FORTIOR

FUTURE
IS
IN
CONTROL

Motor Driver & Controller Product Catalog

FORTIOR **FORTIOR TECHNOLOGY (SHENZHEN) CO., LTD.**

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ABOUT
FORTIOR TECH

Fortior Technology (shenzhen) Co., Ltd (stock code: 688279.SH) is thriving in developing motor control ICs and algorithms. As a leading motor control IC supplier in China, Fortior is honored by the market for delivering high-performance and reliable motor control ICs and systems with the least customer effort.

Fortior's global launching is now in full swing. Our market business covers Asia, North America, Europe and other regions, offering global customers with motor control ICs and systems.

Founded in 2010, headquartered in Shenzhen, China, Fortior has set up R&D centers in China and Singapore, and branches in Shanghai, New Taipei, Singapore, Kawasaki and several other cities. Reinforced by three strong technical teams, IC design team, motor control algorithm team, motor design team, and teammates with great passion for technical innovation, Fortior bears firm confidence to help global customers succeed.
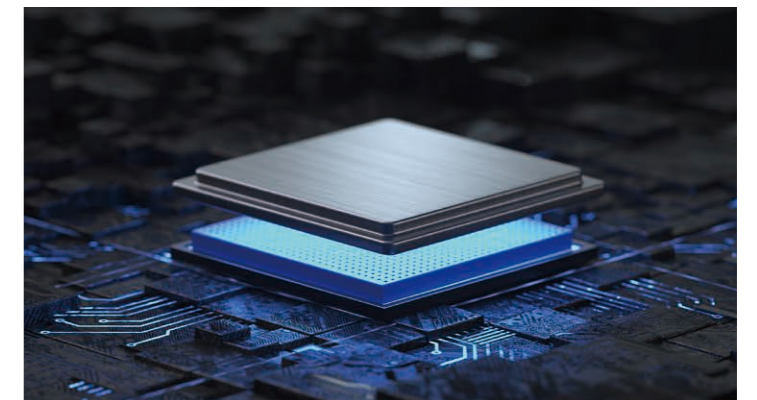
PRODUCT OVERVIEW

Motor Control MCU

Innovative dual-core MCU
BLDC motor and PMSM control

Motor Control ASIC

ASICs for dedicated motor control applications
Comprehensive functions, high integration
Easy motor control, cost effective

Gate Driver

Integrating high voltage devices
Strong gate drive capacity
Low power consumption, high efficiency

Intelligent Power Module IPM

High and low voltage
power modules
Small footprint
Low power consumption

Power Device & MOSFET

Optimized power device/MOSFET
dedicated to motor drive

APPLICATIONS

Consumer Electronics

High-speed vacuum cleaner
High-speed hair dryer
Robot vacuum
Standing fan
Inverter washing machine
Inverter air conditioner
Inverter refrigerator
……

Automotive and Industrial

Automotive cooling fan
Automotive pump
Automotive sunroof
Active grille shutter
Automotive air conditioner
Automotive refrigerator
……
Industrial sewing machine
Industrial fan
Industrial pump
……

Sports & Travel Gadget

Electric bicycle
Treadmill
Self-balancing scooter
Drone
……

Robot

Service robot
Robotic arm
……

APPLICATIONS

Electric Tools

Drill driver
Electric wrench
Angle grinder
Garden power tools
……

IT and Communication Equipment

Cooling fans for communication system
Surveillance and security
PC cooling fan
Cooling fans for data center
……
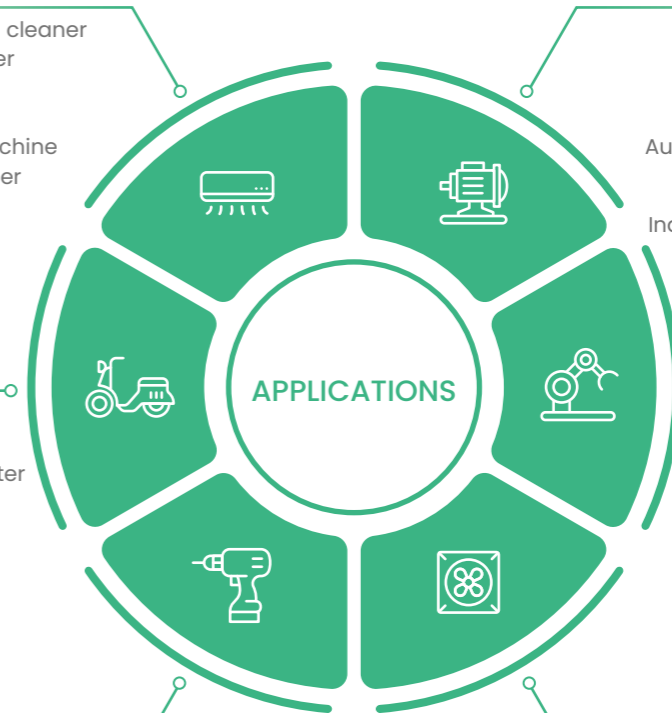
PRODUCTS
IC Product Portfolios

MCU
Motor Control MCU

"Dual-core" Architecture

ME (Motor Engine) core dedicated to motor control tasks
MCU core handling general-purpose and auxiliary tasks

Independently developed ME (Motor Engine) core built-in with complete heart functions of motor control

MCU

High Integration, Rich Functions, High Reliability

MCU ICs integrating LDO, op-amps, ADCs, comparators, gate driver, and built-in with functional modules such as Timer, PWM, SPI, I2C, UART, CRC

Supporting a variety of applications from low to high voltage/power, from low speed to super-high speed

Covering a wide range of motor control application areas such as home appliance, industrial and automotive

MCU Applications

	Legacy models	Mature models	Up-to-date models	Application
High voltage applications (external Gate Driver + MOSFET)	EU6811	EU6812x2 EU6812	EU6815 EU6813	
Middle voltage applications <72V (external MOSFET)	EU6818	EU6861x2 EU6861	EU6865	For diverse motor drive applications, such as home appliances, electric tools, sports and travel gadget, communication equipment, industrial and automotive
Low voltage applications <36V (external MOSFET)	EU6831	EU6832 EU5821 (Single phase)	EU6332 (Built-in MR sensor)	

	Before	2021	2022	2023	2024

Dedicated motor control MCU (MCU + Gate Driver + MOSFET)
- ES9650A (30V 5A) — 2022
- ES9636AH (400V 1.5A) — 2023
- ES9676AH (400V 2.5A) — 2023

Dedicated motor control MCU (MCU + Gate Driver)
- EU6831 (36V 3P3N)
- EU6818 (200V 6N)
- EU6861 (180V 6N)
- EU6863 (100V 6N)
- EU6832 (36V 3P3N)
- EU5821 (28V 2P2N)
- EU6865 (140V 6N)
- EU6862 (600V 6N) — 2022
- EU6572 (140V 6N) — 2022
- EU6561 (140V 6N) — 2023
- EU686x (12V 6N) — 2024

Dedicated motor control MCU
- EU6811
- EU6812
- EU6812x2
- EU6813
- EU6815
- EU6522 — 2023
- EU6511 — 2023
- EU69xx (ME+RISC-V dual-core) — 2024

Dedicated motor control MCU (AEC-Q100)
- EU6832N1 (36V 3P3N) — 2021
- EU6815Q1 — 2022
- EU6865Q1 (140V 6N) — 2022
- EU6866Q1 (180V 6N) — 2023
- EU6816Q1 — 2023
- ES96XX (12V 1A) — 2024

Dedicated motor control MCU for servo motors
- EU6332N (Built-in 180° Sensor) — 2021
- EU633xx (Built-in 360° Sensor) — 2022

ASIC
Motor Control ASIC

Innovative motor drive algorithms
Various drive modes

Innovative algorithms dedicated to complicated and multi-objective control tasks for BLDC motors

Support for sensor, sensorless, square wave, sine wave and FOC drive modes

Easy and flexible debugging

Single/three-phase ASICs for a broad range of applications

ASIC

High integration, high reliability

Low power consumption, low noise

Supporting a variety of applications from low to high voltage/power,
from low speed to super-high speed

Mature applications in a wide range of areas such as small home appliances, white goods, kitchen appliances, communication equipment, industrial and automotive

ASIC Applications

	Legacy models	Mature models	Application
3-phase dedicated ASIC (fully integrated)	ET3206D ET1215	ET8215 ET8213 ES9336 ES9376	Standing fan, air purifier, cooling fan, water pump, ceiling fan, bathroom ceiling heater, exhaust fan, air conditioner fresh air system, air conditioner indoor unit, air conditioner outdoor unit, LIDAR
3-phase dedicated ASIC (external MOSFET)	ET1128 ET3107 ET1007	ET8132 ET8161	Standing fan, air purifier, handheld vacuum cleaner, robot vacuum, air conditioner indoor unit, air conditioner outdoor unit, water heater exhaust fan, water pump, bathroom ceiling heater, exhaust fan, industrial fan, ceiling fan, blower
Single-phase dedicated ASIC (fully integrated)	EA1210 EA1220	EA1611	Single-phase cooling fan, single-phase water pump, single-phase refrigerator fan

Before	2021	2022	2023

3-phase dedicated ASIC（ASIC + Gate Driver + MOSFET）

- ET3206D (5V 0.5A)
- ET1215 (12V 0.7A 24V 0.4A)
- ET8213 (12V 1A)
- ET8215 (12V 2A)
- ES9336 (400V 1.5A)
- ES9376 (400V 2.5A)

