FUTURE ELECTRONICS

GaNdalf

FUTURE ELECTRONICS CENTRE OF EXCELLENCE DESIGN & TRAINING
EXCELLENCE FOR OUR CUSTOMERS, SUPPLIERS AND EMPLOYEES

GaN-based digital Power Factor Correction development system

The new Future Electronics blueprint for bridgeless PFC circuit design

- Up to 99% efficiency
- Low component count
- Low conduction losses
- Latest GaN power components

The Future Electronics GaNdalf development system provides a blueprint for OEMs' implementations of the bridgeless totem-pole Power Factor Correction (PFC) topology.

Featuring components from leading suppliers of technology supporting this topology, including:

- **Panasonic's** GaN High Electron-Mobility Transistors (HEMTs). These devices benefit from the superior electrical and thermal properties of the wide bandgap gallium nitride material to provide far better switching and conduction performance than equivalent silicon-based FETs
- **Microchip's** most recent dual-core 16-bit Digital Signal Controller (DSC)

Offering efficiency of 99% and a power factor of >0.98, the GaNdalf circuit is the ideal starting point for power conversion designs supplying loads up to 1kW.

MICROCHIP muRata INNOVATOR IN ELECTRONICS myrra Panasonic

ENQUIRE FOR MORE INFORMATION ON GANDALF PFC DEVELOPMENT SYSTEM

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GaN power switch: the crucial technology enabling the ultra-efficient bridgeless totem pole topology

Power Factor Correction (PFC) is widely used in AC-DC power supplies with an input power greater than 75W. The PFC circuit controls the input current to synchronize it with the input voltage and to minimize reactive power losses.

Power-system designers are under more pressure than ever to achieve high efficiency across the whole AC-DC converter circuit. In the PFC stage, the drive for efficiency has led designers to evaluate various bridgeless PFC circuit topologies, which remove the rectifying diode bridge and its associated power losses from the input of the PFC stage.

The **bridgeless totem pole PFC topology** offers various advantages compared to other approaches, including:

- Fewer components
- Lowest conduction losses
- Highest efficiency

Conventional silicon super-junction MOSFETs are unsuitable for use in the hard-switched half-bridge arrangement in a bridgeless totem-pole topology, which calls instead for the superior characteristics – including low output capacitance and zero reverse recovery – of GaN High Electron-Mobility Transistor (HEMT) switches.

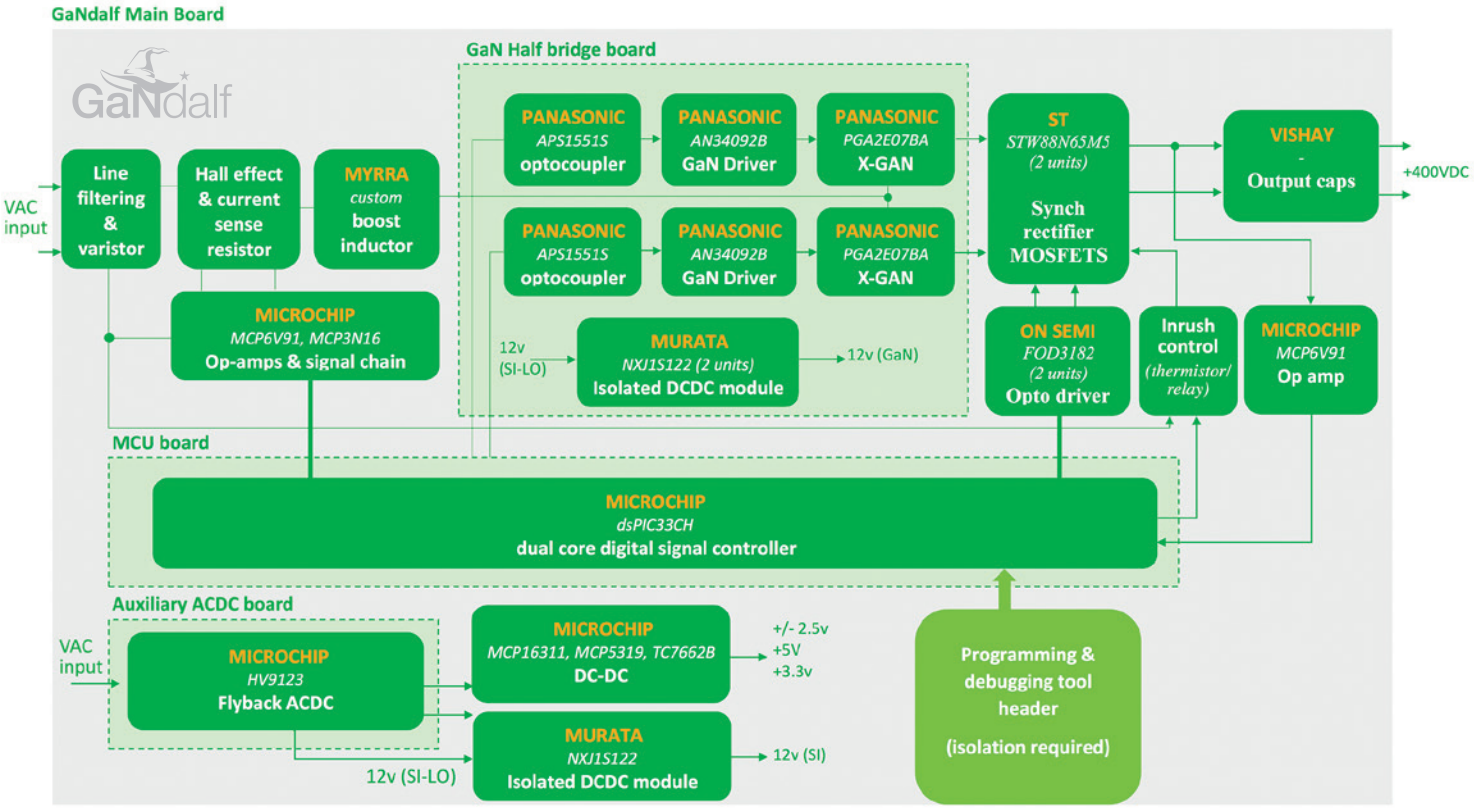
In the GaNdalf circuit, **X-GaN™ HEMTs from Panasonic** offer outstanding performance when operating under continuous conduction mode, helping the PFC stage to achieve efficiency better than 99.0%.

Key components of the GaNdalf power system

- Panasonic X-GaN switches, GaN drivers and optocouplers
- Microchip dsPIC33CH dual core 16-bit digital signal controller
- Microchip signal chain and power management devices
- Myrra custom inductor
- Murata isolated DC-DC converter module
- STMicroelectronics MOSFET for synchronous rectification

Key features of the GaNdalf PFC circuit

- Input-voltage range: 85V to 265V AC
- Output voltage: 400V DC
- Supports loads up to 1kW
- <10% total harmonic distortion
- >0.98 power factor
- Digitally controlled: eases overall control (zero crossing, GaN and synchronous rectification drive)



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