

**Regulator Uses Less Power, Fewer Parts Than Conventional Cap-Drop Designs**

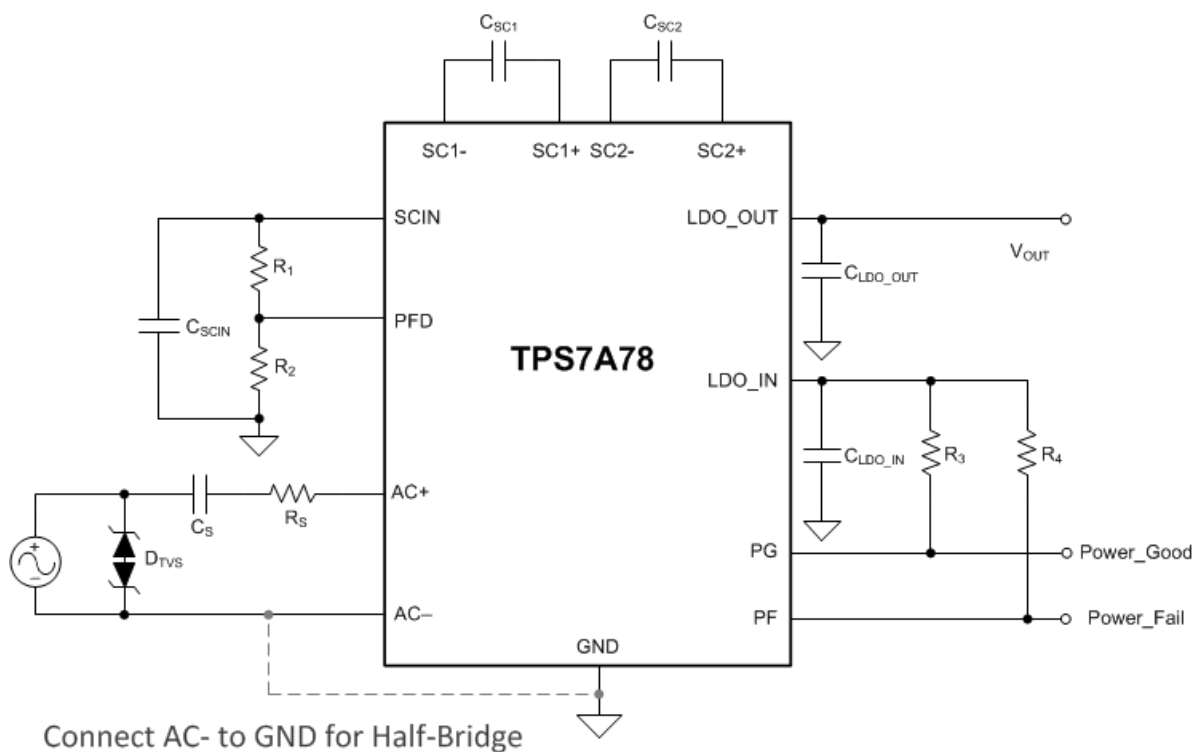
[Texas Instruments'](#) TPS7A78 is being introduced as a first-of-its-kind smart ac-dc linear regulator. According to the company, with its 75% higher efficiency and twice the power density of other linear regulators, this device achieves the best balance between high efficiency and ultra-low noise while shrinking power-supply size.

The fully integrated TPS7A78 linear regulator uses a unique switched-capacitor architecture to eliminate discrete components, including external inductors and transformers and miniature circuit breakers and interrupters, for tamper-resistant designs. Applications for this regulator include electronic metering in grid infrastructure and building automation (Fig. 1).

