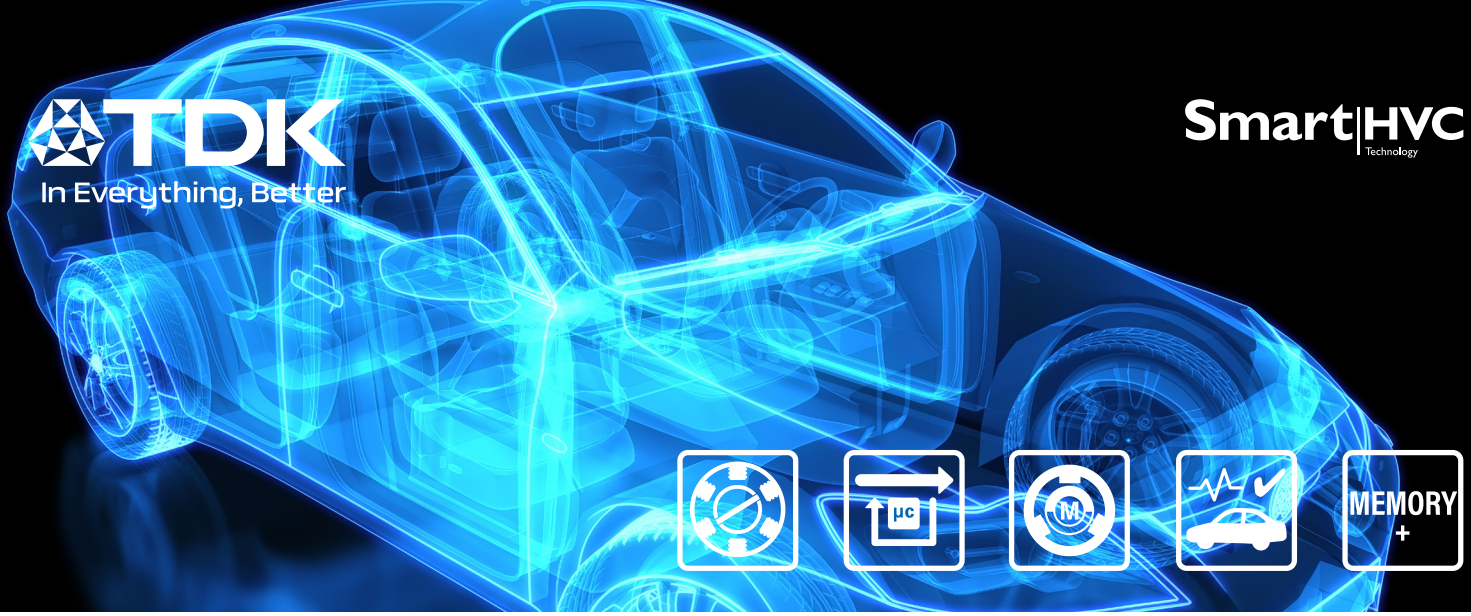


HVC 5x

Compact Motor–Controller Family for BLDC, BDC, or Stepper Motors

As the small actuator market matures, noise performance, over the air update and cybersecurity are becoming more and more important to our customers. For low noise, all of our actuators are FOC capable. To enable more secure applications, we are rounding out our our portfolio with 64 KB flash and 4 KB SRAM variants which support ASIL B and LIN OTA with RSA 256 capability.

In addition, HVC 5422C is our first IC with password protection for increased cybersecurity.

The new C-Revisions of HVC 5221D, HVC 5222C, and HVC 5223C are all 32 KB flash devices with 2 kB-4 KB SRAM and 2 KB EEPROM These HVCxyzC variants are optimized for 3-phase BLDC motors, while the D variants have 4 outputs for stepper and brushless motors. All HVC 5x devices uses the same Arm® Cortex®-M3 CPU based microcontroller with largely the same peripheral motor-control features and LIN bus connectivity as their predecessors.

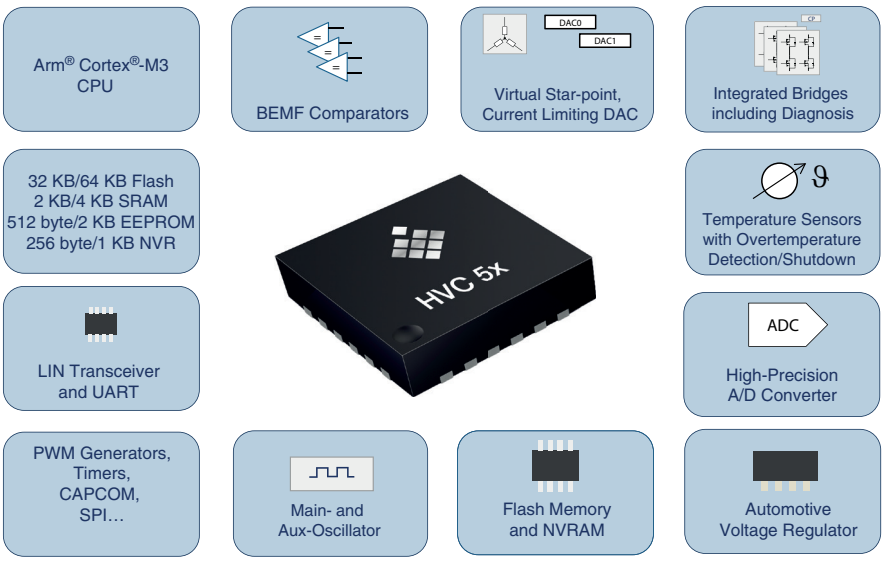
Seven general purpose I/0 pins (LGPIO) and reduced pins for internal supplies, minimize bill of material (BOM) cost.

