Product Brief

TLE987x Infineon Embedded Power IC
3-phase motor driver with integrated Arm® Cortex®-M3 MCU

The TLE987x family is part of the Infineon Embedded Power IC portfolio. The TLE987x is a single chip 3-phase motor driver that integrates the industry standard Arm® Cortex®-M3 core, enabling the implementation of advanced motor control algorithms such as field-oriented control. It includes six fully integrated NFET drivers optimized to drive a 3-phase motor via six external power NFETs, a charge pump enabling low voltage operation and programmable current along with current slope control for optimized EMC behavior. Its peripheral set includes a current sensor, a successive approximation ADC synchronized with the capture and compare unit for PWM control and 16 bit timers. A LIN transceiver is also integrated to enable communication to the device along with a number of general purpose I/Os. It includes an on-chip linear voltage regulator to supply external loads.

The TLE987x family offers scalability in terms of Flash memory sizes and MCU system clock frequency supporting a wide range of motor control algorithms, either sensor based or sensor- less. It uses the same MCU and peripherals as the TLE986x family, 2-phase driver, enabling design synergies between DC and BLDC motor control applications.

It is a highly integrated automotive (Grade-1 & Grade-0) qualified device enabling cost and space efficient solutions for mechatronic BLDC motor drive applications such as pumps and fans.

Key benefits

› **Enable cost and board space improvements** – Our system-on-chip solution integrates data processing, actuation and sensing. The chip comes in a leadless VQFN package with 7x7 mm footprint and enables PCB space saving.
The TLE987x family allows driving MOSFETs at $V_{BATT} \geq 6V$ with a low number of external components, providing a very cost effective solution on a system level. Minimum number of external components reduces BOM cost.

› **Support in-cabin and underhood applications with same design –** Some TLE987x derivatives are qualified up to T_j= 175°C.and therefore enable a family design approach due to pin, package and software-compatibility.

› **Enable high levels of system reliability** – Extensive diagnostics and protections are embedded within the System-on-Chip, more than a discrete approach can offer. In addition the Embedded Power IC and the external MOFESTs can be protected.

› **Drive motors 100 W to ~1 kW** – The charge pump is capable to drive Gate charges up to 150nC per MOSFET under limited conditions.

Key features

› Arm® Cortex®-M3 MCU
› System clock up to 40MHz
› 4K EEPROM emulation
› NFET drivers with charge pump
› Gate charge capability of up to 150 nC
› Current programmable NFET driver with patented slope control for optimized EMC behavior
› Integrated LIN transceiver compatible with LIN standard 2.2 and SAE J2602-supports fast programming via LIN
› Direct memory access (DMA)
› 10-Bit SAR ADC for sensing
› Timers for PWM signal generation for 3 Phase motor control
› On chip oscillator & PLL
› Current sense amplifier
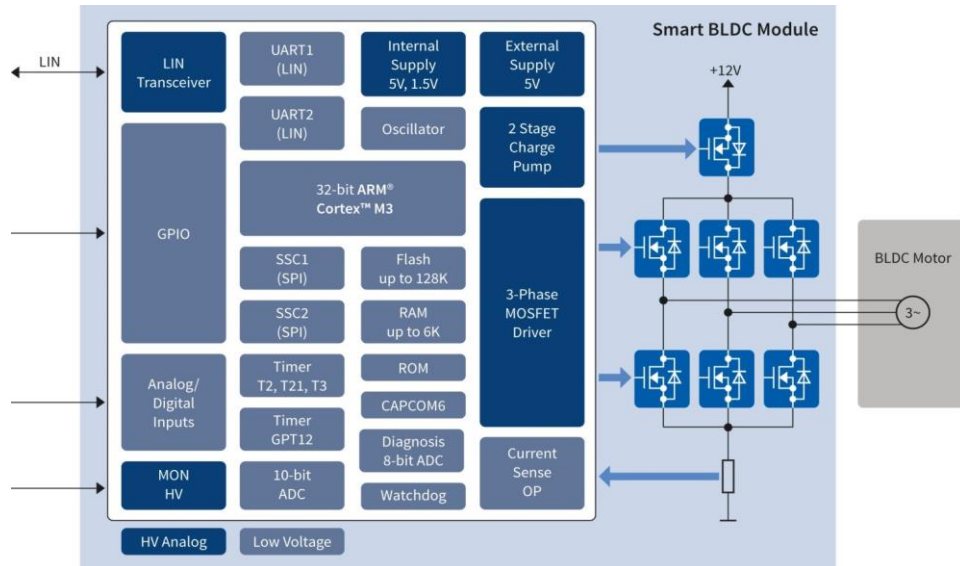› Grade-1 & Grade-0 Qualification

Key applications

› Fuel pump
› Water pump
› Oil pump
› HVAC blower
› Engine cooling fan
› Wiper
› Sensorless and sensor based BLDC motor applications controlled by the Local Interconnect Network (LIN) or PWM.
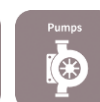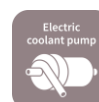
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Block Diagram

Product Overview TLE987x

Product name	Freq. [MHz]	Interface	Package	FLASH [KB]	RAM [KB]	EEPROM in FLASH included [KB]	OP-AMP	2x14-bit Sigma-Delta ADC	Low-Side MOSFET Driver	High-Side MOSFET Driver
TLE987xQXA, Arm® Cortex®-M3 based 3-Phase NFET Gate Driver BLDC Motor Control (Grade-1, Tj = 150°C)										
TLE9871QXA20	24	PWM	VQFN-48-31	36	3	4	yes	no	3	3
TLE9877QXA20	24	PWM + LIN	VQFN-48-31	64	6	4	yes	no	3	3
TLE9877QXA40	40	PWM + LIN	VQFN-48-31	64	6	4	yes	no	3	3
TLE9879QXA20	24	PWM + LIN	VQFN-48-31	128	6	4	yes	no	3	3
TLE9879QXA40	40	PWM + LIN	VQFN-48-31	128	6	4	yes	no	3	3
TLE9879-2QXA40	40	PWM + LIN	VQFN-48-31	128	6	4	yes	yes	3	3
TLE987xQXW, Arm® Cortex®-M3 based 3-Phase NFET Gate Driver for BLDC Motor Control (Grade-0, Tj = 175°C)										
TLE9873QXW40	40	PWM + LIN	VQFN-48-29	48	3	4	yes	no	3	3
TLE9877QXW40	40	PWM + LIN	VQFN-48-29	64	6	4	yes	no	3	3
TLE9879QXW40	40	PWM + LIN	VQFN-48-29	128	6	4	yes	no	3	3

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