

3 Phase 3 Level T-Type Bidirectional Power Converter

Description

This reference design represents a complete solution for high power three-phase Active Front End (AFE) bidirectional rectifier application based on the three level T-Type topology. Reference design topology is mostly used for industrial and electric vehicle DC fast charging applications. It features fully digital control for high performance microcontrollers providing the full control of PF, THD and power conversion control.

Advantages

Using 3 Level T-Type topology provided higher efficiency and lower power losses compared with traditional topologies, bidirectional power output, more pure sinewave AC output in the inversion operation.



Features

- AC/DC Bidirectional Converter
- Switching frequency: 70kHz
- Max. Rated Output Power (Rectifier mode): 15kW
- Rated nominal Input Voltage (Rectifier mode): 400Vac_{L-L} 50Hz
- Rated nominal Output Voltage (Rectifier mode): 800Vdc
- Max. Rated Output Power (Inverter mode): 11kW
- Rated nominal Input Voltage (Inverter mode): 800Vdc
- Rated nominal Output Voltage (Inverter mode): 400Vac_{L-L} 50Hz
- Power Factor: >0.99
- Efficiency: >98%
- THD: <5%

Core Chip

- MCU controller: STM32G474RET3
- Gate driver: STGAP2SCM
- SiC MOSFETs: SCT070W120G3AG x 6pcs, SCT055W65G3AG x 6pcs
- Relay: TE Connectivity T9AS1D12-15

Applications

- High power PV system
- Charger / Inverter

Block Diagram

