ST Spins Motor Control

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ST Spins Motor Control

- ST offers a complete product portfolio for motor control applications.
- Industry leader in ARM Cortex-M MCU and power IC.
- Growing product-development ecosystem reduces design cycle.

STM32F High Performance MCUs

STDRIVE™ Gate Divers

IGBT, MOSFET and IPM

E-Bike Reference Design

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STM32F High Performance MCUs

The high performance STM32 series offers up to 1082 CoreMark of performance and a rich set of peripherals to address all developers needs

Performance DNA	Product Series	System	HW acceleration	Advanced Comm. Periph. Graphic and Audio
• **Smart architecture for fast data transfers: DMAs, Bus Matrix** • **Operating from 1.7 to 3.6V** • **From - 40 up to 105 °C** • **Rich peripheral set including: CAN, Ethernet, Camera interface, SDMMC, USB OTG** • **Advanced analog features** • **16-bit, 32-bit timers** • **Low power Batch Acquisition Mode (BAM)** • **2 watchdogs** • **Temperature sensor** • **Unique ID** • **CRC**	**STM32F7**	FPU, DSP instructions MPU	**Execution:** ART Accelerator™ **Graphics:** Chrom-ART Accelerator™ **Crypto-Hash:** coprocessor	SDRAM I/F, Dual Quad-SPI I/F SPDIF, HDMI-CEC 2xSAI TFT LCD
	STM32F4	FPU, DSP instructions MPU	**Execution:** ART Accelerator™ **Graphics:** Chrom-ART Accelerator™ **Crypto-Hash:** coprocessor	SDRAM I/F, Dual Quad-SPI I/F SPDIF, HDMI-CEC up to 2xSAI TFT LCD I/F MIPI DSI I/F

STM32 F7

CoreMark 1082

► ARM Cortex-M7 + FPU up to 216 MHz – 462 DMIPS

► From 512 KB to 1 MB Flash, 320 KB RAM

► Very High performance from Flash and external memories (including dual Quad-SPI)

STM32 F4

CoreMark 608

► ARM Cortex-M4 + FPU up to 180 MHz – 225 DMIPS

► From 64 KB to 2 MB Flash, up to 384 KB RAM

►Select the right F4 for your needs: from the F401/F411 Access lines to the most Advanced Lines

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Motor Control STDRIVE™

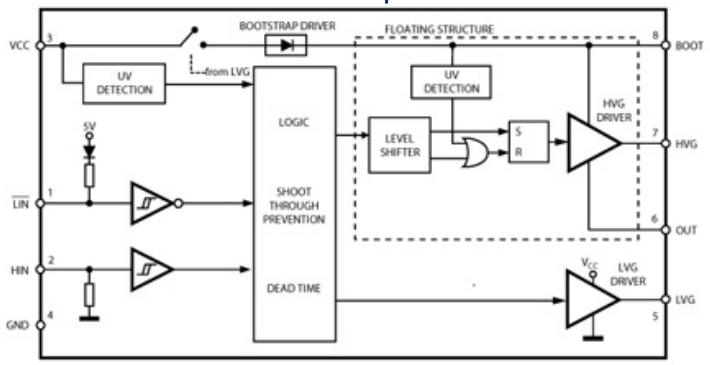
L639x: High Voltage Half Bridge Gate Drivers

The new smartDRIVE™ L639x family embeds a rich set of functionalities, including

- an integrated comparator for protection
- an op amp suitable for current sensing (especially for field-oriented motor drive applications)
- a smart shutdown to improve system protection
- an integrated bootstrap diode.

This all helps reduce part count and the cost in advanced motor control application.

Circuit Diagram of L6398 single chip half-bridge gate driver for N-channel power MOSFET or IGBT



Advanced gate drivers

L639x smartDRIVE

0.4 A - easy sensorless vector control for 3-phase PM or induction motors

Dual Input OPAMP Comparator/Smart SD Dedicated pin for SD Adjustable DT	L6390
Single Input Uncommitted comparator Dedicated pin for SD Adjustable DT Auxiliary Input (brake)	L6393
Dual Input OPAMP Dedicated pin for SD Adjustable DT	L6392
Dual Input Comparator/Smart SD Dedicated pin for SD Adjustable DT	L6391
Dual Input Shoot Through Pr. Dead time	L6398
Dual Input Asymmetric Load	L6395

