System Solution Guide - Preview

USB-C Battery Charger

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Full Guide Preview

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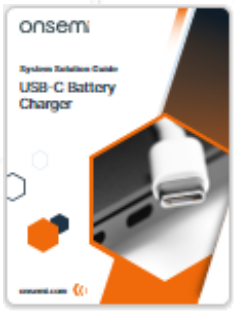

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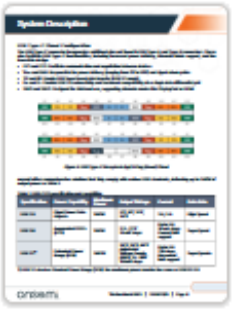
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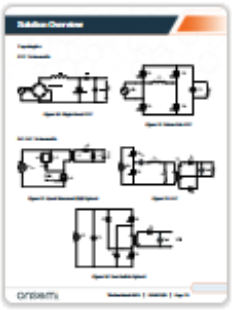
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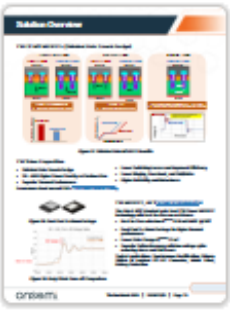
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Block Diagram - USB-C Battery Charger

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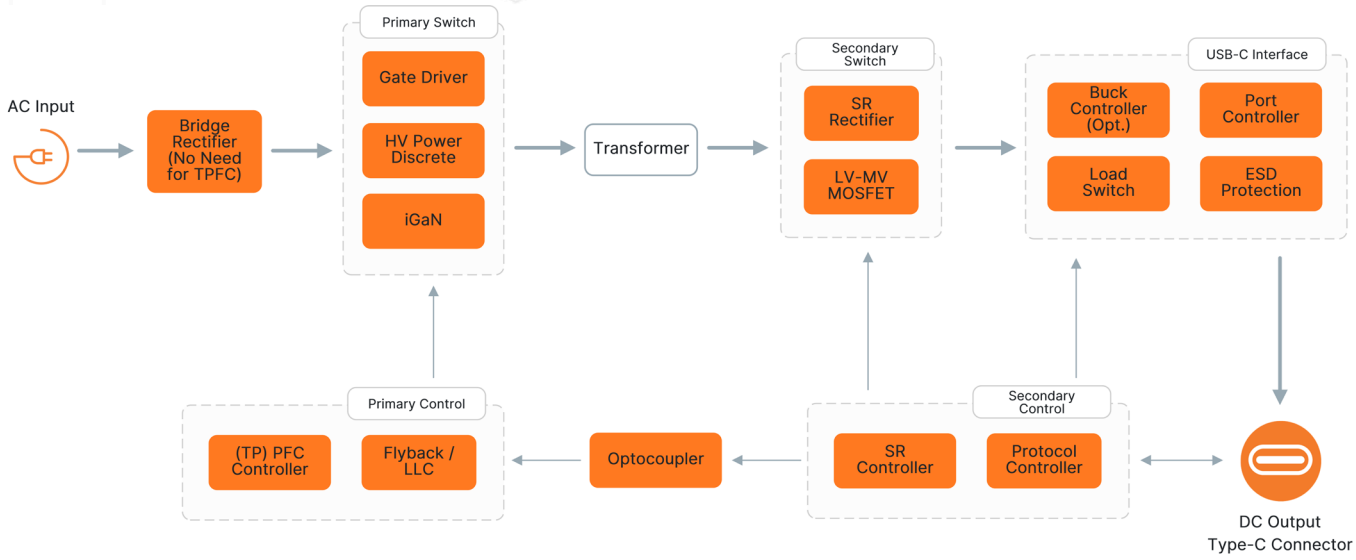
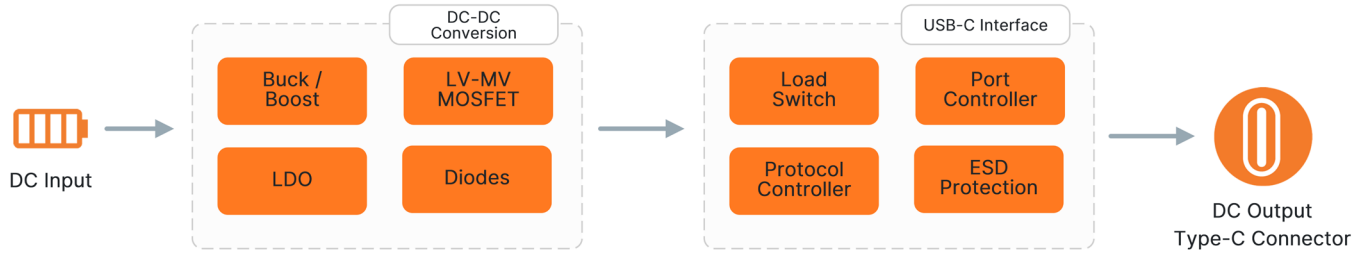
Block Diagram - USB-C Battery Charger

