21V, 3.5A/5.5A 1-Cell Li+ Battery Charger with USB Type-C/BC1.2 Detection

MAX77884/MAX77885

General Description

The MAX77884/MAX77885 is a high-performance, high-input 3.5/5.5A fast charger with Smart Power Selector™. The IC can operate as a reverse boost without an additional inductor, allowing the battery to share its power through the charging port, and offers programmable output voltage from 4.3V to 12V. The device features fully integrated low-loss power switches to provide a small solution size and high efficiency, even at high input voltage and high charging current. Its high switching frequency allows the use of a smaller-sized inductor. The IC features true load disconnection in reverse-boost mode and an adjustable output-current protection limit. The device is highly flexible and programmable through I²C configuration. Li-ion, Li-polymer, and LiFePO4 battery chemistries are supported. It can also provide fast, programmable, unplugged source detection for dynamic management of system load. To support a variety of legacy USB and proprietary adapters, the device also integrates BC1.2 detection using the D+ and D- pins.

The battery charger includes a Smart Power Selector to accommodate various battery sizes and system loads. The Smart Power Selector allows the system to start up gracefully when an input source is available, even when the battery is deeply discharged (dead battery) or missing. It can be configured so that the battery charging can automatically start when power is applied to the charger input.

Applications

- Gaming Devices
- VR Applications
- mPOS
- Tablet PCs

Benefits and Features

- High-Efficiency Single-Cell Switching Charger
- Up to 5.5A Charging with MAX77885
- Up to 3.5A Charging with MAX77884
- +26V Absolute Maximum Input Voltage Rating
- 4.4V to 21V Input Operating Voltage Range
- Reverse Boost with Programmable Output Voltage Options from 4.3V to 12V
- Up to 18W with MAX77785
- Up to 12W with MAX77884
- Integrated Battery True-Disconnect FET
  - R_{DSON} = 7.7mΩ
  - Programmable Discharge Current Limit up to 10A
  - Shipping Mode and Low Battery Leakage Current
  - 0.9MHz Switching Frequency with 1.5µH Inductor
  - 1.3MHz Switching Frequency with 1µH Inductor
- Safety
  - Battery Temperature Sensing and Charge Safety Timer
  - JEITA Guideline Compliant
  - Thermal Regulation and Thermal Shutdown
  - System Voltage OVLO/UVLO
- Integrated CC Detection for USB Type-C (MAX77884/MAX77885)
- USB Switch with BC1.2 Detection
- Spread Spectrum for Noise-Sensitive Applications
- Charge Status Output for LED
- Push-Button Input for Exiting from Ship Mode
- Programmable Unplug Detection Output
- I²C Interface
- 3.03mm x 2.96mm Wafer-Level Package (WLP)

