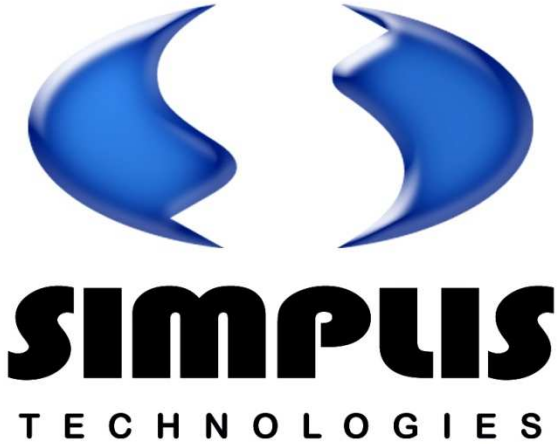
New SIMetrix/SIMPLIS 5.6

Advanced Digital Simulation
for Power Electronics



Advanced Digital Simulation -- SIMPLIS 5.6

- Brings SIMPLIS speed to power supply simulations with significant digital content
- Provides new digital functions
- Improves performance of digital devices
- Allows high speed simulation of digital control and digital monitoring and protection functions

Faster Simulation of Digital Content

- Simulation with Advanced Digital devices is 10 – 20 X faster than with classic SIMPLIS digital devices
- Digital clock frequencies can be much higher than switching frequency of power supply
- Advanced Digital devices effectively reduce overall power supply simulation complexity
- Simulation speed of digitally controlled power supplies as fast as those with comparable analog functionality

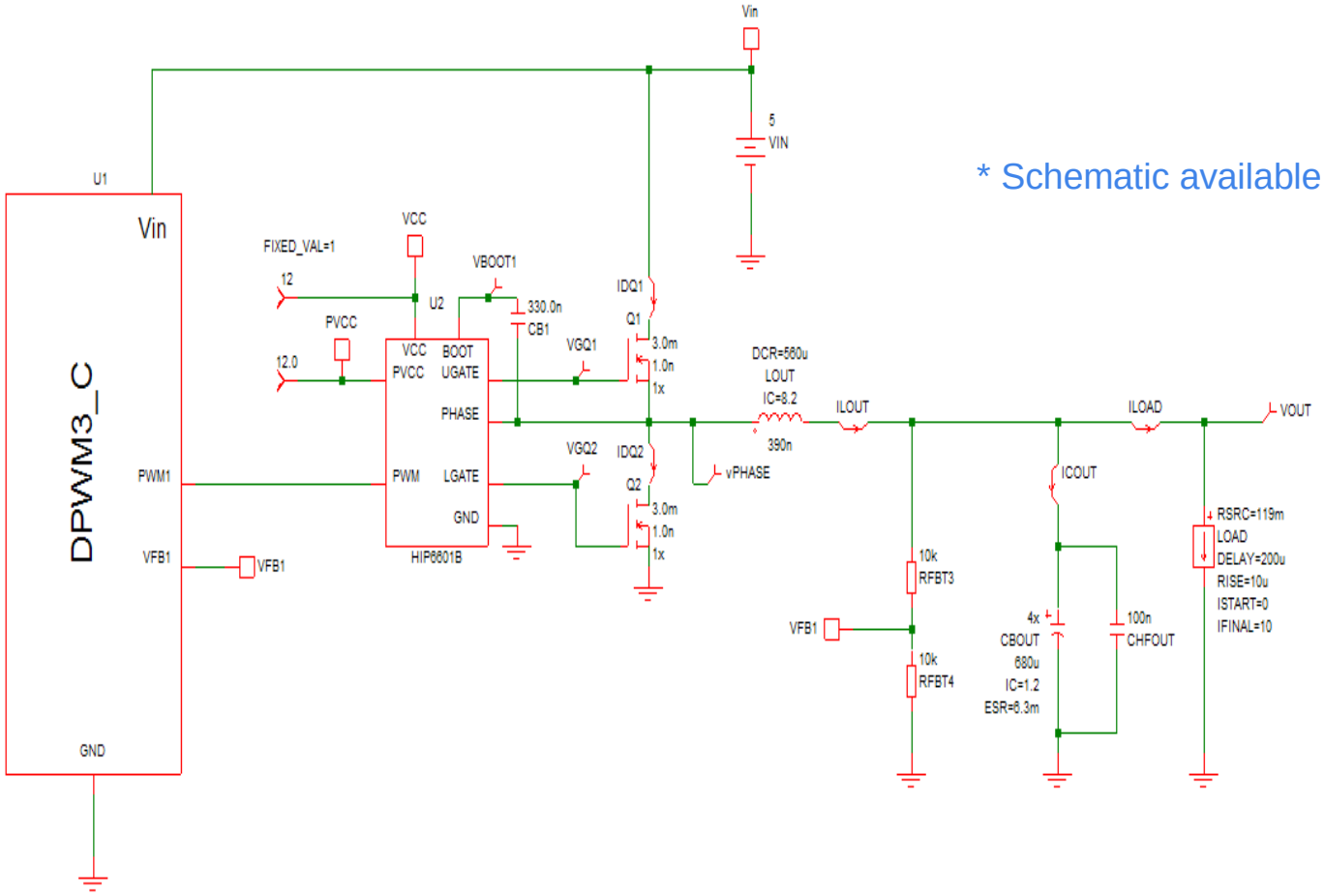
Advanced Digital Simulation -- SIMPLIS 5.6 New Features