Additional features, such as differential input channels, digital timers, capture-compare units, and an SPI master interface enable integration of application functions as well as TDK-Micronas' large portfolio of Hall switches or 2D/3D sensors for more precise motor control.

All current HVC 5x devices are qualified according to AEC-Q100 Grade 1, come in a thermally efficient 5 x 5 mm PQFN24 package and are pin compatible with each other as well as with future devices with higher currents and more memory.

HVC 5x Variants

	Flash	RAM	Drivers	Package
HVC 5221D	32 KB	2 KB	4 × 0.5 A	QFN24
HVC 5222C	32 KB	4 KB	3 × 1.0 A	QFN24
HVC 5223C	32 KB	2 KB	3 × 2.0 A	QFN24
HVC 5422D	64 KB	4 KB	4 × 1.0 A	QFN24
HVC 5422C	64 KB	4 KB	3 × 1.0 A	QFN24



Main Features

- Supply voltage range from 6 V to 18 V (transient from 4.0 to 40 V)
- 3.3 V, 15 mA supply for peripherals
- 32-bit Arm® Cortex®-M3 CPU core
- 20 MHz system clock, 35 kHz watchdog oscillator
- 32 KB or 64 KB flash memory
- 12-bit, 1 µs ADC for internal and external measurements
- 2 x 8-bit current DAC for motor current limiting
- 12-bit PWM generators with center- and edge alignment and ADC triggering
- 16-bit timers for input and output PWM signal handling
- 7 GPIOs for application interface
- LIN Transceiver for auto-addressing using the bus shunt method*
- Small thermally efficient QFN24 package

Evaluation Boards (see Fig. 1)

- HVC 5x Application Board, 120 mm x 90 mm
- Clamshell socket for QFN24 package
- Driving brushed DC, brushless DC and stepper motors using the integrated half-bridges
- Prepared for commutation via Hall-sensor feedback or BEMF sensing
- Standard 20-pin (0.1”) debug interface header
- LIN-bus header with auto-addressing support evaluation

Software Development

- Keil MDK 5 µVision IDE and Arm® Cortex® debug adapter or SEGGER J-LINK debug probes, IAR Development Environment
- Various Application Notes available (BLDC- and Stepper-Motor Control, LIN, Bootloader, ...)

Demo Boards (see Fig. 2)

- HVC 5x Small Demo Board SDB-I, 40 mm diameter
- Configurable by solder jumpers, to drive either brushed DC, brushless DC or stepper motors using the integrated halfbridges of the HVC 5x
- Prepared for commutation via Hall-sensor feedback or BEMF sensing
- 10-pin (0.05”) Cortex Debug Connector
- LIN-bus interface with auto-addressing support

For further information see https://www.micronas.tdk.com/en/products/embedded-motor-controllers-smart-actuators

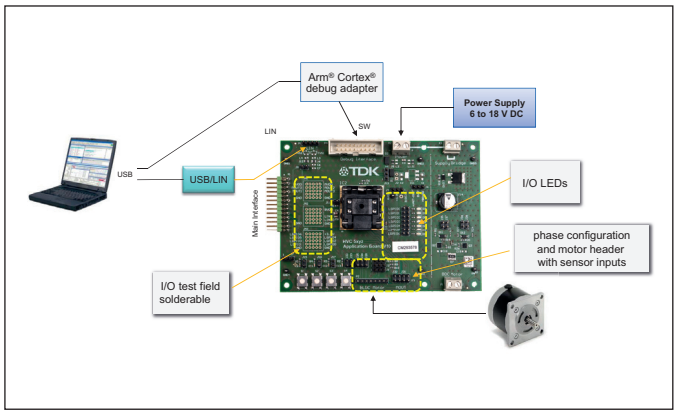


Fig. 1: HVC 5x Application Board

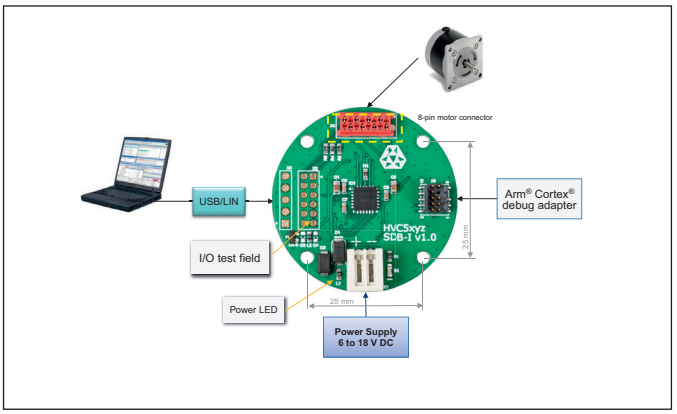


Fig. 2: HVC 5x Small Demo Board SDB-I

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