3-phase dedicated ASIC（external MOSFET）

- ET1128 (40V 3P3N)
- ET3107 (40V 3P3N)
- ET1007
- ET8132 (40V 3P3N)
- ET8161 (140V 6N)
- ET8061 (600V 6N)
- ET816x (90V 6N)

Single-phase dedicated ASIC（ASIC + Gate Driver + MOSFET）

- EA1210 (12V 0.5A)
- EA1220 (12V 0.5A 24V 0.3A)
- EA1611 (12V 0.5A)

Gate Driver
Motor Drive Gate Driver

Reliable drive, high energy efficiency

- Built-in with high voltage devices and logic circuitry
- High reliability, fast switching
- Low power consumption, high efficiency

Gate Driver

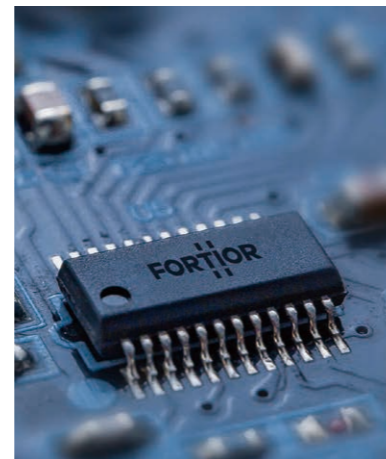### Rich functions, comprehensive product series

Support MOSFET/IGBT driving
Support for overvoltage protection, overtemperature protection, overcurrent protection, short-circuit detection, shoot-through prevention
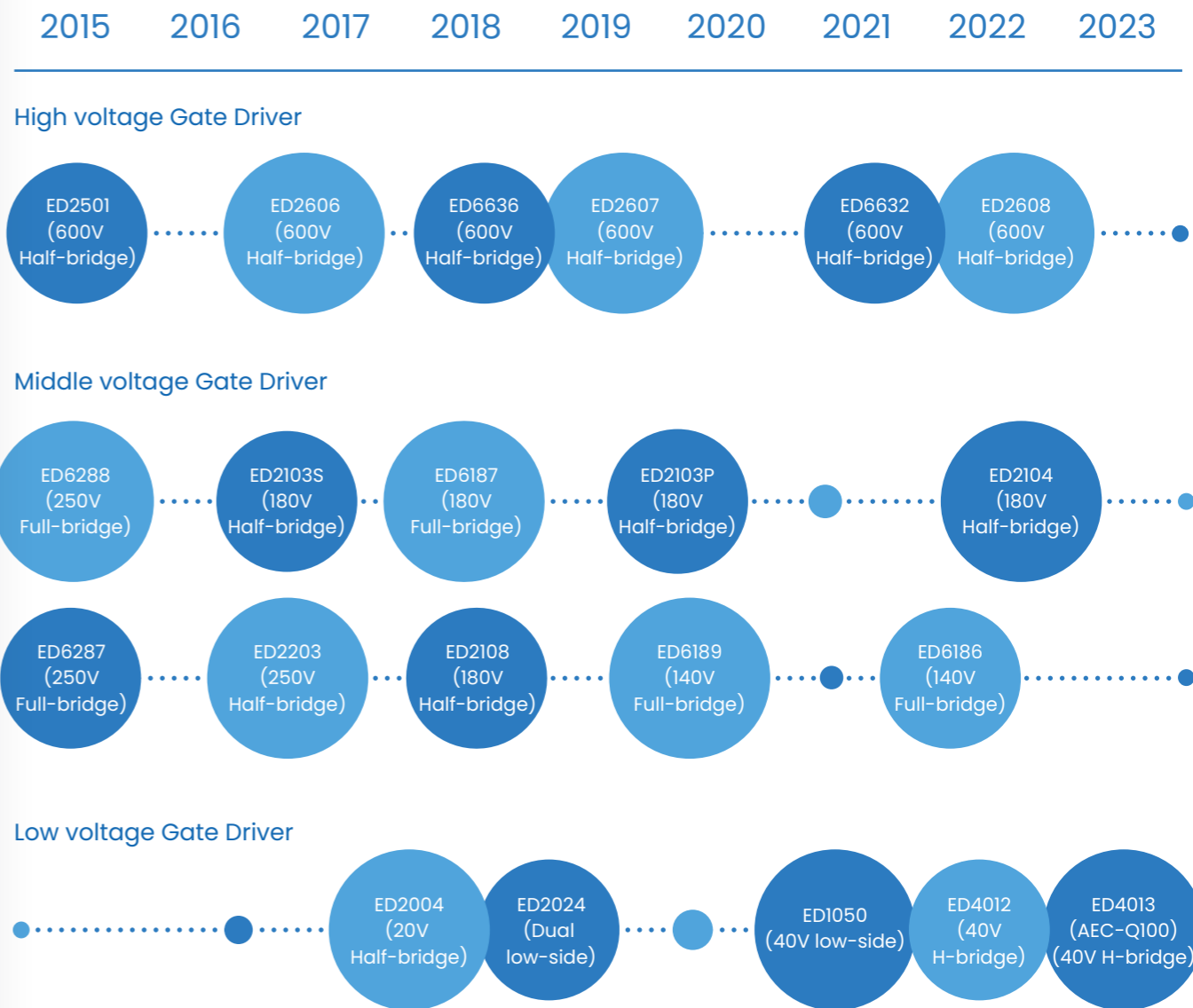
Powerful gate drive capability, low switching loss

Comprehensive product series covering a wide range of channel numbers/voltages/currents, well suiting variety of applications

Gate Driver Applications

	Legacy Models	Mature models	
High voltage Gate Driver	ED2606 ED2504	ED2607 ED6636	
Middle voltage Gate Driver	ED6287 ED6288	ED6189 ED2109S ED2103S	ED2203 ED6187 ED2103P
Low voltage Gate Driver	ED2004 ED2024		

Gate Driver Roadmap

2015	2016	2017	2018	2019	2020	2021	2022	2023

High voltage Gate Driver

- ED2501 (600V Half-bridge)
- ED2606 (600V Half-bridge)
- ED6636 (600V Half-bridge)
- ED2607 (600V Half-bridge)
- ED6632 (600V Half-bridge)
- ED2608 (600V Half-bridge)

Middle voltage Gate Driver

- ED6288 (250V Full-bridge)
- ED2103S (180V Half-bridge)
- ED6187 (180V Full-bridge)
- ED2103P (180V Half-bridge)
- ED2104 (180V Half-bridge)
- ED6287 (250V Full-bridge)
- ED2203 (250V Half-bridge)
- ED2108 (180V Half-bridge)
- ED6189 (140V Full-bridge)
- ED6186 (140V Full-bridge)

Low voltage Gate Driver

- ED2004 (20V Half-bridge)
- ED2024 (Dual low-side)
- ED1050 (40V low-side)
- ED4012 (40V H-bridge)
- ED4013 (AEC-Q100) (40V H-bridge)

IPM/MOSFET
IPM/MOSFET

High efficiency, low power consumption

Integrating power devices, driver and protection circuitries

Rich functions such as low-power mode, overvoltage/undervoltage protection, overcurrent/current limit protection, overtemperature protection, short-circuit detection

MOSFET with short reverse recovery time, low switching loss, low temperature rise in operation
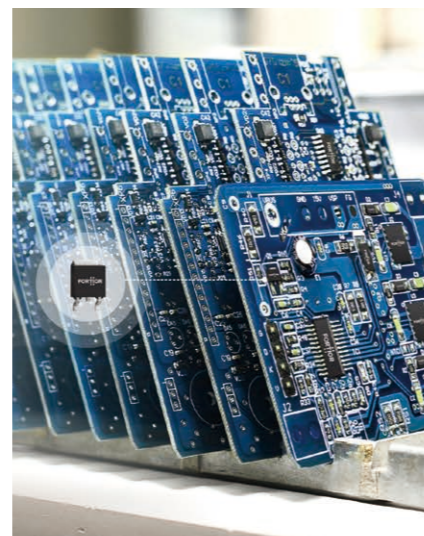
IPM/MOSFET

High reliability, small footprint

Highly integrated IPM fulfilling the same function with reduced external components, attaining small system board footprint

IPM packaging with high insulation, easy thermal conductivity, low EMI, and compact packaging type, well suiting applications with demands of system boards installed inside motors or space-critical installation needs

MOSFET/Super Junction offering high-performance and reliable high voltage solutions

IPM/MOSFET Applications

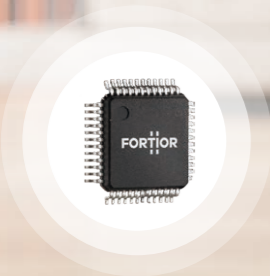|	Legacy Models	Mature Models
H-bridge IPM (low voltage)	ES4030	ES8003 ES4005
Half-bridge IPM (high voltage)	ES230BD ES260AQ	ES236BQ ES256AQ ES276AQ
MOSFET (high voltage)	EMD5N50	EMD3N60 ECD4N60 (Super Junction) EMD5N60 EMD7N60

*ES9336/76 is detailed in ASIC models (p9, p10)

Roadmap

	2019	2020	2021	2022

H-bridge IPM

ES4030 (40V 30A)　ES8003 (12V 0.8A)　ES4005 (10V 1.5A)

Half-bridge IPM

ES236BQ (600V 3A)　ES256AQ (600V 5A)　ES276AQ (600V 7A)

