

Digital Power Chip Builds Efficient, Low-Cost Supplies for Industrial Applications

Designed to implement power supplies for industrial applications, [iWatt's](#) iW1810 is a primary-side regulated, ac-dc digital PWM IC with an 800-V bipolar power transistor included in package. This co-packaging of the power switch together with other features reduces the number of components and cost required to complete a low-wattage ac-dc power supply (Fig.1.)

At the same time, the chip's high, 64-kHz switching frequency limits the size of the external transformer and capacitors to achieve a compact design. Taken together, the iW1810's integration and high switching frequency enable designers to fit power supplies rated up to 3 W into 25-mm x 25-mm x 15-mm form factors using only 21 components.

The iW1810 uses the company's digital control technology to implement peak-current mode PWM flyback converters, which operate in a quasi-resonant mode to achieve high efficiency and low EMI. The efficiency is such that supplies based on the iW1810 easily meet Energy Star 2.0 efficiency specifications for external power supplies (see the table.)

The reduced EMI helps lower power supply BOM costs by reducing the number of EMI filter components required. The device, which employs primary-side regulation, also lowers costs by eliminating the opto-coupler and secondary-side shunt reference commonly used for isolation. Digital feedback and control allows better than +2% output voltage regulation in typical isolated power supply designs

With its internal 800-V bipolar power transistor offering protection against voltage spikes, the iW1810 implements rugged offline power supplies for household appliances, motor controls, and smart meters. The bipolar power transistor also generates less EMI than a comparable power MOSFET due to the bipolar's slower switching slew rates.

Other features of the iW1810 include less than 100 mW of standby power consumption, soft start, and extensive safety features. These include overvoltage, short-circuit, and current-sense resistor short-circuit protection.

"The iW1810 combines the performance benefits of digital power with an integrated 800-V power transistor for ease-of-use and ample power supply voltage de-rating," says Zahid Rahim, vice president and general manager of iWatt's AC-DC business unit.

In addition to meeting Energy Star, CEC, and ECC energy standards, power supplies based on the iW1810 are compliant with worldwide regulatory standards such as EN55022B, CISPR22B, UL1950, and IEC950. The chip comes in a standard SO-8 package with high creepage distance between the high-voltage power transistor collector pin and the adjacent low-voltage pin to comply with industry-wide safety requirements. It is available immediately for \$0.34 in quantities of 10,000 units.

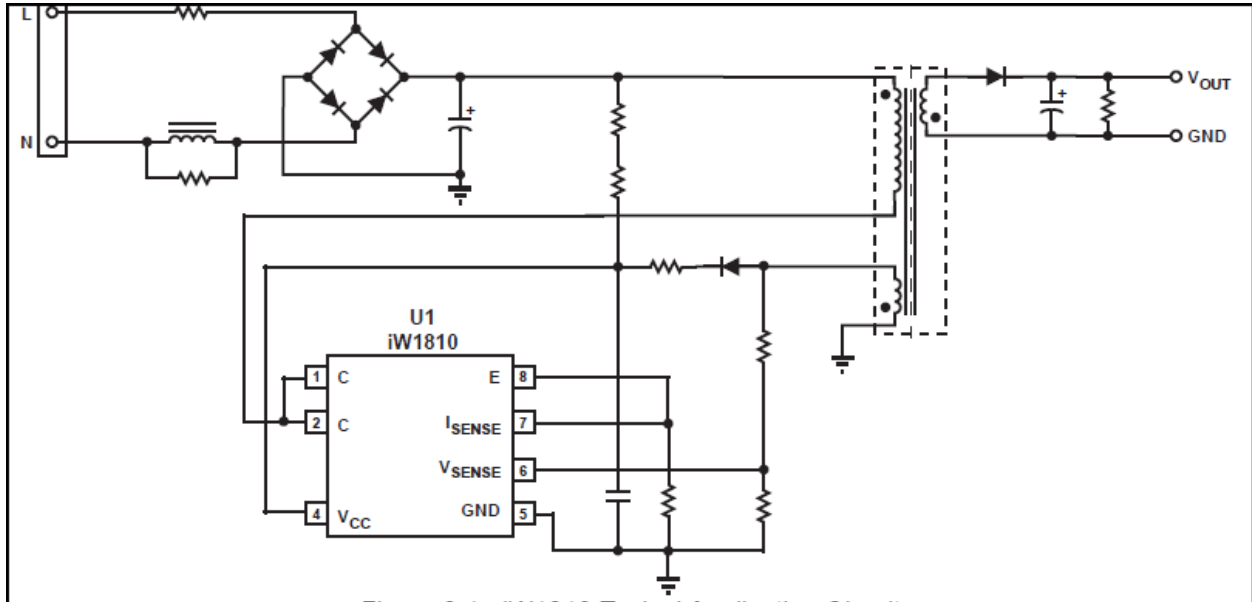


Fig. 1 Aimed at industrial applications, the iW1810 is a digitally controlled PWM IC with a built-in 800-V bipolar power transistor. This device requires few external components to complete a low-wattage ac-dc power supply as shown in this typical application circuit.

Table. A 3-W ac-dc power supply based on the iW1810 easily meets the Energy Star 2.0 specification for external power supplies. For 3-W rated standard models, this specification requires a min. average efficiency in active mode of 64.3%.

V _{IN} (V ac)	I _{OUT} (mA)	P _{IN} (W)	Measure at end of PCB				Measure at end of Cable (26 AWG/1.8m, R _{Cable} =0.51Ω)			
			V _{OUT_PCB} (V)	P _{OUT_PCB} (W)	EFF _{PCB} (%)	AV-EFF _{PCB} (%)	V _{OUT_Cable} (V)	P _{OUT_Cable} (W)	EFF _{Cable} (%)	AV-EFF _{Cable} (%)
115	150	1.01	5.11	0.77	76.19	78.21	5.03	0.76	75.05	75.28
	300	1.95	5.12	1.54	78.69		4.97	1.49	76.34	
	450	2.92	5.13	2.31	79.06		4.90	2.21	75.52	
	600	3.91	5.14	3.08	78.92		4.83	2.90	74.22	
230	150	1.06	5.14	0.77	72.80	76.44	5.06	0.76	71.72	73.56
	300	2.01	5.12	1.54	76.27		4.97	1.49	73.99	
	450	2.97	5.13	2.31	77.78		4.90	2.21	74.30	
	600	3.91	5.14	3.08	78.92		4.83	2.90	74.22	