

ISSUE: [April 2025](#)

## ***Fifth-Generation Switcher Family Delivers 175 W And 92% Efficiency In Flybacks***

[Power Integrations'](#) TinySwitch-5 extends the output power of its popular family of integrated offline switcher ICs up to 175 W with heatsinking and 230-Vac input, or 190 W with 400-V dc input. The TinySwitch-5 achieves up to 92% efficiency using basic diode rectification and optocoupler feedback (Fig. 1).

Discussing this product family recently at Power Integrations' annual press dinner at APEC, PI's Doug Bailey, VP of marketing, observed that 190 W of output with heatsinking or 10 to 70 W with PCB cooling are power levels that are "almost unheard of" with standard flybacks. The TinySwitch-5 family includes devices with a range of output power ratings from approximately 10 W to 200 W, which correspond to the silicon power switches of different die size that they contain (see the table). Pricing for TinySwitch-5 family members will reflect those different die sizes.

TinySwitch-5 switcher ICs feature an advanced control engine which seamlessly manages switching frequency and power delivery to maximize efficiency, even at light loads (Fig. 2). This enables power supplies that easily meet the light-load power consumption limit of 300 mW, set by the European Commission Energy-related Products (ErP) Directive 2009/125/EC, while still delivering up to 220-mW output power for display, controls and communications functions.

In addition, the enhanced thermally efficient eSOP-12 package means that TinySwitch-5 ICs can deliver up to 75 W without a heatsink. Line undervoltage and overvoltage protection ensures robustness for use in countries with unstable mains power.

Prior to the introduction of this TinySwitch-5 family, the highest power available from a TinySwitch device was 36.5 W. This is the rating of the TNY290K with 230-Vac input with the IC configured in an open-frame power supply design. The TNY290K is a member of the TinySwitch-4 family. There are similarly rated parts in the TinySwitch-3 and -LT families.

The ratings of those earlier devices were, at least in part, limited by the power dissipation capabilities of dual-inline (DIP) and standard outline (SOP) packages, which at best had an exposed metal pad on the underside for dissipating heat through the PCB. In contrast, the eDIP-12 and eSIP-7 in which the TinySwitch-5 switchers are offered have exposed topside or vertical pads that accept attachment of external heatsinks.

Silvestro Fimiani, director of product marketing at Power Integrations said, "TinySwitch has become the gold standard for small power supplies because of its efficiency and ease of use. With TinySwitch-5, designers can scale up to 175 W at highline input, while easily achieving 220 mW of output and meeting the needs of appliance manufacturers subject to the European Union ErP-mandated 300-mW standby power rule."

Other benefits of the TinySwitch ICs include low parts count as they integrate a power supply controller, driver, power switch, start-up, and protection; good accuracy as they enable  $<\pm 5\%$  regulation across line, load, production, and temperature; fast transient response; and versatility as they can be used to build both single and multi-output offline flybacks. They also accommodate a range of power levels and an extended wide input range.

With more than six billion units sold around the world, TinySwitch ICs are widely used in bias and auxiliary supplies in appliance, computing, communications, industrial and medical applications. Designers have long appreciated TinySwitch products for their design simplicity and high efficiency—particularly at light load, says the vendor. TinySwitch ICs were the first to feature Power Integrations' EcoSmart technology, which has saved an estimated 200 terawatt-hours of electricity since 1998, says the company, by slashing standby power waste.

Pricing for TinySwitch-5 starts at \$0.35 for 10,000-unit quantities. Reference designs are available which document a 12-W single-output power supply (DER-1017); a 26.5-W dual-output power supply with excellent standby efficiency (RDR-1016); a 36-W single-output power supply with high efficiency at light load (DER-1040); and a 120-W power supply with 92% efficiency at 230 Vac (DER-1027).

For further information, see the TinySwitch-5 product [page](#), or the [DER-1017](#), [RDR-1016](#), [DER-1040](#), and [DER-1027](#) reference design pages. Or contact a Power Integrations sales representative or one of the company's authorized worldwide distributors—[DigiKey](#), [Newark](#), [Mouser](#) and [RS Components](#).