Power Device

EMD3N60 (600V 3A MOS)　EMD5N60 (600V 5A MOS)　EMD7N60 (600V 7A MOS)　ECD4N60 (600V 4A Superjunction)　EID6N60 (600V 6A IGBT)
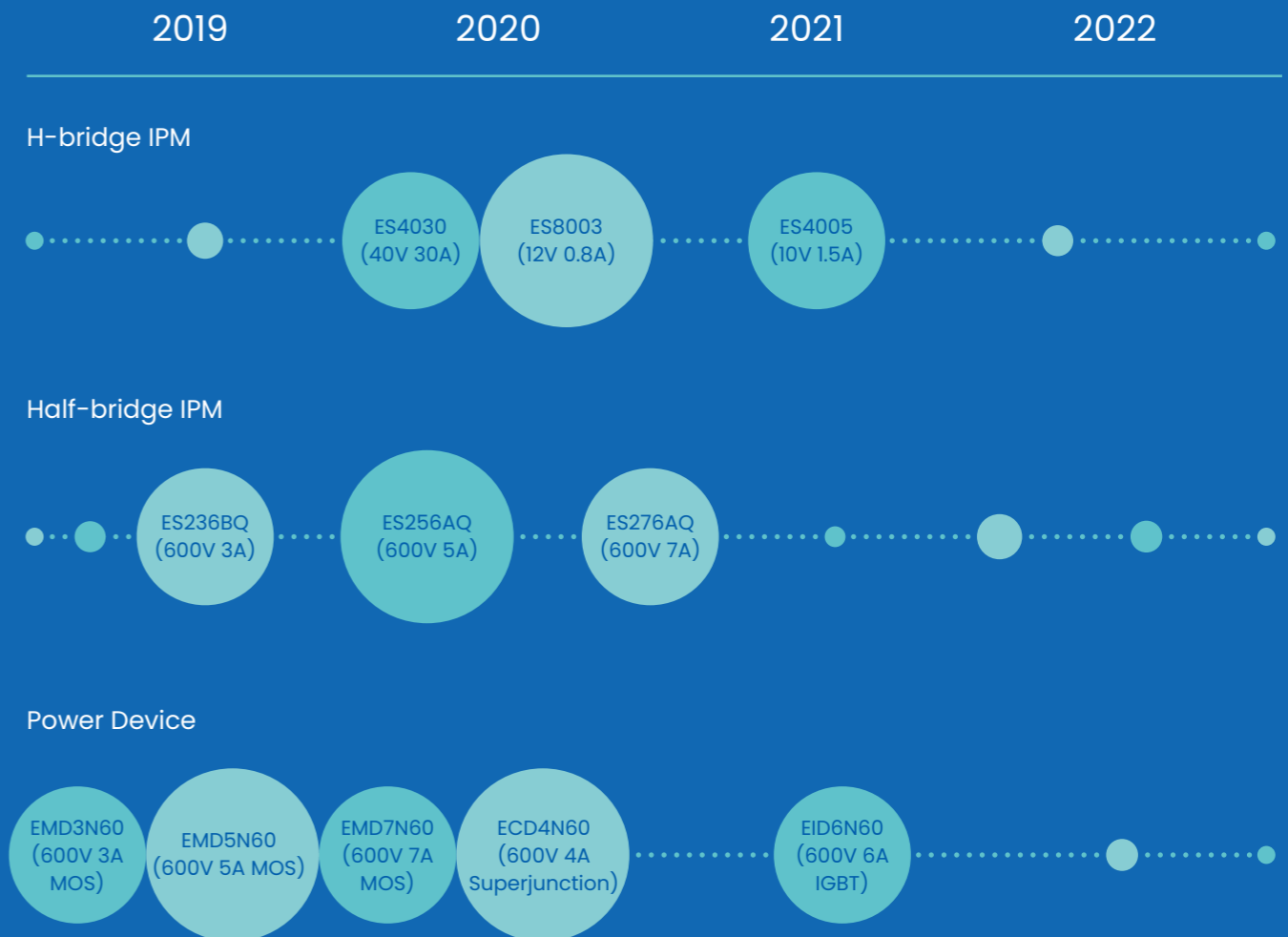
SOLUTIONS

Solution for air conditioner indoor unit:
MCU solution: EU6812V + ES236
ASIC solution: ES9336/ES9376
Voltage: DC100V – 380V
Power: 5W – 80W
Speed: 200RPM – 2,200RPM
Mode: Sensorless FOC/sensor SVPWM
Feature: High integration, low noise, high efficiency

Solution for air conditioner compressor with PFC:
EU6815L + ED2607S + N MOSFET
Voltage: AC100V – 300V
Power: 5W – 2,000W
Speed: 200RPM – 6,000RPM
Mode: Sensorless FOC with single sampling resistor
Feature: Start under high differential pressure, low vibration, high power factor, torque compensation

Solution for air conditioner outdoor unit: EU6812S2 + IPM
Voltage: DC100V – 380V
Power: 10W – 150W
Speed: 200RPM – 1,500RPM
Mode: Sensorless FOC with single sampling resistor
Feature: High integration, high efficiency, cost effective

SMALL INTELLIGENT APPLIANCE

Washing Machine

Solution for washing machine motor:
EU6815L + IPM
Solution for drain pump (Solution-I):
EU6812S2 + ED2606S + N MOSFET
Solution for drain pump (Solution-II):
EU6832S + P/N MOSFET
Feature: start with high torque and low speed, field weakening control at high speed, high accuracy during weighing and OBB detection

Refrigerator

Solution for refrigerator compressor:
EU6812S2 + ED2606S + N MOSFET
Solution for refrigerator blower:
ET8215 (fully built-in sensorless FOC)
Feature: Low noise, high integration, cost effective

Water Heater

Solution for gas water heater forced exhaust fan:
EU6812S2 + ED6187 + N MOSFET
Feature: High efficiency, low noise, cost effective, quick control response, sensorless, quick start (1.5s to full speed)

Motor for Roller Brush (Solution-I): ET8132 + P/N MOSFET
Motor for Roller Brush (Solution-II): EU6832 + P/N MOSFET
Voltage: DC5V – 18V
Power: 5W – 50W
Speed: 3,000RPM – 5,000RPM
Mode: Sensorless BLDC/sensorless FOC
Feature: Quick response, cost effective, high efficiency

Motor for Side Brush:
ET3206 (fully built-in sensorless SVPWM)
Voltage: DC3V – 6V
Power: 0.5W – 2W
Speed: 300RPM – 1,000RPM
Mode: Sensorless SVPWM
Feature: Quick response, high integration, cost effective

Motor for Pump (Solution-I):
ET8215 (2A fully built-in sensorless FOC)
Motor for Pump (Solution-II):
ET8213 (1A fully built-in sensorless FOC)
Voltage: DC5V – 18V
Power: 5W – 30W
Speed: 1,000RPM – 3,000RPM
Mode: Sensorless FOC with 3 sampling resistors
Feature: High integration, cost effective, low noise

Motor for Vacuum (Solution-I): EU6832S/ET8132 + P/N MOSFET
Motor for Vacuum (Solution-II): EU5821 + P/N MOSFET + 1 HALL
Voltage: DC5V – 18V
Power: 5W – 60W
Speed: 3,000RPM – 30,000RPM
Mode: Sensorless FOC/sensor SVPWM/sensor BLDC
Feature: Quick response, cost effective, high efficiency

LIDAR: ET3206 (fully built-in sensorless SVPWM/BLDC)
Voltage: DC3V – 6V
Power: 0.1W – 0.5W
Speed: 360RPM – 1,100RPM
Mode: Sensorless SVPWM/BLDC
Feature: Quick response, low noise, small footprint, cost effective

Motor for Road Wheel (Solution-I): EU6332 + P/N MOSFET
Motor for Road Wheel (Solution-II):
ET1215Q (fully built-in sensor SVPWM)
Voltage: DC5V – 18V
Power: 5W – 60W
Speed: 3,000RPM – 5,000RPM
Mode: Sensor BLDC/Sensor FOC with single sampling resistor
Feature: High accuracy, high efficiency

Small Intelligent Appliance

Ceiling Fan

ASIC (Solution-I): ET8215 (fully built-in sensorless FOC)
ASIC (Solution-II): ET8132 + P/N MOSFET
MCU (Solution-I): EU6832 + P/N MOSFET
MCU (Solution-II): EU6812S2 + ED2606 + N MOSFET
Feature: Cost effective, low noise, smooth start, high efficiency

Standing Fan

ASIC (Solution-I): ET8215 (fully built-in sensorless FOC)
ASIC (Solution-II): ET8132 + P/N MOSFET
MCU: EU6832 + P/N MOSFET
Feature: Cost effective, low noise, quick response, high efficiency

Hair Dryer

MCU (Solution-I): EU6812L2 + ES256
MCU (Solution-II): EU6812L2 + ED2606 + N MOSFET
MCU (Solution-III): EU6862L + N MOSFET
Feature: Low noise, cost effective, quick response, high efficiency

Vacuum Cleaner

ASIC (Solution-I): ET8132 + P/N MOSFET
ASIC (Solution-II): ET8161S + N MOSFET
MCU (Solution-I): EU6832 + P/N MOSFET
MCU (Solution-II): EU6861Q2 + N MOSFET
Feature: Ultrahigh speed, low noise, high integration, high cost efficiency