- New Digital Functions
  - Adders
  - Subtracters
  - Multipliers
  - Digital Comparators
  - Counters
  - ADCs
  - Expanded library of Flip-Flops and Latches
  - Asymmetric Delay Block

Advanced Digital Simulation – SIMPLIS 5.6 New Features

- Inertial Delay on inputs – Input glitches narrower than the specified delay are effectively ignored rather than being propagated through the device
- Finite delay in all Advanced Digital devices – Eliminates problems encountered with classic SIMPLIS logic gate's ability to instantaneously switch state with zero delay
- Option to include or omit Ground Reference
- Indeterminate output logic level is 1/2

Example: Digital PWM with PID Compensator



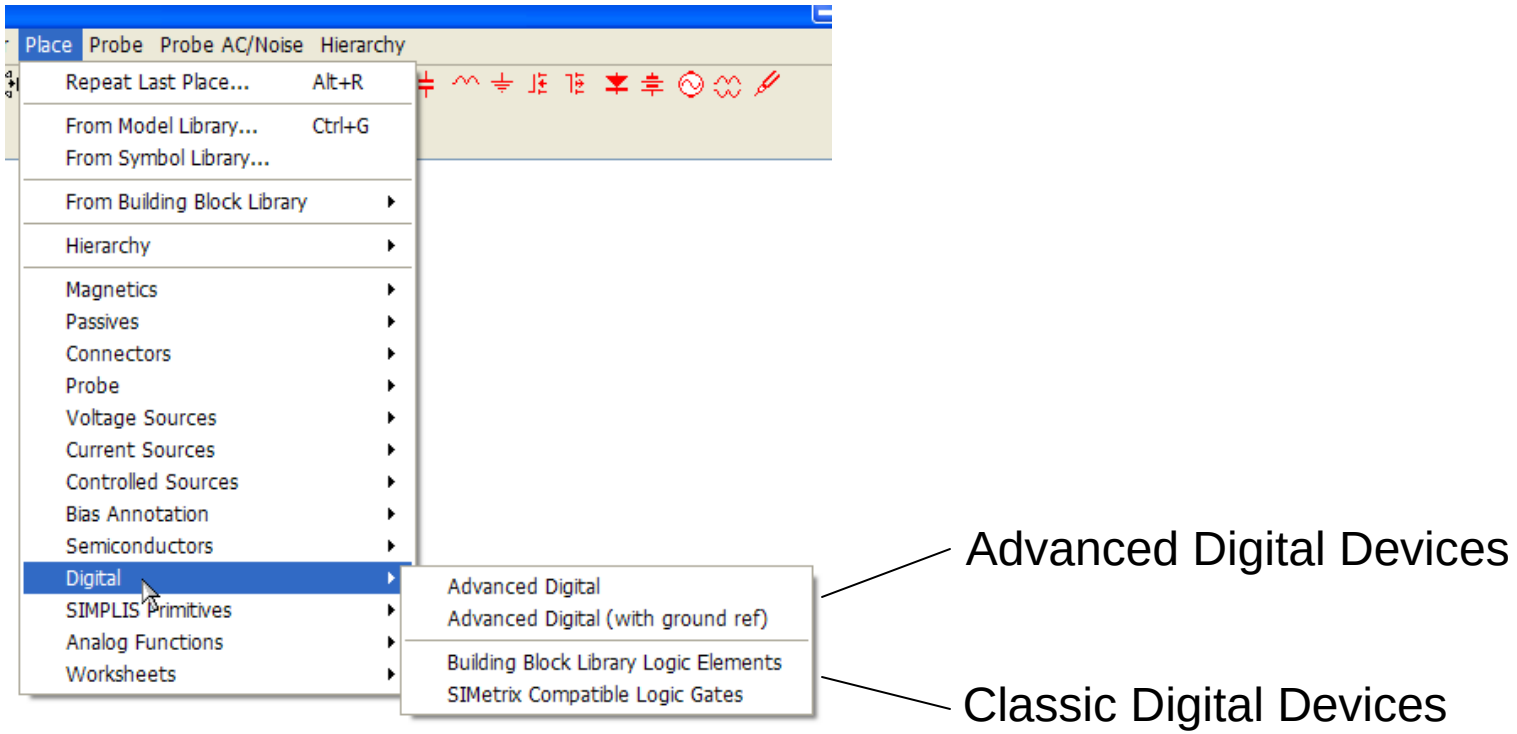
* Schematic available from website

SIMPLIS TECHNOLOGIES

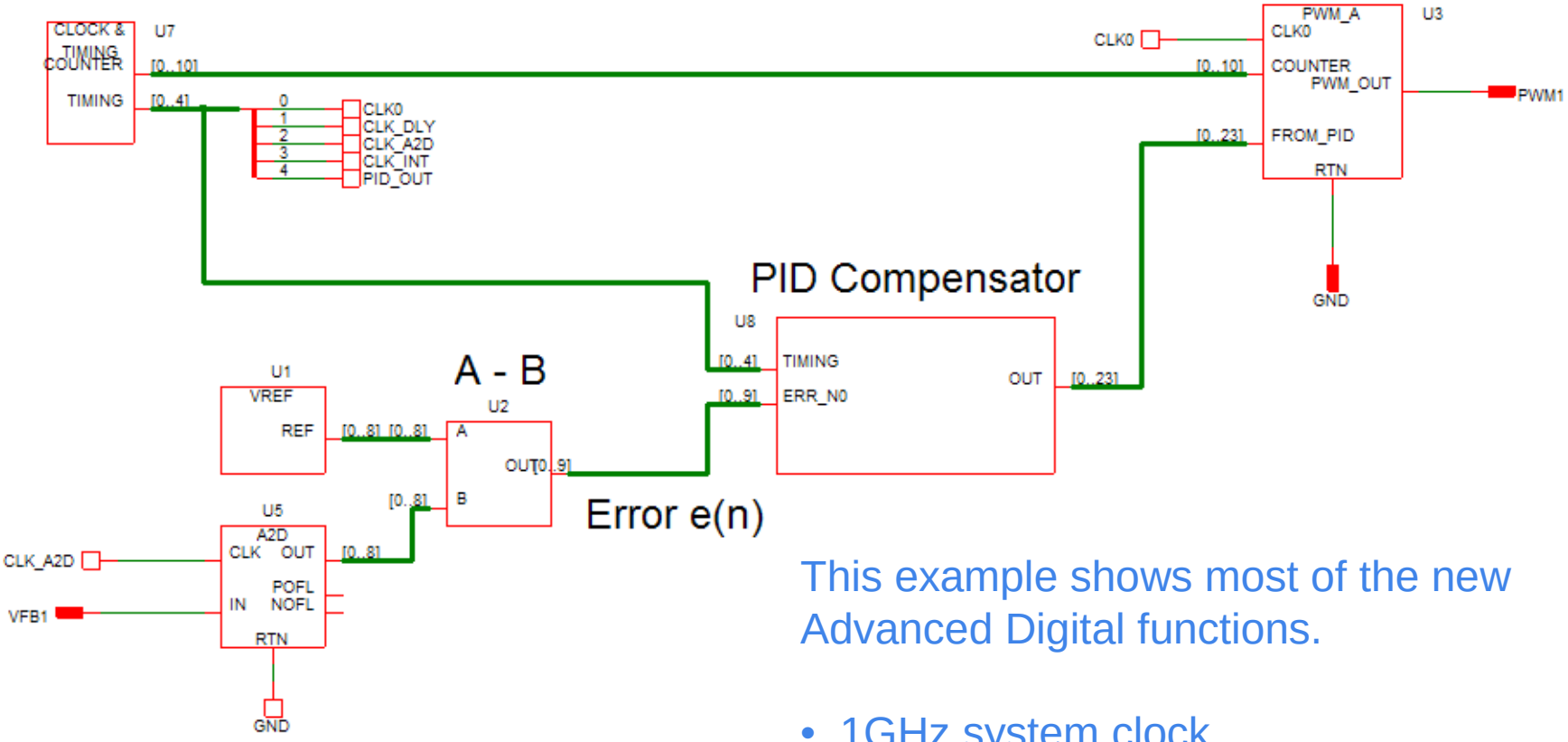
Simulation Software for Power Electronics

