System Solution Guide - Preview

Switched-Mode Power Supply (SMPS)

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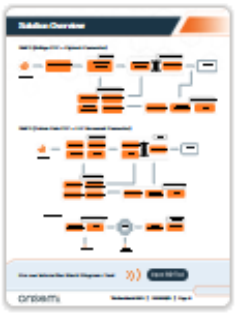
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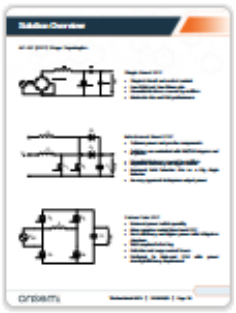
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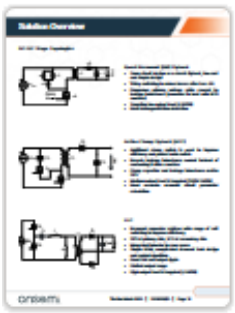
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Block Diagram - SMPS

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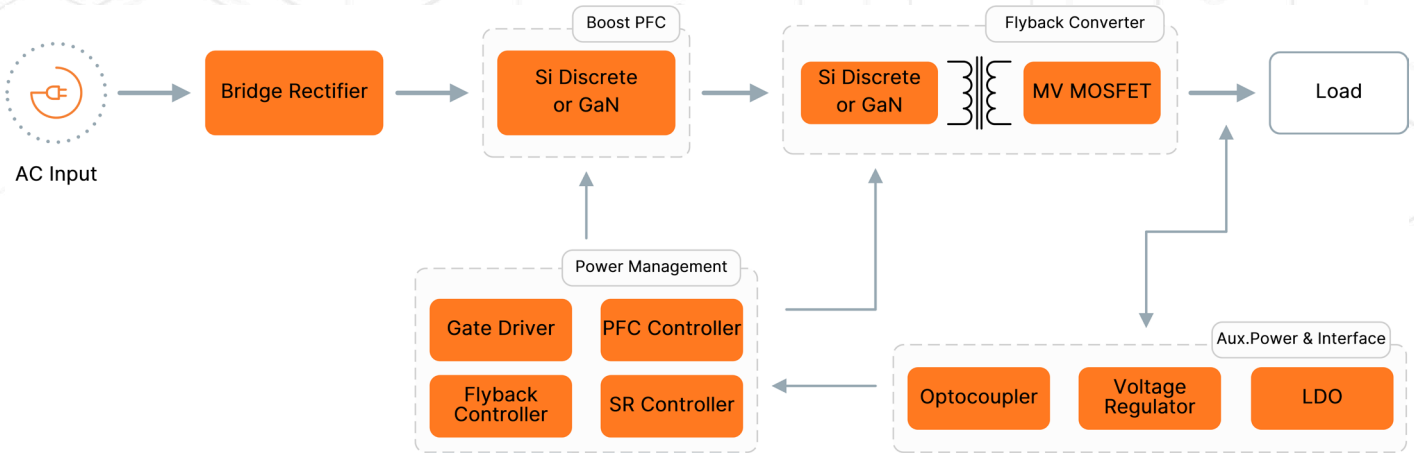
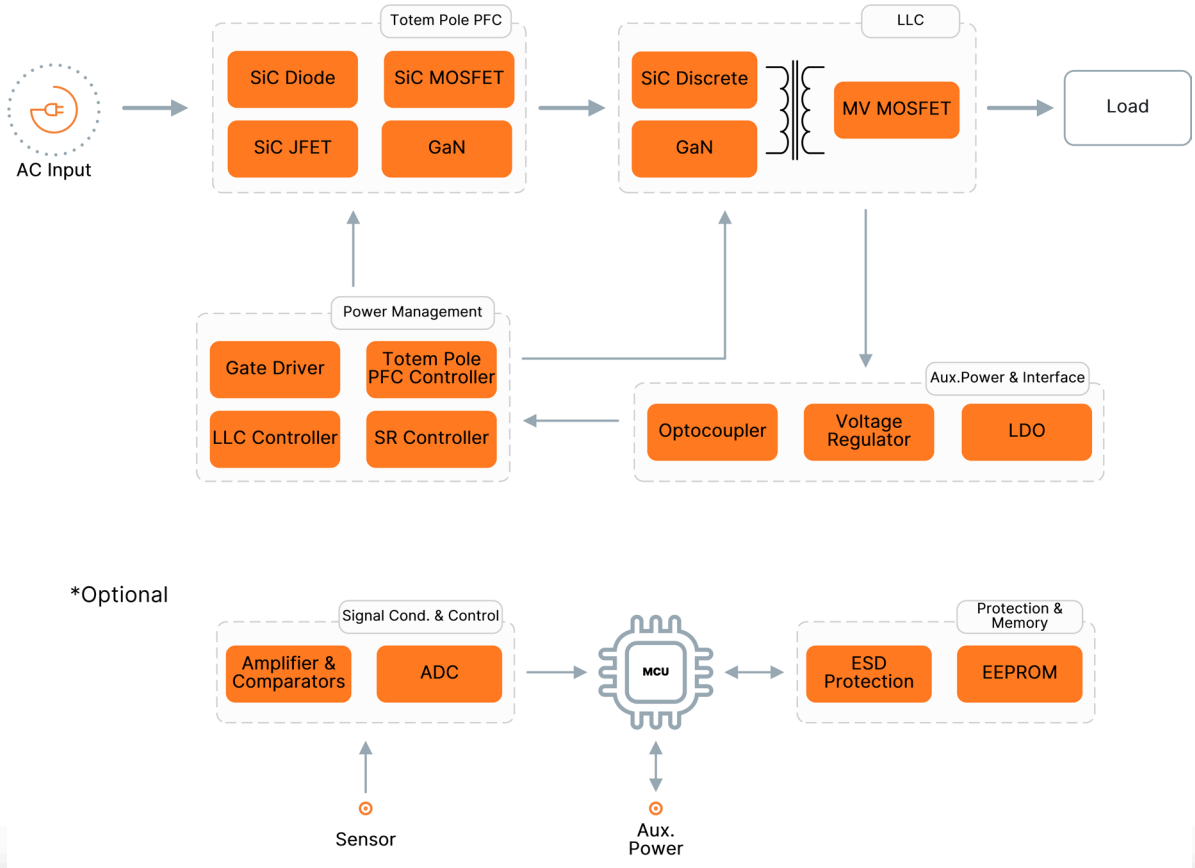
Block Diagram - SMPS (Bridge PFC + Flyback Converter)