# IT & COMMUNICATION EQUIPMENT
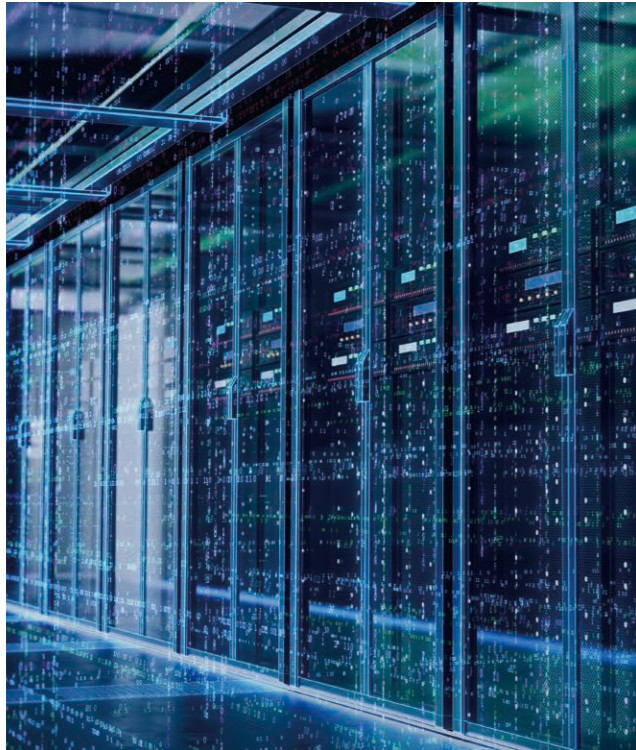
Server Cooling Fan

ASIC (Solution-I): ET8215 (fully built-in sensorless FOC)
ASIC (Solution-II): ET8132 + P/N MOSFET
MCU (Solution-I): EU6832 + P/N MOSFET
MCU (Solution-II): EU6861N2 + N MOSFET
MCU (Solution-III): EU5821 + P/N MOSFET + 1 HALL
Voltage: DC5V – 80V
Power: 1W – 1,000W
Speed: 500RPM – 50,000RPM
Mode: Sensorless FOC/sensor BLDC
Feature: High integration, low noise, cost effective, high efficiency, low vibration

Notebook Cooling Fan

Solution-I: ET3206 (fully built-in sensorless SVPWM)
Solution-II: ET8213 (fully built-in sensorless FOC)
Voltage: DC2.5V – 13.2V
Power: 0.1W – 6W
Speed: 500RPM – 10,000RPM
Mode: Sensorless SVPWM/sensorless FOC
Feature: High integration, low noise, cost effective, high efficiency, low vibration

ELECTRIC TOOL
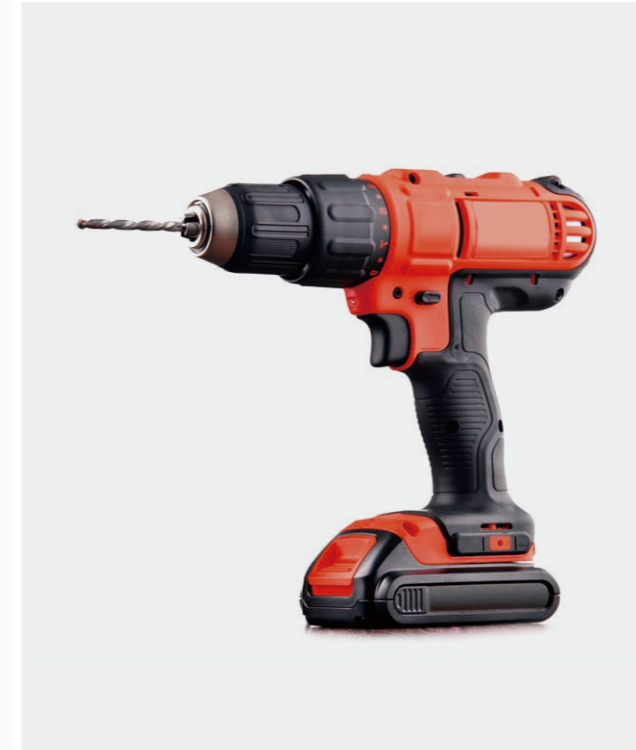
Power Tool

Drill driver: EU6861L2 + N MOSFET
Electric wrench: EU6832S + P/N MOSFET
Feature: Simple control, quick response, cost effective

Garden Power Tool

Intelligent lawn mower: EU6832N + P/N MOSFET
Push lawn mower: EU6861Q2 + N MOSFET
Feature: High efficiency, low noise, high integration

SPORTS &
TRAVEL GADGET

Electric Bicycle

MCU: EU6865Q+N MOSFET
Mode: 3-HALL control, dual-HALL control
Feature: HALL self-learning, smooth start,
e-brake, reverse

Self-Balancing Scooter

MCU: EU6861Q2 + N MOSFET
Mode: 3-HALL control
Feature: Quick response, smooth, safe and
comfortable riding experience

AUTOMOTIVE

Automotive electric fan: EU6866Q1 + N MOSFET
Voltage: 5V – 36V
Power: 1W – 1,000W
Speed: 500RPM – 5,000RPM
Mode: Sensorless FOC with single sampling resistor
Speed control: PWM/LIN/CAN
Feature: High integration, low noise, high efficiency

Automotive air conditioning fan: EU6866Q1 + P/N MOSFET
Voltage: 5V – 36V
Power: 1W – 500W
Speed: 200RPM – 6,000RPM
Mode: Sensorless FOC with single sampling resistor
Speed control: PWM/LIN/CAN
Feature: High integration, low noise, cost effective

Automotive pump: EU6866Q1 + N MOSFET
Voltage: 5V – 36V
Power: 1W – 50W
Speed: 200RPM – 8,000RPM
Mode: Sensorless FOC with single sampling resistor
Speed control: PWM/LIN/CAN
Feature: High integration, low noise, cost effective

Active Grille Shutter: EU6832N1 + P/N MOSFET
Voltage: 9V – 16V
Power: 0.5W – 3W
Speed: 2,000RPM – 5,000RPM
Mode: 3-phase sensorless FOC with single sampling resistor
Speed control: LIN
Feature: High integration, high efficiency

Automotive sunroof: EU6832N1 + P/N MOSFET
Voltage: 9V – 16V
Power: 1W – 200W
Speed: 200RPM – 3,000RPM
Mode: Brushed motor control, HALL sensor detection
Feature: High integration, rich functions

INDUSTRIAL AND ROBOTS

Rotary & Linear Servo Drives

MCU: EU6815L + IPM
Voltage: AC150V – 280V
Power: 50W – 1,000W
Speed: 2,000RPM – 5,000RPM
Mode: Sensorless FOC with dual sampling resistors
Closed loop: Torque/speed/angle

Robotic Arm

MCU: EU6332 + P/N MOSFET
Feature: Built-in magnetic sensor, small size, quick response, high accuracy, cost effective

TECHNICAL STRENTH

Distinguished technical route for motor control ICs

Possession of patented technology Dedicated IP cores for motor control

- Dual-core architecture
  ME(Motor Engine) core dedicated to motor control tasks
  MCU core handling general-purpose and auxiliary tasks

- State-of-the-art ME(Motor Engine) core, built-in with the complete heart functions of motor control
  Hardware based algorithm consolidating performance, reliability and cost competence

- General-purpose MCU easy-adapting to dynamic market needs and trends

- Independent IP securing product competence and sustainable success

Highly integrated IC design

- Integrating peripherals required for motor control on a single IC, such as LDO, op-amps, comparators

- Fully integrated ICs built in with overall components on a single chip, such as LDO, op-amps, comparators, gate driver, power devices

- Attaining small footprint, reduced external components, high reliability, and cost competence
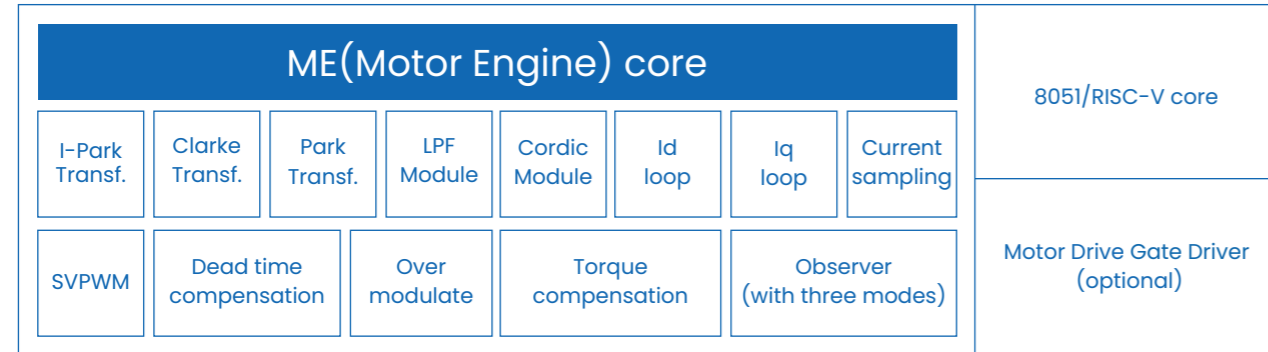