Component Design • Circuit Design • System Design

Reorganized Menus for Digital Devices



Example: Digital PWM with PID Compensator



This example shows most of the new Advanced Digital functions.

- 1GHz system clock
- 500kHz power conversion frequency

SIMPLIS TECHNOLOGIES

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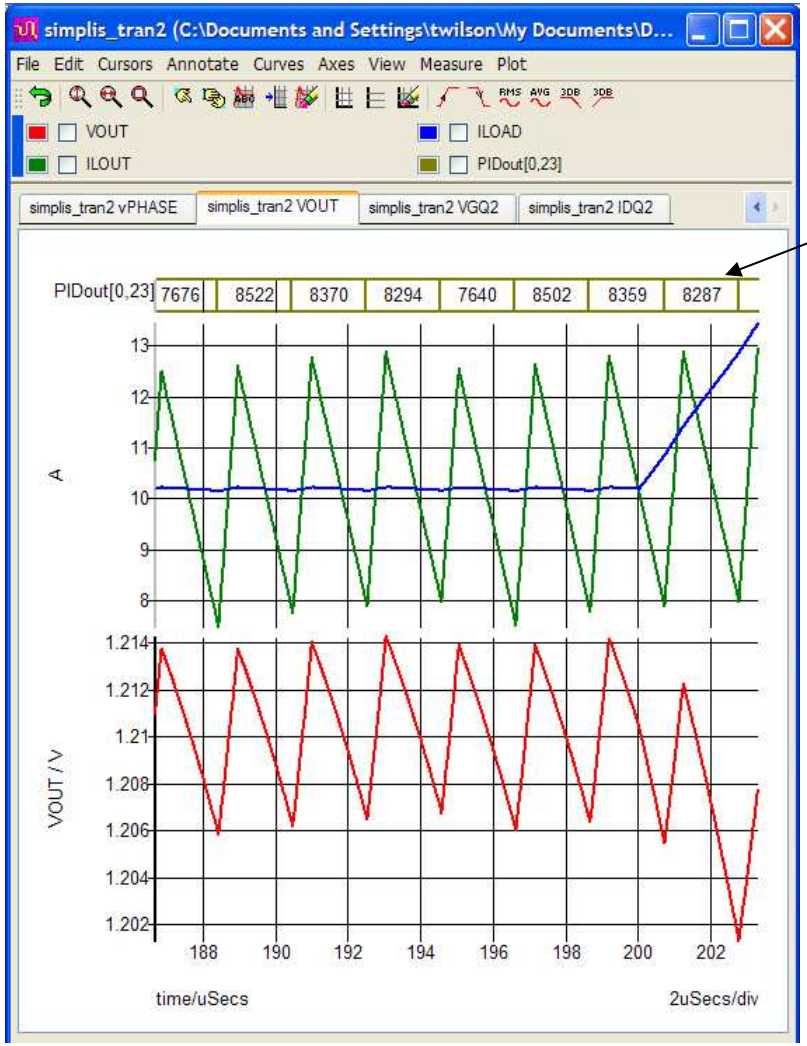
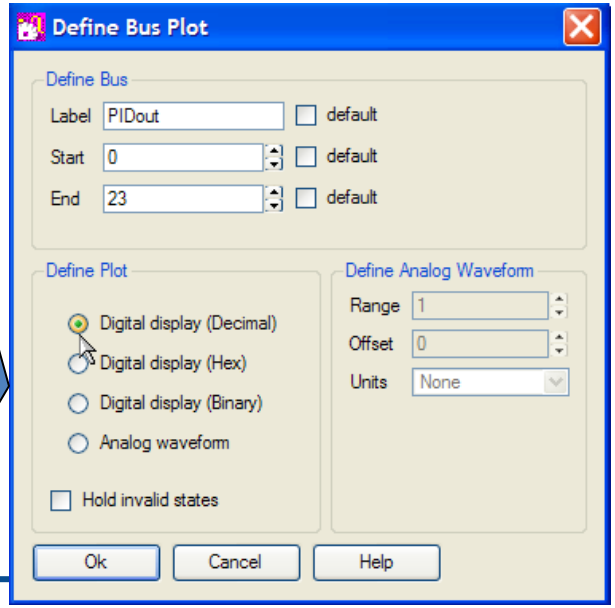
Bus Probe Feature for Advanced Digital Data