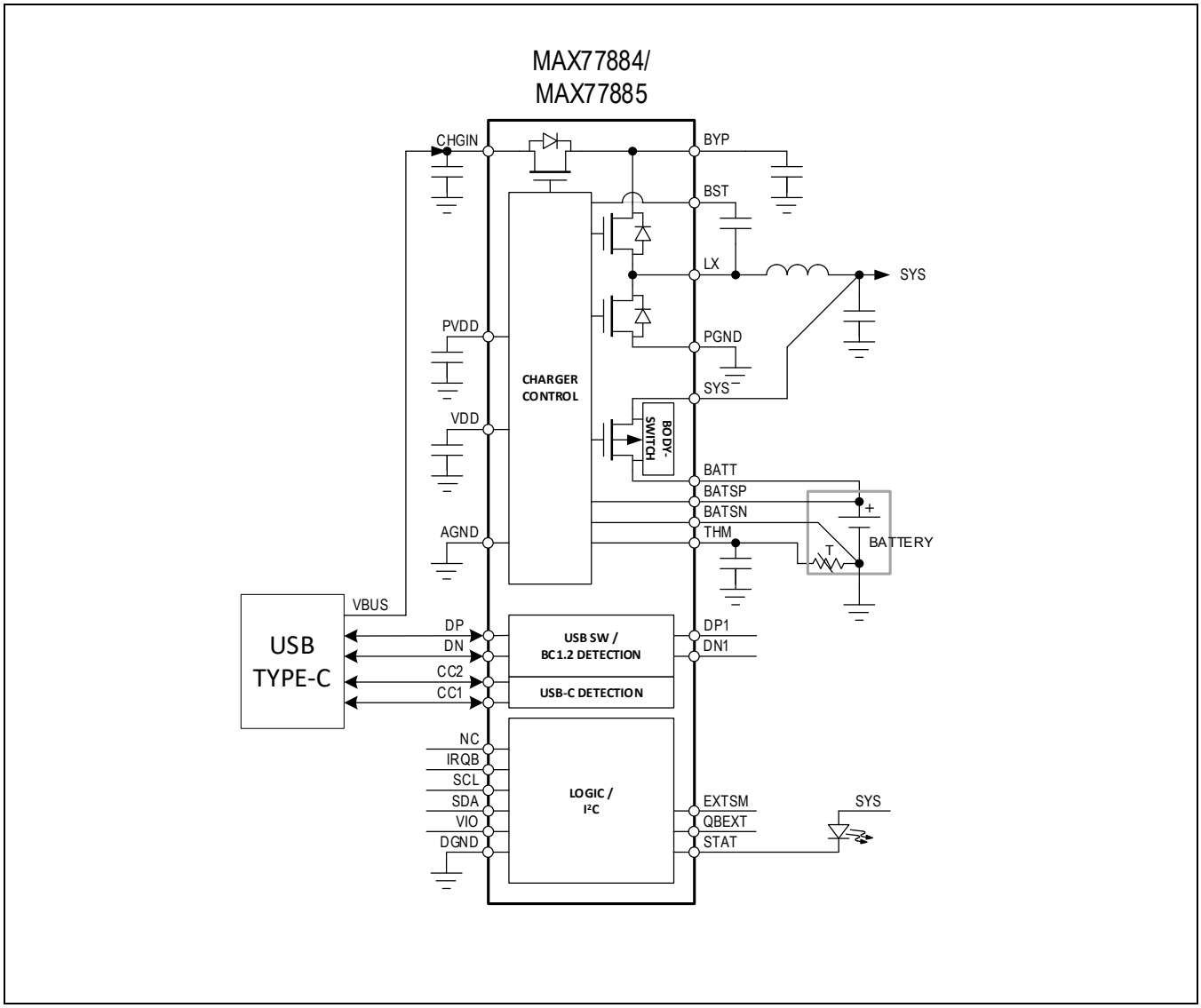
***Ordering Information* appears at end of data sheet.**

Smart Power Selector is a trademark of Maxim Integrated Products, Inc.
USB Type-C is a registered trademark of USB Implementers Forum, Inc.
Power Path is a trademark of Linear Technology Corporation.

Visit Web Support to complete the nondisclosure agreement (NDA) required to receive additional product information.

19-102050; Rev 0; 11/25

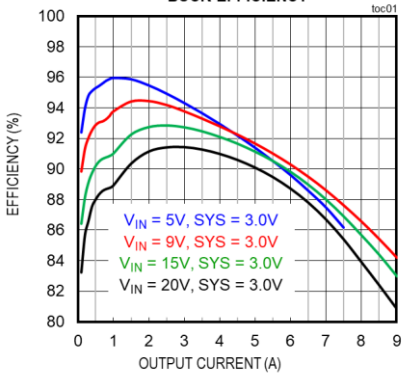
Simplified Block Diagram



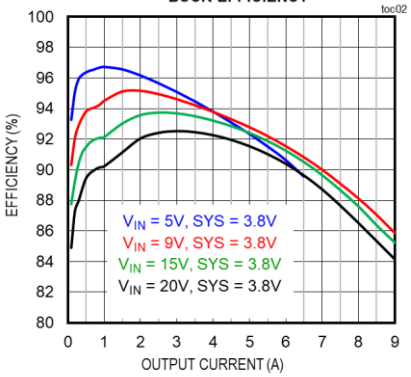
Typical Operating Characteristics

(T_A = +25°C, unless otherwise noted.)

