

THE LINKSWITCH-TN CHIPS, which come in DIP or surface-mount packages, can form an all-surface-mount power-supply design.

ates a regulated output, no zeners or linear regulators are required as with cap droppers.

Switchers built around the new chips will also improve efficiency. While a cap dropper supply typically achieves about 20% efficiency, LinkSwitch-TN switchers will achieve efficiencies ranging from 65% to 85%. The higher efficiency will enable equipment makers to reduce standby current to the levels required for Energy Star and Blue Angel certifications.

In a self-powered buck topology with optocoupler feedback, the chips consume just 50 mW of no-load power when operating from a 115 V ac source. That value rises to 80 mW when the source is 230 V ac. Even better performance is achieved in a flyback topology with external bias circuitry. In this case, no-load power consumption is 7 or 12 mW, respectively, with a 115- or 230-V ac source.

As with other switching power supplies, those based on LinkSwitch-TN

can operate from a universal input voltage range (85 to 265 V ac). So unlike cap-dropper circuits and linear supplies, which require multiple versions to satisfy different input voltage requirements, LinkSwitch-TN supplies will be suitable—using a single design—for all of the line voltages encountered globally.

In terms of overall supply size, the new chips also have an edge. In cap droppers, X2 safety-rated capacitors are required for 230-V ac input systems. These are large through-hole parts. Yet the LinkSwitch-TN chips, which come in DIP or surface-mount packages, can form an all-surface-mount power-supply design (*see the table, “LinkSwitch-TN-Based Switcher Versus Cap-Dropper Power Supply,” below*).


The LinkSwitch-TN-based switching power-supply designs resemble existing solutions like Power Integrations’ TinySwitch. Like TinySwitch, LinkSwitch-TN employs an on-off con-

trol scheme in which the on-time for each switching cycle is set by the value of the external inductor, the chip’s current limit, and the value of the high-voltage dc input bus. Output regulation is achieved by skipping switching cycles in response to an on/off signal applied to the Feedback pin (Enable on TinySwitch). Contrast this with the standard pulse-width-modulation (PWM) control, where the duty-cycle of the switching frequency is altered in response to load changes.

But unlike TinySwitch, the logic of the Feedback pin has been inverted in the LinkSwitch-TN. And, this pin also functions as the voltage reference. Consequently, a direct feedback scheme can be employed in the buck or buck-boost topologies. This innovation eliminates the external optocoupler and zener voltage reference required by TinySwitch while still achieving ±10% voltage regulation at the rated output current.

Eliminating the optocoupler and zener saves cost, making the LinkSwitch-TN switcher design affordable in new applications. At the same time, it overcomes the high-temperature and humidity problems associated with optocouplers.

LinkSwitch-TN’s auto-restart mode protects the chips against output overloads and short-circuits, as well as open-loop conditions. In addition, jittering of the switching frequency reduces EMI by approximately 10 dB, reducing external filtering requirements to a simple resistor in many cases.

The LinkSwitch-TN family includes three models—LNK304, LNK305, and LNK306—which are rated for output currents of 170, 280, and 360 mA, respectively, when operated in a continuous conduction mode. Each model is offered in an eight-pin DIP (LNK30xP) or surface-mount package (LNK30xG). In lots of 10,000, the LNK304P costs \$0.42.  **ED Online 7155**

Power Integrations
www.powerint.com
(408) 414-9665

LINKSWITCH-TN-BASED SWITCHER VERSUS CAP-DROPPER POWER SUPPLY		
	Cap dropper	LinkSwitch Supply
Output capability	20 to 100 mA of low-voltage output (e.g., 12 V)	0 to 360 mA of low-voltage output
Voltage regulation	No May be used with zener or linear regulator	Yes
Input voltage range	Limited input range requires different supplies for different global requirements	Universal input (85 to 265 V ac)
Efficiency	Approximately 20%	65% to 80%
Standby power	Constant input power (as much as 1 to 3 W in standby)	< 100 mW, meets Blue Angel, Energy Star, and EU standards
Size	Requires an X2 safety-rated capacitor, a large, through-hole component, for 230 V ac	Implements completely surface-mount design
Component count	Approximately 10 components	Approximately 10 components for a buck converter design
Design	Performs voltage stepdown only	Supports buck, buck-boost, and flyback topologies
System cost	Cost-effective at current levels up to 100 mA	Competitive with cap droppers at current levels of 40 mA and higher