Analog & Power for Motor Control

Marketing & Application EMEA

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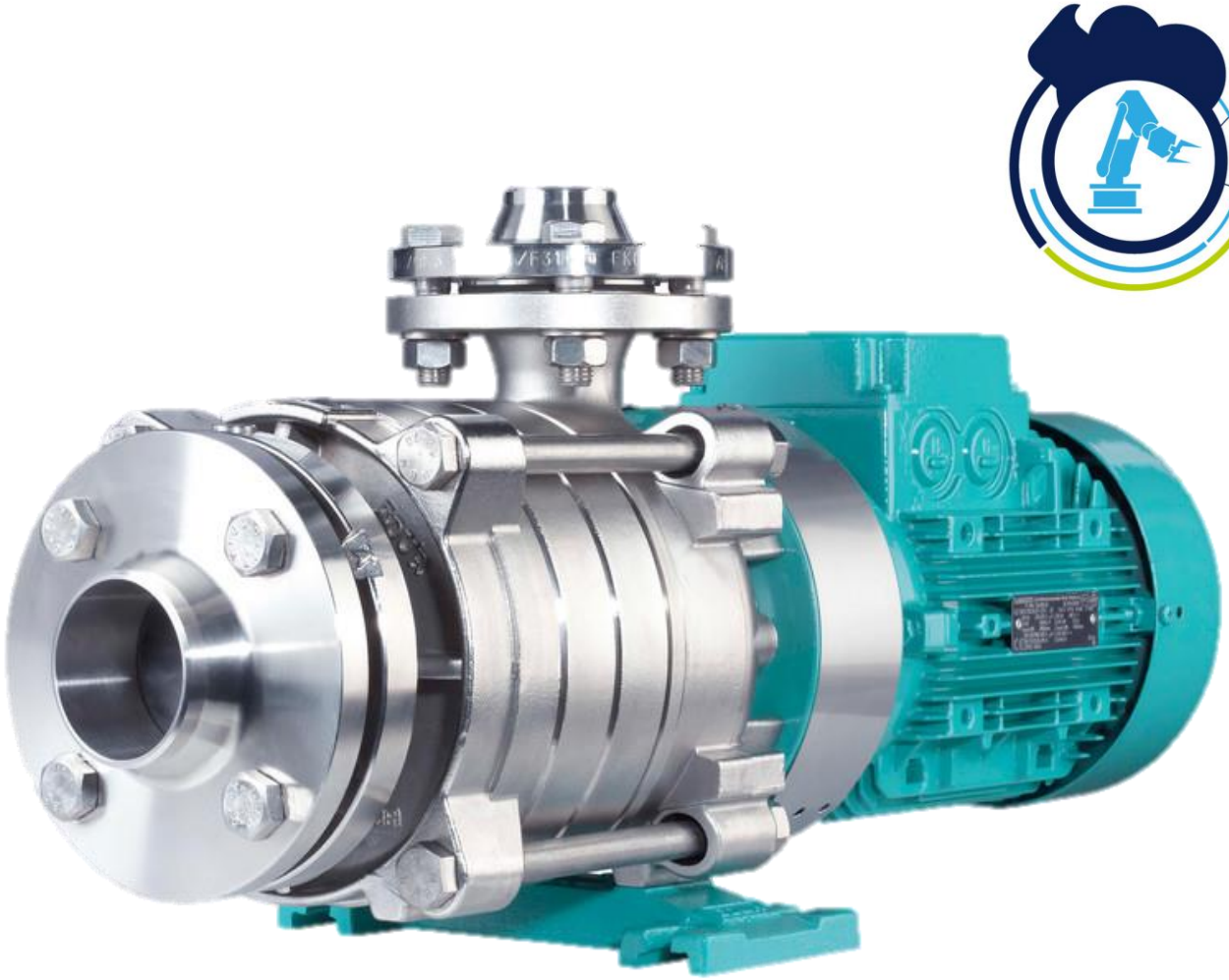

Analog and Power for **HIGH VOLTAGE MOTOR CONTROL**

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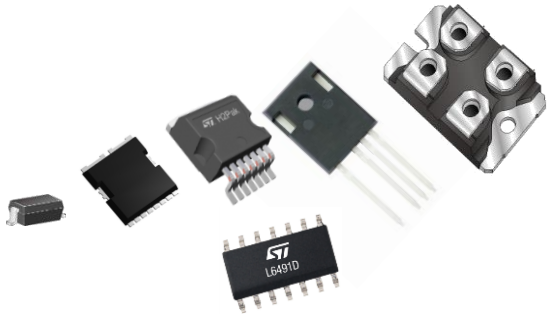
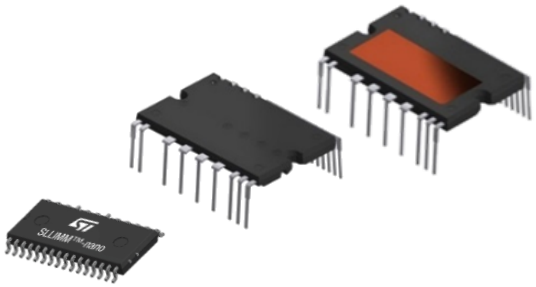
HV Motor Drives Top 3 Product Clusters

ACEPACK™ → Highest current density package in ST power portfolio



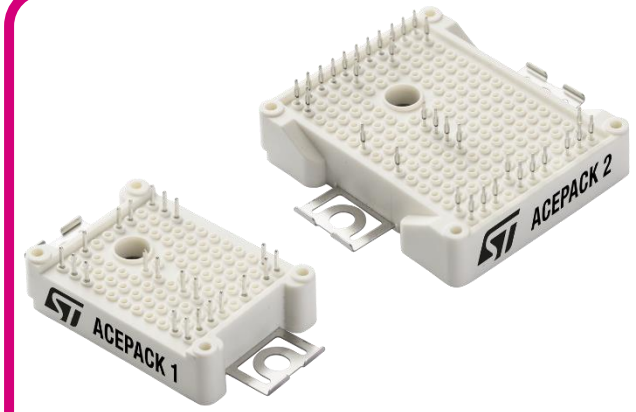
Discrete & Drivers & SIP

Typical Power: 10W ÷ 5kW



SLLIMM™ IPM

Typical Power: 20W ÷ 4kW



ACEPACK™ Power Modules

Typical Power: 3kW ÷ 30kW

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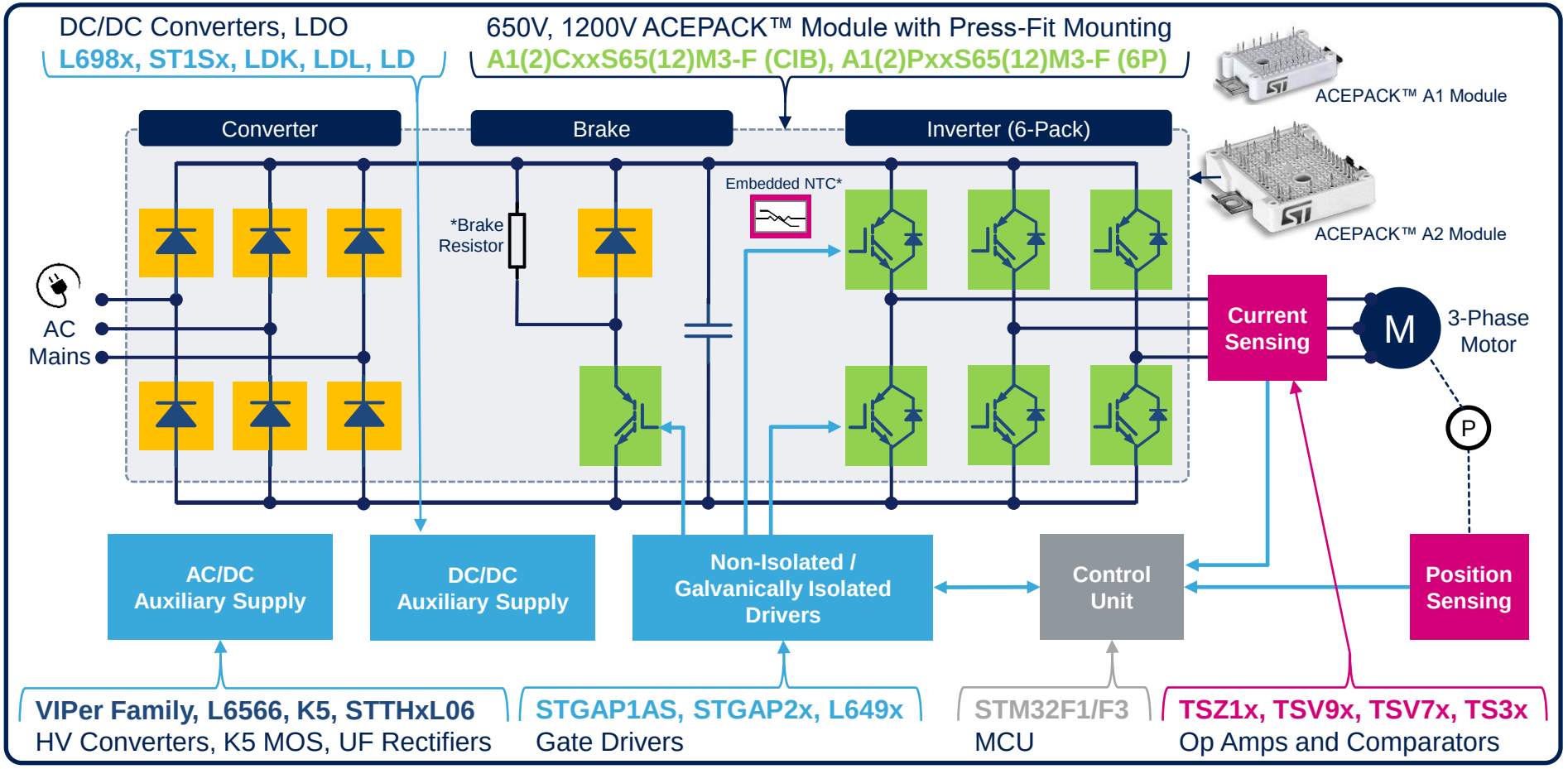
High Voltage, High Power Motor Drive

