

FOR ENERGY EFFICIENT INNOVATIONS

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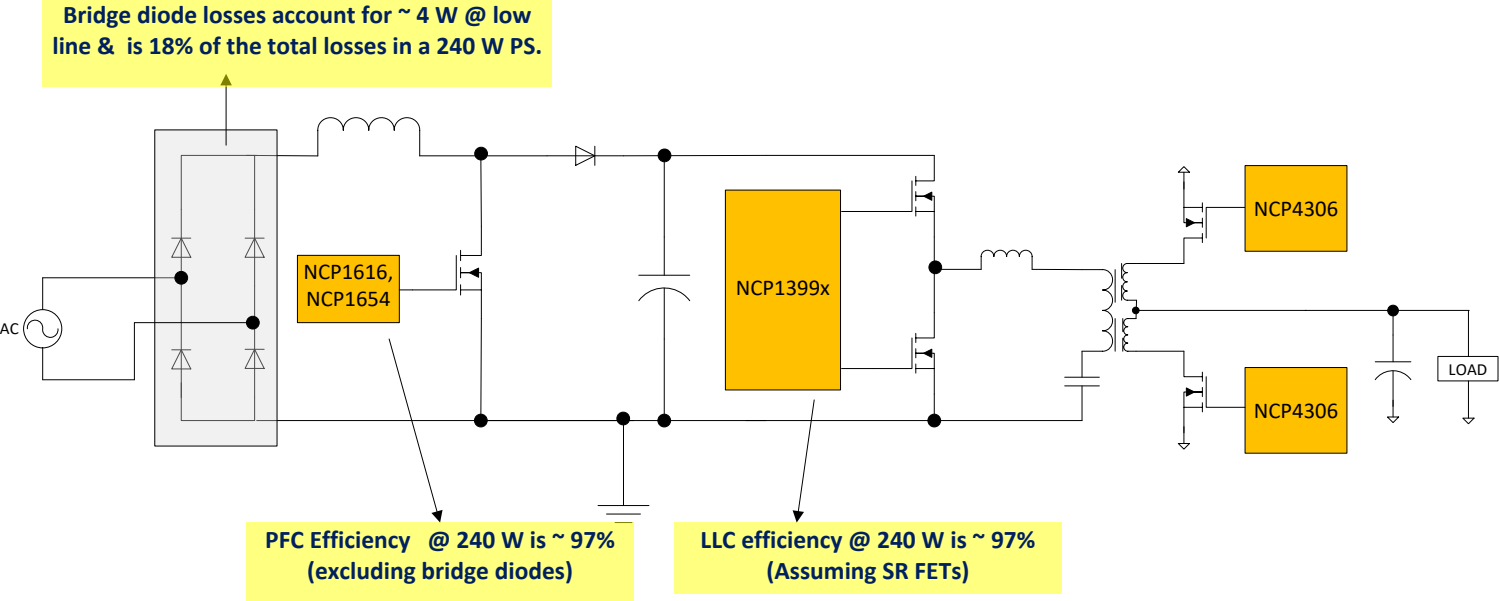
PFC Controller Totem Pole & 300W Demo Board