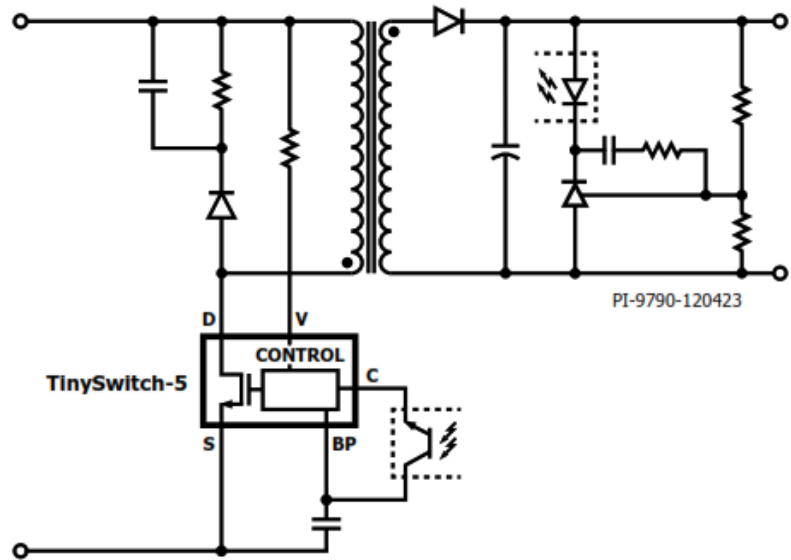





Fig. 1. The fifth generation of TinySwitch offline switcher ICs delivers higher output power, is more efficient and has enhanced protection when compared with previous generations of this product family. TinySwitch-5 flybacks generate 10-W to 70-W output with PCB cooling alone or up to 190+ W of output with heatsink cooling. Flybacks based on TinySwitch-5 also achieve up to 92% efficiency at full-load and >85% efficiency at light load, enabling more functionality in standby and reduced total energy consumption. Enhanced power protection features include line undervoltage and overvoltage, output overcurrent, overpower and short circuit; open loop, mis-wire, and overtemperature protection.

Table. Members of the TinySwitch-5 family cover the output power range from ~10 W to ~200 W.

Part Number	PCB Cooling			Part Number	Metal Heatsink		
	Peak or Open Frame O/P Power (W)				Peak or Open Frame O/P Power (W)		
	400 VDC	230 VAC ± 15%	85 - 265 VAC		400 VDC	230 VAC ± 15%	85 - 265 VAC
TNY5071K	25	22	15	TNY5075E	120	105	70
TNY5071V	25	22	15	TNY5076E	170	155	105
TNY5072K	35	32	20	TNY5077E	190	175	120
TNY5072V	35	32	20				
TNY5073K	50	45	30				
TNY5073V	50	40	25				
TNY5074K	60	55	35				
TNY5074V	60	50	30				
TNY5075K	75	70	45				
TNY5075V	75	70	40				