Block Diagram - SMPS (Totem Pole PFC + LLC Resonant Converter)



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SMPS Matrix

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Easy to Use SMPS Matrix

onsemi's SMPS Matrix (Table 2) offers a comprehensive range of power management options tailored for various applications. These solutions cover power ranges from 5W to over 3kW. For instance, the matrix includes controllers, gate drivers, and switches designed for applications such as Power Factor Correction (PFC), Active Clamp Flyback (ACF), Quasi Resonant Flyback (QR), and Synchronous Rectifier Controller (SRC) configurations. These solutions are optimized to provide reliable and efficient power conversion, catering to diverse needs from low-power USB-C PD designs to high-power industrial and telecom applications.
By leveraging advanced technologies like SiC and iGaN, **onsemi** ensures the SMPS Matrix solutions deliver superior performance and energy efficiency for a wide range of power management requirements.

*Table 2: **onsemi** "Easy to Use" SMPS Matrix*

Power Range (W)	Power Density Rating	Rectifier	Primary Side										Secondary Side		USB-C/PD
			PFC			ACF			QR Flyback		LLC				
			Controller	Power Switch	Slow / Fast Leg Gate Drive	Controller	HV (Q2) Gate Drive	Power Switch	Controller	Power Switch	Controller	HS/LS Switch / Gate Drive	Controller	SR Switch	Controller
1kW to >3kW (24-48V)	Ultra High	w/o	NCP1681 (CCM)	SiC iGaN	NCP51530 NCP51561	NA					NCP13994	SiC /iGaN NCP51561	NCP4318	LV-MV MOSFET	NA
	High	DFB25100 DFB2580	FAN9672 FAN9673 (CCM)	HV MOSFET	NA						NCP4390		NA		
350W to 1kW (12V-24V)	Ultra High	w/o	NCP1681	SiC iGaN	NCP51530 NCP51561	NA					NCP13994		NCP4318		
	High	DFB20100 DFB2080	NCP1618 (MM)	HV MOSFET	NA							HV MOSFET			
200W to 350W (12V-24V)	Ultra High	w/o	NCP1680 (TP CrM)	SiC iGaN	NCP51530 NCP51561	NA						SiC /iGaN NCP51561			
	Low Profile	DFB20100 DFB2080	NCP1632 (CrM)	SiC / iGaN NCD 57000	NA										
	High	GBU8M GBU8K	NCP1616 (CrM)	HV MOSFET	NA							HV MOSFET			
70W to 200W (12V-24V)	Ultra High		NCP1623	SiC / iGaN NCD 57000	NA	NCP1568	NCP51561	SiC iGaN	NA				NCP4307		FUSB15101
	High	GBU6M GBU6K		HV MOSFET	NA				NCP1343	HV MOSFET	NA				
65W (3.3V-21V)	High	GBU4M GBU4K	NA						NCP1345	HV MOSFET	NA		NCP4306		
25W to 50W	High		Switchers: NCP11184 / NCP11185 / NCP11187												
5W to 25W	High	DF10S DF08S	Switchers: NCP1072 / NCP1075 / NCP1076 / NCP1077												

