

Fact sheet

Reference design for 1 kW engine cooling fan

Automotive 3-phase motor drive powered by a 12V vehicle battery

The reference design targets engine cooling fan applications in the thermal management system. It is capable to drive motors up to 1 kW. The main components used in the reference design are:

- › **TLE9879QXW40:** This device is a part of Embedded Power IC family and it is a single chip 3-phase motor driver, System-on-Chip (SoC) solution. It integrates an industry standard Arm® Cortex®-M3 core along with LIN transceiver, bridge driver and power supply, enabling the implementation of advanced motor control software such as sensorless field-oriented control (FOC).
- › **IAUA250N04S6N007:** This is an OptiMOS™-6 40 V MOSFET in high-power leadless sTOLL package, providing higher current capability in smaller form factor of 7x8 mm² without sacrificing thermal performance. In combination with OptiMOS™-6 40 V power MOS technology, sTOLL offers best in class power density and power efficiency at Infineon's well known quality level for robust automotive packages.

The reference design is optimized in terms of thermal performance and EMC. It includes layout and schematic files in an Altium project, along with comprehensive support documents like the reference design guide, including design considerations, thermal analysis, EMC measurements and a detailed board description. In addition, example software is available in the Software Development Kit (SDK).

Key benefits

- › **Reduced time to market** - Our reference design for 1 kW engine cooling fan reduces design complexities by providing recommendation for parts and layout. Moreover, it is a PCB-based design which takes less time in assembling a circuit in comparison to a lead frame solution. The detailed design considerations help you to speed up the overall development process and enable a fast track to market.
- › **Minimal BOM and reduced PCB size** - Due to the highly integrated Embedded Power IC device and OptiMOS™-6 40 V MOSFET in sTOLL package, providing an ultra-small footprint, reference design offers minimal BOM and reduced PCB size.
- › **State-of-the-art components designed for long service life** – The reference design is equipped with the best-in-class components with trusted Infineon quality sustaining product longevity.
- › **Scalability of the device** - Scalability of the Embedded Power IC device enables customer to extend the platform approach up to 1 kW.

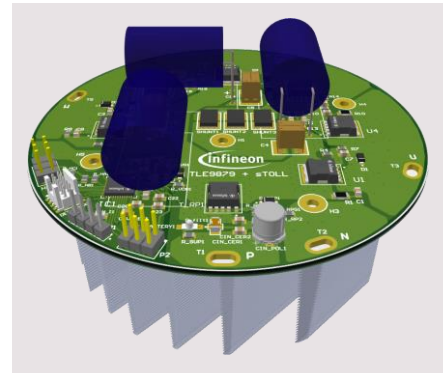


Figure: Reference design for engine cooling fan

Key features

- › Up to 1 kW power capability for 12V automotive cooling fan applications
- › Optimized BOM and PCB size (ø100mm)
- › Optimized thermal behavior
- › SWD port for debug connection
- › Hall sensor, LIN, ADC ports
- › High-temperature FR4 PCB with 2oz, 6-layer Copper
- › Single-side component mounting
- › Extensive documentation including
 - ✓ reference design guide
 - ✓ layout files
 - ✓ schematics
 - ✓ getting started guide
 - ✓ EMC measurement report
 - ✓ thermal analysis
 - ✓ example software

 [Reference design guide preview](#)

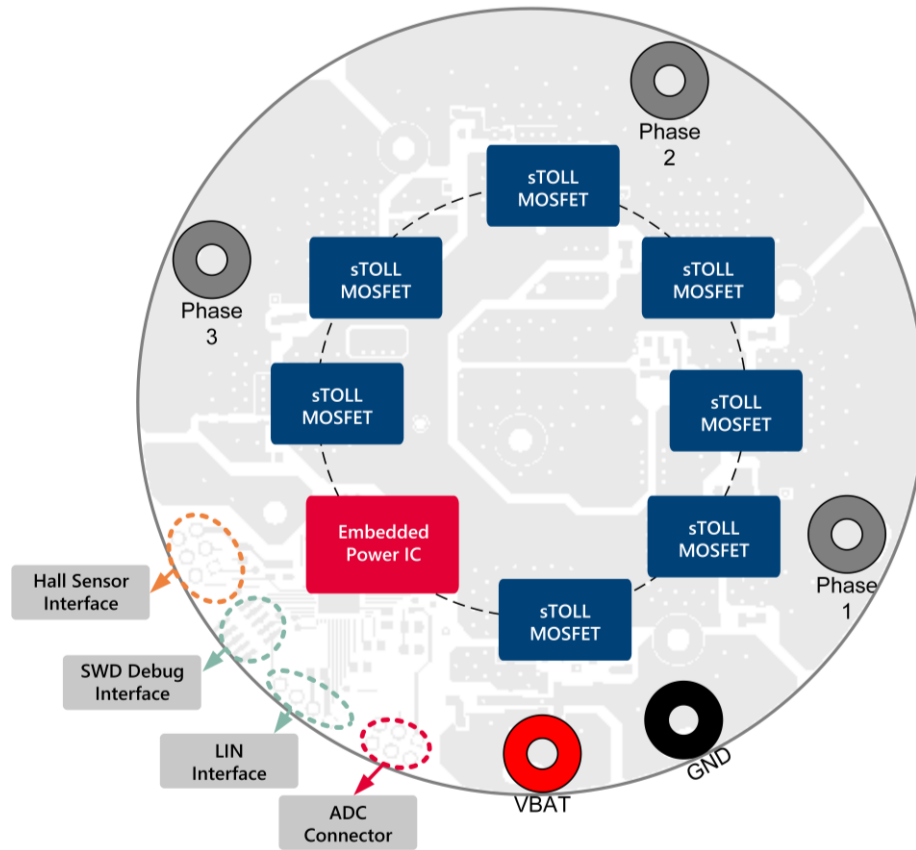
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Block Diagram



Parametrics Table

Parametrics	REF_ENGCOOLFAN1KW
Input Type	DC
P_{out} (max)	1 kW
Qualification of the devices	Automotive
Supply Voltage (min - max)	$7.0\text{ V} \leq 12.0\text{ V} \leq 18.0\text{ V}$
Target Application	Engine cooling fan, radiator fan, 1 kW BLDC motor for 12V application
Topology	3-phase full-bridge

Published by
Infineon Technologies AG
81726 Munich, Germany

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