PID output of digital PWM viewed with Bus Probe

Options for plotting Bus Probe display



SIMPLIS TECHNOLOGIES

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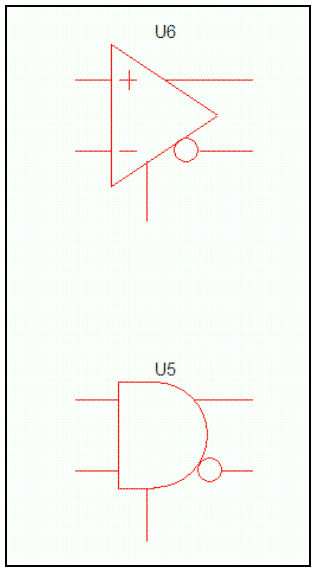
Advanced Digital Devices – SIMPLIS 5.6
Ground Reference

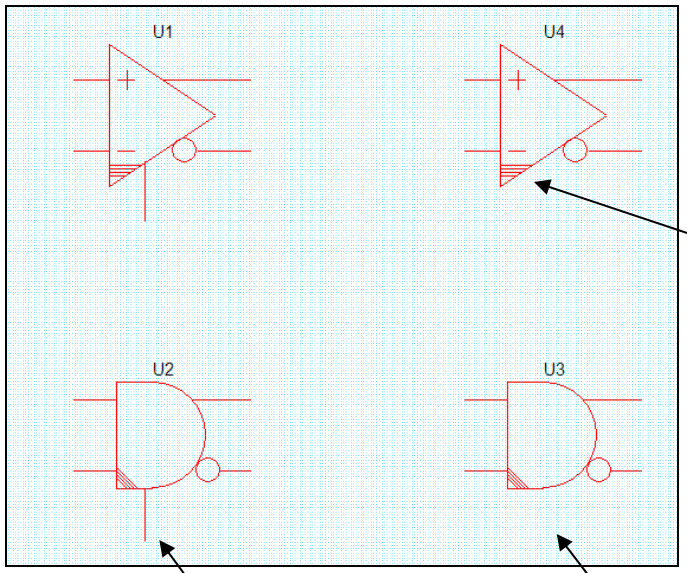
- SIMPLIS does not require digital functions to be referenced to node “0”.
  - This permits SIMPLIS logic to appear anywhere in a power system -- referenced to ground, or to -48V, or left completely floating.
- Advanced Digital devices in SIMPLIS now have the option of using a ground reference or not.