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Four technical advantages
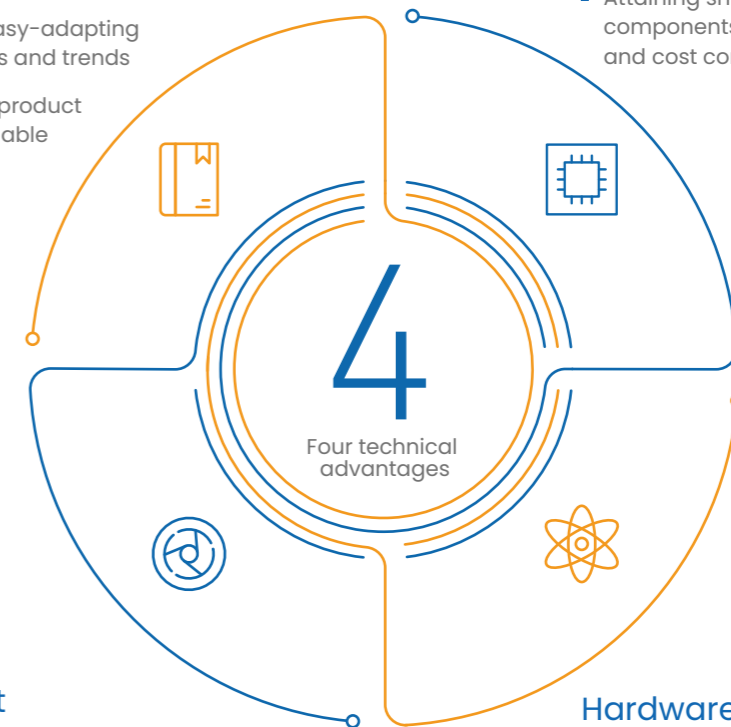
Easy development

- A full portfolio of motor drive ICs: discrete, semi-integrated, and fully-integrated, adapting to various customer needs

- Ease of development
  Technical platform seeks for minimal art in customer effort paralleled with functional flexibility.
  Customers can fulfill application development with easy project communication and super-light coding, which has helped our customers save overall cost dramatically.
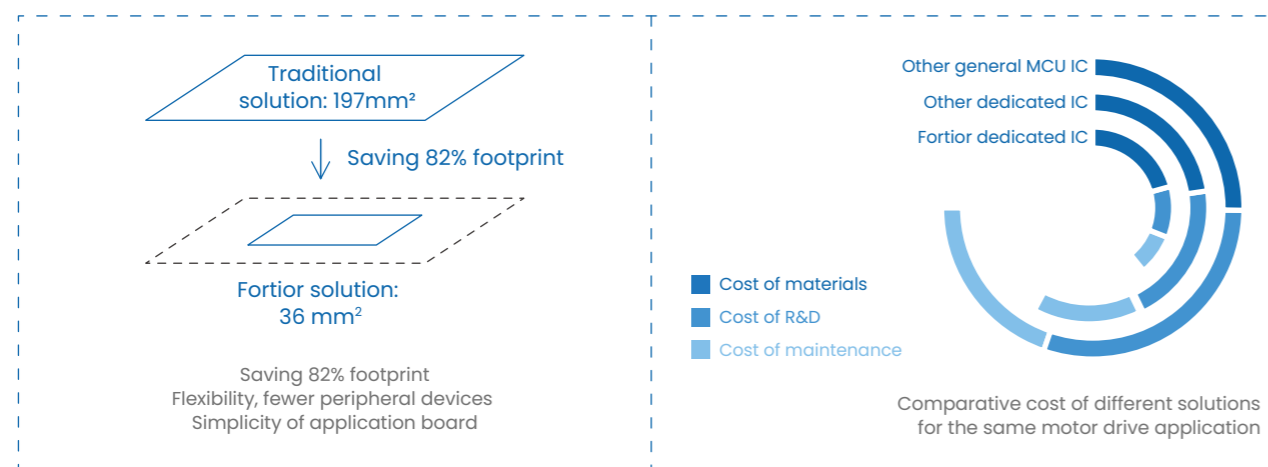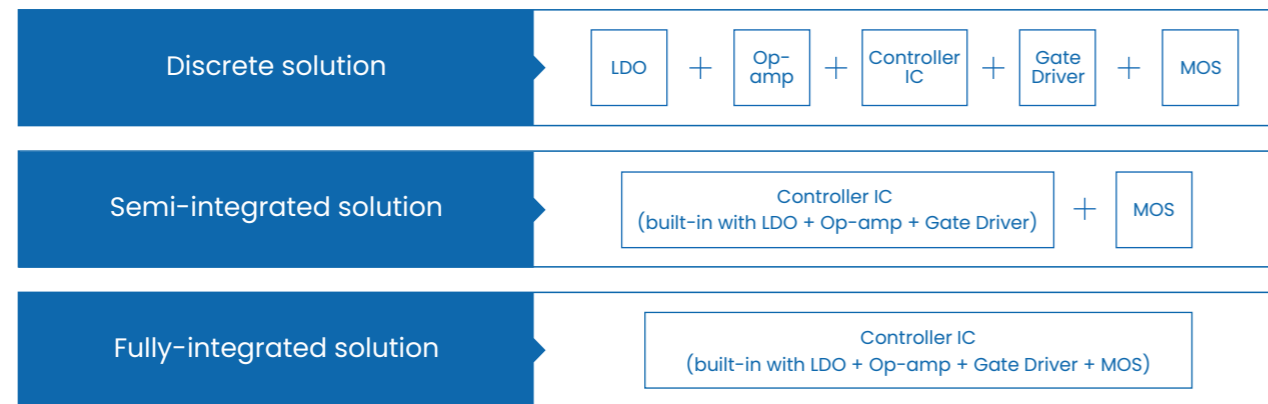
Hardware based motor control algorithms

- Hardware based algorithm for sensor/sensorless FOC/BLDC control modes

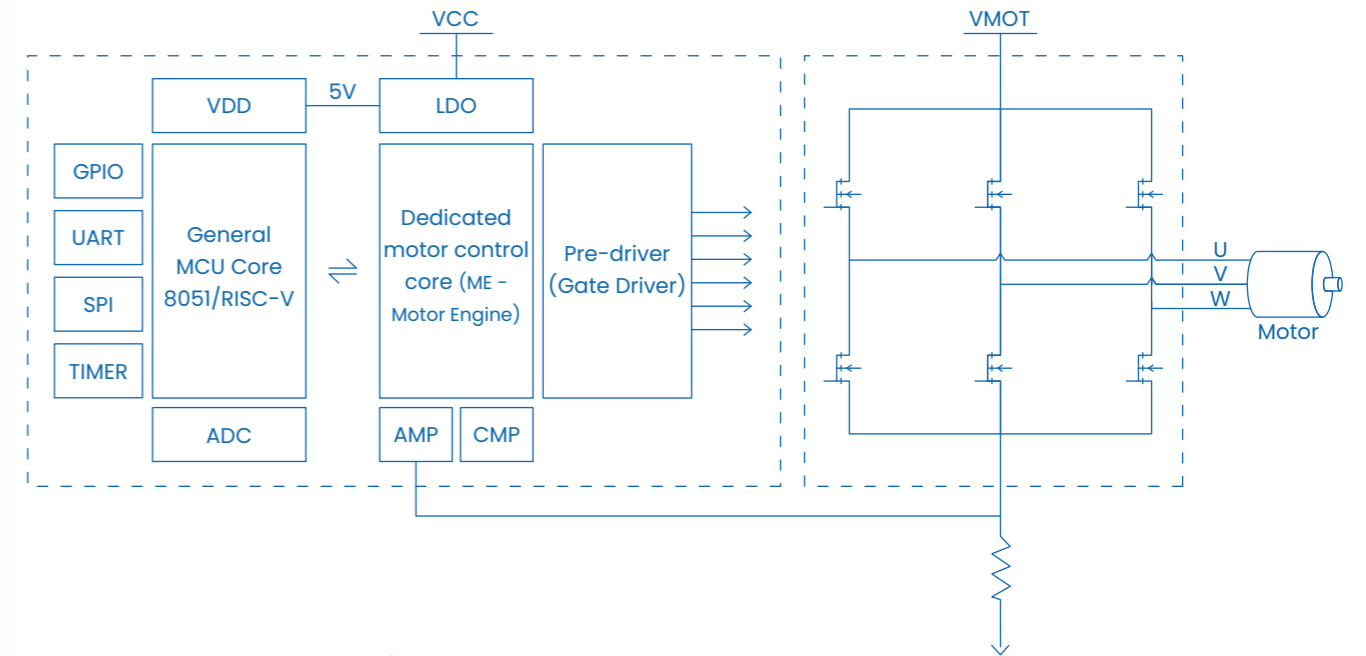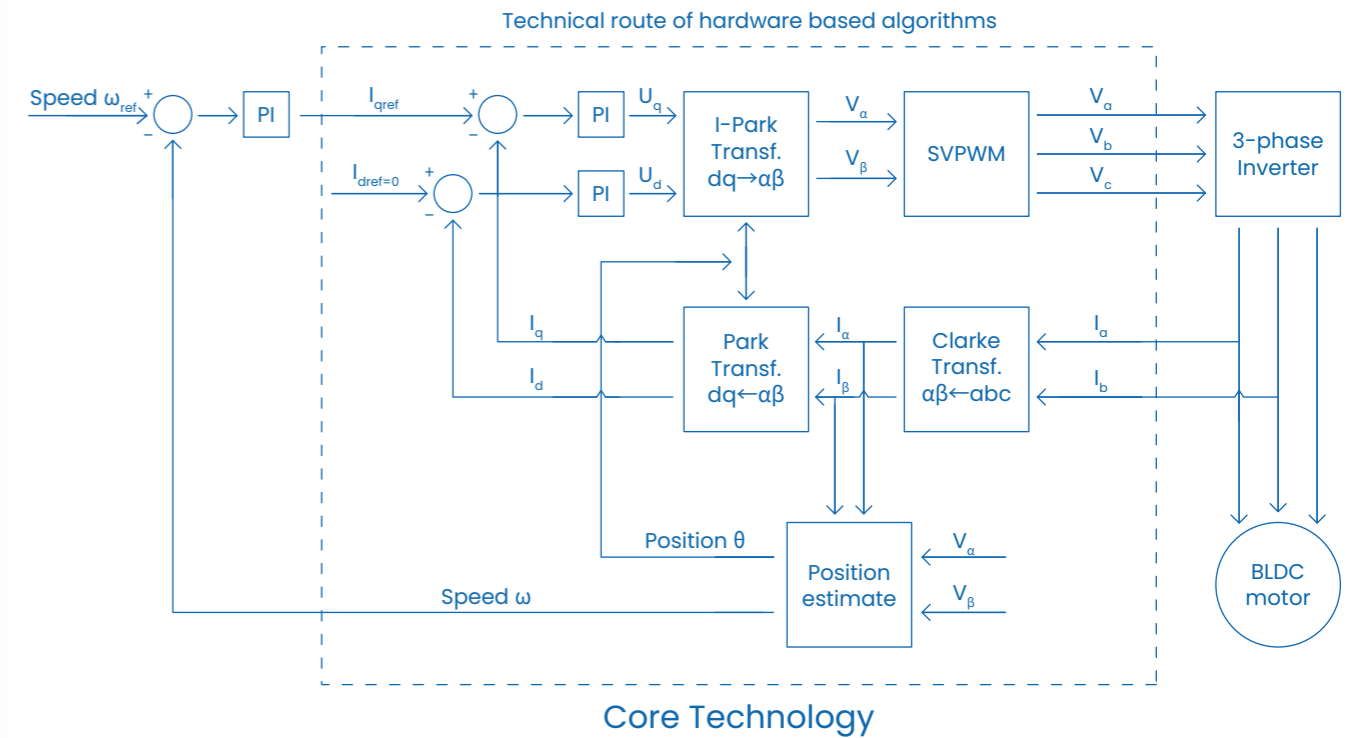- Highly reliable, highly efficient, super-high-speed BLDC motor control

