Adapter power IC speeds adoption of universal USB charging

Steve Taranovich - August 21, 2012

Texas Instruments Incorporated (TI) introduced its efficient power management controllers with standby power savings that will help smartphone users use less electricity with their 5-watt cube adapters, even when they are left plugged into the wall. The UCC28700 primary-side controllers will result in smaller cubes, wireless power charging stations and other AC powered equipment. TI also introduced the TPS2511, an intelligent USB charging controller that complies with USB Battery Charging 1.2 specifications for charging adapters of popular smartphones or 5-V tablets.

The USB Battery Charging 1.2 Compliance Plan, Rev. 1.0 dated October 12, 2011 states, “Previously a USB Portable Device with a battery and charging capability simply took power from a USB port without any control. With BC 1.2, a Portable Device can get more power and the battery can be charged faster. It is important to verify that a Portable Device complies with the BC 1.2 specification while communicating with a Charging Downstream Port and identifying a Dedicated Charger, and ensuring that it continues to operate as a functional USB device.”
No-load adapter power

Phone and adapter makers must meet new 5-Star low-power charging rating of <30mW, as set by the European Commission’s Integrated Product Policy (EC IPP), so consumers can select 5-W adapters that use the least energy. The UCC28700 flyback controllers meet this requirement with low standby power consumption, small size and low component count with excellent power density.
Key capabilities of the UCC28700:

- Low power adapter technology: Able to achieve <30-mW standby power consumption and requires only 1.5uA startup current.
- Small size: High integration with primary side regulation (no opto-feedback circuit needed); a wide input voltage range results in smaller capacitors; high frequency allows smaller transformers; and no need for a microcontroller and battery in the adapter.
Making smartphone and tablet charging universal

Today’s mobile users are frustrated with phone and tablet 5-W and 10-W chargers that cannot support more than one brand name device. Consumers often need an additional charger when they purchase a new mobile device, adding to the number of adapters in a home – and ultimately end in a landfill. TI’s TPS2511 intelligent USB charge controller meets the USB Battery Charging 1.2 specification, plus additional charge algorithms. It combines a current-limit USB power switch and a USB dedicated charging port identification circuit to automatically detect USB 2.0 and 3.0 data line voltages, and provide the correct electrical signature to safely charge compliant devices.

Key capabilities of the TPS2511:

- Meets regulatory requirements set forth by USB Battery Charging 1.2, as well as the Chinese Telecom Specification YD/T 1591-2009.
- Supports many popular smartphones or 5-V tablets using universal charging capability.

Speed time to market with reference designs

TI introduced several new reference designs for download that include the TPS2511, UCC28700 and other TI power management circuits.
Designers can order the following by clicking on the links:

- Universal AC input, 5V, 2.1A smart USB charger cube (TPS2511, UCC28700)
- Universal car charger for USB devices (TPS2511, TPS40240)
- Dual-port USB universal car charger (TPS2511, TPS40170)

**Availability and pricing**
The UCC28700 flyback controller is available in a 6-pin, 3-mm x 3-mm SOT-23 package, and is priced as low as $0.35 in quantities of 1,000. TI’s new TPS2511 universal charger controller comes in an 8-pin, 3-mm x 5-mm MSOP package, and is priced at $0.90 in quantities of 1,000.

See also EDN Tech Paper “How to design a dual-port USB universal car charger”

USB Approved Class Specification Documents http://www.usb.org/developers/devclass_docs

High-efficiency AC adapters for USB charging-- Tech paper on EDN