Advanced Digital Devices – SIMPLIS 5.6
Ground Reference

Classic Digital Gates



Advanced Digital Gates



marked with stripes in corner

With GND Ref

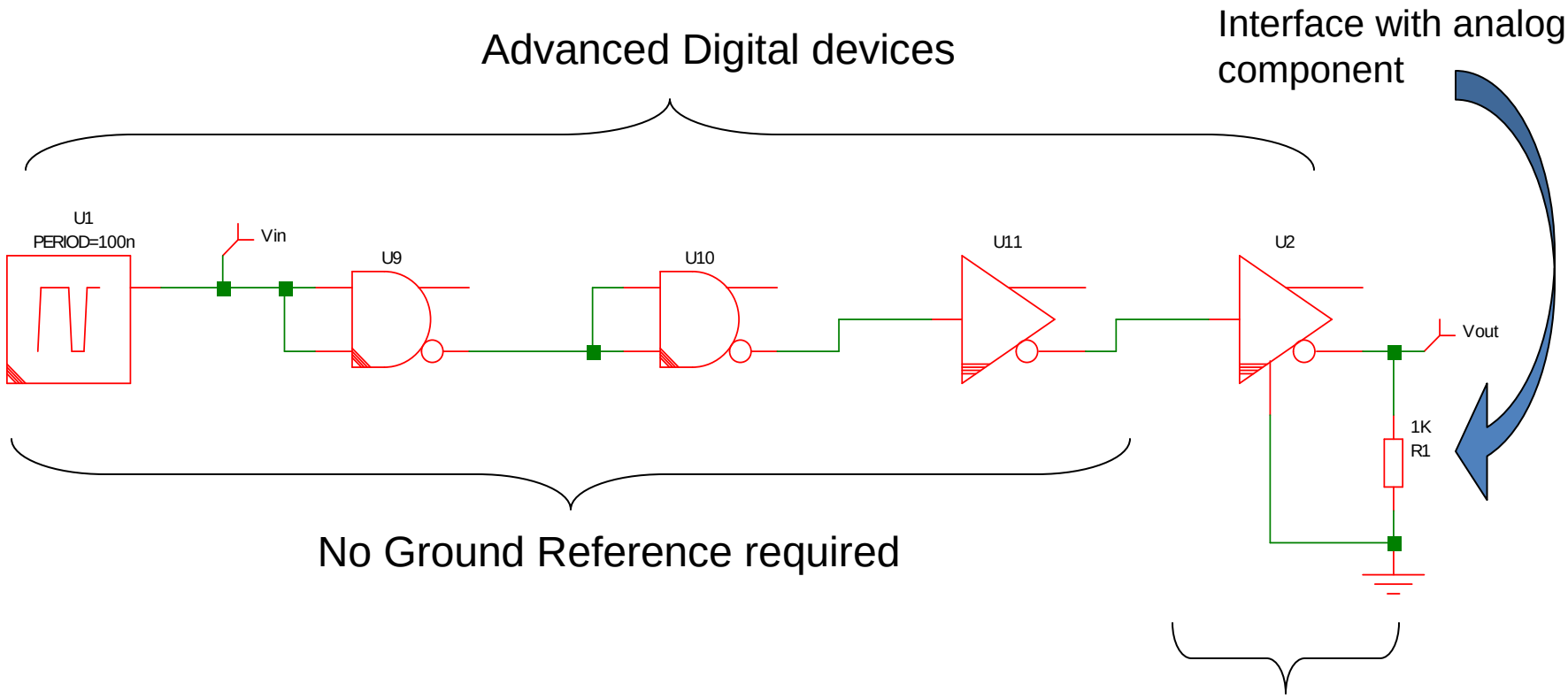
Without GND Ref

Advanced Digital Devices – SIMPLIS 5.6
Ground Reference (cont.)