Dual-Core

ME(Motor Engine) core								8051/RISC-V core
I-Park Transf.	Clarke Transf.	Park Transf.	LPF Module	Cordic Module	Id loop	Iq loop	Current sampling	
SVPWM	Dead time compensation	Over modulate		Torque compensation		Observer (with three modes)		Motor Drive Gate Driver (optional)

Diversity & cost competence

Discrete solution → LDO + Op-amp + Controller IC + Gate Driver + MOS

Semi-integrated solution → Controller IC (built-in with LDO + Op-amp + Gate Driver) + MOS

Fully-integrated solution → Controller IC (built-in with LDO + Op-amp + Gate Driver + MOS)

Traditional solution: 197mm²

↓ Saving 82% footprint

Fortior solution: 36 mm²

Saving 82% footprint
Flexibility, fewer peripheral devices
Simplicity of application board

Other general MCU IC
Other dedicated IC
Fortior dedicated IC

- Cost of materials
- Cost of R&D
- Cost of maintenance

Comparative cost of different solutions for the same motor drive application

Highly integrated IC design

Hardware based algorithms

Technical route of hardware based algorithms

Speed ω_{ref} → PI → I_{qref} → PI → U_q → I-Park Transf. dq→αβ → V_α, V_β → SVPWM → V_a, V_b, V_c → 3-phase Inverter

$I_{dref=0}$ → PI → U_d

I_q, I_d → Park Transf. dq←αβ → I_α, I_β → Clarke Transf. αβ←abc → I_a, I_b

Position θ → Position estimate → V_α, V_β

Speed ω

BLDC motor

Core Technology

SUPPORT & SERVICE

## Global Vision Localized Service

Group Headquarter: Shenzhen
R&D Center: Shenzhen, Singapore
Market Coverage: China, Asia Pacific,
North America, Europe

Fortior adheres to attentive customer care.

Our sophisticated application engineers work closely with customer to: Recommend customer-oriented project/application templates, provide fitting solutions, develop application boards, debug, deliver turn-to-key sample boards, and help customers settle down end user system issues, as well as assist customers in fulfilling and refining motor design.

Fortior is always together with customers from demand creation to application design, sample delivering, and end user care.

SALES AND SERVICE
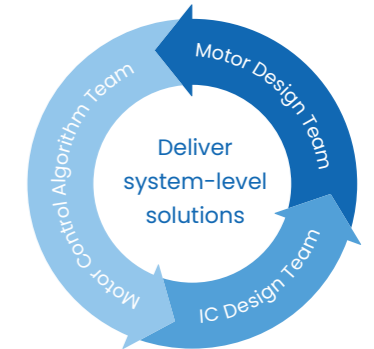
The three technical teams, IC design team, motor control algorithm team, motor design team, forge solid strength of the company, which enables us to offer system-level solutions of motor control to convert customer concept into reality.

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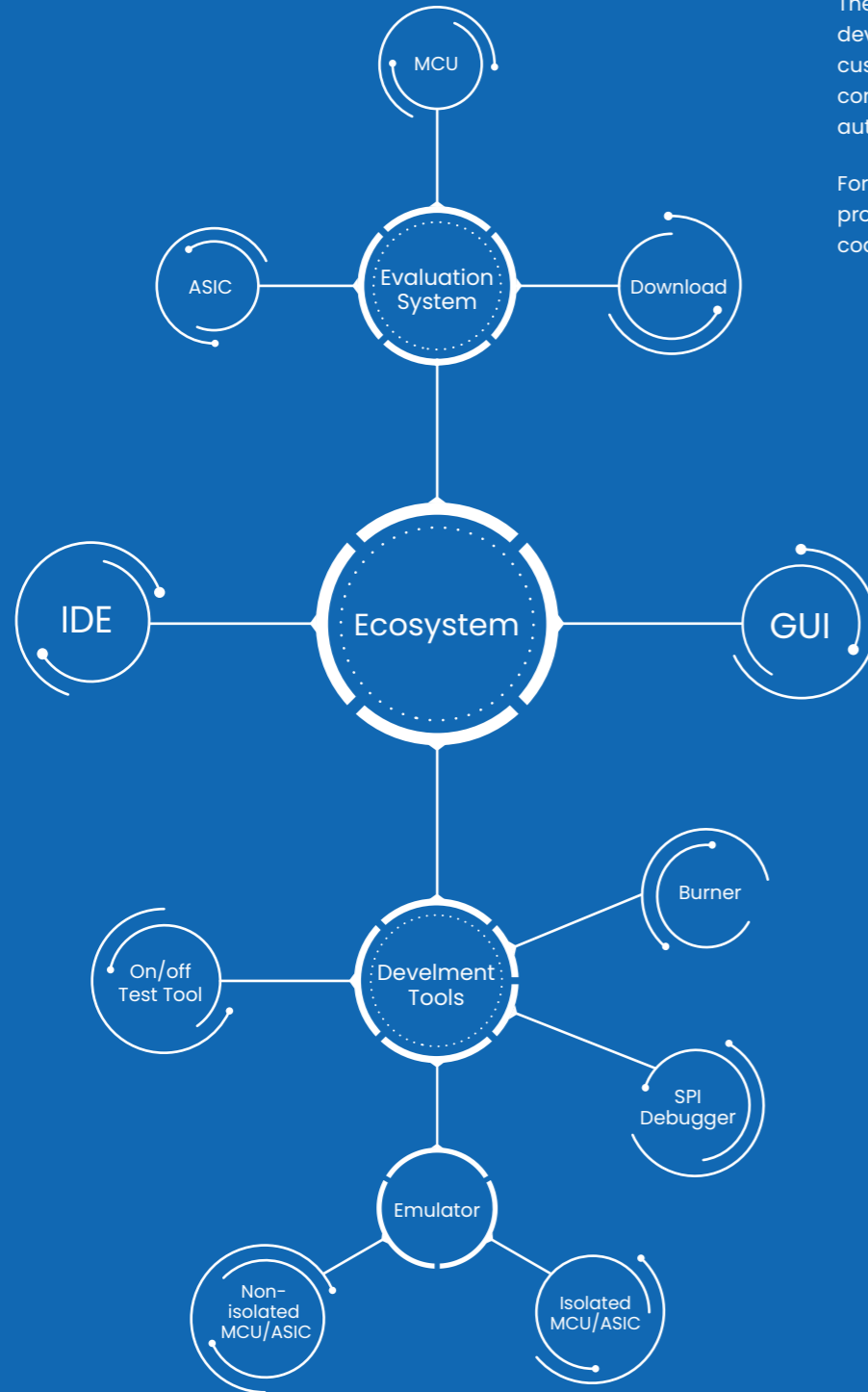Hauzenbergerstr. 20, 80687 München, Germany

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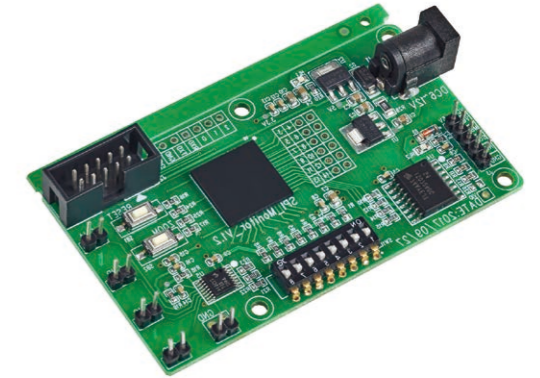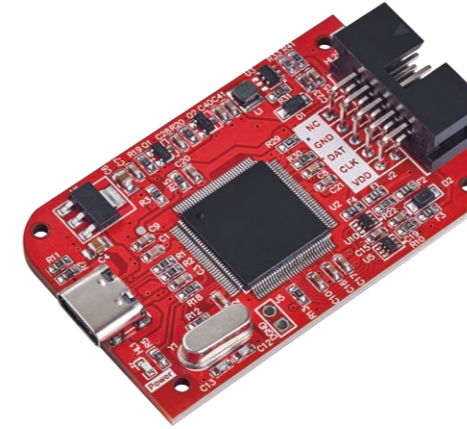
DEVELOPMENT ECOSYSTEM

Fortior's development ecosystem provides full toolchain for development and debugging, such as IDE, simulation tools, DEMO evaluation boards.

