

## 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

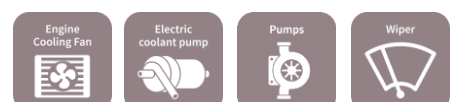
- › **Enable cost and board space improvements** – Our system-on-chip solution integrates data processing, actuation and sensing. The chip comes in a leadless VQFN package with 7x7 mm footprint and enables PCB space saving. The TLE987x family allows driving MOSFETs at  $V_{BATT} \geq 6V$  with a low 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  $T_j = 175^\circ C$  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 MOSFETs can be protected.

### Key features

- › Arm® Cortex®-M3 MCU
- › System clock up to 40MHz
- › Up to 128kB Flash memory
- › 4K EEPROM emulation
- › NFET drivers with charge pump
- › 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

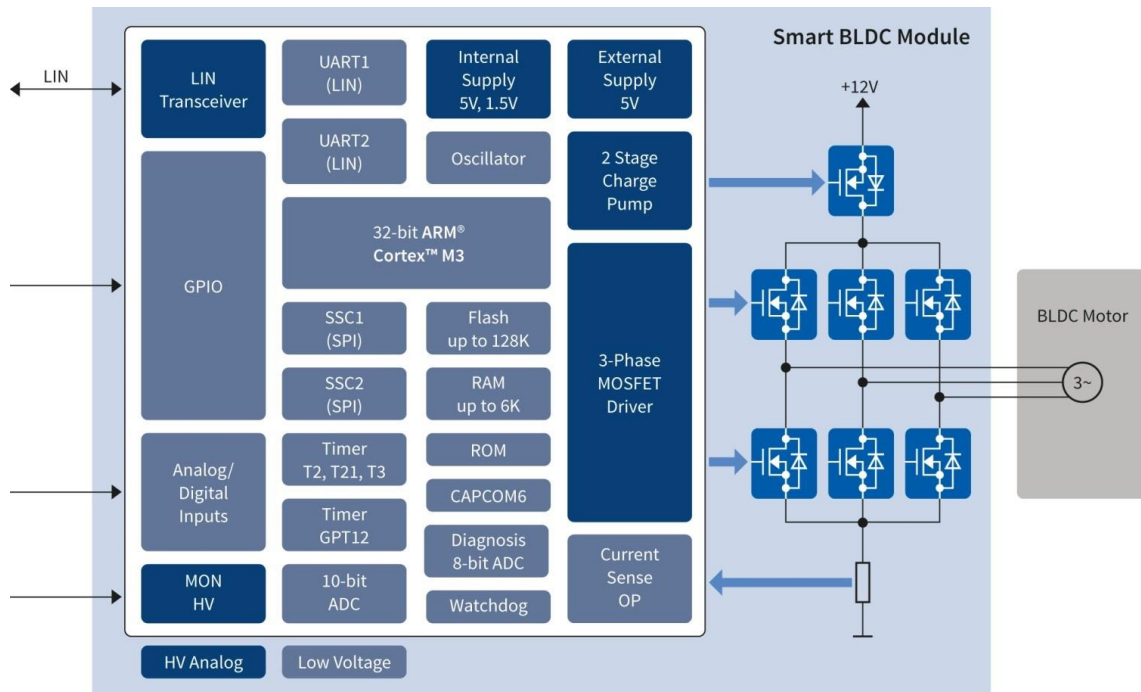
- › Fuel pump
- › Water pump
- › Oil pump
- › HVAC blower
- › Engine cooling fan
- › Wiper
- › Sensor-less and sensor based BLDC motor applications controlled by the Local Interconnect Network (LIN) or PWM.



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### Block Diagram



### Product Overview TLE987x

Product name	Freq. [MHz]	Interface	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, T <sub>j</sub> = 150°C)									
<a href="#">TLE9871QXA20</a>	24	PWM	36	3	4	Yes	No	3	3
<a href="#">TLE9877QXA20</a>	24	PWM + LIN	64	6	4	Yes	No	3	3
<a href="#">TLE9877QXA40</a>	40	PWM + LIN	64	6	4	Yes	No	3	3
<a href="#">TLE9879QXA20</a>	24	PWM + LIN	128	6	4	Yes	No	3	3
<a href="#">TLE9879QXA40</a>	40	PWM + LIN	128	6	4	Yes	No	3	3
<a href="#">TLE9879-2QXA40</a>	40	PWM + LIN	128	6	4	Yes	Yes	3	3
TLE987xQXW, Arm® Cortex®-M3 based 3-Phase NFET Gate Driver for BLDC Motor Control (Grade-0, T <sub>j</sub> = 175°C)									
<a href="#">TLE9873QXW40</a>	40	PWM + LIN	48	3	4	Yes	No	3	3
<a href="#">TLE9877QXW40</a>	40	PWM + LIN	64	6	4	Yes	No	3	3
<a href="#">TLE9879QXW40</a>	40	PWM + LIN	128	6	4	Yes	No	3	3

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