The block diagram below represents USB-C Battery Charger solution created by **onsemi**. The diagram illustrates the power management and power conversion technologies utilized in USB-C battery chargers. It features components such as the TP PFC controller, High-Frequency Quasi-Resonant Flyback / LLC controllers, gate drivers, synchronous rectification, as well as iGaN and MOSFET devices. These elements are categorized into primary and secondary stages to enhance system efficiency. Majority of the functional block devices can be sourced by the **onsemi** solutions as shown in the following device tables.

USB-C Battery Charger - AC Input



USB-C Battery Charger - DC Input (Auto)



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USB-C PD Charger Reference Designs

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onsemi USB-C PD Charger Reference Designs

Leveraging the robust technical expertise, **onsemi** offers a suite of highly efficient system reference designs and evaluation boards, as shown in Table 2.

*Table 2: **onsemi**'s series of USB-C PD system reference boards*

Power Rating	Topologies	Support	Output Voltage	Efficiency (Max.)	Typical Application
65 W	HF QR Flyback + SR	PD3.0 & PPS protocol	3 V – 21 V (PPS)	> 93%	Smart phone, PAD, NB adapter
100 W	CrM Boost PFC+HF QR Flyback + SR	PD3.0 & PPS protocol	3 V – 21 V (PPS)	> 92%	Smart phone, PAD, NB adapter
240 W	TP CrM PFC + 2 Switch Flyback	PD3.1 EPR	up to 48 V	> 95%	Adapter for computer and smartphone, Industrial and lighting power supply
240 W	TP CrM PFC + LLC UHD	PD3.1 EPR	up to 48 V	> 96%	Adapter for computer and smartphone, Industrial and lighting power supply

240W TP CrM PFC + 2 Switch Flyback Reference Design

Leveraging the robust technical expertise, **onsemi** offers a suite of highly efficient system reference designs and evaluation boards, as shown in Table 2.

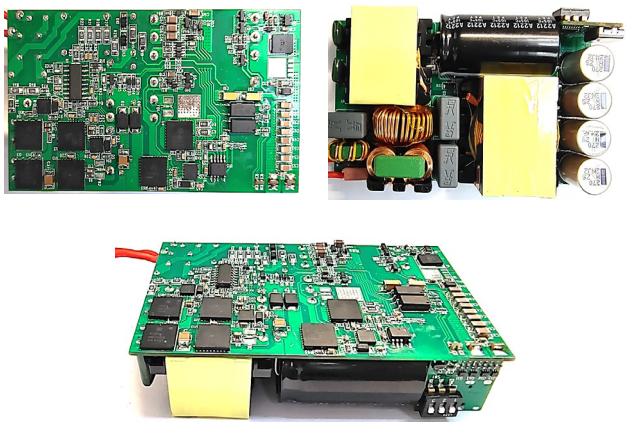

Figure 6: EVB of 240W TPFC + 2SW QR Flyback

Features

- AC input from 90V to 264V
- Totempole CrM PFC + 2SW Flyback Topology
- High Frequency operation with **iGaN**
- Simulated circuit to support PD3.1 multi-output
- Output voltage 5V, 9V, 12, 15V, 20V, 28V, 36V & 48V / 5A
- Ripple & Noise: <150 mV
- Efficiency: AVG 94.75% / 95.43% & Full load 95.12% / 96.17% @115VAC / 230VAC and 48V / 5A
- Output precise OVP, OCP, SCP, Open loop protection
- PCBA size: 89mm x 51mm x 21.5mm, 40W/in^3

Find Reference Design

USB PD Controller FUSB15101

Programmable USB Type-C and Power Delivery 3.1 Source Controller with PPS Support

Key Features:

- Fully Programmable and Upgradable Open−source Firmware providing API for Customer Specific Device Policy Manager Development
- Robust Collection of Peripherals including DACs, ADC, NTCs and NMOS Gate Driver
- Programmable Constant Voltage & Current Control with Cable Drop Compensation
- USB PD 3.1 with PPS Support and integrated VCONN support for E-Marked Cables
- Idle and Sleep Modes to Meet CoC and DoE Requirement
- Full Fault Protection - OVP, OUP, OCP and OTP
- Integrated UART Transceiver

Typical applications: AC−DC USB PD Compliant Adapters, Wall Chargers for Mobile Phones and Tablets and Computing Devices, Power Banks

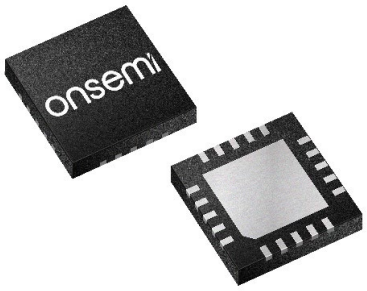

Figure 26: 20-pin QFN 4 x 4mm Package

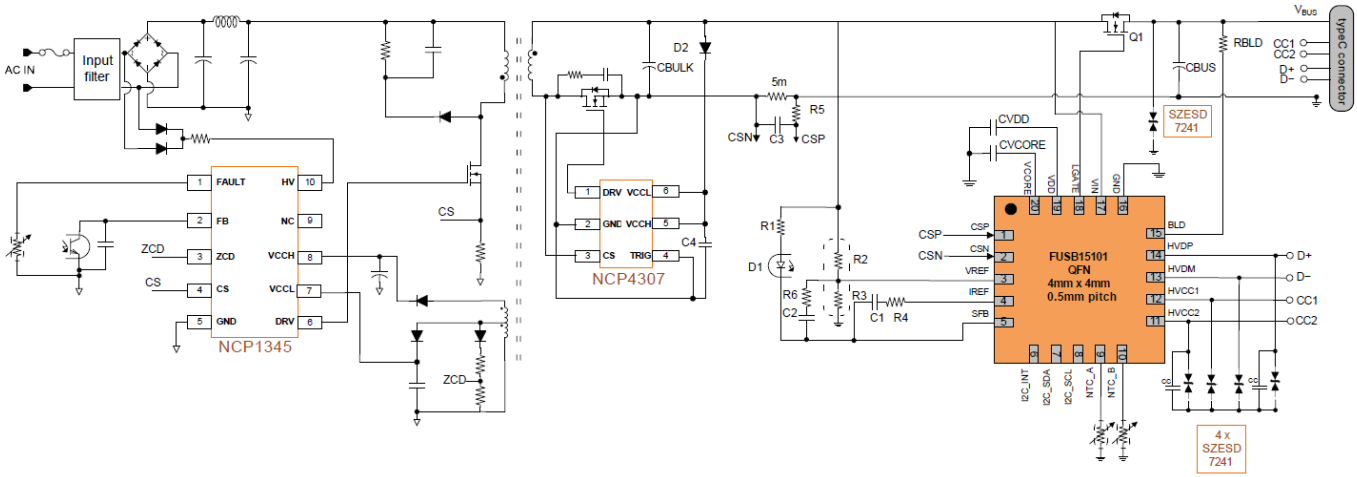

Figure 27: AC/DC Application Schematic

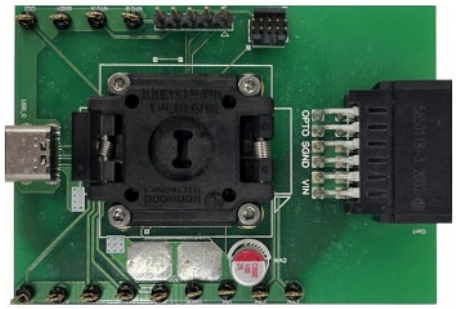

Figure 28: FUSB15101 Socket

FUSB15101 Evaluation Board (EVB) Guide UM70086/D

- An ease-of-use evaluation board with together with the firmware binary provided in the release package permits a customer to program the one−time programmable (OTP) non−volatile memory (NVM) of FUSB15101
- Software Development Kit (SDK) including USB PD protocol stacks, sample code, libraries and documentation

Learn more about **onsemi**'s USB Type-C PD controller families

USB-C Battery Charger

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