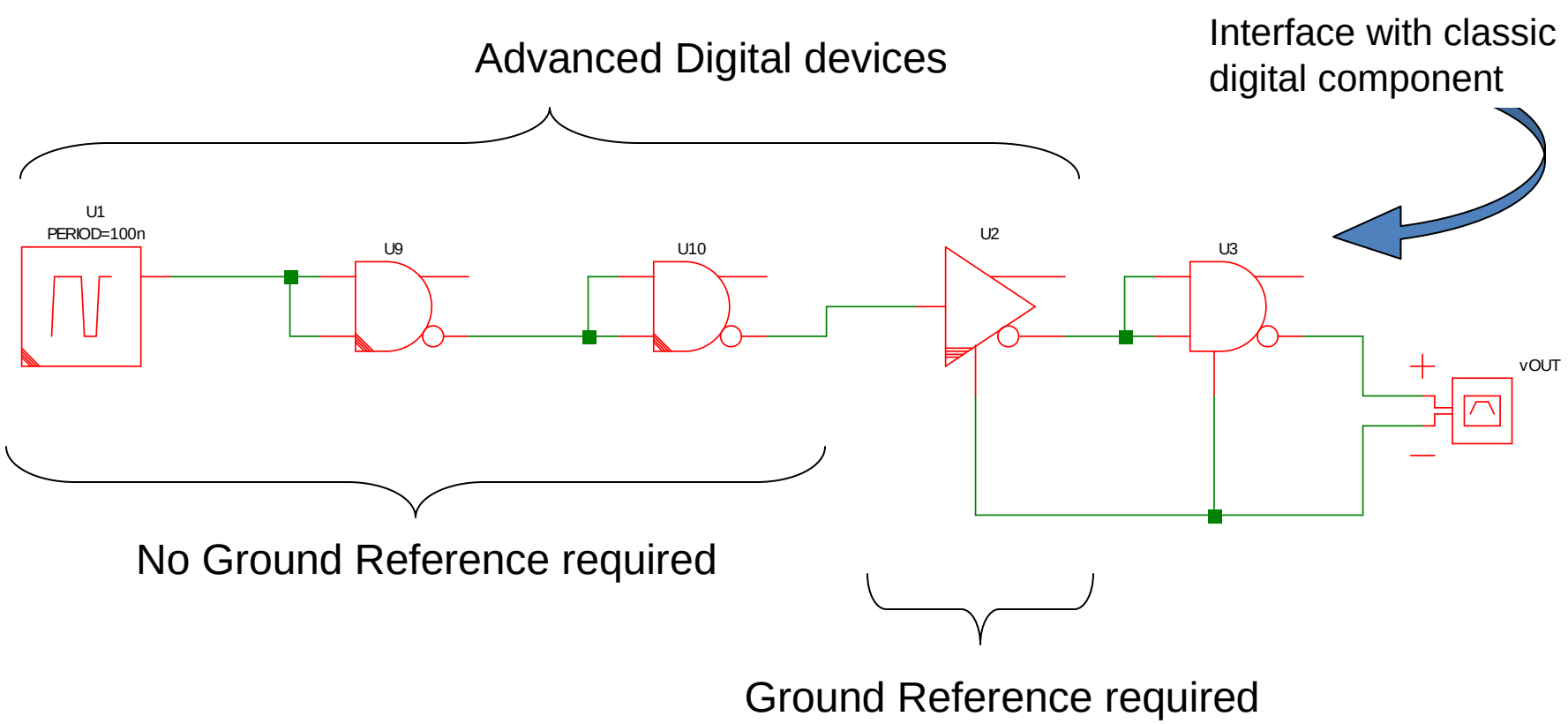
- The use of a ground reference is optional whenever an Advanced Digital device interfaces only with other Advanced Digital devices.

- A ground reference is required for any Advanced Digital device that interfaces with an analog device or a classic digital device.

Advanced Digital Devices – SIMPLIS 5.6
Ground Reference (cont.)



Advanced Digital Devices – SIMPLIS 5.6
Ground Reference (cont.)



Advanced Digital Devices – SIMPLIS 5.6
Ground Reference (cont.)

- If a required ground reference for an Advanced Digital device is missing, an error message will be generated.
- When the ground reference for an Advanced Digital device is required, the interfacing input or output voltage range will be controlled by edit dialog box entries.
- Otherwise, I/O will be logical one or zero.

How to maximize benefit from SIMPLIS Advanced Digital capability

- Simulation speed increases the more you isolate Advanced Digital content from rest of “analog” circuit.
- In general, simulations will go faster using new Advanced Digital devices as much as possible.
- Use logic gates instead of analog switches as much as possible.

Qualifications

- New Advanced Digital devices will only work with SIMPLIS version 5.6 and higher
- Classic SIMPLIS digital devices will continue to work with newer versions