

Product brief

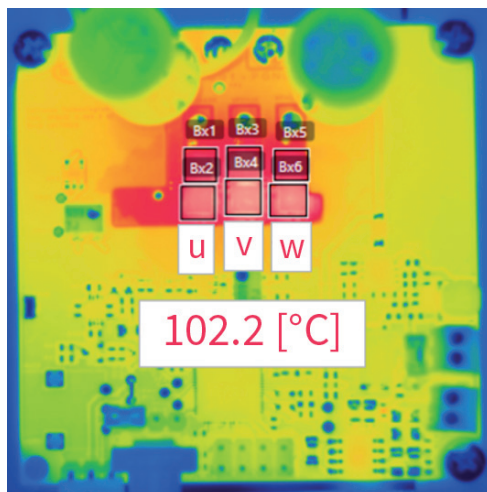
OptiMOS™ Source-Down 40 V

Innovation in a PQFN 3.3x3.3 mm footprint

Infineon is extending the innovative Source-Down family with the IQE013N04LM6 1.35 mΩ, 40 V in a 3.3x3.3 PQFN package (also available in a Center-Gate version). This new best-in-class power MOSFET challenges the status quo in power density and form factor in end applications.

Optimizing user experience in power tools, one design target is to minimize internal restriction on the PCB area to enable more ergonomic tool design. Moving the inverter from the handle into the head minimizes the volume of the motor housing. Torque can be kept at a reasonably high level to enable quick and easy action.

With the design goal to achieve the smallest possible form factor of the motor drive circuit, a MOSFET case temperature of ~100°C is acceptable under the full load. Utilizing the performance advantages of the new IQE013N04LM6, a maximum power of 400 W can be achieved with optimized form factor while staying within the defined limits.



Key features

- > Major reduction in $R_{DS(on)}$ by up to 25%
- > Superior thermal performance in R_{thJC}
- > Optimized layout possibilities
- > Standard and Center-Gate footprint

Key benefits

- > High current capability
- > More efficient use of PCB area
- > Highest power density and performance
- > Optimized footprint for MOSFET parallelization with Center-Gate

Target applications

- > SMPS
- > Telecom
- > Server
- > Battery protection
- > Power tools
- > Charger

Figure 1 shows a thermal image of a three-phase inverter stage driving a power tool motor at 400 W and generating 8.5 Nm of torque



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The performance improvement of the IQE013N04LM6, compared with alternative solutions in a 3.3x3.3 package, extends the power level and density achievable in a smaller form factor. Today, many designs require a 5x6 PQFN package in order to handle the respective power. This limits the achievable form factor of the end application.

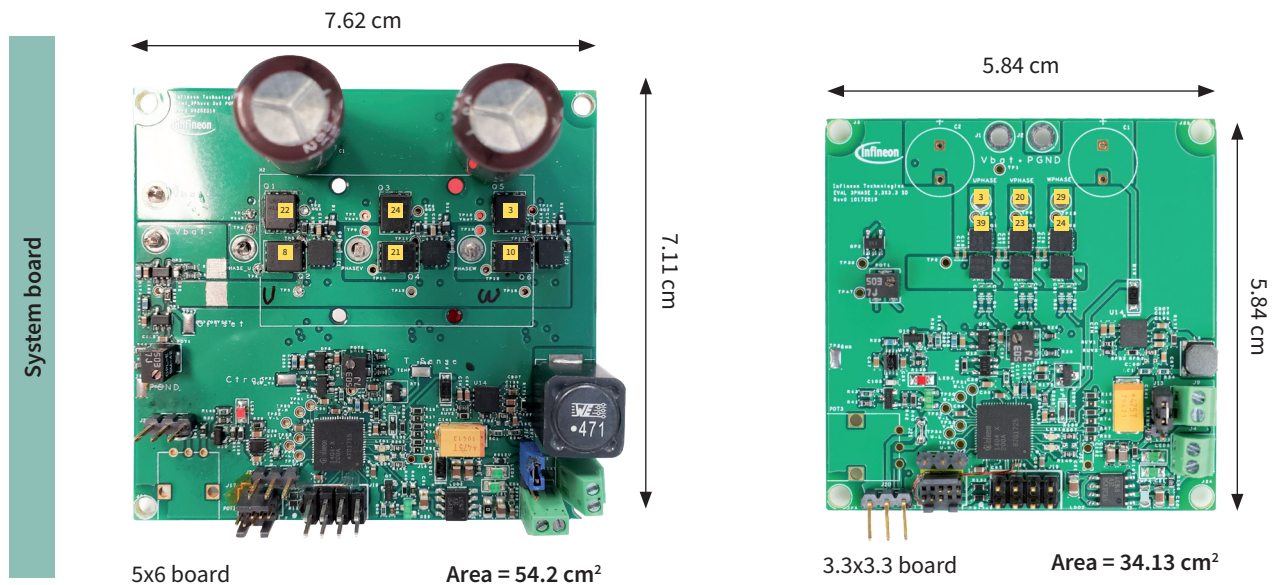


Figure 2 shows a comparison of a three-phase inverter solution based on a 5x6 PQFN package solution and the new 3.3x3.3 PQFN Source-Down solution. Comparing the package size, a 60% reduction of the MOSFET footprint is achieved by moving from a 5x6 to a 3.3x3.3 package. A 40% board space savings can be achieved at the system level by utilizing the benefits of the Source-Down package technology.

Product portfolio Source-Down OptiMOS™ 25–150 V

Source-Down Standard-Gate	Source-Down Center-Gate	$R_{DS(on)}$ max.	V_{DS}
IQE006NE2LM5	IQE006NE2LM5CG	0.65 mΩ	25 V
IQE007N03LM5*	IQE007N03LM5CG*	~0.7 mΩ	30 V
IQE013N04LM6	IQE013N04LM6CG	1.35 mΩ	40 V
IQE030N06NM5*	IQE030N06NM5CG*	~3.0 mΩ	60 V
IQE060N08NM5*	IQE060N08NM5CG*	~6.0 mΩ	80 V
IQE080N10NM5*	IQE080N10NM5CG*	~8.0 mΩ	100 V
IQE220N15NM5*	IQE220N15NM5CG*	~22.0 mΩ	150 V

*Coming soon / product name subject to change based on final $R_{DS(on)}$ max. value

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