Typical schematic & Product mapping

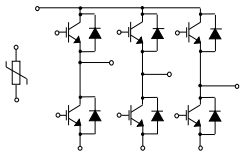
Converter Inverter Brake (CIB) or 6-Pack (6P) with ACEPACK™ Module for 3-Phase Motor



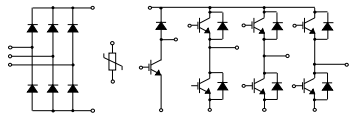
* Brake resistor and DC link capacitor are not part of ACEPACK™ Module

ACEPACK™ Module for Motor Control

Standard products available (Solder-Pin and Press-Fit Connection)



Six-Pack + NTC



CIB + NTC

ACEPACK™ 1

Part Number*	Topology	BV_{CES}	I_C rating
A1P25S12M3/-F	Six-Pack	1200V	25A
A1P35S12M3/-F			35A
A1C15S12M3/-F	Converter Inverter Brake	1200V	15A
A1P50S65M2/-F	Six-Pack	650V	50A

ACEPACK™ 2

Part Number*	Topology	BV_{CES}	I_C rating
A2C25S12M3/-F	Converter Inverter Brake	1200V	25A
A2C35S12M3/-F			35A
A2P75S12M3/-F	Six-Pack	1200V	75A
A2C50S65M2/-F	Converter Inverter Brake	650V	50A

*Connection Pins type:
-F = Press-Fit | if blank = Solder-Pin

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Gate Drivers- Portfolio Overview

A future-proof portfolio for a wide range of applications

Electric/ Hybrid vehicles

1200 V inverters

Server, UPS

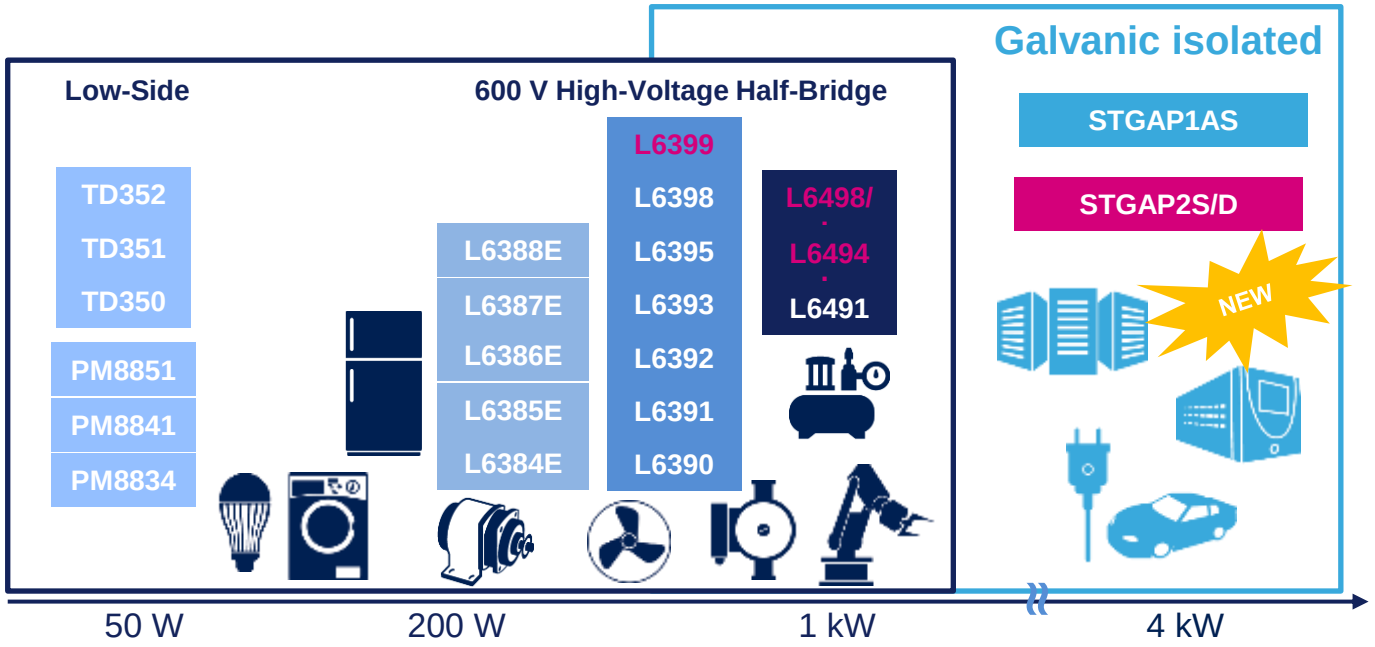
Compressors

Factory Automation

White goods

Solar

E-bikes



* New 2017

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NEW

STGAP2S/ STGAP2D

1700 V, 4A Galvanically Isolated Drivers

Samples Available! | SOP in Q3 2018

KEY APPLICATIONS

- Motor driver
- Factory automation
- Industrial drives and Fans
- DC/DC converters
- Welding

Key benefits & features

High performance

- **Up to 1700 V high voltage rail**
- Best In Class for propagation delay **80ns**
- 4A sink / source driver current capability
- **± 100 V / ns transient immunity**
- 3.3 to 5 V TTL/CMOS inputs with hysteresis

Value for Customer

- Best in Class for fast speed
- Reduced BOM thanks to embedded Isolation and Miller Clamp feature

Minimum footprint and lightweight

- Compact and simplified layout **SO8** package (STGAP2S)

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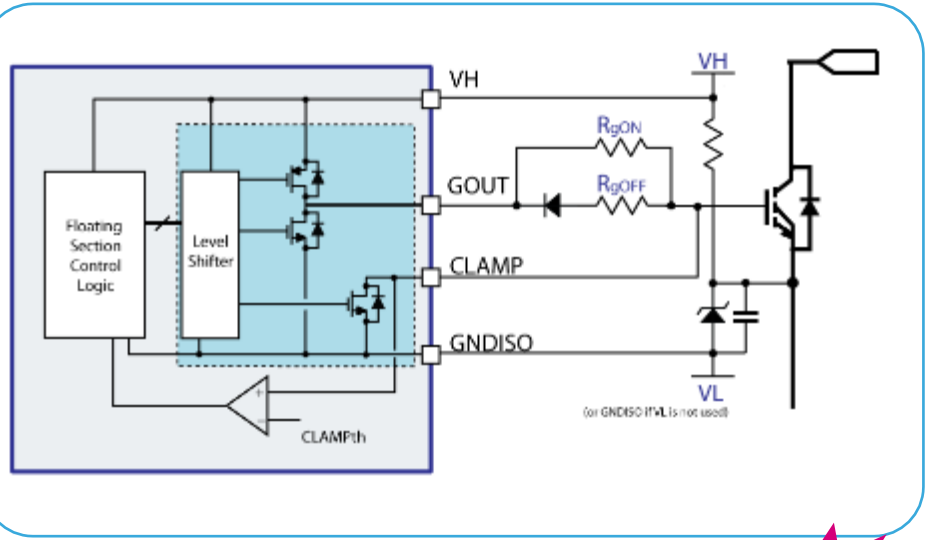
NEW

STGAP2S

1700 V, 4A Galvanically Isolated Drivers

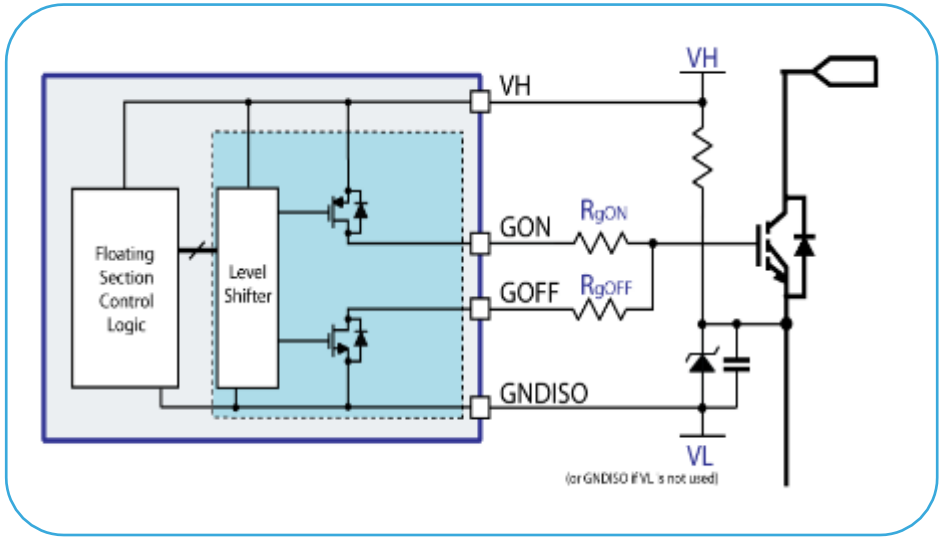
Samples Available!