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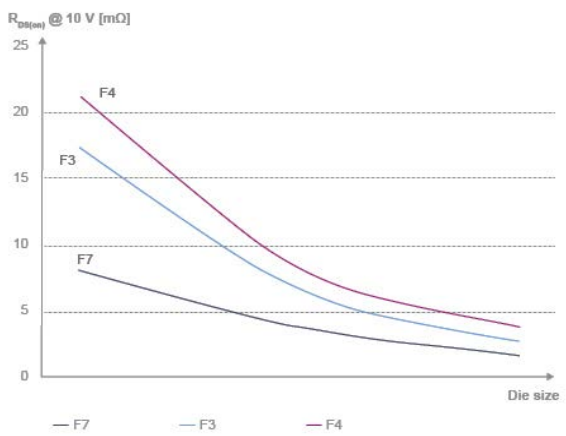
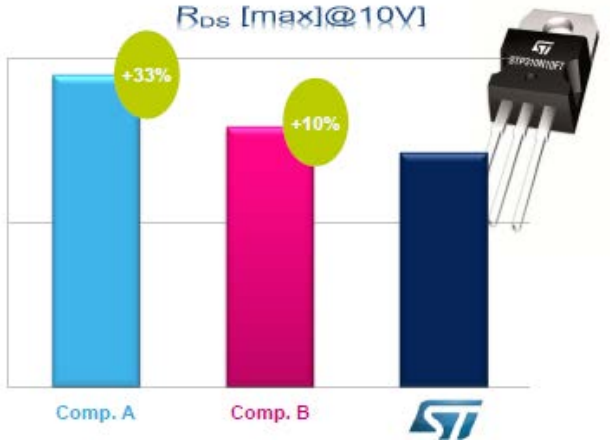
Motor Control LV MOSFETs

STripFET F7 series: Industry's lowest RDS(on) Low Voltage MOSFETs





100V STripFET™ VII DeepGATE™MOSFET

- Enhanced trench-gate structure
- Exhibits more than 50% RDS(ON) reduction versus the F3 (planar technology)
- 30, 40, 60, 80, 100, 120 and 150V MOSFETs serving Industrial, Motor Control, SMPS and Automotive applications
- Extremely low On Resistance boost efficiency of final design
- Low conduction losses and efficient intrinsic body diode allow package miniaturization
- Increased Tj(max) up to 175°C in PowerFLAT 5x6 and 3.3x3.3 ensures longer lifetime

Key Features

- Industry's lowest RDS(on)
- High avalanche capability
- Optimized body diode
- High junction temperature (175°C)

Benefits

- Low conduction losses
- Small form factor of final system
- No EMI issues
- Robust design

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Motor Control Discrete IGBT

Trench Gate Field Stop IGBT for Motor Control Applications

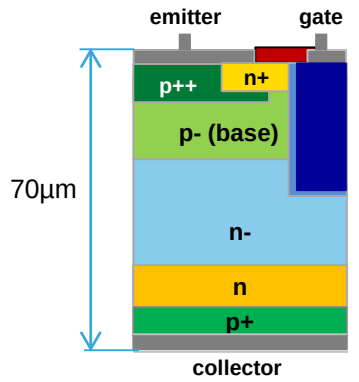
Key Features

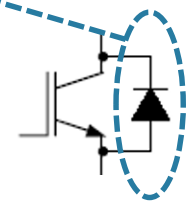
- Families characterized by F_{SW}
- 600V, 650V, and 1200V Available
- Wide I_{CN} Portfolio (4A to 120A)
- Positive $V_{CE(SAT)}$ Temp Coefficient
- Co-packed very fast antiparallel recovery freewheeling diode
- Short-circuit withstand time
- High junction temperature (175°C)
- Low thermal resistance
- Wide packaging options

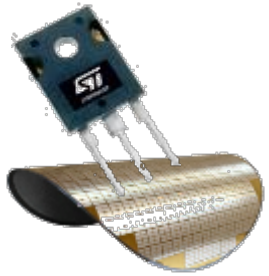
Benefits

- Optimal trade off for conduction and switching losses
- Fits broad set of motor drives
- Safe paralleling
- Low system component count
- High reliability power design

