

What's New with LTspice IV?

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BLOG BY ENGINEERS, FOR ENGINEERS

Check out the LTspice® blog (www.linear.com/solutions/LTspice) for tech news, insider tips and interesting points of view.

New Article: “Achieving Low On-Resistance with Guaranteed SOA in High Current Hot Swap Applications”
by Dan Eddleman
www.linear.com/solutions/5722

The requirement for live insertion and removal in high current backplane applications demands MOSFETs that exhibit both low on-resistance during steady state operation and high safe operating area (SOA) for transient conditions. Often, modern MOSFETs optimized for low on-resistance are unsuitable for high SOA hot swap applications. This article overviews an application that provides the best of both worlds by utilizing the

LTC4234 to satisfy SOA requirements and an external low on-resistance MOSFET reduces the overall power dissipation.

SELECTED DEMO CIRCUITS

For a complete list of simulations utilizing Linear Technology’s devices, please visit www.linear.com/democircuits.

Buck Regulators

- **LT3697:** 5V step-down converter with cable drop compensation & output current limit (8V–35V to 5V at 6A) www.linear.com/solutions/5476
- **LT8613:** 5V step-down converter with 6A output current limit (5.8V–42V to 5V at 6A) www.linear.com/solutions/5751
- **LT8616:** 5V, 3.3V, 2MHz step-down converter (5.8V–42V to 5V at 1.5A & 3.3V at 2.5A) www.linear.com/solutions/5753
- **LT8640:** 2MHz μ Power ultralow EMI buck converter (5.7V–42V to 5V at 5A) www.linear.com/solutions/5635

Buck-Boost Controllers

- **LT8709:** Negative buck-boost regulator with output current monitor and power good (–4.5V to –38V input to –12V output at 5A) www.linear.com/solutions/5719

SEPIC Converter

- **LT8494:** 450kHz, 5V output SEPIC converter (3V–60V to 5V at 1A) www.linear.com/solutions/5848

Isolated Regulator

- **LTM®8057:** 2kV AC isolated low noise μ Module regulator (3.1V–29V to 5V at 300mA) www.linear.com/solutions/5206

LED Driver

- **LT3952:** Short-circuit robust boost LED driver (7V–42V to 50V LED string at 333mA) www.linear.com/solutions/5749

SELECT MODELS

To search the LTspice library for a particular device model, choose Component from the Edit menu or press F2. Since LTspice is often updated with new features and models, it is good practice to update to the current version by choosing Sync Release from the Tools menu. The changelog.txt file (see root installation directory) list provides a revision history of changes made to the program.

Linear Regulators

- **LT3042:** 20V, 200mA, ultralow noise, ultrahigh PSRR RF linear regulator www.linear.com/LT3042
- **LT3088:** 800mA single resistor rugged linear regulator www.linear.com/product/LT3088

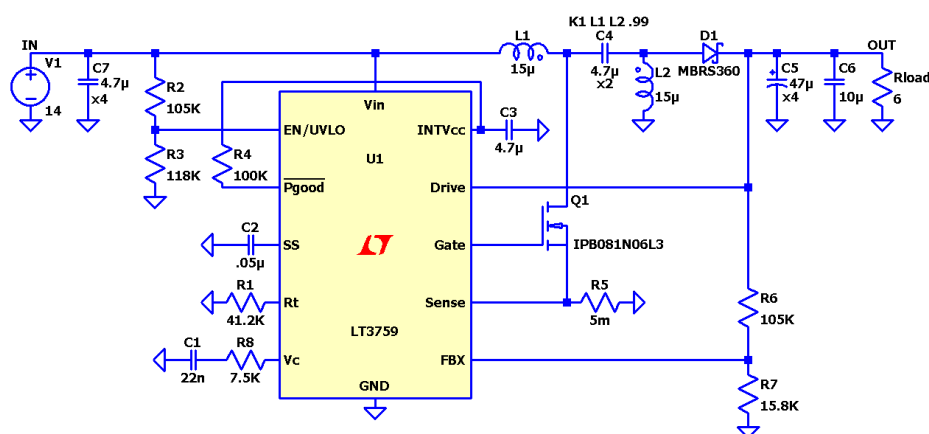
Buck Regulators

- **LT8602:** 42V quad monolithic synchronous step-down regulator www.linear.com/LT8602
- **LTC3887:** Dual output PolyPhase® step-down DC/DC controller with digital power system management www.linear.com/LTC3887
- **LTC7138:** High efficiency, 140V 400mA step-down regulator www.linear.com/LTC7138
- **LTM4622:** Dual ultrathin 2.5A step-down DC/DC μ Module regulator www.linear.com/LTM4622

What is LTspice IV?