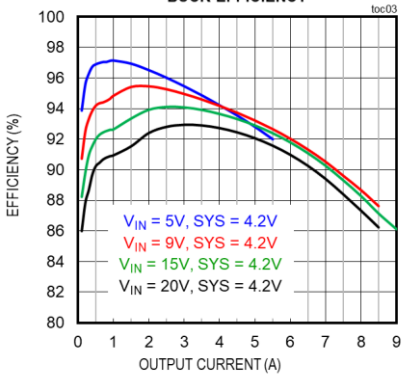
1µH, SYS = 3.0V, 1.3MHz BUCK EFFICIENCY



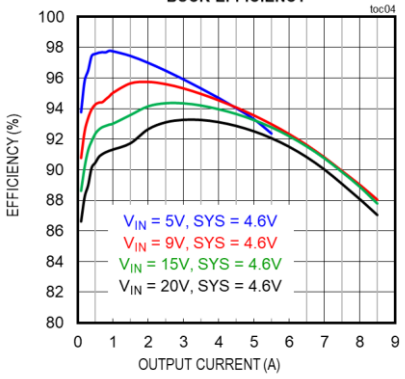
1µH, SYS = 3.8V, 1.3MHz BUCK EFFICIENCY



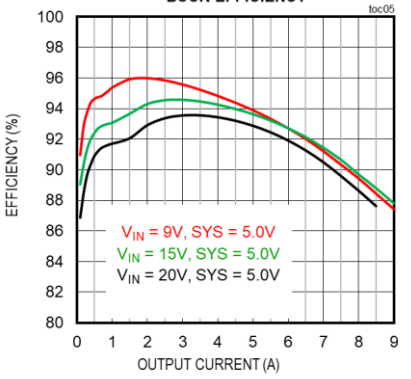
1µH, SYS = 4.2V, 1.3MHz BUCK EFFICIENCY



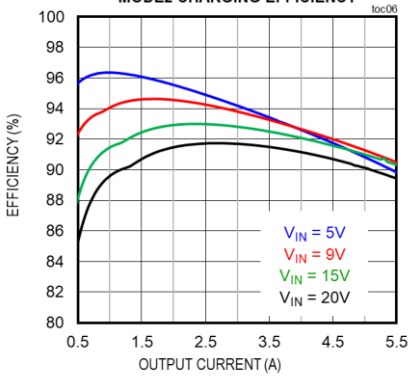
1µH, SYS = 4.6V, 1.3MHz BUCK EFFICIENCY



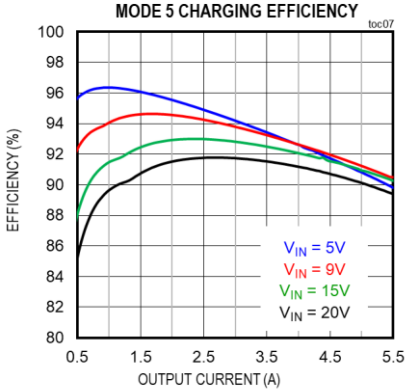
1µH, SYS = 5.0V, 1.3MHz BUCK EFFICIENCY



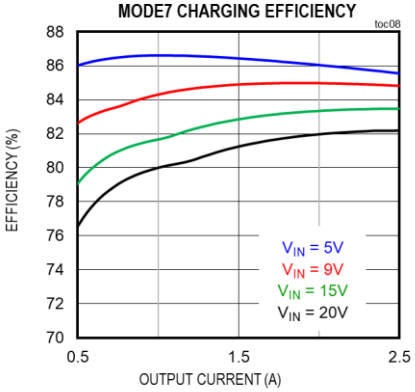
1µH, V_{BATT} = 3.8V, 1.3MHz MODE2 CHARGING EFFICIENCY



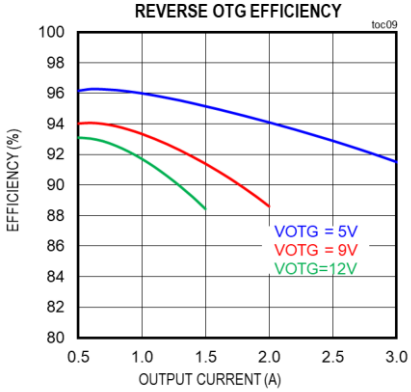
1µH, V_{BATT} = 3.8V, 1.3MHz MODE 5 CHARGING EFFICIENCY



1µH, V_{BATT} = 3.8V, 1.3MHz MODE7 CHARGING EFFICIENCY



1µH, V_{BATT} = 3.8V, 1.3MHz REVERSE OTG EFFICIENCY



Ordering Information

PART NUMBER	TEMP RANGE	MAX FAST-CHARGE CURRENT (A)	INDUCTOR CURRENT LIMIT (A)	REVERSE BOOST POWER CEILING (W)	PIN-PACKAGE	DEFAULT MODE[3:0]
MAX77884AEWJ+	-40°C to +85°C	3.5	9	12	7 x 7 WLP, 0.4mm Pitch, 3.03mm x 2.96mm	0X4
MAX77884AEWJ+T	-40°C to +85°C	3.5	9	12	7 x 7 WLP, 0.4mm Pitch, 3.03mm x 2.96mm	0X4
MAX77885AEWJ+	-40°C to +85°C	5.5	12.8	18	7 x 7 WLP, 0.4mm Pitch, 3.03mm x 2.96mm	0X4
MAX77885AEWJ+T	-40°C to +85°C	5.5	12.8	18	7 x 7 WLP, 0.4mm Pitch, 3.03mm x 2.96mm	0X4

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

T = Tape and reel.

NOTES