The prompt and enriched IDE developed by Fortior keeps customers free from potential complexity of license authorization or restrictions.

Fortior's private programing protocol guarantees strong code safety.

MCU

ASIC — Evaluation System — Download

IDE — Ecosystem — GUI

Develment Tools

Burner

On/off Test Tool

SPI Debugger

Emulator

Non-isolated MCU/ASIC

Isolated MCU/ASIC

MCU emulator (non-isolated)

Support for Windows OS
Supporting KEIL IDE uVision v4, or higher versions
Supporting Fortior IDE for Fortior MCU development
Cost effective

MCU emulator (isolated)

Support for Windows OS
Supporting KEIL IDE uVision v4, or higher versions
Supporting Fortior IDE for Fortior MCU development
Supporting isolation protection

ASIC emulator (non-isolated)

Compact, easy-to-use, customizable ASIC emulator
User-friendly indicators and pin information display
Cost effective

ASIC emulator (isolated)

Compact, easy-to-use, customizable ASIC emulator
User-friendly indicators and pin information display

Offline programmer

Robust and compact casing design
One-click burn-in function
Multiple-chip operation mode
Intuitive LCD display of chip type and burn-in status
Interfacing with IC programming machine to fulfill semi/fully automatic IC programming

SPI debugger

Up to 8x waveform amplification
4-channel analog output for oscilloscope waveform display
Support for single-, dual- and three-wire SPI communication
Support for serial communication

On/off test tool

Wide voltage input 3-100V
Configurable PWM output, frequency and duty
Dual-channel FG reading
IC self-identification
AC Lose function test
Support for SMF read/write function test (HP, Cisco function)
Motor speed test function
4-wire programming
CRC check

MCU
Evaluation Kit

EU6832L low voltage 3-phase DEMO

Input voltage up to 24V
FOC and BLDC control modes
Sensorless mode control with reserved HALL mode interface
Sensor mode control capability
Multiple communication modes such as SPI, UART, I2C
QEP encoding capture
Analog speed control and PWM speed control
FG speed feedback
Support for single-resistor and dual-resistor sampling
modes switching
Support for internal and external LDO modes switching
Reserved interfaces for fault indicators, buzzers, keys, etc. to
have function expansion
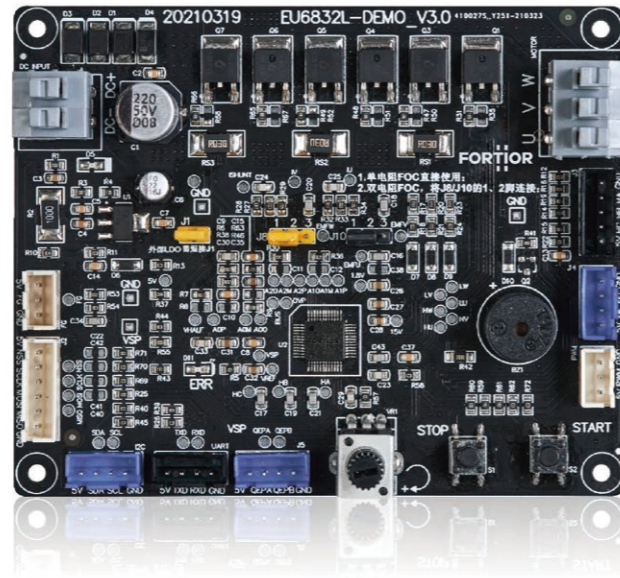
EU5821 low voltage single-phase DEMO

Input voltage up to 24V
P+N drive
Customized softSwitch
HALL-IC/HALL-sensor input
I2C, UART communication
Analog speed control and PWM speed control
Support for low power mode
High voltage endurance for FG port
Anti-current-backflow for PWM port
1.8V/3.3V/5V PWM input

EU6861Q medium and low voltage 3-phase DEMO

Input voltage up to 80V
BUS current up to 50A
FOC and BLDC control modes
Sensorless mode control with reserved HALL mode interface
Sensor mode control capability
SPI, UART, I2C communication
Analog speed control and PWM speed control
FG speed feedback
Support for single-resistor and dual-resistor sampling
modes switching
Support for triple-comparator mode and dual-comparator
mode switching to detect Back-EMF
Support for internal and external LDO modes switching
MOS temperature detection
Reserved interfaces for indicators, keys, etc. to have function
expansion

ASIC
Evaluation Kit
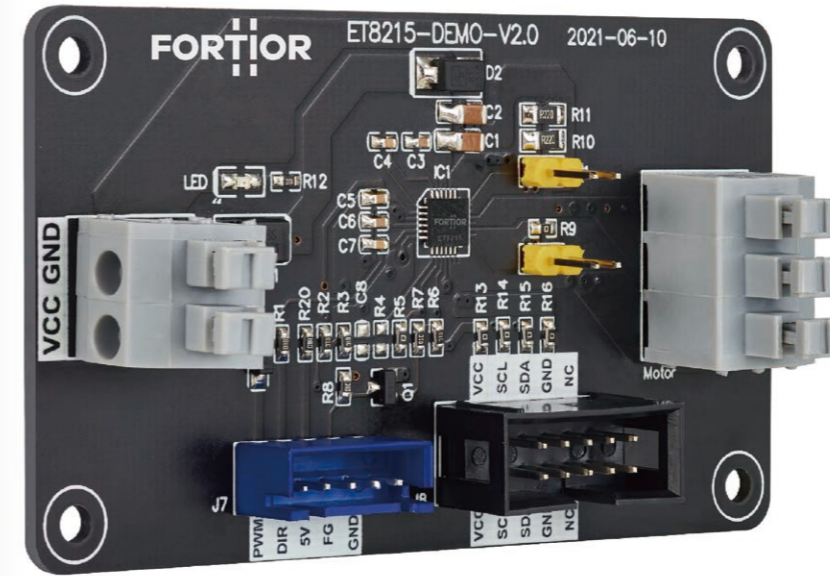
ET8132Q low voltage 3-phase DEMO

Input voltage up to 28V
BUS current up to 10A
Sensor SVPWM mode and sensorless FOC mode control
Sensorless mode control with reserved HALL mode interface
Sensor mode control capability
Analog speed control and PWM speed control
Support for single-resistor and dual-resistor sampling
modes switching
Triple-comparator mode to detect Back-EMF
Support for FR input and FG output

### ET8215 low voltage 3-phase fully built-in DEMO

Input voltage up to 18V
BUS current up to 2A
Sensorless FOC mode control
Analog, PWM and CLOCK speed control
Support for single-resistor, dual-resistor and triple-resistor
sampling modes switching
Dual-comparator mode to detect Back-EMF
Support for FR input and FG output
Support for DIR(forward/reverse rotation) input, 5V output,
and FG output

IDE

Fortior IDE — Start Solution

- Create new solution....
- Open an existing solution....
- Open the most recent solution:

Name	Modified Time
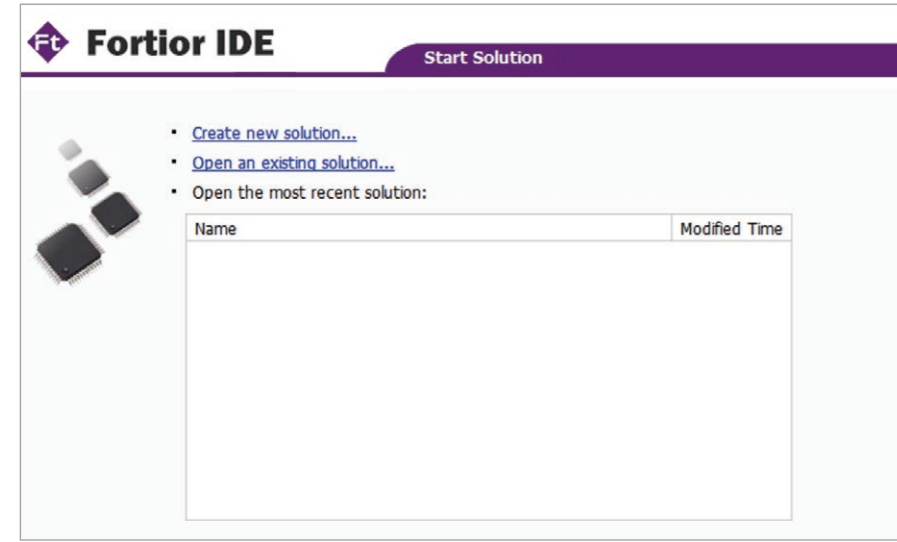
Compact and prompt GUI style
Compile function with multiple optimization levels
Easy-to-use emulators and debuggers
Project framework supporting unified management of multiple projects
Seamless integration with Keil projects after code migration, attaining strong code compatibility

DEMO Evaluation Kit

Information List | Downloads
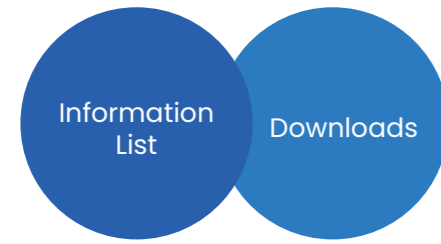
We offer comprehensive application-based and general-purpose DEMO board systems, covering various MCU and ASIC models, to serve different application areas and requirements.