SOP in Q3 2018



Available

STGAP2SCM:
Single output and Miller CLAMP



STGAP2SM:
Separated sink\source outputs

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NEW

STGAP2D

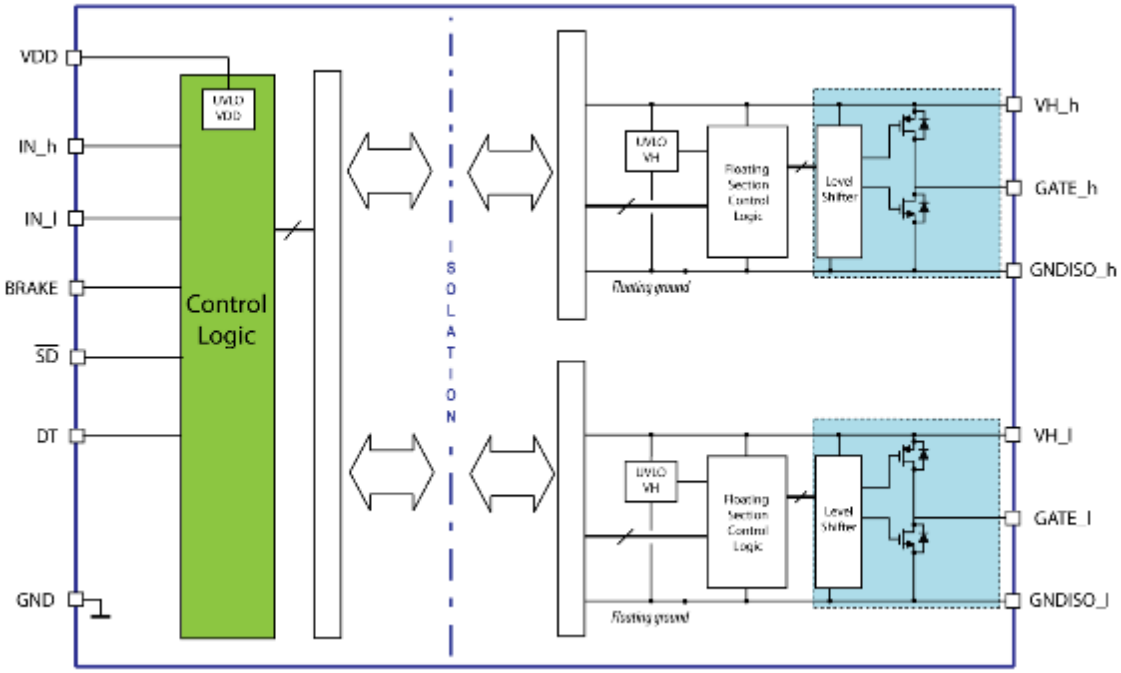
1700 V, 4A Galvanically Isolated Drivers

Samples Available!

SOP in Q3 2018

- 3V3 / 5 V logic inputs (1/3, 2/3 of VDD thresholds)
- **Up to 26 V supply voltage**
- **4 A Sink/Source current capability**
- Single input pin, in phase with output
- Shut-down SD pin, with integrated pull-down
- Propagation delay < 100 ns over temperature
- BRAKE pin
- UVLO Function (for each supply)
- Interlocking
- Programmable Dead-Time
- Stand-by function
- Temperature shut-down protection
- > 100 V/ns CMTI
- **Galvanic isolation**
  - **1.7 kV V_{IORM},**

SO16N



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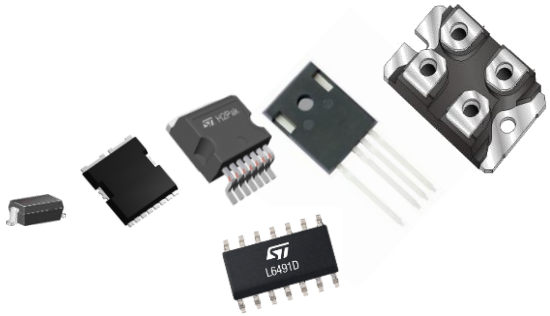
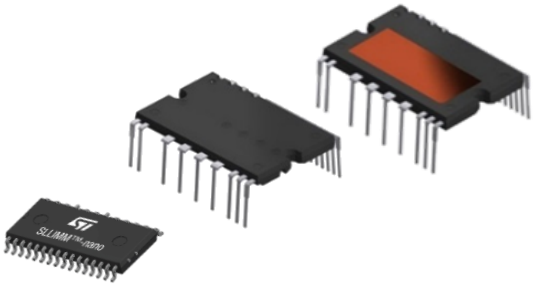
HV Motor Drives Top 3 Product Clusters

