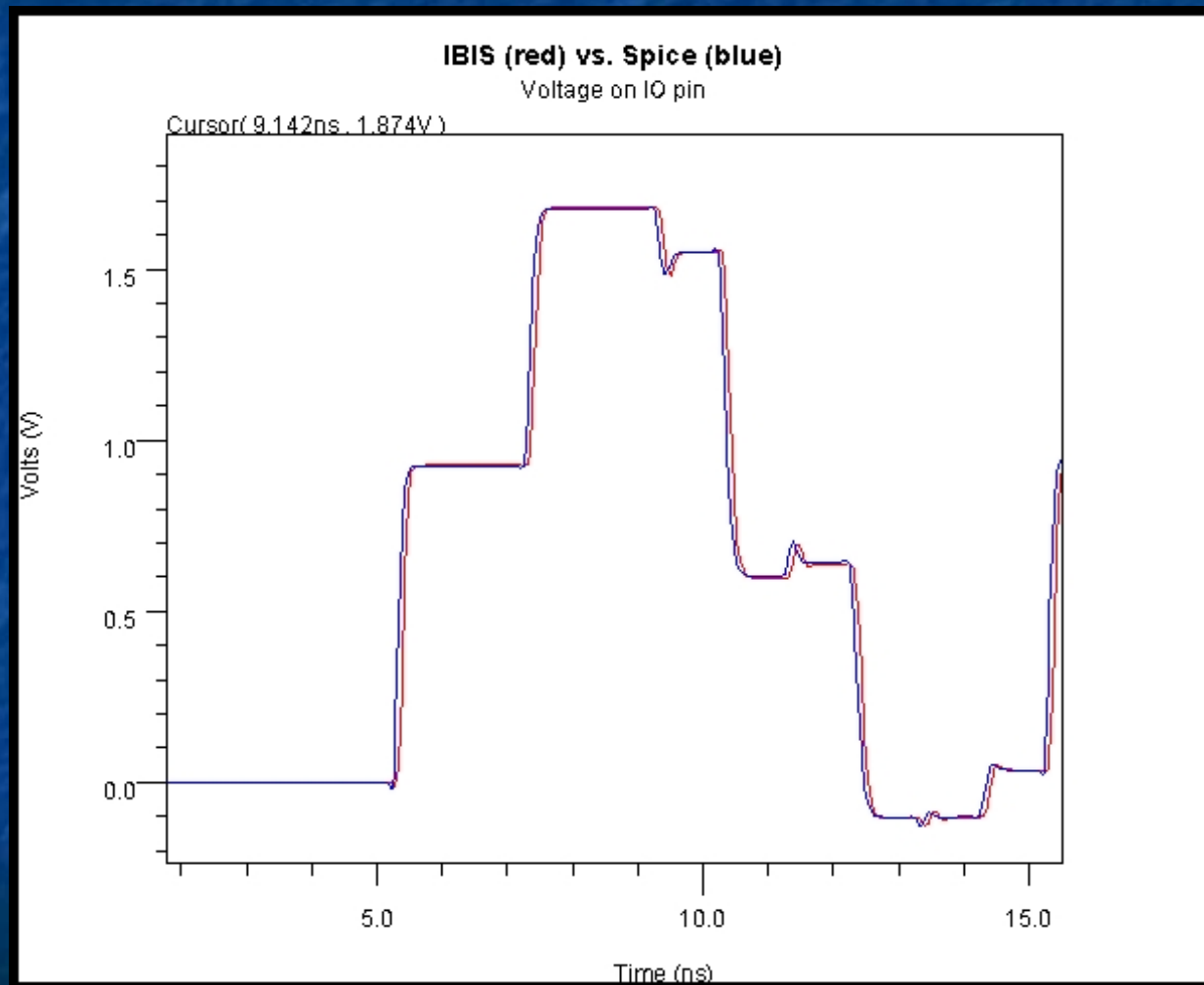


# A Simple Circuit

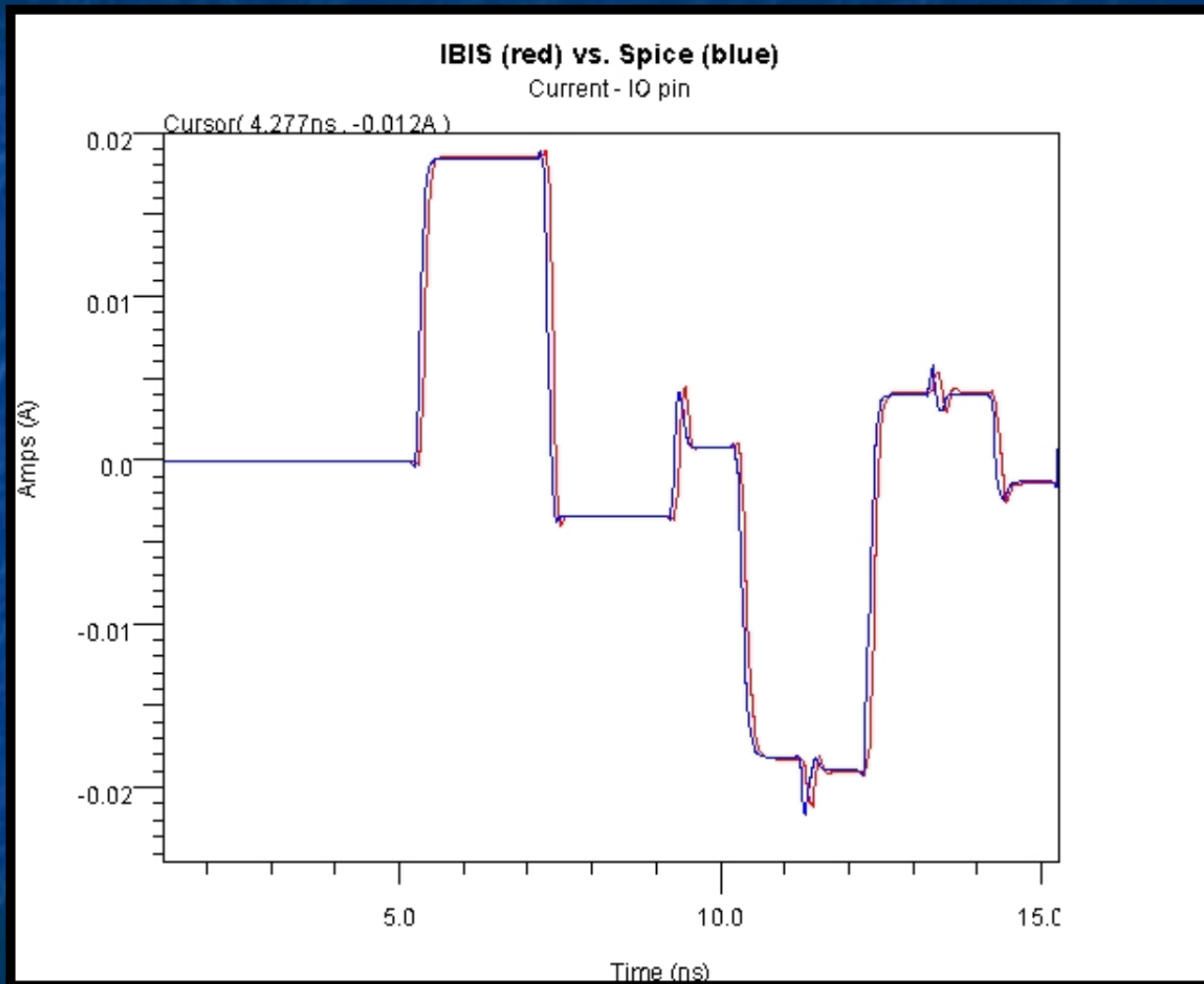


# Voltage - Pin of I/O Buffer

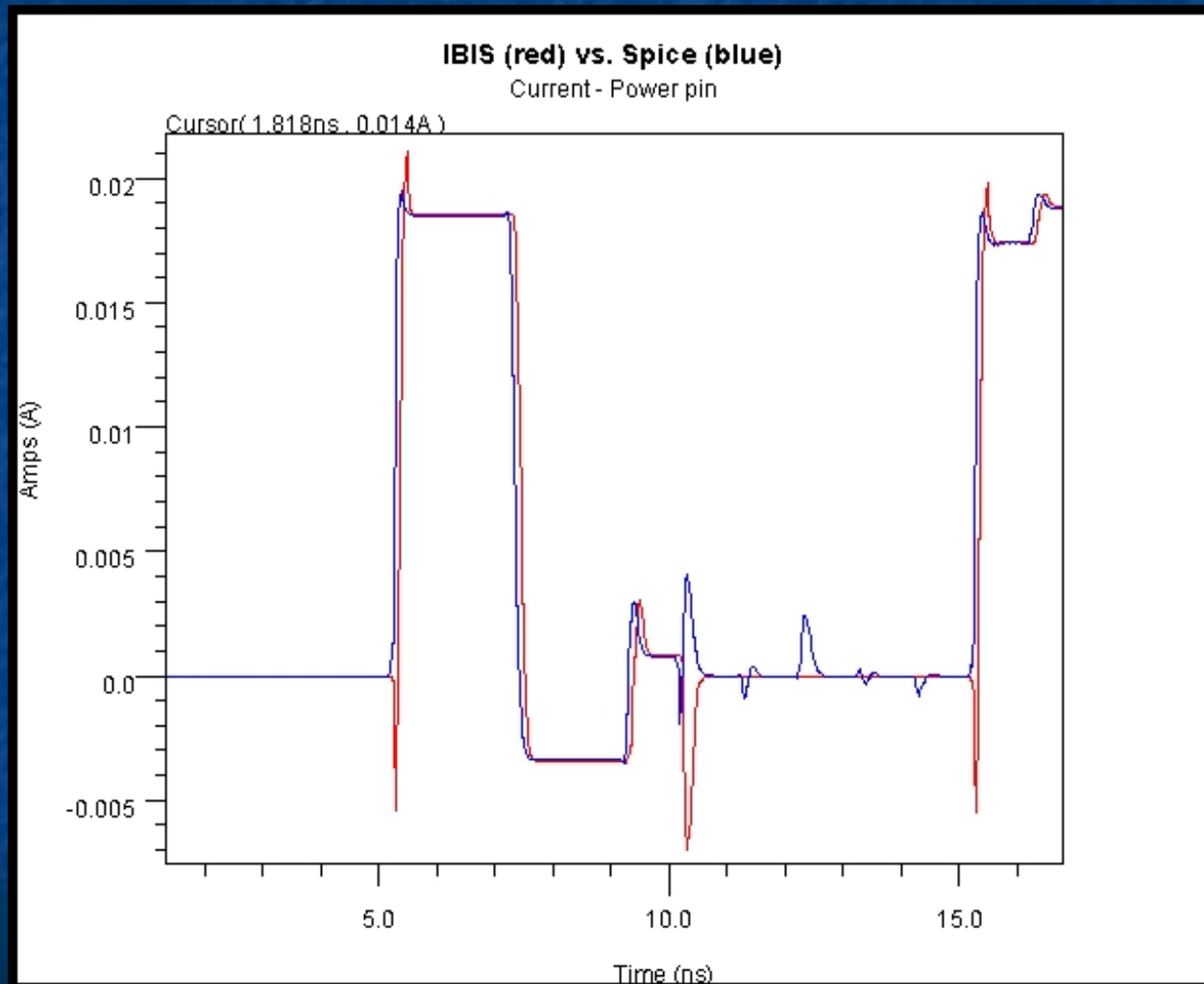
