Embedded Motor Controllers

TDK introduces its next-generation embedded motor controller family HVC 5x

- The HVC 5221D is a motor controller with 4 x 500 mA outputs for stepper, brushless (BLDC), and brushed DC motors with 32 KB Flash memory and LIN interface
- The HVC 5222C is a 3 x 1 A controller for BLDC or BDC motors with 32 KB Flash memory and LIN interface

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TDK Corporation (TSE:6762) has expanded its Micronas embedded motor controller portfolio with the first members of the new HVC 5x family of programmable system-on-chip (SOC) motor controllers for driving small stepper, brushed (BDC) and brushless (BLDC) motors in automotive and industrial applications. The new HVC 5x family represents an application-specific evolution of the popular HVC 4x devices which were intended as a “one IC fits all” motor-control solution for stepper, BLDC and BDC motors. The new HVC 5221D and HVC 5222C are focused on individual motor types to enable lower-cost and smaller-form-factor applications.
Samples are already available, start of production is planned for the beginning of 2024.

With the HVC 4x and the first two devices of the HVC 5x family, TDK is offering an ever-increasing portfolio of motor-control solutions for smart actuators with a specific focus on thermal systems in electric and hybrid vehicles. The HVC 5221D includes four motor terminals with a peak current of 500 mA each, focusing on stepper and DC motors in expansion and water valves. The HVC 5222C has three motor terminals, making it suitable for brushless motors with up to 1 A phase current for grille shutters and small fans.* Both devices include seven general-purpose I/O ports and many automotive diagnostic and safety features in small form-factor 24-pin QFN package. All HVC 5x controllers are pin compatible for easier design and scalability.

Commonalities across the HVC 4x and HVC 5x families include:

- 32-bit ARM® Cortex®-M3 CPU core
- 20 MHz system and 35 kHz watchdog oscillator
- 32k or 64k Flash memory versions with 2k or 4k SRAM
- 12-bit, 1-µs ADC for various measurements
- Digital periphery to support motor-control algorithms
- LIN transceiver and UART for communication and auto-addressing using the BSM method**
- Automotive qualification according to AEC-Q100 for temperature Grade 1

In addition, HVC 4x and HVC 5x are sourced from different wafer fabs to improve supply resilience for our customers.

Glossary

- SRAM = Static RAM, volatile memory without the need to refresh
- ADC = Analog/Digital Converter
- LIN = Local Interconnect Network
- UART = Universal Asynchronous Receiver/Transmitter
- NVR= Non-volatile Register

Main applications**

- Expansion valves for refrigerant chillers
- Water valves for coolant distribution
- Fans for seat cooling and heating
- HVAC flaps for passenger air distribution
- Automatic sunshades
- Automatic grille shutters and spoilers to reduce aerodynamic resistance
- Charge-door actuators

Key data***		
Type	**HVC 5221D**	**HVC 5222C**
Motor terminals	4	3
Drive current	500 mA (peak)	1 A (peak)
High- and low-side on-resistance	3 Ω	1.8 Ω
Current measurement	Internal and external shunt	External shunt only
Microcontroller	32-bit ARM® Cortex®-M3 CPU core	
Flash memory	32 KB	
RAM	2 KB	
EEPROM	512 byte	
NVR	256 byte	
Package	5 x 5 mm^2, 24-pin PQFN	

* Any mention of target applications for our products are made without a claim for fit for purpose as this has to be checked at system level.
** IP-Notice: If LIN auto-addressing features are used, third-party rights such as EP 1490 772 B should be considered.
*** All operating parameters must be validated for each customer application by customers' technical experts.

About TDK Corporation

TDK Corporation is a world leader in electronic solutions for the smart society based in Tokyo, Japan. Built on a foundation of material sciences mastery, TDK welcomes societal transformation by resolutely remaining at the forefront of technological evolution and deliberately "Attracting Tomorrow." It was established in 1935 to commercialize ferrite, a key material in electronic and magnetic products. TDK's comprehensive, innovation-driven portfolio features passive components such as ceramic, aluminum electrolytic and film capacitors, as well as magnetics, high-frequency, and piezo and protection devices. The product spectrum also includes sensors and sensor systems such as temperature and pressure, magnetic, and MEMS sensors. In addition, TDK provides power supplies and energy devices, magnetic heads and more. These products are marketed under the product brands TDK, EPCOS, InvenSense, Micronas, Tronics and TDK-Lambda. TDK focuses on demanding markets in automotive, industrial and consumer electronics, and information and communication technology. The company has a network of design and manufacturing locations and sales offices in Asia, Europe, and in North and South America. In fiscal 2022, TDK posted total sales of USD 15.6 billion and employed about 117,000 people worldwide.

About TDK-Micronas

TDK-Micronas is the center of competence for magnetic-field sensors and CMOS integration within the TDK group. TDK-Micronas has gained operational excellence for sensors and actuators production in over 25 years of in-house manufacturing. It was the first company to integrate a Hall-effect based sensor into CMOS technology in 1993. Since then, TDK-Micronas has shipped over six billion Hall sensors to the automotive and industrial market. The operational headquarters are located in Freiburg im Breisgau (Germany). Currently, TDK-Micronas employs around 1,000 people.

You can download this text and associated images from https://www.micronas.tdk.com/en/tradenews/pr2301.

Further information on the products can be found https://www.micronas.tdk.com/en/products/embedded-motor-controllers/hvc-5x.

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