NCP1680

Public Information



Why using a Totem-Pole PFC ? Some system advantages here

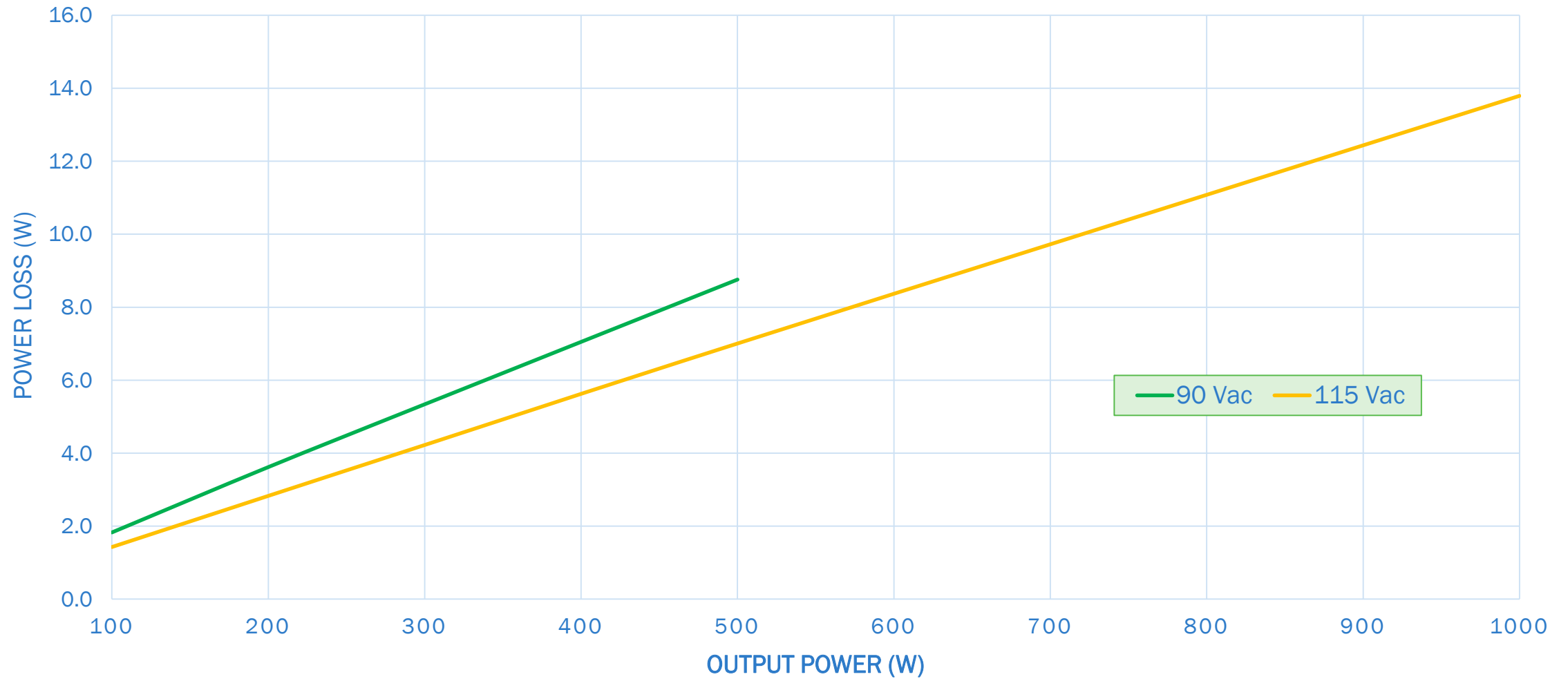


Diode bridge with heat sink

- Efficiency of the boost stage & LLC stage have plateaued.
- Bridge diodes are the major source of power loss.