LTspice IV is a high performance SPICE simulator, schematic capture and waveform viewer designed to speed the process of power supply design. LTspice IV adds enhancements and models to SPICE, significantly reducing simulation time compared to typical SPICE simulators, allowing one to view waveforms for most switching regulators in minutes compared to hours for other SPICE simulators.

LTspice IV is available free from Linear Technology at www.linear.com/LTspice. Included in the download is a complete working version of LTspice IV, macro models for Linear Technology’s power products, over 200 op amp models, as well as models for resistors, transistors and MOSFETs.



Be sure to check for recently added demonstration circuit simulations, such as this wide input voltage range boost/SEPIC/inverting controller: 2.5V to 36V input, 12V/2A output SEPIC converter (automotive 12V regulator).

- **LTM4675:** Dual 9A or single 18A μ Module regulator with digital power system management www.linear.com/LTM4675

- **LTM4676A:** Dual 13A or single 26A μ Module regulator with digital power system management www.linear.com/LTM4676A

Multitopology Controller

- **LT8570:** Boost/SEPIC/inverting DC/DC converter with 65V switch, soft-start and synchronization www.linear.com/LT8570

Surge Stopper

- **LTC7860:** High efficiency switching surge stopper www.linear.com/LTC7860

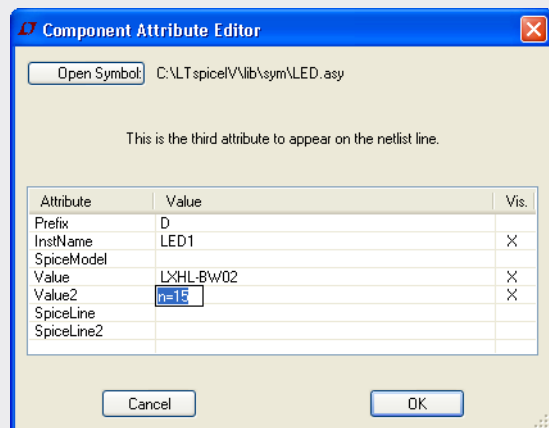
Wake-Up Timer

- **LTC2956:** Wake-up timer with pushbutton control www.linear.com/LTC2956 ■

Power User Tip

TIGHTEN UP YOUR SCHEMATICS: COMBINE MULTIPLE MODEL INSTANCES INTO ONE SYMBOL

When you need multiple instances of a model, it is easy to copy and paste a symbol, but sometimes you can tighten up your schematics by using a single symbol to define multiple instances of same device. For instance, instead of placing four identical capacitor symbols in parallel, use one symbol times four, "x4". This feat can be accomplished using the M (parallel units) or N (series units) parameters.



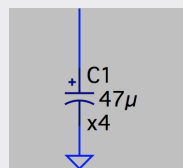
A number of intrinsic devices support the M (parallel units) parameter, such as the capacitor, inductor, diode and MOSFET models. If you are not sure if the model supports the M (parallel units) parameter, try it, and if you do not get an error message, you should be good. The diode (including LED) model is the only intrinsic model that supports N (series units) parameter.

To define multiple instances of a model in a device symbol:

1. Ctrl + right-click the symbol to edit the component attributes.
2. Insert "m=<number>" or "n=<number>" into the Value2 field. Note that non-integer <number> values are allowed.
3. Make the multiple instances visible in your schematic by selecting the Value2 attribute and clicking the Vis column.

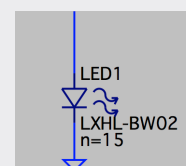
Parallel Capacitors

To match certain electrical schematic standards you can define parallel capacitors either using "m=<number>" or "x<number>" syntax as in "x4".



Series (String) of LEDs

Diodes are the only intrinsic models that support the N (series units) parameter.



Happy simulations!