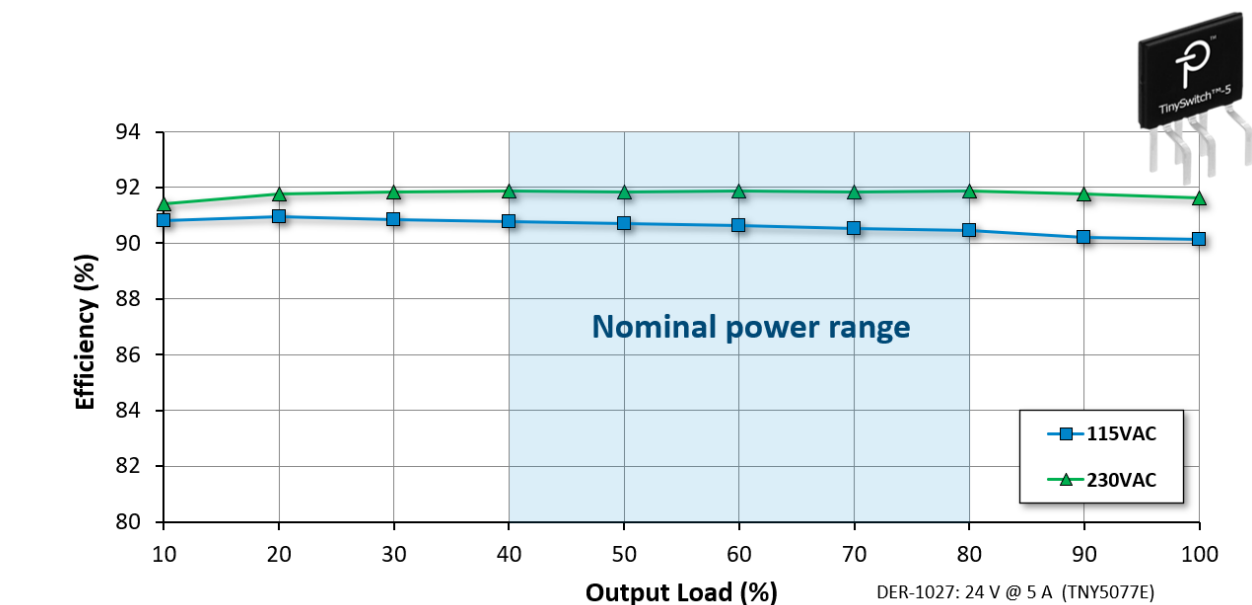
Open frame power supply in 50°C ambient



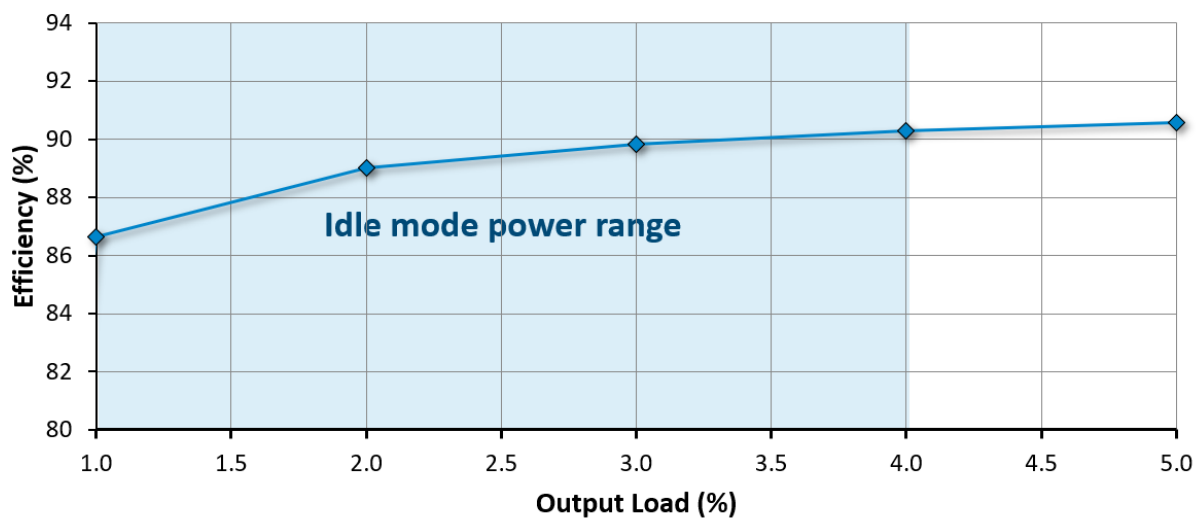
Package K: eSOP-12

Package V: eDIP-12

Package E: eSIP-7



(a)



(b)

Fig. 2. Efficiency of TinySwitch-5 flybacks is flat across the load range (a) and remains in the high 80s percentages even at very light loads as seen in idle modes of operation (b).