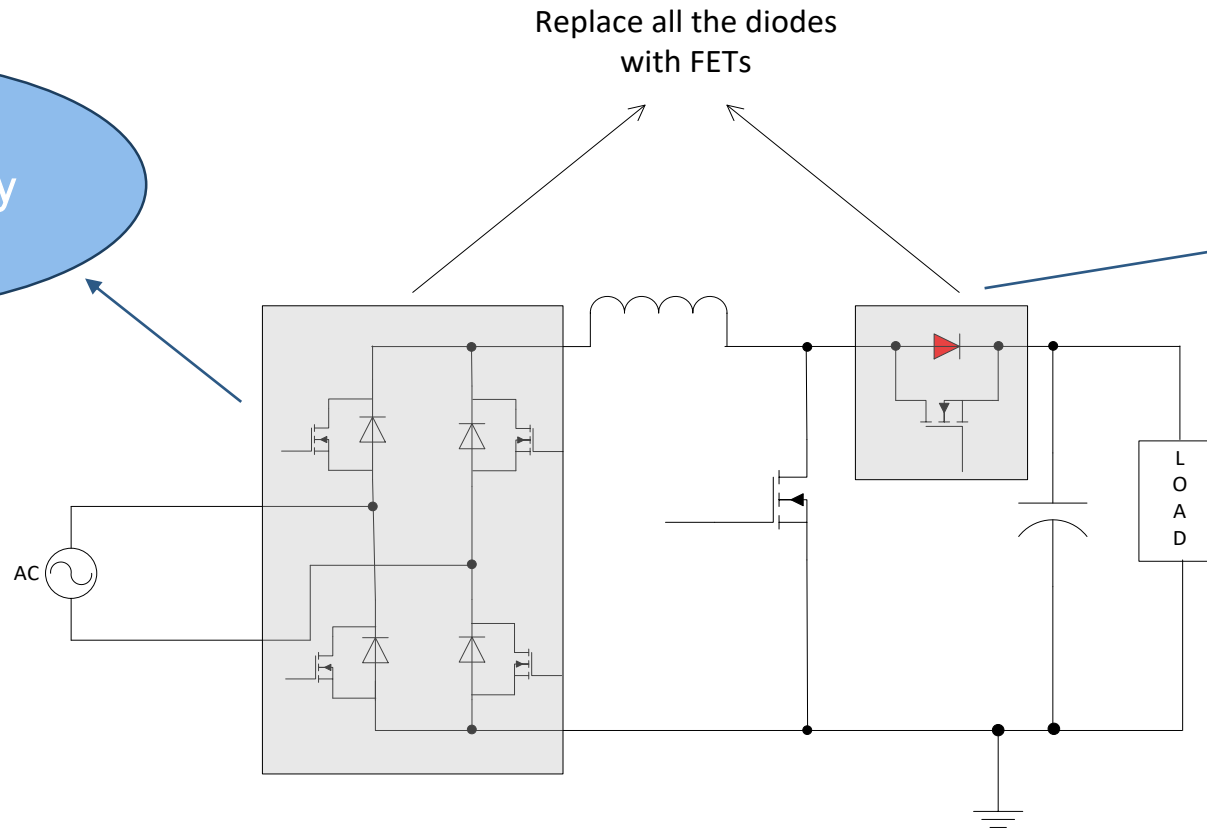


Bridge diode power losses can impact the application heavily



How to make boost PFC stages more efficient

Active bridge solution is costly and clunky



Body diode of Synchronous FET prevents CCM operation



- Replace all the diodes with FETs. All the front-end diodes have to be replaced with $\sim 50 \text{ m}\Omega$, 650 V FETs.
- 2 FETs in the 'bridge' and 1 FET in the boost stage are always conducting.
- In total 6 High Voltage FETs are present. This leads to an expensive implementation.

NCP1680– Totem Pole PFC Controller

Value Proposition

The NCP1680 is a CrM Totem Pole PFC Controller capable constant on time and valley synchronized frequency foldback for optimized efficiency across the entire load range. The device features a proprietary current sensing architecture and proven control algorithms for a cost-effective solution without jeopardizing performance.

Unique Features

- Constant on-time / fixed freq CrM architecture w. valley switching during foldback
- **Proprietary Current Sense Scheme**
- Line Polarity detection
- **Proprietary valley sense scheme**
- Control loop Internally compensated

Benefits

- Optimized performance across power levels
- Cycle-by-cycle current limit w/o hall effect sensor
- Removes external components;

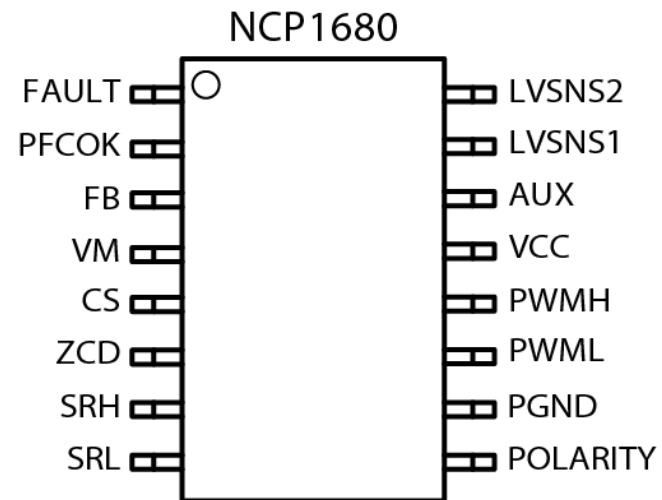
Other Features

- Two low voltage pins for sensing and recreating half-wave sinusoid.
- DCM with valley synchronized turn-on for improved light load efficiency
- Zero Current Detection for CrM Operation
- Integrated Digital voltage loop control

Market & Applications

- Computing Power Supplies
- Gaming Console Power Supplies
- TV Power Supplies,
- Network Power

