

# MAX14640–MAX14644/MAX14651

## USB Host Adapter Emulators

### General Description

The MAX14640–MAX14644/MAX14651 are next-generation USB 2.0 host charger adapter emulators that combine USB Hi-Speed analog switches with a USB adapter emulator circuit.

The MAX14640/MAX14651 feature an I<sup>2</sup>C interface to fully configure the charging behavior with different address options. The MAX14641–MAX14644 are controlled by two GPIO inputs (CB1/CB0) and support USB data and automatic charger mode. In charging downstream port (CDP) pass-through mode, the devices emulate the CDP function while supporting normal USB traffic. The MAX14641/MAX14642/MAX14643 have a CEN output for an active-high CLS enable input, and the MAX14644 has a CEN output for an active-low CLS enable input to restart the peripheral connected to the USB host.

The MAX14640–MAX14644/MAX14651 feature 2A high-current autodetect mode. The MAX14641 features 1A high-current forced mode instead of regular DCP mode. The MAX14640/MAX14651 can be configured through I<sup>2</sup>C to support various dedicated charger modes such as DCP, Apple® 1A/2A forced, or Apple 1A/2A automatic mode.

All the devices support CDP and standard downstream port (SDP) charging while in the active state (S0) and support the dedicated charging port (DCP) charging while in the standby state (S3/S4/S5). All devices support low-speed remote wake-up by monitoring DM, and the MAX14642 also supports remote wake-up in sleep mode (S3).

The MAX14640–MAX14644/MAX14651 are available in an 8-pin (2mm x 2mm) TDFN-EP package and are specified over the -40°C to +85°C extended temperature range.

**Ordering Information and Typical Operating Circuit appear at end of data sheet.**

### Benefits and Features

- ◆ **Improved Charger Interoperability**
  - ◇ **USB (CDP) Emulation**
    - Smart CDP
    - Foolproof CDP
    - Meets New USB Battery Charging (BC) Revision 1.2 Specification
  - ◇ **Backward Compatible with Previous USB BC Revisions**
  - ◇ **Meets China YD/T1591-2009 Charging Specification**
  - ◇ **Supports Standby-Mode Charging for Apple BC Revision 1.2 Compatible Devices**
- ◆ **Provide Greater Application Flexibility**
  - ◇ **I<sup>2</sup>C Controls Multiple Modes (MAX14640/MAX14651)**
  - ◇ **CB0 and CB1 Pins Control Multiple Automatic and Manual Charger States**
- ◆ **Enhance Performance with High Level of Integrated Features**
  - ◇ **Supports Remote Wake-Up**
  - ◇ **Low-Capacitance USB 2.0 Hi-Speed Switch to Change Charging Modes**
  - ◇ **Automatic Current-Limit Switch Control**
  - ◇ **±15kV ESD Protection on DP/DM**
- ◆ **Minimize PCB Area**
  - ◇ **2mm x 2mm, 8-Pin TDFN Package**

### Applications

Laptop/Desktop Computers

USB Hubs

Universal Chargers Including iPod®/iPhone®/iPad®

### Selector Guide

PART NUMBER	I/O MODE	CEN POLARITY	REMOTE WAKE-UP IN AM	FORCED CHARGER MODE	BIAS IN FM
MAX14640	I <sup>2</sup> C (0x35)	N/A	Optional	Yes	DP/DM short
MAX14651	I <sup>2</sup> C (0x15)	N/A	Optional	Yes	DP/DM short
MAX14641	GPIO	CEN	No	No	Apple 1A
MAX14642	GPIO	CEN	Yes	Yes	DP/DM short
MAX14643	GPIO	CEN	No	Yes	DP/DM short
MAX14644	GPIO	CEN	No	Yes	DP/DM short

