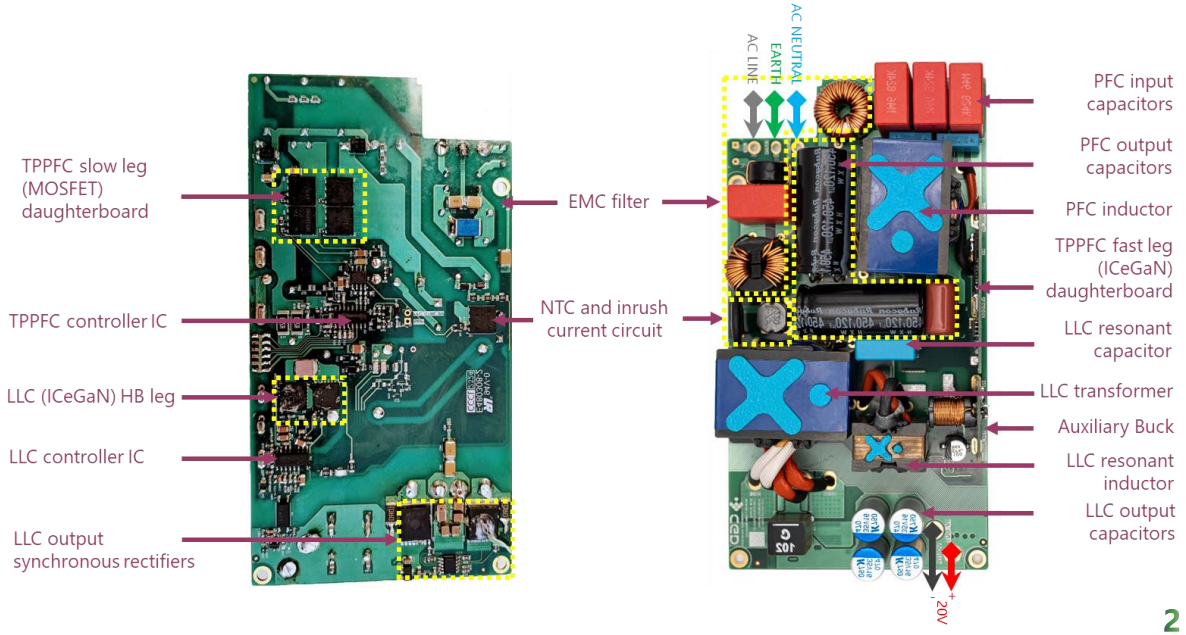
Specifications

Parameter	Details
Topology	CrCM totem-pole PFC + HB LLC
Power devices	CGD65A055SH2 & CGD65A130SH2
Input voltage	90–264 V_{AC} / 47–63 Hz
Output voltage	20 V
Output power	300 W
Full-load output current	15 A
Peak output power (less than 30 min)	350 W
Peak output current (less than 30 min)	17.5 A
Power Factor (PF) at full load	> 0.96
Total Harmonic Distortion (THD) at full load	< 10 %
Peak efficiency at 230 V_{AC} 50 Hz	95.27%
No-load power	150 mW at 115 V_{AC} / 168 mW at 230 V_{AC}
Open-frame dimensions	153 x 80 x 20.4 mm

Main Blocks and I/O Ports

The figure below highlights the main functional blocks of the converter as well as the main input and output connections for correct operation. Please refer to the user guide **CGD-UG2401** for full details.



Overview

This reference design is a two-stage converter. The front-end stage topology is a critical conduction mode (CrCM) bridgeless totem-pole PFC, and the output stage topology is a half-bridge LLC with secondary side synchronous rectifiers (SR).

The TPPFC high frequency half-bridge leg, commonly called fast leg, incorporates two CGD65A055SH2 ICeGaN™ devices, 650 V / 55 mΩ GaN HEMTs. The two devices on the LLC half-bridge are CGD65A130SH2 ICeGaN devices, 650 V / 130 mΩ GaN HEMTs. All ICeGaN devices, both in TPPFC and in HB LLC, are 8 x 8 mm.

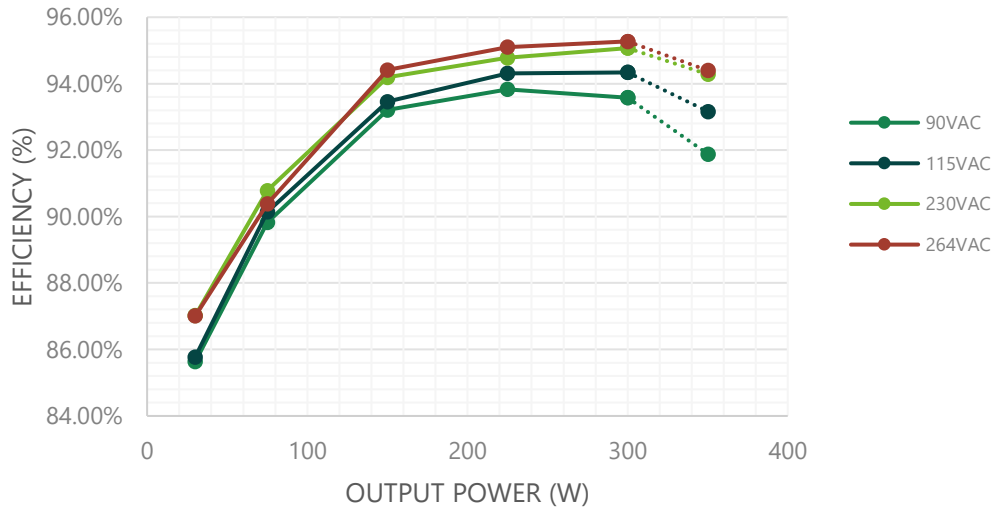
This reference design is rated to 300 W (20 V - 15 A), and it is able to run at 350 W (20 V – 17.5 A) for over 20 mins before the over temperature protection is triggered.

