Digital PWM Controller Cuts BOM Cost, Standby Power In Smartphones

Eyeing low-cost smartphone adapters and chargers, Dialog Semiconductor has released a digital pulse-width modulation (PWM) controller with the ability to efficiently drive low-cost bipolar junction transistor (BJT) switches. By allowing designers to replace field-effect transistors (FETs) with lower-cost BJTs in these power supplies (Fig.1), Dialog's iW1679 controller promises to reduce the BOM cost in 5-V/2-A smartphone adapters and chargers, while lowering standby power in these applications. Additional BOM cost savings come from Dialog's PrimAccurate primary-side control technology that eliminates the need for a secondary-side regulator and optical feedback isolator.

According to Dialog, the iW1679 reduces BOM costs while achieving high efficiency through the use of the company's adaptive multi-mode PWM/PFM control that dynamically changes the BJT switching frequency. It optimizes the system to improve light-load efficiency, power consumption and EMI, says Dialog.

The company's test results show that the iW1679 provides an active average efficiency of 83% and maintains high efficiency at loads as light as 10% while achieving <30 mW no-load standby power with fast standby recovery time. The maker claims that the high performance of iW1679 will enable designers to meet or exceed emerging global energy standards, including the stringent proposed European Code of Conduct (CoC) version 5, as well as the proposed U.S. DoE regulation, and the Energy Star EPS 2.0. While the European CoC version 5 is anticipated to require 76% active average efficiency and high light-load efficiency down to 10% loads, the proposed U.S. DoE is expected to require 79% active average efficiency, and the Energy Star EPS 2.0 will require 73% active average efficiency for compliance.

Ron Edgerton, vice president and general manager for Dialog's Power Conversion Business Group, indicates that with the launch of the iW1679, the company is extending its extensive knowledge in driving BJTs in 5 W and lower power supplies to higher-power applications. Although, BJTs reduce cost compared to FETs, BJT drive requirements are more complex, says the executive.

The manufacturer says that the iW1679 solves the challenge of driving BJTs by using the company's digital control technology to actively modulate the BJT base current drive. As a result, it keeps the BJT out of saturation to optimize the performance and improve efficiency. Since BJTs have softer switching compared to FETs, they generate less noise and, therefore, have inherently lower EMI. In fact, to further reduce EMI, simplify manufacturing and minimize the need for external EMI filtering components, the iW1679 incorporates Dialog's EZ-EMI technique. In addition, the new PWM controller also employs a proprietary switching mode that results in no audible noise.

The iW1679 offers a user-configurable, four-level cable drop compensation option to eliminate the ordering and inventory challenges of stocking multiple product versions for various output voltage needs. It comes in a standard, low-cost, 8-lead SOIC package (Fig.2) and offers full protection from fault conditions, including output short circuit, output overvoltage, output overcurrent, and overtemperature protection. In production, the iW1679 is priced at $0.29 each in 1000-piece quantities.

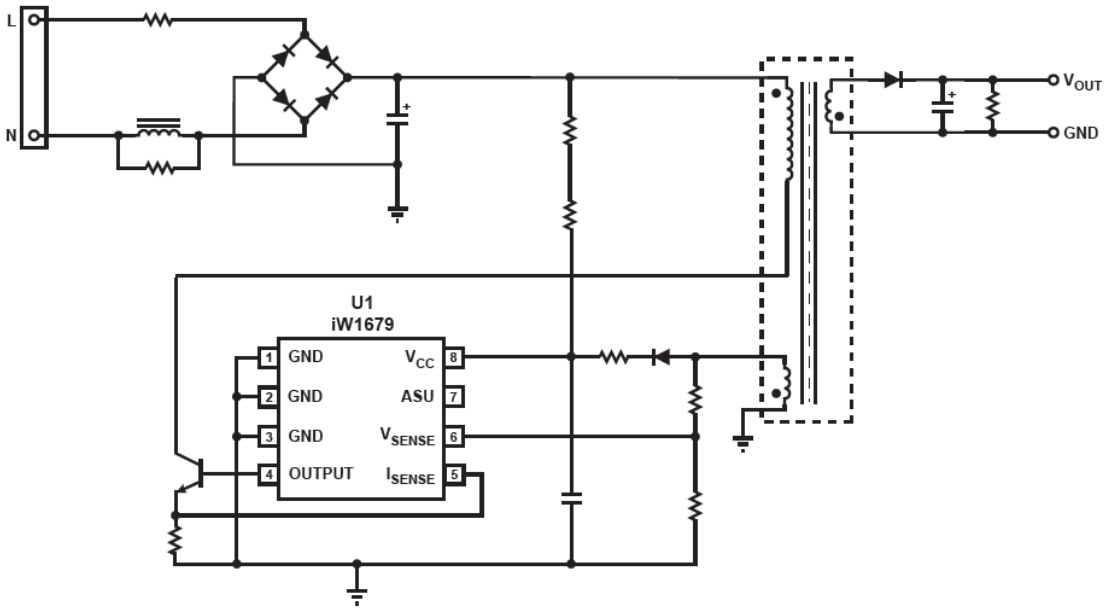

Fig.1. To lower BOM cost, the iW1679 PWM controller directly drives a low-cost power bipolar junction transistor instead of a more-costly FETs. Quasi-resonant operation enables high efficiency.

Fig.2. The PWM controller comes in a standard 8-lead SOIC package.

—Contributed by Ashok Bindra