SLLIMM™ IPM



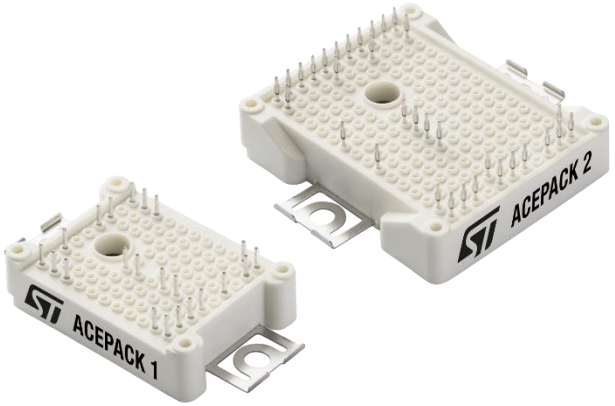
Discrete & Drivers & SIP

Typical Power: 10W ÷ 5kW



SLLIMM™ IPM

Typical Power: 20W ÷ 3kW



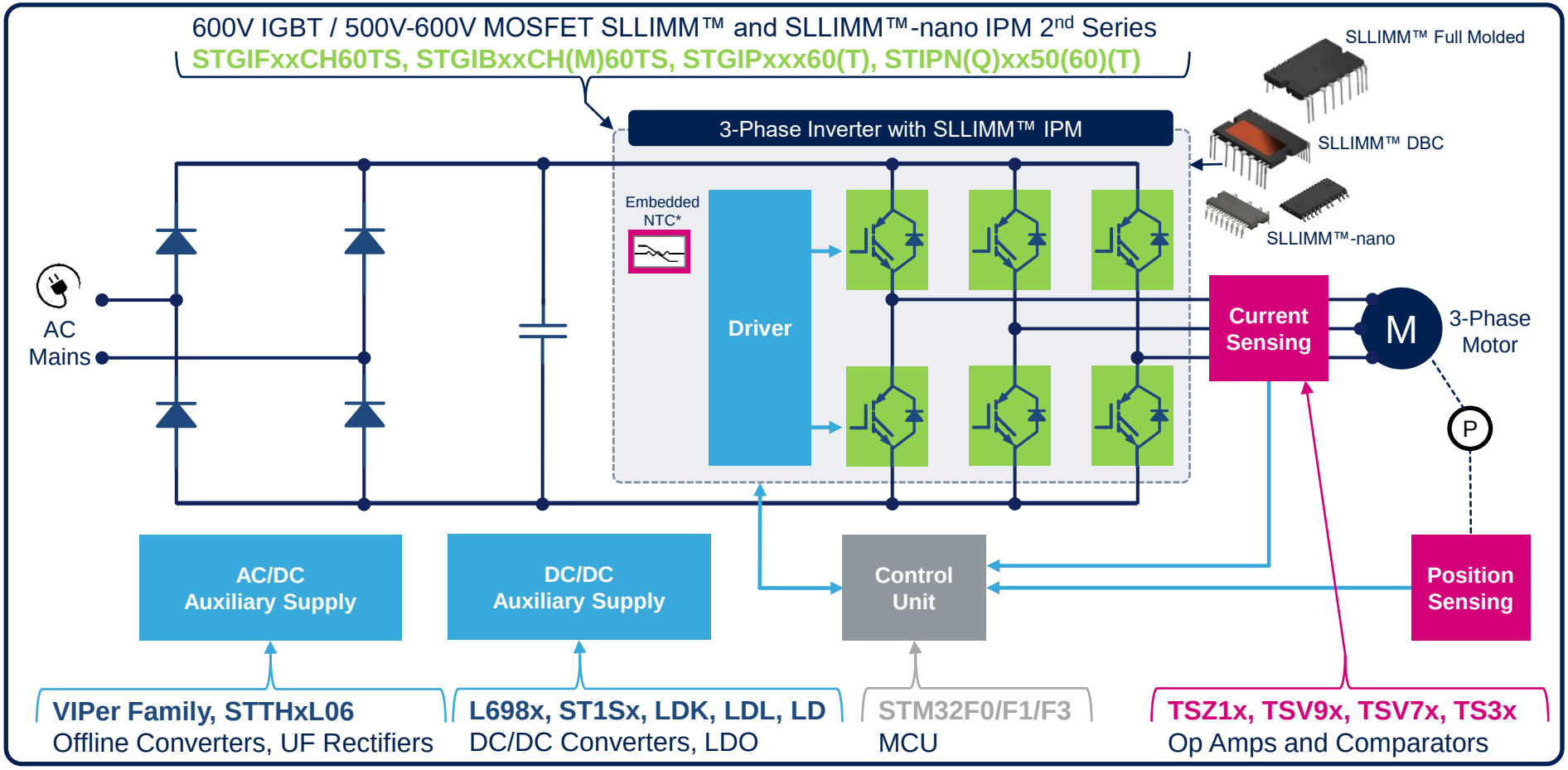
ACEPACK™ Power Modules

Typical Power: 3kW ÷ 30kW

High Voltage, Low/Mid Power Motor Drive

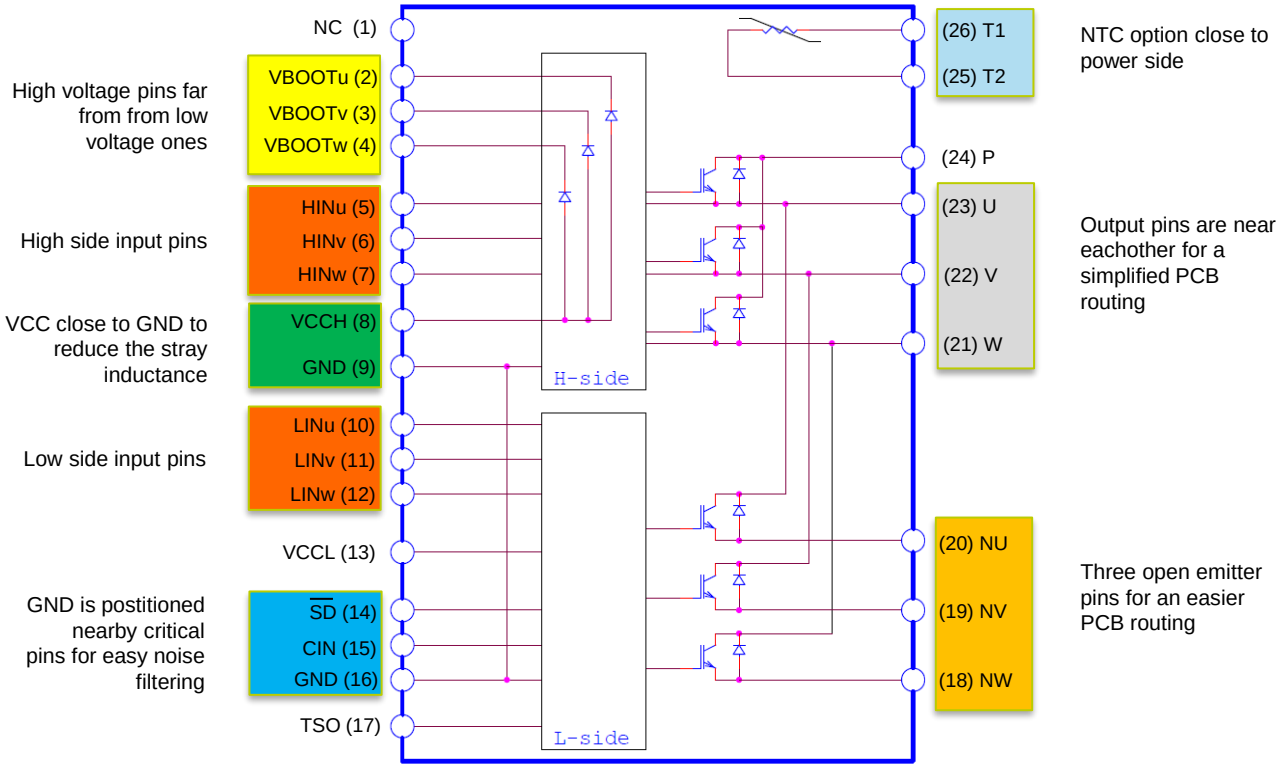
Typical schematic & Product mapping

SLLIMM™ and SLLIMM™-nano IPM for 3-Phase Motor

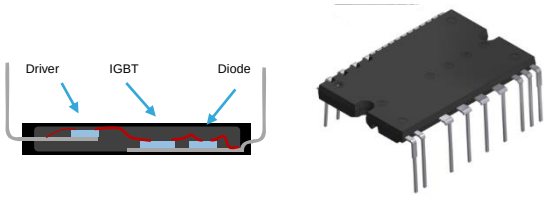


* NTC for temperature control is an option. “T” in the ordering code indicates that the NTC is present.

SLLIMM™ 2nd Series Technical Info



Full Molded

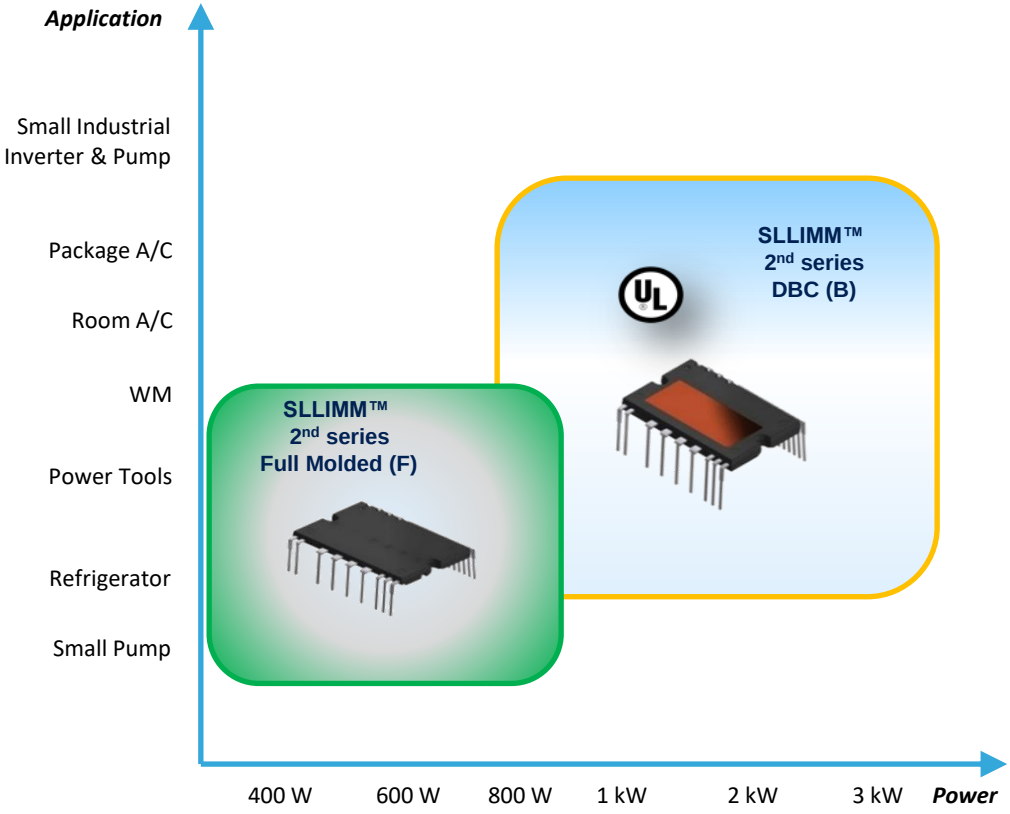


- Ideal choice for low/medium power platforms

Direct Bonded Copper (DBC)

- Improved DBC for power side for a better thermal dissipation
- Vacuum soldering process to improve the die attach