Device Pin-Out



Ordering & Package information

- SOIC-16

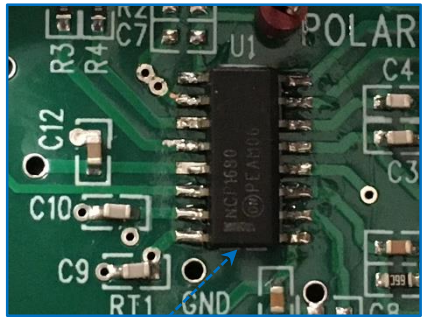
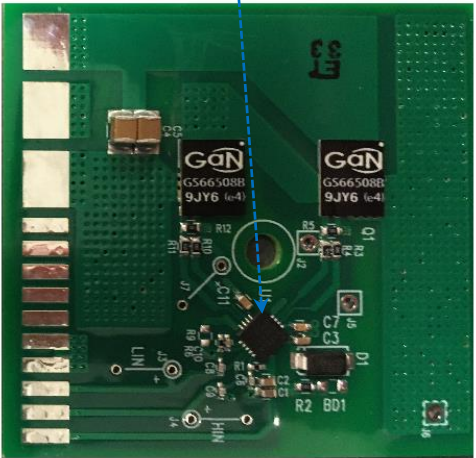
RTM Q2'21