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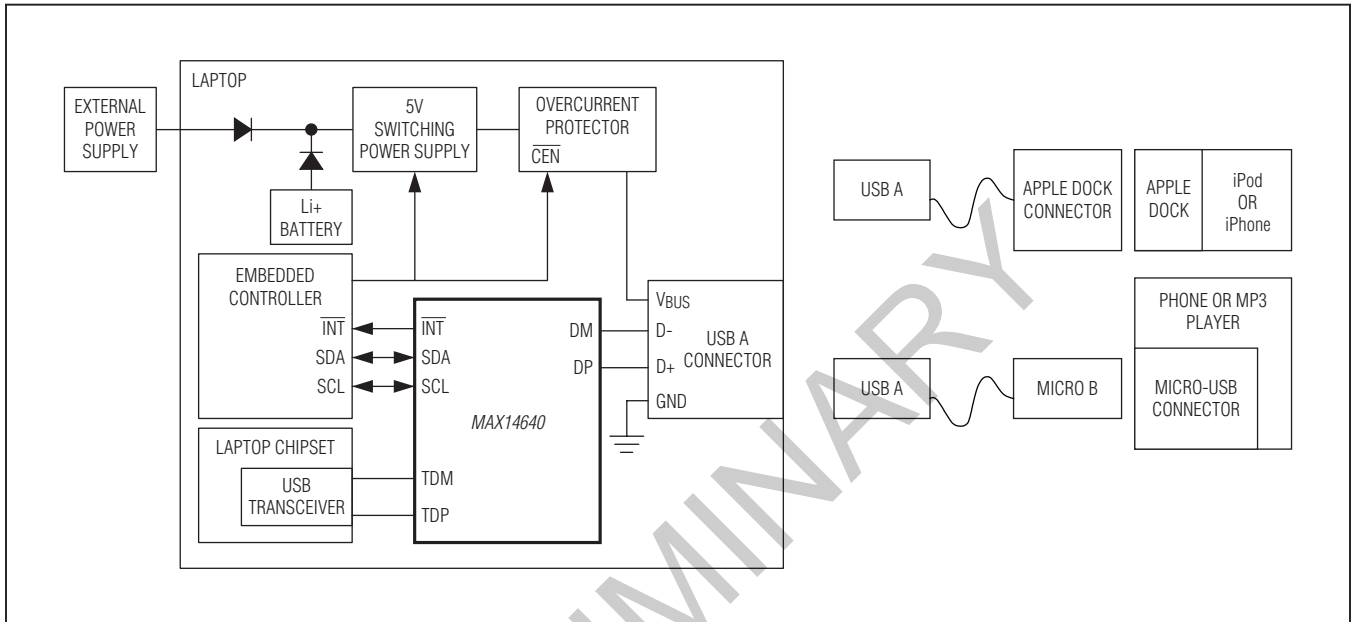
For related parts and recommended products to use with this part, refer to: [www.maximintegrated.com/MAX14640.related](http://www.maximintegrated.com/MAX14640.related)

**For pricing, delivery, and ordering information, please contact Maxim Direct at 1-888-629-4642, or visit Maxim's website at [www.maximintegrated.com](http://www.maximintegrated.com).**

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## USB Host Adapter Emulators

### Typical Operating Circuit



### Ordering Information

PART	TEMP RANGE	PIN-PACKAGE
MAX14640ETA+T	-40°C to +85°C	8 TDFN-EP*
MAX14941ETA+T	-40°C to +85°C	8 TDFN-EP*
MAX14942ETA+T	-40°C to +85°C	8 TDFN-EP*
MAX14943ETA+T	-40°C to +85°C	8 TDFN-EP*
MAX14944ETA+T	-40°C to +85°C	8 TDFN-EP*
MAX14651ETA+T	-40°C to +85°C	8 TDFN-EP*

+ Denotes a lead(Pb)-free/RoHS-compliant package.

\*EP = Exposed pad.

T = Tape and reel.

### Chip Information

PROCESS: BiCMOS

### Package Information

For the latest package outline information and land patterns (footprints), go to [www.maximintegrated.com/packages](http://www.maximintegrated.com/packages). Note that a "+", "#", or "-" in the package code indicates RoHS status only. Package drawings may show a different suffix character, but the drawing pertains to the package regardless of RoHS status.

PACKAGE TYPE	PACKAGE CODE	OUTLINE NO.	LAND PATTERN NO.
8 TDFN	T822+2	<a href="#">21-0168</a>	<a href="#">90-0065</a>