## IBIS versus Spice



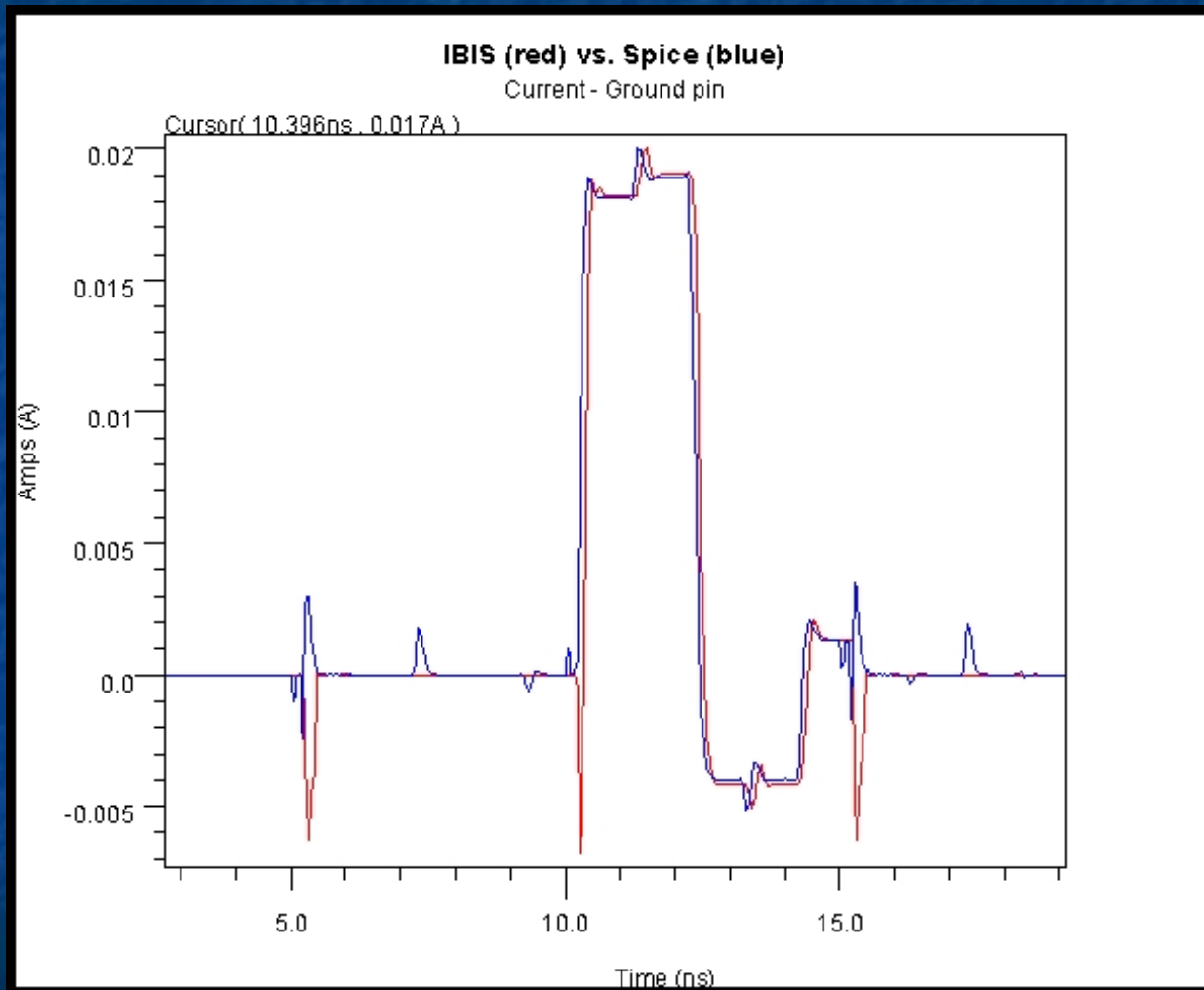
# Current - Pin of I/O Buffer



# Current - Power Node of I/O Buffer

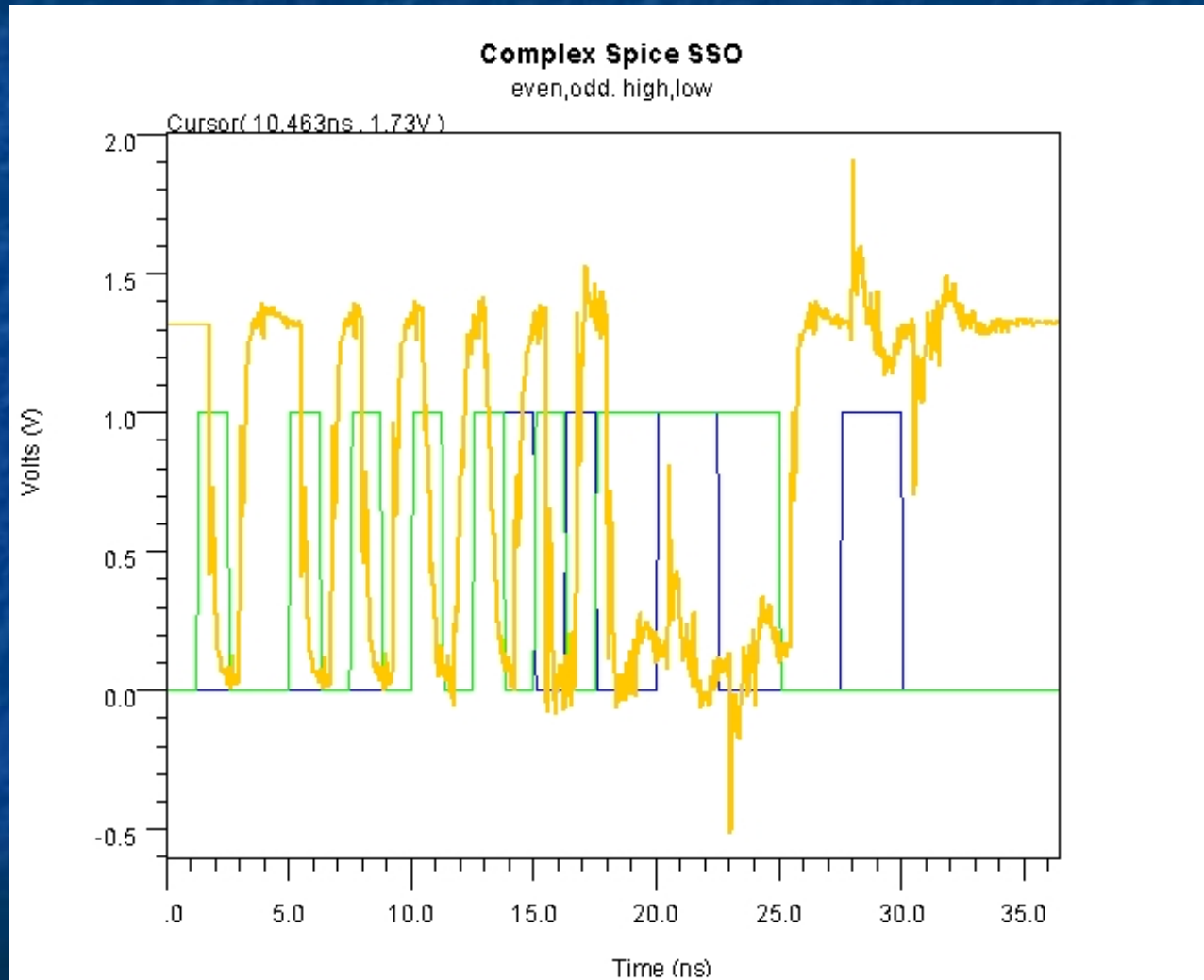


# Current - Ground Node of I/O Buffer





# Complex SSO (SPICE simulation)



# Summary

- Can IBIS model SSO ?
  - Sometimes
  - On-die power network (decoupling) critical
  - Buyer beware
- Are IT tables the answer ?
  - Clearly current is an issue
  - Work for another day...

# Additional Resources

- Plug for the IBIS Quality Committee !
  - IQ\_Specification.txt
  - IQ\_Example.ibs
  - IQ\_Checklist.xls
- Mailing list
  - Ibis-quality@freelists.org
  - <http://www.freelists.org/archives/ibis-quality>
- Web site
  - <http://www.sisoft.com/ibis-quality>
  - <http://www.sisoft.com/ibis-quality/docs>
- Questions ?