



Product brief

MOTIX™ MCU Embedded Power IC TLE987x

3-phase motor driver with integrated ARM® Cortex®-M3

The MOTIX™ 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 MOTIX™ 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 MOTIX™ 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.

Applications

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

Key features

- › ARM® Cortex®-M3 MCU
- › System clock up to 40 MHz
- › Up to 256 kB flash memory
- › 14-bit Sigma-Delta ADCs
- › 4 K 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
- › Support 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

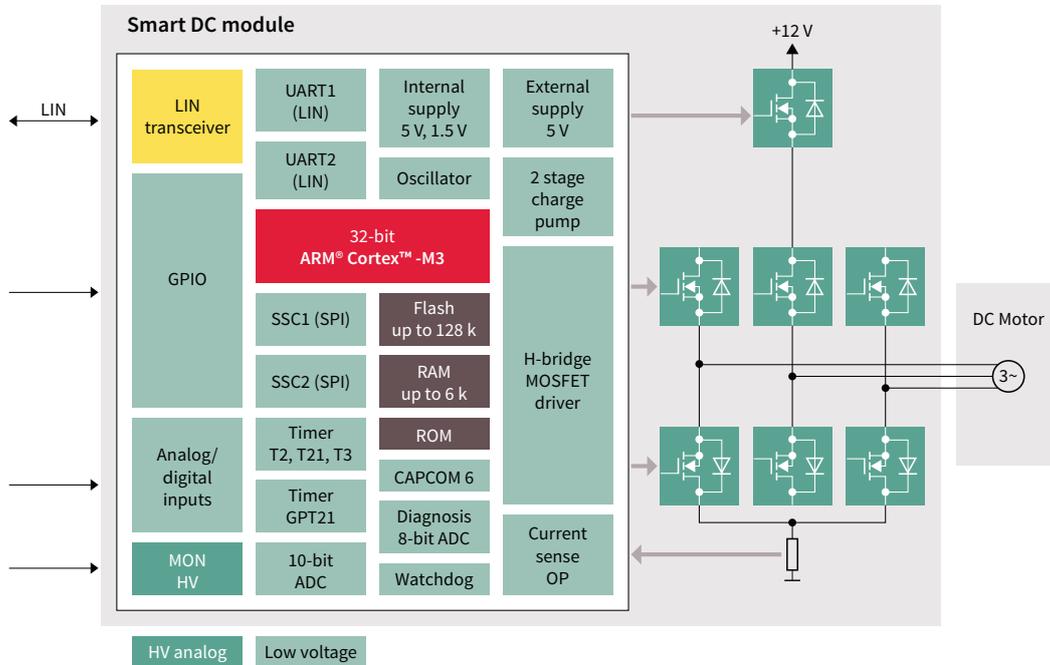
Key applications

- › Fuel pump
- › Water pump
- › Oil pump
- › HVAC blower
- › Engine cooling fan
- › Wiper
- › Sensor-less and sensor-based BLDC motor applications controlled by LIN or PWM

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3-phase motor driver with integrated ARM® Cortex®-M3 MCU

Block diagram



Product overview TLE987x

Product name	Frequency [MHz]	Interface	RAM [kB]	Flash [kB]	EEPROM emulation [kB]	OP-AMP	2x 14-bit Sigma-Delta ADC	Package
MOTIX™ TLE9871QXA20	24	PWM	3	36	4	Yes	No	PG-VQFN-48-31
MOTIX™ TLE9877QXA40	40	PWM + LIN	6	64	4	Yes	No	PG-VQFN-48-31
MOTIX™ TLE9879QXA40	40	PWM + LIN	6	128	4	Yes	No	PG-VQFN-48-31
MOTIX™ TLE9879-2QXA40	40	PWM + LIN	6	128	4	Yes	Yes	PG-VQFN-48-31
MOTIX™ TLE9872QXA40	40	PWM + LIN	8	256	4	Yes	No	PG-VQFN-48-29
MOTIX™ TLE9872-2QXA40	40	PWM + LIN	8	256	4	Yes	Yes	PG-VQFN-48-29
MOTIX™ TLE9873QXW40	40	PWM + LIN	3	48	4	Yes	No	PG-VQFN-48-29
MOTIX™ TLE9877QXW40	40	PWM + LIN	6	64	4	Yes	No	PG-TQFP-48-10
MOTIX™ TLE9877QXW40	40	PWM + LIN	6	64	4	Yes	No	PG-VQFN-48-29
MOTIX™ TLE9879QXW40	40	PWM + LIN	6	128	4	Yes	No	PG-TQFP-48-10
MOTIX™ TLE9879QXW40	40	PWM + LIN	6	128	4	Yes	No	PG-VQFN-48-29
MOTIX™ TLE9872QXW40	40	PWM + LIN	8	256	4	Yes	No	PG-TQFP-48-10



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