The design consists of a main board and two daughterboards. One daughterboard is the TPPFC fast-leg component: 2x CGD65A055SH2 devices and the half-bridge driver IC. The second daughterboard is an auxiliary buck converter to provide 15 V to the low voltage rail for the control circuit.

Refer to the '**Safety Warning**' and '**Operating Limits and Recommendations**' sections in the user guide **CGD-UG2401** before using the circuit for the first time.

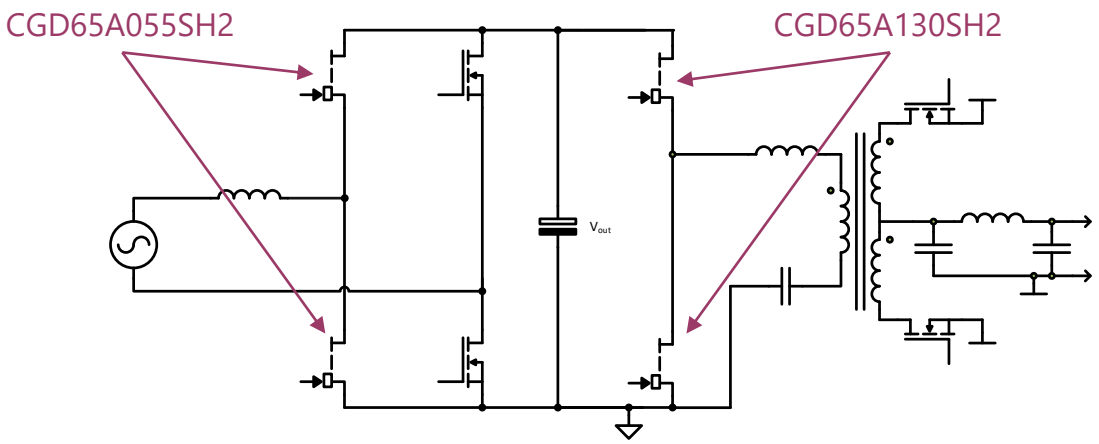
Efficiency

The chart below shows the efficiency curves at 30 W, 75 W, 150 W, 225 W, 300W and 350W operation at input lines 90 V_{AC}, 115 V_{AC}, 230 V_{AC} and 265 V_{AC}. Please refer to the full user guide **CGD-UG2401** for more details.



Functional Schematic

The schematic below provides a simplified representation of the totem-pole PFC & half-bridge LLC power-circuit. The totem-pole PFC fast leg has 2x 55 mΩ ICeGaN devices, CGD65A055SH2. The half bridge LLC has 2x CGD65A130SH2 (650 V, 130 mΩ ICeGaN) devices.



Technical support

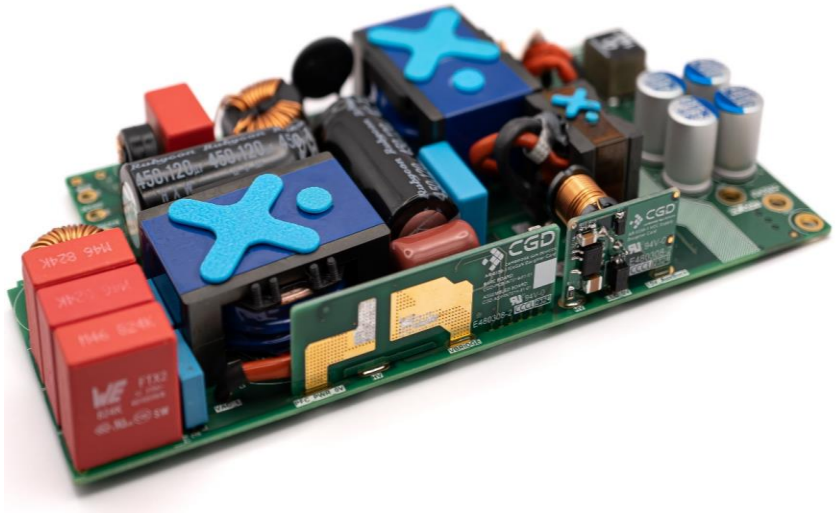
Please refer to the complete user guide **CGD-UG2401** for more details.

For support, please contact CGD at techsupport@camgandevices.com.

Cambridge GaN Devices Limited
Jeffreys Building, Suite 8
Cowley Road
Cambridge CB4 0DS
United Kingdom

Dare to innovate differently

300 W Totem-Pole PFC + HB LLC Reference Design with H2 Series ICeGaN™



Features

This reference design demonstrates how ICeGaN can improve efficiency, reduce no-load power consumption and lower thermal stress for offline converters opening the door to the next generation of high-power density, compact and low-profile designs. Target applications: gaming laptops, TVs, low-power data center power supplies.

- Features 2 x H2 Series 650-V / 55-mΩ GaN HEMTs with ICeGaN gate technology
- Features 2 x H2 Series 650-V / 130-mΩ GaN HEMTs with ICeGaN gate technology
- Only 2 external SMD components per ICeGaN device
- Peak Efficiency > 95%
- Average efficiency > 93%
- No-load power consumption of only 150 mW due to the NL^3 circuit of H2 series devices
- Open-frame power density of 20 W/in^3 (300 W) and 23 W/in^3 (350 W)
- Open-frame heigh of only 20.4 mm