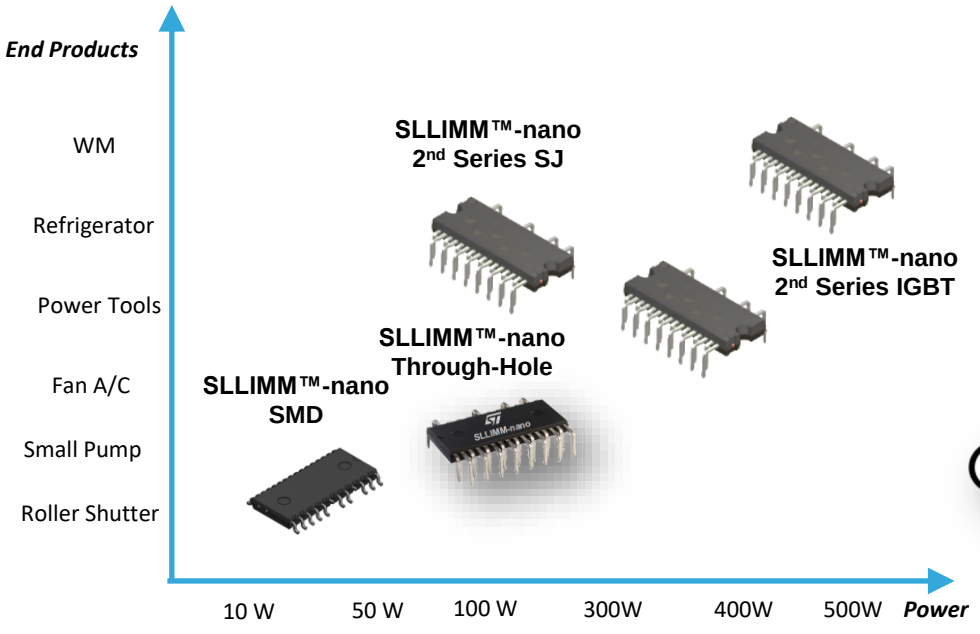
SLLIMM™ IPM 2nd Series Product Plan



SLLIMM 2nd series Full Molded (F)		BV	I_{CN} 25°C	MP
IGBT based	STGIF5CH60TS-L	600V	8A	Available
	STGIF7CH60TS-L		10A	Available
	STGIF10CH60TS-L		15A	Available

SLLIMM 2nd series DBC (B)		BV	I_{CN} 25°C	Max $R_{DS(on)}$	MP
IGBT based	STGIB8CH60TS-L	600V	12A	-	Available
	STGIB10CH60TS-L		15A		Available
	STGIB15CH60TS-L		20A		Available
	STGIB20M60TS-L		25A		Available
	STGIB30M60TS-L		35A		Available
SJ MOSFET based	STIB1060DM2T-L		10A	0.2Ω	Q4/18
	STIB1560DM2T-L		15A	0.15Ω	Q4/18

SLLIMM™-nano IPM Product Plan



SLLIMM™-nano SMD		BV	I_{CN} 25°C	Max $R_{DS(on)}$	MP
IGBT based	STGIPNS3H60T-H	600V	3A	-	Available
	STGIPNS3HD60-H				Available
MOSFET based	STIPNS2M50(T)-H	500V	2A	1.7Ω	Available
	STIPNS1M50T-H		1A	3.6Ω	Available
	STIPNS1M50SDT-H				Available

SLLIMM™-nano Through-Hole		BV	I_{CN} 25°C	Max $R_{DS(on)}$	MP
IGBT based	STGIPN3H60(A)(T)-(H)	600V	3A	-	Available
	STGIPN3HD60-H				Available
MOSFET based	STIPN2M50(T)-H(L)	500V	2A	1.7Ω	Available
	STIPN1M50(T)-H(L)		1A	3.6Ω	Available

SLLIMM™-nano 2nd Series		BV	I_{CN} 25°C	Max $R_{DS(on)}$	MP
IGBT based	STGIPQ3H60T-HZ/L(S)	600V	3A	-	Available
	STGIPQ3HD60-HZ/L		3A		Available
	STGIPQ5C60T-HZ/L(S)		5A		Available
	STGIPQ8C60T-HZ		8A		Available
SJ MOSFET based	STIPQ3M60T-HZ/L		3A	1.6Ω	Available
	STIPQ5M60T-HZ/L		5A	1.0Ω	Available

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Evaluation boards, test your Motor with ST

+

+

STM32 NUCLEO Board

X-NUCLEO-IHM09M1 Exp.

STEVAL-IPMxxx Board

The easiest and fastest way to evaluate any SLLIMM™ IPM with your own 3-Phase Motor

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ST PowerStudio

Dynamic electro-thermal simulation software for power devices

Scope:

- Supports SLLIMM™ & ACEPACK™ families
- Enables DC/AC 3-phase 2-level application
- Compatible with Windows & MAC OS X*
- Freeware software

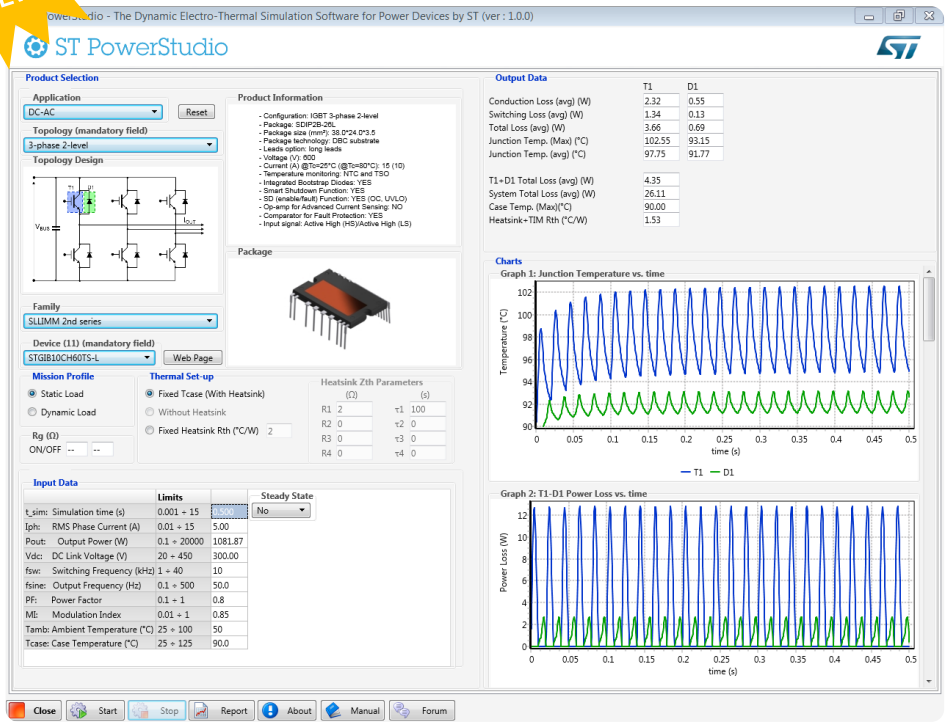
Comprehensive Analysis:

- Static and dynamic load mission profile
- Long mission profile duration of hours
- Several thermal setup
- Deep analysis of junction temperatures

High Connectivity:

- Multi language (English, Chinese*, Japanese*)
- Quick link to st.com doc (product page, DS)
- Output Report
- Online Forum

NEW



* Available in the next releases

STSW-POWERSTUDIO

Available now on st.com

www.st.com/en/embedded-software/stsw-powerstudio.html

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Analog & Power for **LOW VOLTAGE MOTOR CONTROL**

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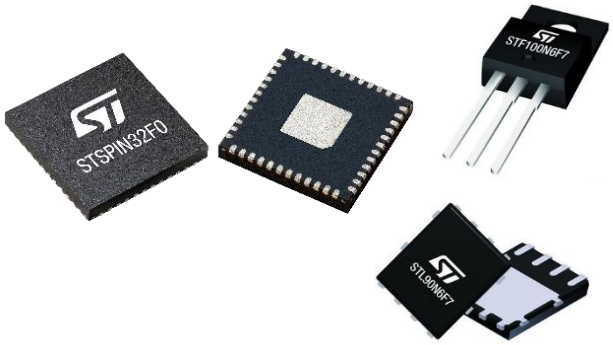
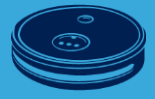
STSPIN Innovation Update

Drive your low voltage motor with ease



STSPIN200	STSPIN800	STSPIN32	&	F7 MOSFETs
1.8V to 10V | 1.3A/2.6A$_{RMS}$	7V to 45V | 1.5A/3A$_{RMS}$	6.6V to 45V	&	40V to 100V