NA: Not Applicable

Figure 3: Applications per Power Level

Reference Designs for SMPS

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Power Supply Reference Designs

onsemi offers a versatile range of SMPS solutions that cater to various power requirements, spanning from 65W to over 3kW. Their product lineup includes controllers, gate drivers, MOSFETs, and advanced WBG materials like SiC and GaN. These solutions are designed to provide high efficiency, reliability, and performance across a wide range of applications, including USB-C PD, industrial power supplies, and cloud server power supplies.

3kW EliteSiC Totem Pole PFC + LLC PSU

- High power density topology - Totem Pole PFC + LLC
- Vin = 85V-264V, Vout = 54V, Iout = 55.5A
- PFC Efficiency > 98% @100% load
- System Peak Efficiency > 94% @115VAC; > 96% @230VAC
- PCBA size: 280mm x 110mm x 38mm
- Featuring products: Multi-mode TP PFC NCP1681, LLC with SR Controller NCP4390, Isolated HB Gate Driver NCP51561, 650V SiC MOSFET NTHL045N065SC1
- Application: Industrial PSU

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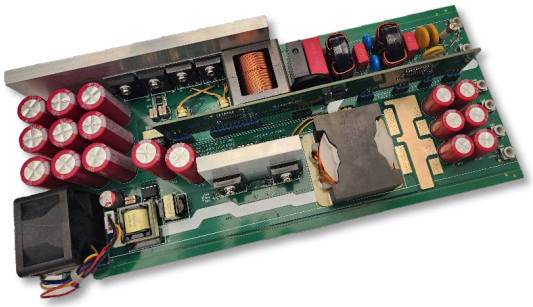

Figure 4: 3kW Totem Pole PFC + LLC PSU Evaluation Board

1 kW Universal Input 48V Output Power Supply

- High efficiency Totem Pole CCM PFC + HF LLC
- Vin = 90-265VAC, Vout = 48V, Iout = 21A
- Full load efficiency: 92.5% & 95.4% @110 & 230VAC
- PCBA size: 328mm x 93mm x 50mm
- Power Density: 10.74W/in^3
- Featuring products: TP PFC NCP1681, LLC NCP13994, iGaN NCP58921, NCP58920 & SR Controller NCP4306
- Application: Computing Power Supply, Industrial PSU

Find Reference Design

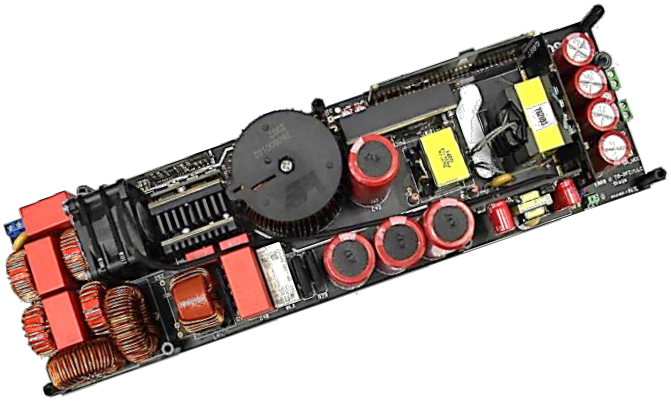

Figure 5: 1 kW 48V Output Power Supply Evaluation Board

Explore more power supply reference designs and evaluation boards from System Solution Guide - USB-C Battery Charger as below link.

Find more information in System Solution Guide:

USB-C Battery Charger

USB-C battery chargers have become the universal standard for quickly and effectively charging a wide range of portable devices, thanks to their high- power delivery and efficiency. The adoption of wide-bandgap semiconductors in these chargers further enhances efficiency, reduces energy losses, and contributes to the reduction in device size.

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