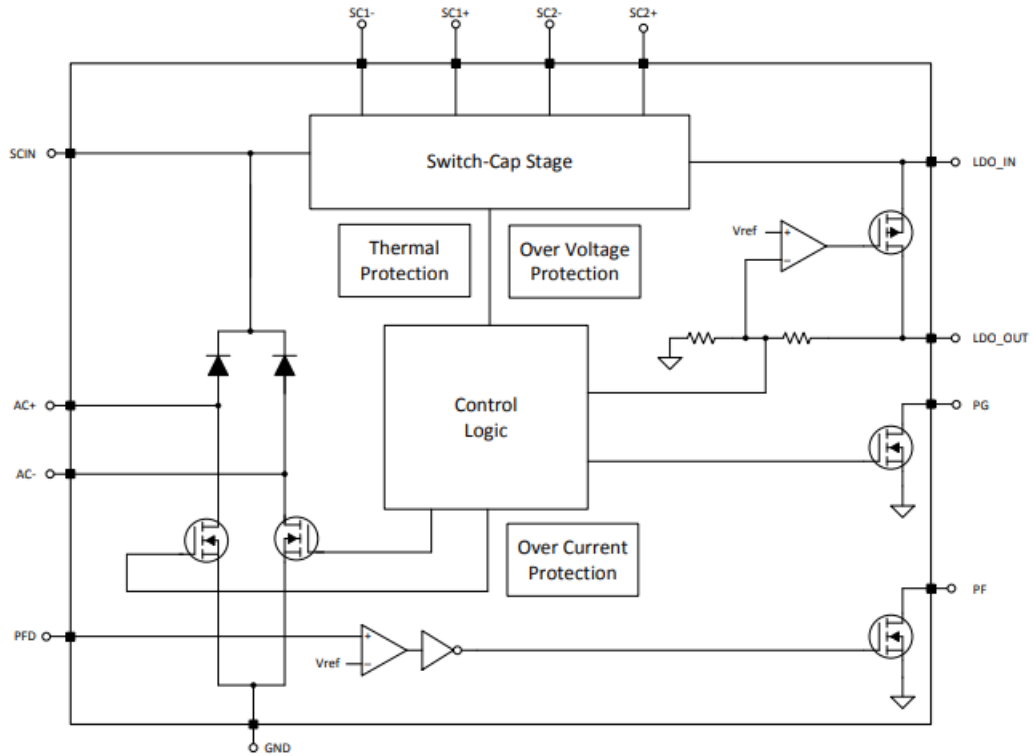
The TPS7A78 is a nonisolated linear regulator that delivers up to 0.5 W from ac to dc with smaller, fewer components. This smart design optimizes regulation through an active bridge, switch capacitor and integrated low-dropout regulator (LDO) (Fig. 2). This design results in higher efficiency and a reduced capacitor size compared to linear regulators in traditional capacitor-drop solutions utilizing a Zener diode.

A unique dynamic active bridge clamp pre-regulates the input voltage for optimal performance to reduce standby power to 10 mW, which is up to 75% lower compared to traditional capacitor-drop solutions. The switched-capacitor architecture eliminates up to 26 discrete components, including the bridge rectifier. This architecture reduces capacitor size by 25% compared to traditional capacitor-drop solutions. Offering tamper-proof design, the TPS7A78 is free of costly magnetic shielding, thus meeting the International Electrotechnical Commission (IEC) 61000-4-8 standard required by applications.

Available through the TI store and authorized distributors, the TPS7A78 is offered in a 14-pin, 5-mm by 6.5-mm TSSOP and priced at \$1.00 in 1,000-unit quantities. For more information and to request samples, see [www.ti.com/TPS7A78-pr](http://www.ti.com/TPS7A78-pr). To learn more watch the video, "[What is a smart AC/DC linear regulator?](#)"



*Fig. 1. The TPS7A78 ac-dc linear regulator uses an external capacitor to create a current source and actively clamps the rectified voltage. The device then regulates the voltage down to the application-specific operating voltage. The unique architecture of the device allows the standby power to be reduced from several hundreds of milliwatts to just a few tens of milliwatts.*



*Fig. 2. The regulator's switched-capacitor architecture eliminates up to 26 discrete components, including the bridge rectifier. This architecture reduces capacitor size by 25% compared to traditional capacitor-drop solutions.*