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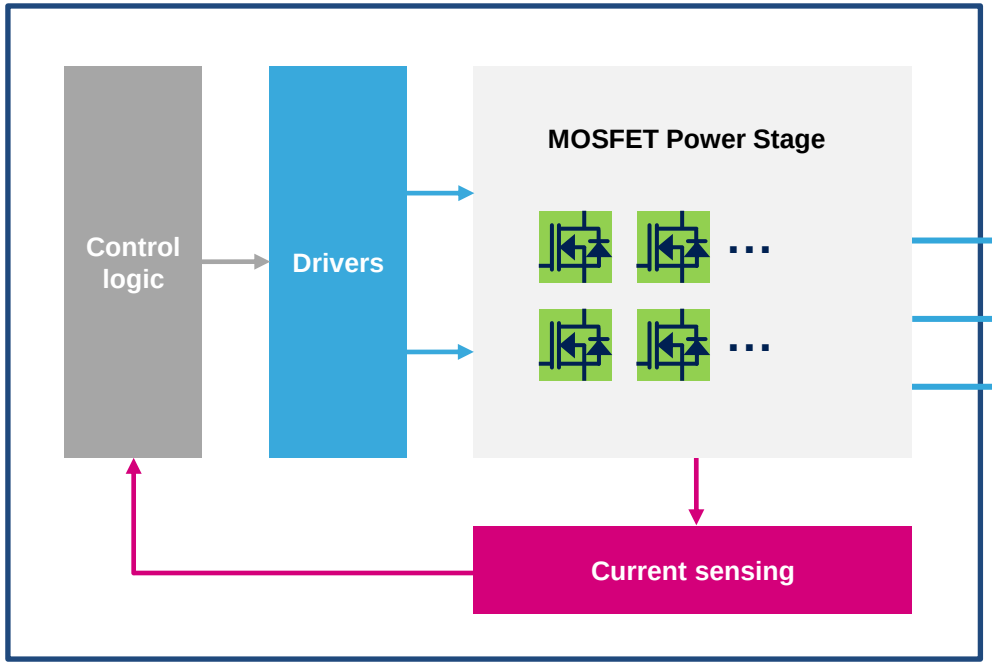
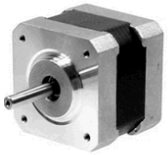
Low Voltage Motor Control by means of ST

STSPIN™ & F7 MOSFET Technology

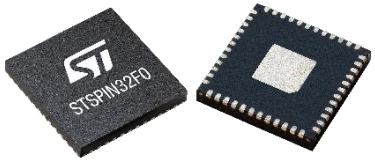


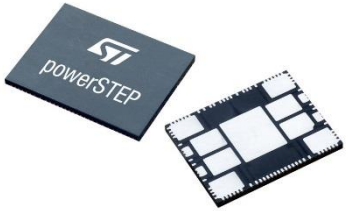
DC motors



Stepper motors

Brushless DC motors





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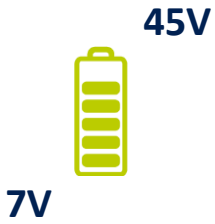
STSPIN Innovation Update

STSPIN800: Cutting-Edge Motion Control Technology



$I = 1.5A_{RMS}$ | $R_{DS(on)} = 500m\Omega$

- Ultra-low standby consumption below 50µA
- 1/256 microstepping (STSPIN820)

- Integrated protection & diagnostics
- Miniaturized QFN 4×4 mm

Stepper	BLDC	Brushed DC
		
STSPIN820	STSPIN830	STSPIN840

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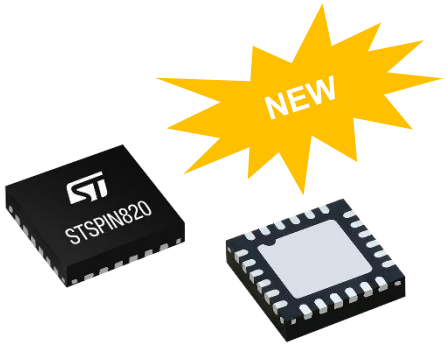
STSPIN Innovation Update

STSPIN820: Up to 1/256 microstepping on-the-fly!