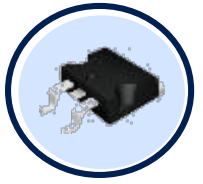
Trench Gate Field Stop



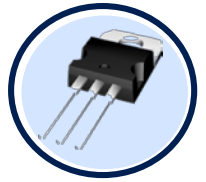




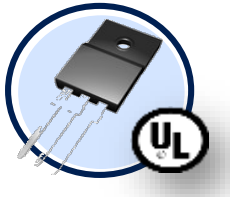
D2PAK



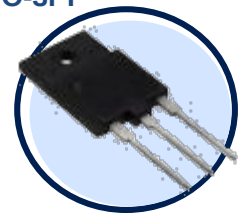
TO-220



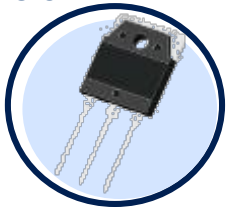
TO-220FP



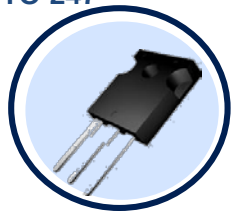
TO-3PF



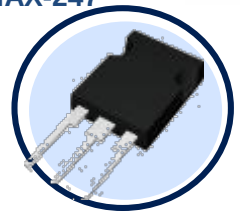
TO-3P



TO-247



MAX-247



- M-Series with ~1.55V $V_{CE(SAT)}$ is most popular for motor control
- S-Series = <8 kHz, M-Series = 8-20 kHz, V-Series = 20-120 kHz
- Tight parameter distribution
- TO-247 Long Lead (WA Package) is solderable

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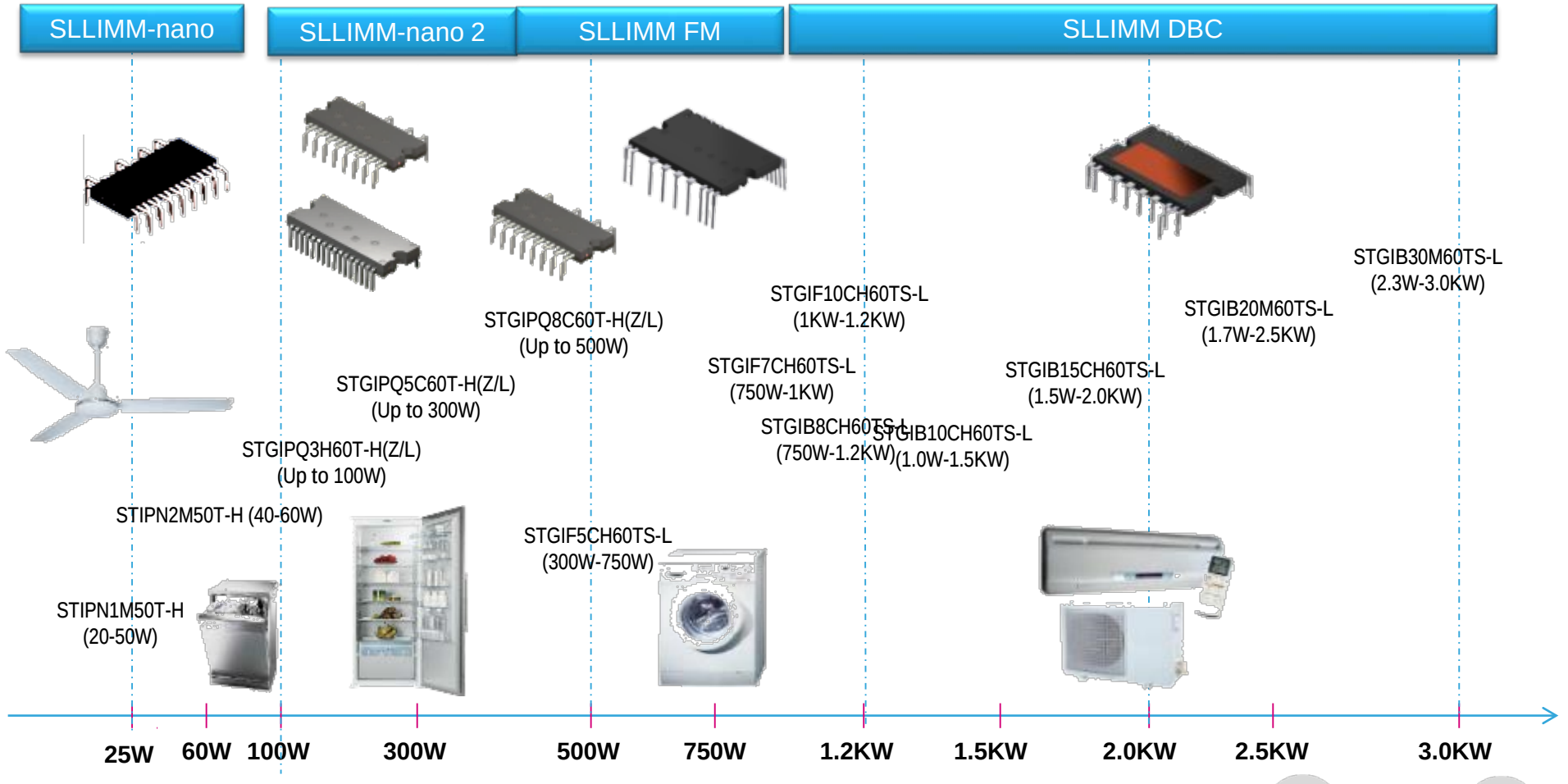
Motor Control SLLIMM™ Series