**Multiple Patents
Issued/Pending**

NCP1680 – 300W PFC - Evaluation Board



NCP51820
GaN Gate Driver

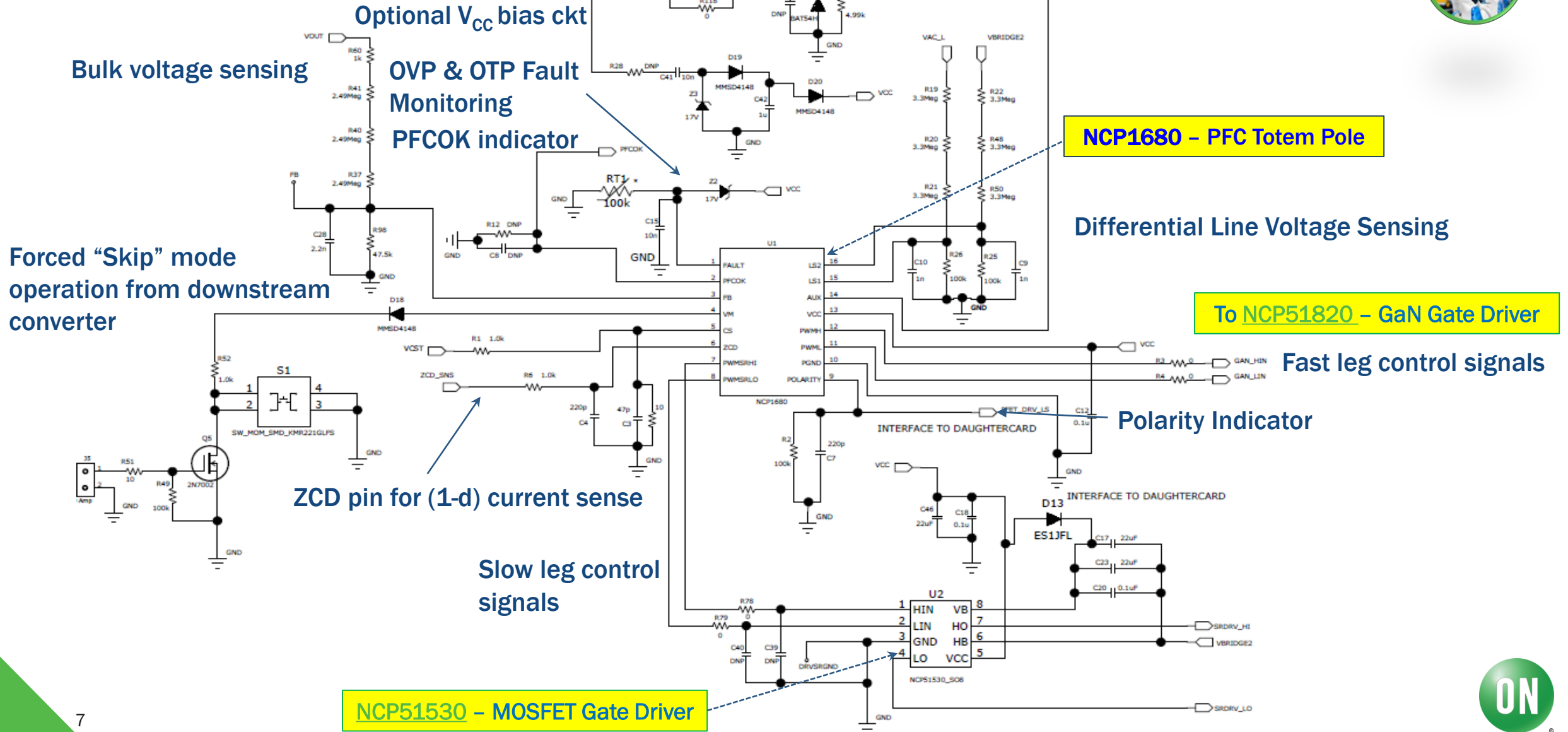


NCP1680
Totem Pole PFC



NCP1680 Controller Application Diagram

AUX winding circuitry → Optimized for bidirectional operation



NCP1680 - PFC Totem Pole

To NCP51820 - GaN Gate Driver

NCP51530 - MOSFET Gate Driver



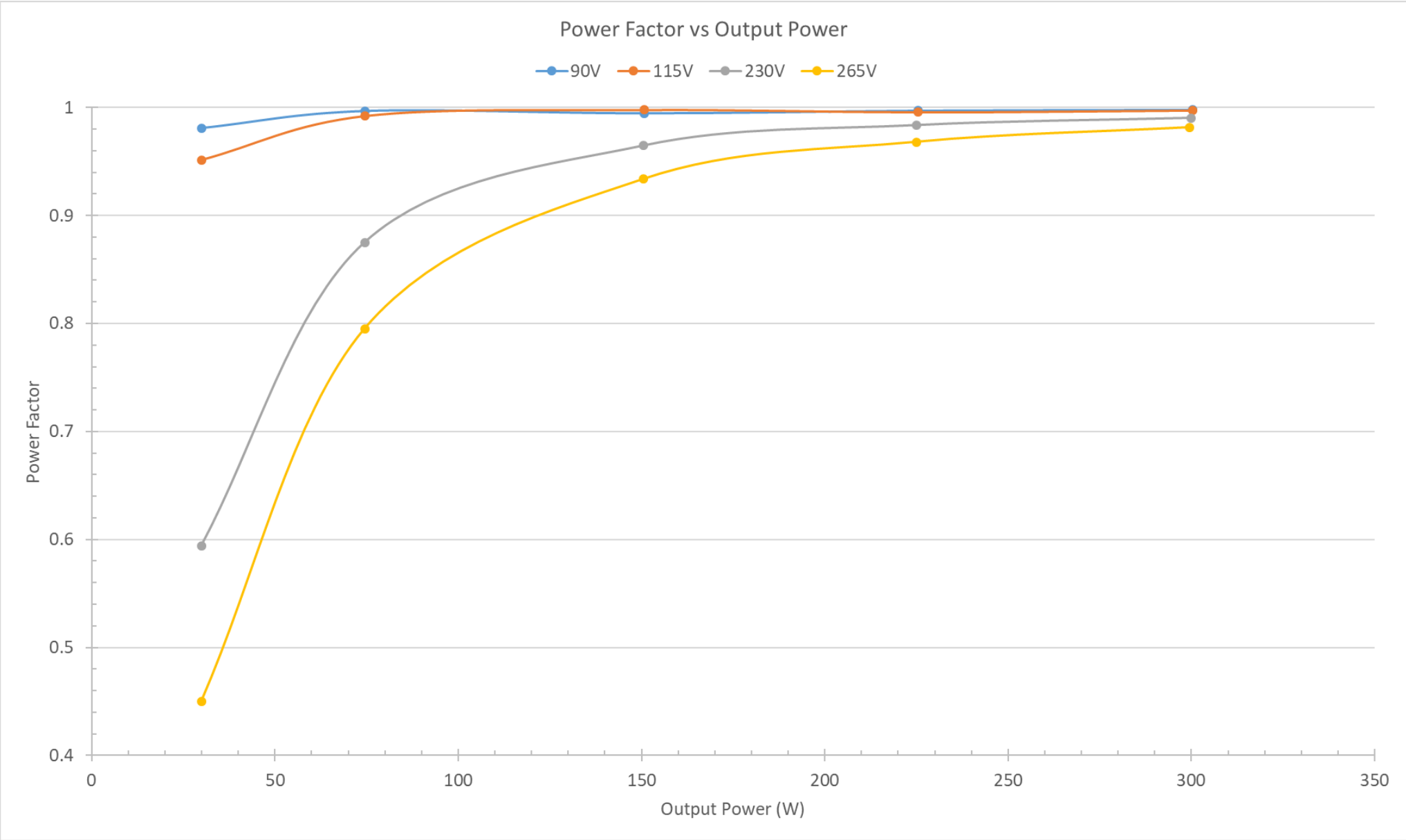
NCP1680 – 300W PFC Demo Board - Efficiency



Public Information



NCP1680 – 300W PFC Demo Board - Power Factor Plots



Public Information