Stepper

STSPIN820

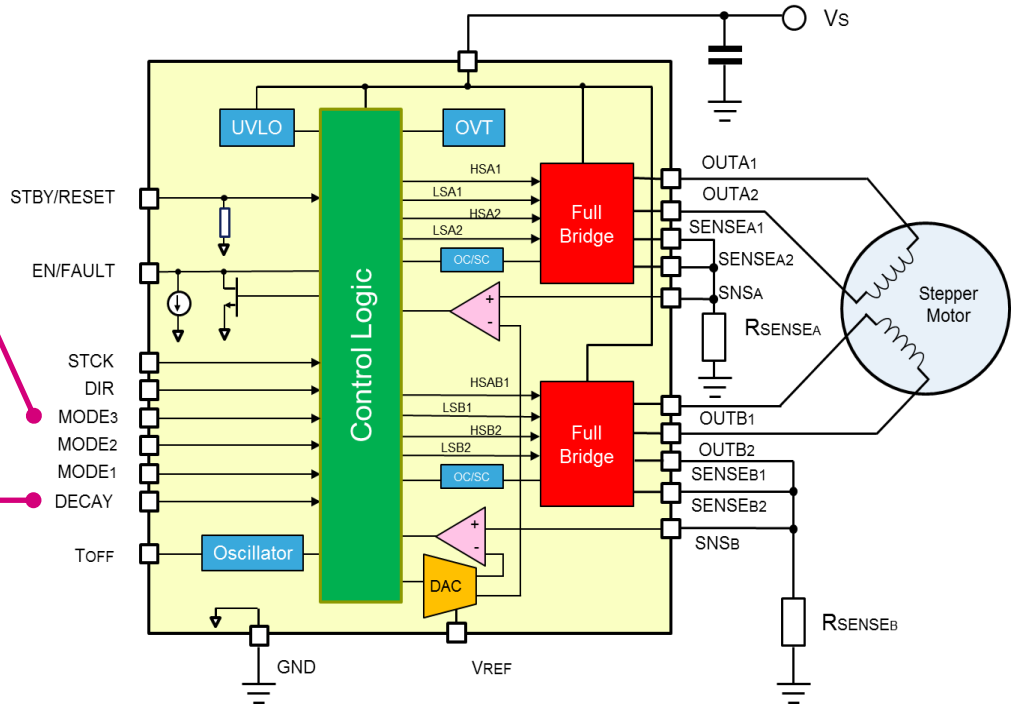
45V

7V

QFN 4×4mm

On-the-fly microstepping configuration

Flexible decay selection



STSPIN Innovation Update

STSPIN830: Three-phase brushless DC motor driver

NEW

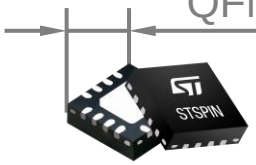
BLDC

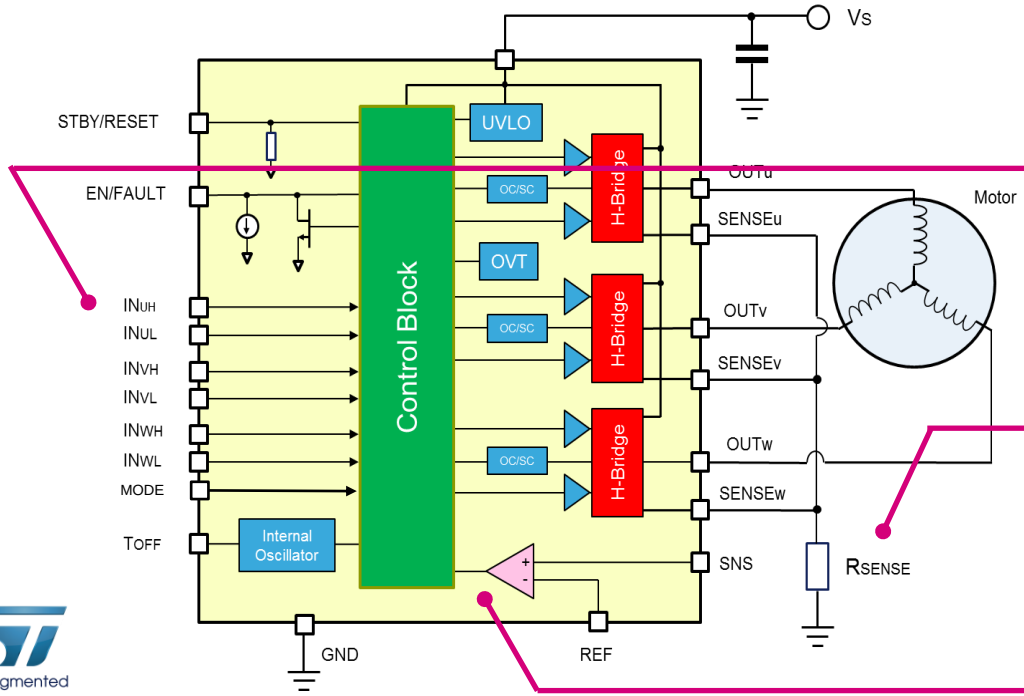
STSPIN830

45V

7V

QFN 4×4mm





3 & 6 INx compatible

Single-shunt/three-shunt FOC ready

Embedded current limiter

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STSPIN Innovation Update

STSPIN840: Single/dual brushed DC motor driver

NEW

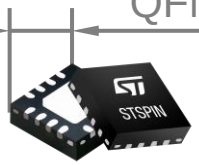
Brushed DC

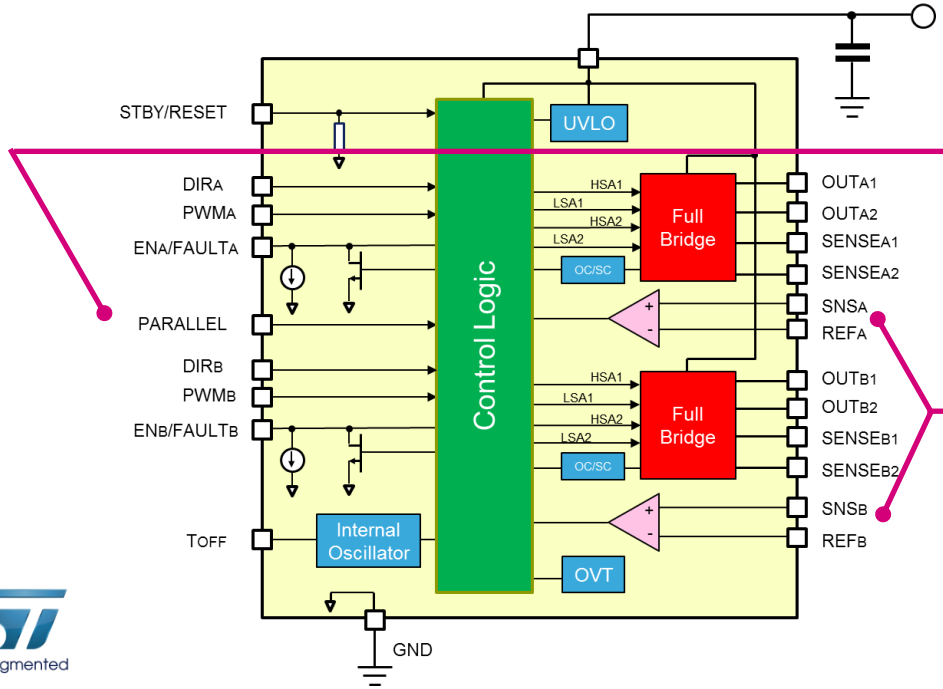
STSPIN840

45V

7V

QFN 4×4mm





Optimized parallel bridge control

More flexibility with dual current control loop

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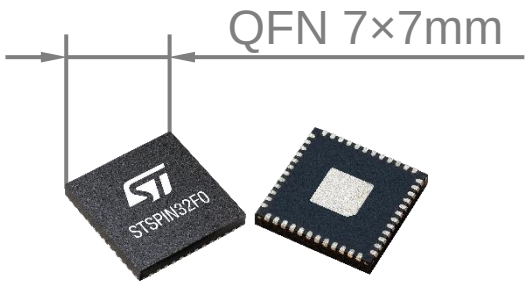
STSPIN32F0 For Motor Control

Motor Driver IC integrating an advanced BLDC controller and a 32-bit MCU

STSPIN32F0

STM32 + BLDC motor Driver & Conditioning

F7 MOSFETs



High integration with embedded 32-bit STM32F0 MCU with ARM® Cortex®-M0

High performance 3-phase gate driver up to 600 mA and 45 V

Cost-effective sensorless or hall-effect sensors controls

Compact design in a 7x7 mm QFN package

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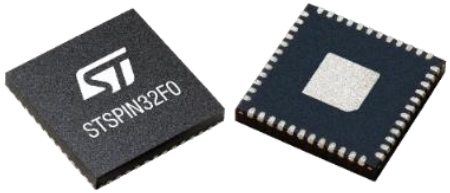
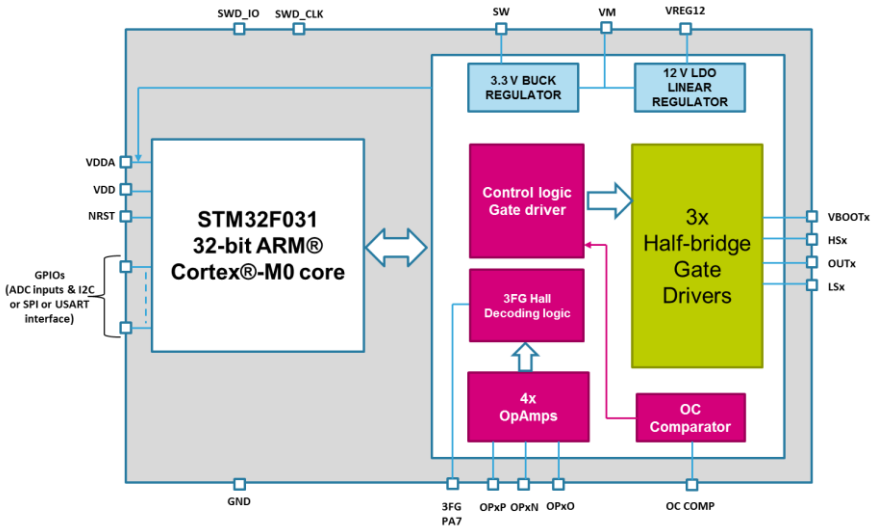


STSPIN32F0

Advanced 3-phase BLDC driver + STM32



KEY APPLICATIONS:

- **Industrial automation**
- **Robotics**
- **Fans**
- **Battery powered Home Appliances**
- Drones and aeromodelling
- Power tools

Key Features

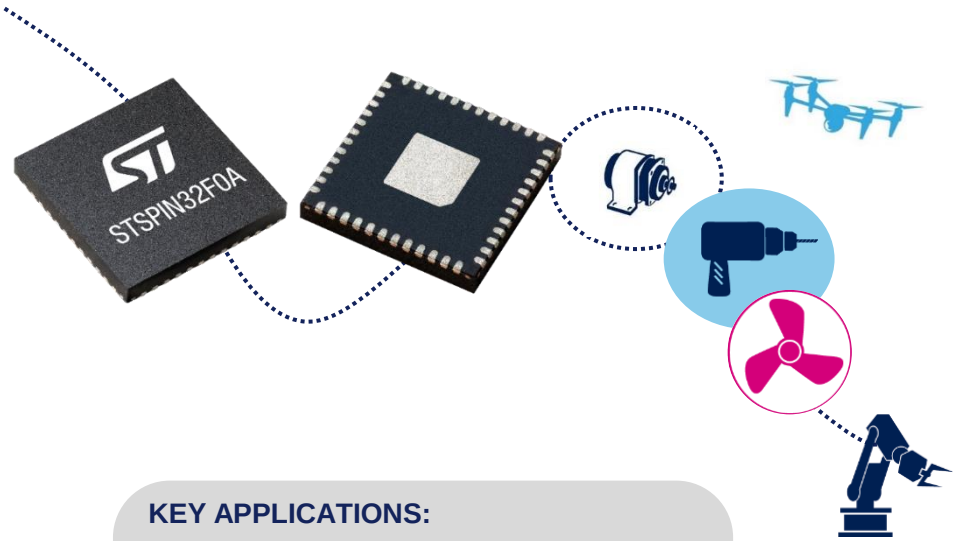
- **STM32 Cortex™ M0 + 3-phase Gate Driver**
- **Fully compatible with STM32 ecosystem**
- **12V LDO & 3.3V DC-DC regulators integrated**
- **FOC & 6-step sensorless / sensored algorithms**

- VS = 45 V, I = 600mA driving capability
- 48 MHz, 32k Flash & 4k SRAM
- 12 bit ADC
- I2C / UART / SPI
- Fully protected (UVLO, Short-circuit, OCP, OTP)
- 4 Op-Amps & 1 Comparator
- Compact design with 7x7 mm QFN
- Extended temp range: -40 to 125°C

NEW

STSPIN32F0A

Advanced 3-phase BLDC driver + STM32 – **from 2 Li-Po Cells to 45V**



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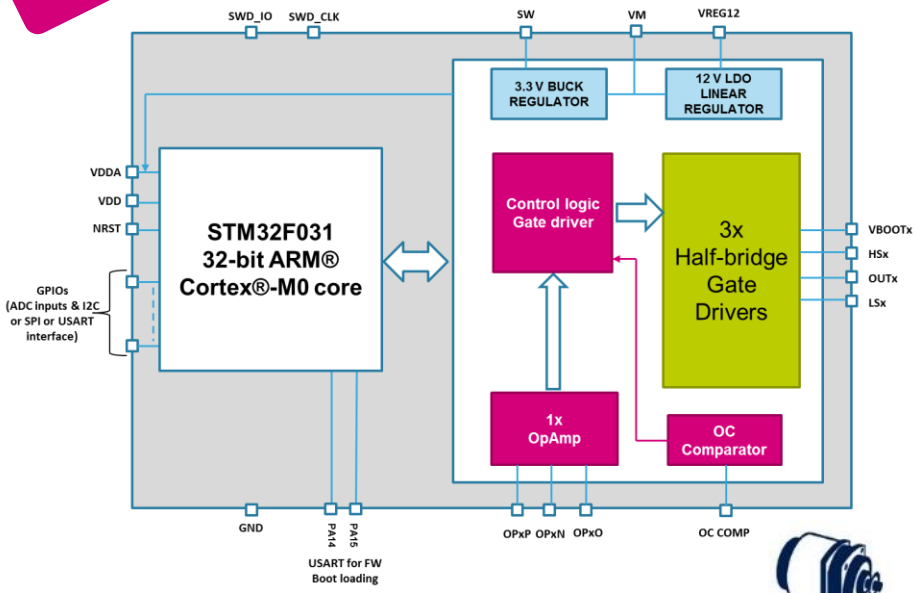
- **12V LDO & 3.3V DC-DC regulators integrated**
- **6step** & FOC **sensorless / sensored algorithms**

