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System-On-Chip Family For Motor Control Enables Compact And Cost-Efficient Designs

Infineon Technologies' TLE994x and TLE995x are additions to the company's MOTIX 32-bit motor control SoC (system-on-chip) family, offer new solutions for both brushed (BDC) and brushless (BLDC) motor applications. The products are tailored for small- to medium-sized automotive motors, ranging from functions such as battery cooling in electric vehicles to comfort features such as seat adjustment.

The number of such motors continues to grow in modern, especially electric, vehicles and they are used in an increasing number of safety-critical applications. Therefore, car manufacturers require reliable, compact and cost-effective solutions that integrate multiple functions. Based on Infineon's extensive experience in motor control, the new SoCs combine advanced integration with functional safety and cybersecurity-relevant features.

The three-phase TLE995x (BLDC) is well suited for pumps and fans in thermal management systems, while the two-phase TLE994x (BDC) targets comfort functions such as electric seats and power windows. Both devices integrate advanced diagnostic and protection functions that support reliable motor operation.

By combining a gate driver, microcontroller, communication interface, and power supply in a single chip, Infineon's SoCs offer exceptional functionality with minimal footprint. The new LIN-based devices feature an Arm Cortex-M23 core running up to 40 MHz, with integrated flash and RAM (Fig. 1.)

Field-oriented control (FOC) capability ensures efficient and precise motor operation. Compared to the established TLE986x/7x family, the TLE994x/5x offers enhanced peripherals, flexible PWM generation via the CCU7, and automatic LIN message handling to reduce CPU load. All devices comply with ISO 26262 (ASIL B) for functional safety. Additionally, the integrated Arm TrustZone technology provides a foundation for improved system security. (See Figs. 2 and 3 for descriptions of the related parts.)

With the TLE994x/5x series, Infineon introduces a new generation of the MOTIX MCU family based on the scalable TLE99xx platform. This unified approach enables hardware and software synergies across future products, simplifying design and improving development efficiency.

To accelerate evaluation and design-in, Infineon also provides a comprehensive development ecosystem, including evaluation boards, configuration and simulation tools, and dedicated software packages. A 150-W water pump reference design and application-optimized FOC motor control software further support rapid prototyping, robust performance, and faster time-to-market.

The MOTIX TLE994x/5x devices are in production. For further information on the TLE994x, see the MOTIX MCU 32-bit motor control SoC with integrated h-bridge driver page. For more on the TLE995x, see the MOTIX MCU 32-bit motor control SoC with integrated three-phase bridge driver page.

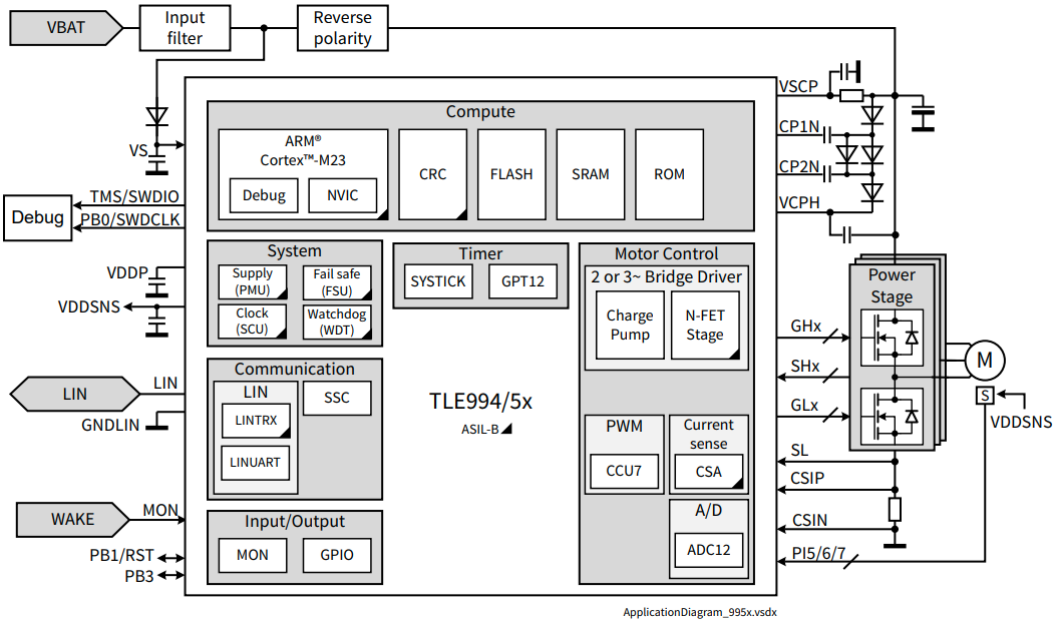

Fig. 1. The MOTIX TLE994x and TLE995x microcontrollers with LIN and NFET driver for motor applications. The two-phase TLE994x targets brushed motors, while the three-phase TLE995x is for brushless (BLDC) motors.

Fig. 2. The MOTIX TLE985x, TLE986x, TLE988x and the new TLE994x 32-bit motor control SoC solutions based on Arm Cortex M with integrated H-bridge driver are equipped with either a LIN or CAN/CAN-FD communication interface and provide smallest system solution for automotive brushed dc motor control applications. Moreover, the TLE988x and TLE994x include variants with ASIL-B rated safety and secure motor control with high performance.

Fig. 3. The MOTIX TLE987x, TLE989x and the new TLE995x 32-bit motor control SoC solutions based on Arm Cortex M with integrated three-phase bridge driver are equipped with either a LIN or CAN/CAN-FD communication interface and provide smallest system solution for brushless dc automotive applications. Moreover, TLE989x and TLE995x offer ASIL B-rated safety and secure motor control.