Intelligent Power Modules with Gate



Full Molded (FM)

Direct Bond Copper (DBC)

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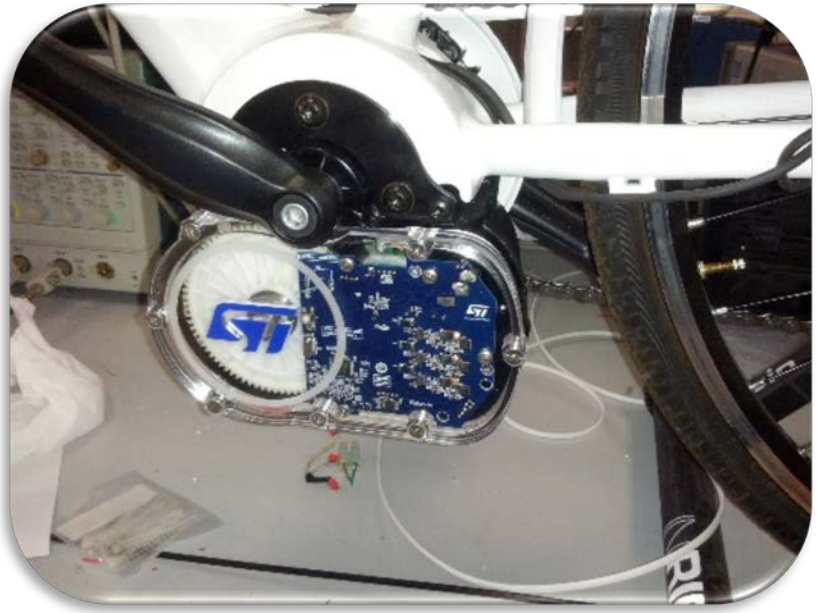
E-Bike Reference Design



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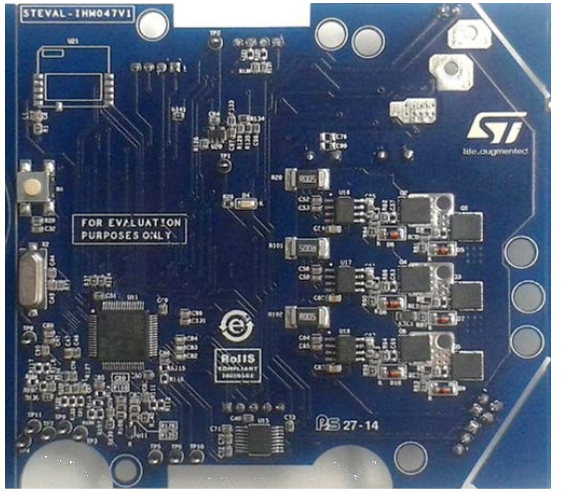
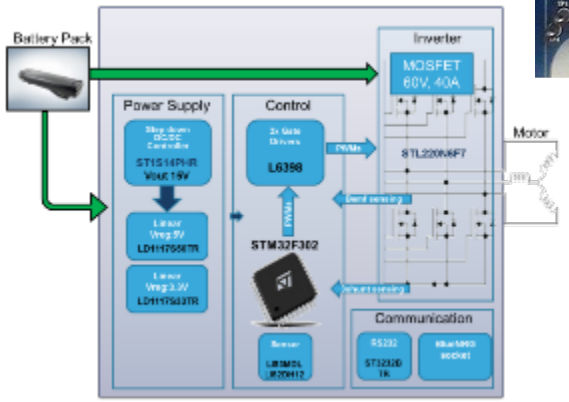
3-Phase PMSM 250W Drive

Dedicated Solution for 250W LV drives suitable for ebikes

- 250W inverter, <40V battery supplied
- 3shunt current sensing, compact design using STM32F3
- bemf sensing,
- MEMS magnetometer, for speed sensing
- MEMS accelerometer, for safety purpose
- Input connector for market available torque/cadence/Hall sensors



- **STM32F302RBT** (cortex-M4 micro)
- **6x STL220N6F7** (STripFET F7 MOSFET)
- **3x L6398** (H/L gate driver)
- **ST1S14PHR** (DCDC switching regulator)
- **LIS3MDL** (MEMS magnetometer)
- **LIS2DH12** (MEMS accelerometer)



Platform available

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