- VS = **6.6V–45V**, I = 600mA driving capability
- 48 MHz, 32k Flash & 4k SRAM
- 12 bit ADC
- I2C / UART / SPI
- **FW boot loader support**
- Fully protected (UVLO, Short-circuit, OCP, OTP)
- **3 Op-Amps** & 1 Comparator
- Compact design with 7x7 mm QFN
- Extended temp range: -40 to 125°C

Available in Q3

Advanced 3-phase BLDC driver + STM32 – **More GPIOs**



KEY APPLICATIONS:

- **Power tools**
- **Fans**
- **Battery powered Home Appliances**
- Industrial automation

Key Features

- **STM32 Cortex™ M0 + 3-phase Gate Driver**
- **Fully compatible with STM32 ecosystem**
- **12V LDO & 3.3V DC-DC regulators integrated**
- **6step control algorithm**

- VS = **6.6V–45V**, I = 600mA driving capability
- 48 MHz, 32k Flash & 4k SRAM
- 12 bit ADC
- I2C / UART / SPI
- **20GPIOs & FW boot loader support**
- Fully protected (UVLO, Short-circuit, OCP, OTP)
- **1 Op-Amp** & 1 Comparator
- Compact design with 7x7 mm QFN
- Extended temp range: -40 to 125°C

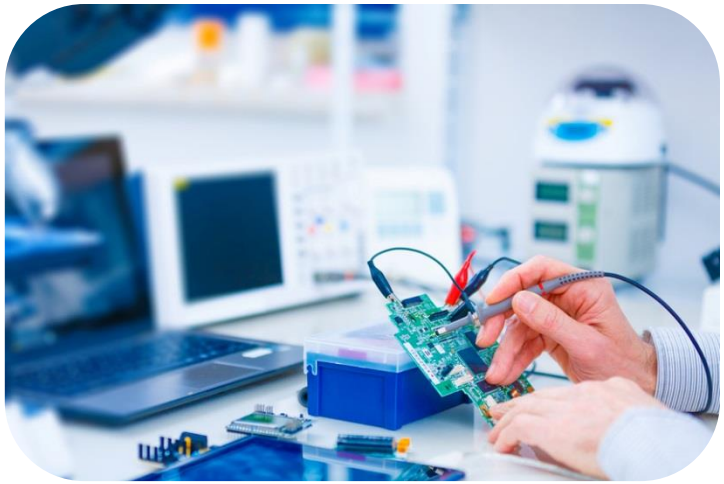
STSPIN32F0/A/B Easy Comparison

Feature	STSPIN32F0	STSPIN32F0A	STSPIN32F0B
Operating voltage	**7.9 V to 45 V**	**6.6 to 45 V**	**6.6 to 45 V**
Embedded MCU	STM32F031x6 with extended temp range	STM32F031x6 with extended temp range	STM32F031x6 with extended temp range
Gate drivers	600 mA triple half-bridge	600 mA triple half-bridge	600 mA triple half-bridge
3.3 V DC/DC buck conv	Embedded	Embedded	Embedded
12 V LDO	Embedded	Embedded	Embedded
OpAmps	**4**	**3**	**1**
3FG decoding logic	**Embedded**	**Not embedded**	**Not embedded**
Comparator	Embedded	Embedded	Embedded
# of GPIOs	**15**	**16**	**20**
OC protection via comparator	Available	Available	Available
Current control via comparator	**Not available**	**Available**	**Available**
Standby	Available	Available	Available
UVLO	Available	Available	Available
Firmware upgrade on the field	**Not available**	**Available**	**Available**

STSPIN Evaluation Ecosystem

Speed-up your design with STSPIN!

= $$!



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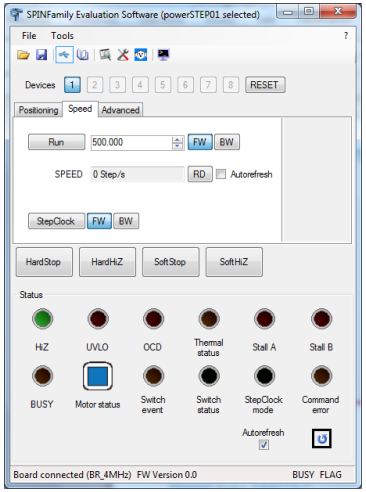
Save Time with STSPIN Evaluation Ecosystem!

- ST provides a rich set of tools for easy evaluation and rapid app design with STSPIN!
- STSPIN evaluation ecosystem includes evaluation boards (X-NUCLEO) and free evaluation software (GUI) & STM32 firmware libraries (X-CUBE).

SPIN Family Evaluation Software



X-NUCLEO-IHM03A1

24VDC Power Supply

NUCLEO-F401RE,
NUCLEO-F030R8,
NUCLEO-L053R8

Stepper motor

X-CUBE firmware package

www.st.com/x-nucleo

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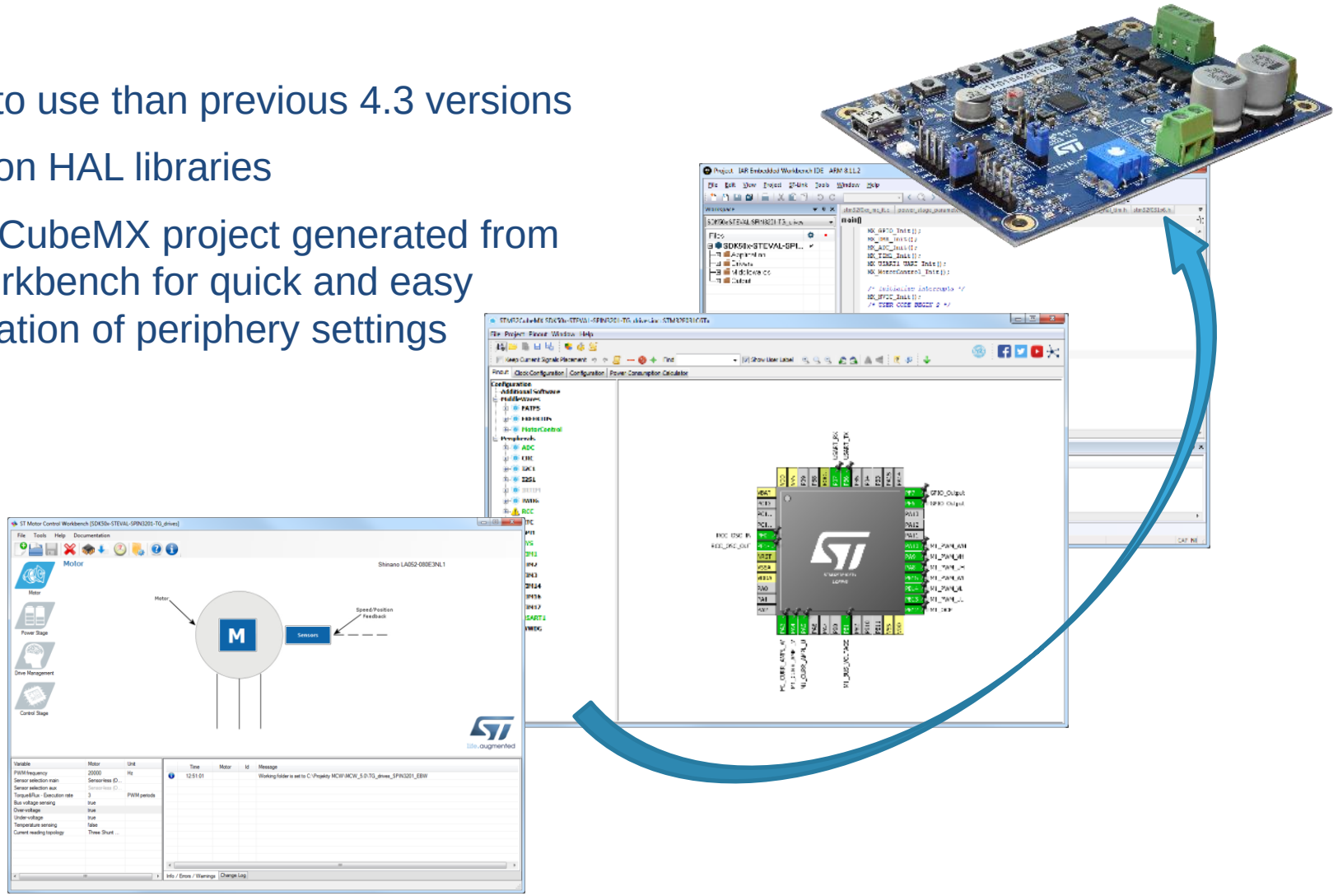
Available now

Motor Control Workbench 5

- Easier to use than previous 4.3 versions
- Based on HAL libraries
- STM32CubeMX project generated from MC Workbench for quick and easy modification of periphery settings



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