Fortior's powerful DEMO evaluation system facilitates customers for easy project evaluation, product design and development, and fast time to market.

PRODUCT SELECTION

MCU selection

Product Description	Model	FOC HW	SVPWM HW	BLDC HW	Single-phase Ctrl HW	PI/PID	LPF	MDU	Sin/Cos/Atan	PFC HW	MIPS (MHz)	FLASH (KB)	RAM (KB)	GPIO	Int Fast Clk	Ext Fast Clk	Int Slow Clk	Ext Slow Clk	PWM (HV det.)	I²C	UART	SPI	CAN	LIN	DMA	Timer	RTC	WDT	6N Pre-driver	3P2N Pre-driver	6 Ch PWM	2P2N Pre-driver	Pre-driver Max V	Drive Current IC+ (mA)	Drive Current IO- (mA)	Single-phase	Sensor/Sensorless Sq Wave	Sensor SVPWM	Sensor FOC	Sensorless FOC	ADC Number	ADC Channels	ADC Bit	DAC Number	DAC Bit	VREF	OP	Comparators	Working Voltage / Temperature	Package
Low voltage Applications 3P3N gate driver	EU6832L	√	√	√	−	4	1	1	1	−	24	16	1	35	√	−	√	−	−	1	2	1	−	1	2	5	1	1	−	√	−	−	36	90	180	√	√	√	√	√	1	14	12	2	9\6	√	3	4	3–36V: −40~85°C	LQFP48(7x7 mm)
	EU6832N	√	√	√	−	4	1	1	1	−	24	16	1	22	√	−	√	−	−	1	2	1	−	1	2	5	1	1	−	√	−	−	36	90	180	√	√	√	√	√	1	11	12	2	9\6	√	3	4	3–36V: −40~85°C	QFN32(4x4 mm)
	EU6832S	√	√	√	−	4	1	1	1	−	24	16	1	13	√	−	√	−	−	1	2	1	−	1	2	5	1	1	−	√	−	−	36	90	180	√	√	√	√	√	1	7	12	2	9\6	√	1	3	3–15V: −40~105°C	SSOP24(8x9 mm)
	EU6832F	−	√	√	−	4	4	1	1	−	24	16	1	13	√	−	√	−	−	1	2	1	−	1	2	5	1	1	−	√	−	−	36	90	180	√	√	√	√	√	1	7	12	2	9\6	√	1	4	3–15V: −40~105°C	QFN24(4x4 mm)
Applications of automotive grade 3P3N gate driver	EU6832N1	√	√	√	−	4	1	1	4	−	24	16	1	22	√	−	√	−	−	1	2	1	−	1	2	5	1	1	−	√	−	−	36	90	180	√	√	√	√	√	1	12	12	2	9\6	√	3	4	3–18V: −40~125°C	QFN32(4x4 mm)
Applications of automotive grade 6N gate driver	EU6865Q1	√	√	√	−	4	1	1	1	−	24	32	4	36	√	√	√	−	√	1	2	1	1	1	2	5	1	1	√	−	−	−	140	800	800	√	√	√	√	√	1	14	12	3	9\8\6	−	4	5	7–18V: −40~125°C	QFN56(7x7 mm)
	EU6866Q1	√	√	√	−	4	4	4	4	−	24	32	4	36	√	√	√	−	√	2	1	2	1	1	1	2	5	1	√	−	−	−	180	1500	1800	√	√	√	√	√	1	15	12	3	9\6	√	4	5	7–12V: −40~125°C	QFN56(7x7 mm)
Applications of automotive grade PWM Output	EU6815Q1	√	√	√	−	4	1	1	1	√	24	32	4	38	√	−	√	−	−	1	2	1	−	1	2	5	1	1	−	−	√	−	−	50	100	√	√	√	√	√	1	14	12	3	9\8\6	√	4	5	3–18V: −40~125°C	QFN48(6x6 mm)
	EU6816Q1	√	√	√	−	4	4	4	4	−	24	32	4	38	√	−	√	−	−	2	1	2	1	1	1	2	5	1	1	−	√	−	−	50	100	√	√	√	√	√	1	15	12	3	9\6	√	4	5	3–5.5V: −40~125°C	QFN48(6x6 mm)
MR Sensors Low voltage Applications 3P3N gate driver	EU6332N	√	√	√	−	4	1	1	1	−	24	16	1	22	√	−	√	−	−	1	2	1	−	1	2	5	1	1	−	√	−	−	36	90	180	√	√	√	√	√	1	9	12	2	9\6	√	3	4	3–36V: −40~85°C / 3–15V: −40~105°C	QFN40(5x5 mm)
Middle voltage Applications 6N gate driver	EU6861Q2	√	√	√	−	4	1	1	1	−	24	16	1	32	√	−	√	−	−	1	1	1	−	−	2	5	1	1	√	−	−	−	180	800	800	√	√	√	√	√	1	12	12	1	8	√	3	3	7–18V: −40~85°C	QFN56(7x7 mm)
	EU6861L2	√	√	√	−	4	1	1	1	−	24	16	1	27	√	−	√	−	−	1	1	1	−	−	2	5	1	1	√	−	−	−	180	800	800	√	√	√	√	√	1	11	12	1	8	√	3	3	7–18V: −40~85°C	LQFP48(7x7 mm)
	EU6861N2	√	√	√	−	4	1	1	1	−	24	16	1	19	√	−	√	−	−	1	1	1	−	−	2	5	1	1	√	−	−	−	180	800	800	√	√	√	√	√	1	9	12	1	8	√	1	3	7–12V: −40~105°C	QFN40(5x5 mm)
	EU6866L	√	√	√	−	4	4	4	4	−	24	32	4	30	√	√	√	−	√	2	1	2	1	1	1	2	5	1	√	−	−	−	180	1500	1800	√	√	√	√	√	1	15	12	3	9\6	√	4	5	7–12V: −40~105°C / 7–18V: −40~85°C	LQFP48(7x7 mm)
	EU6865Q	√	√	√	−	4	1	1	1	−	24	32	4	36	√	−	√	−	−	1	2	1	−	1	2	5	1	1	√	−	−	−	140	800	800	√	√	√	√	√	1	14	12	3	9\8\6	√	4	5	7–18V: −40~85°C	QFN56(7x7 mm)
Full Voltage Applications PWM output	EU6812L2	√	√	√	−	4	1	1	1	−	24	16	1	34	√	−	√	−	−	1	1	1	−	−	2	5	1	1	−	−	√	−	−	50	100	√	√	√	√	√	1	12	12	1	8	√	3	3	3–36V: −40~85°C	LQFP48(7x7 mm)
	EU6812N2	√	√	√	−	4	1	1	1	−	24	16	1	20	√	−	√	−	−	1	1	1	−	−	2	5	1	1	−	−	√	−	−	50	100	√	√	√	√	√	1	7	12	1	8	√	1	2	3–36V: −40~85°C	QFN32(4x4 mm)
	EU6812S2	√	√	√	−	4	1	1	1	−	24	16	1	12	√	−	√	−	−	1	1	1	−	−	2	5	1	1	−	−	√	−	−	50	100	√	√	√	√	√	1	5	12	1	8	√	1	2	3–15V: −40~105°C	SSOP24(8.65x3.9 mm)
	EU6812V	√	√	√	−	4	1	1	1	−	24	16	1	12	√	−	√	−	−	1	1	1	−	−	2	5	1	1	−	−	√	−	−	50	100	√	√	√	√	√	1	7	12	1	8	√	1	3	3–15V: −40~105°C	SSOP24(8.65x3.9 mm)
	EU6815L	√	√	√	−	4	1	1	1	√	24	32	4	38	√	−	√	−	−	1	2	1	−	1	2	5	1	1	−	−	√	−	−	50	100	√	√	√	√	√	1	14	12	3	9\8\6	√	4	5	3–36V: −40~85°C / 3–15V: −40~105°C	LQFP48(7x7 mm)
	EU6816L	√	√	√	−	4	4	4	4	−	24	32	4	38	√	−	√	−	−	2	1	2	1	1	1	2	5	1	1	−	√	−	−	50	100	√	√	√	√	√	1	16	12	3	9\8\6	√	4	5	7–18V: −40~85°C	LQFP48(7x7 mm)
	EU6816N	−	√	√	−	4	4	4	4	−	24	32	4	22	√	−	√	−	−	2	1	2	1	1	1	2	5	1	1	−	√	−	−	50	100	√	√	√	√	√	1	15	12	3	9\6	√	4	5	7–12V: −40~105°C	QFN32(4x4 mm)
High voltage Applications 6N gate driver	EU6862Q	√	√	√	−	4	1	1	1	−	24	16	1	20	√	−	√	−	−	1	1	1	−	−	2	5	1	1	√	−	−	−	600	800	800	√	√	√	√	√	1	12	12	1	8	√	3	3	7–12V: −40~105°C	QFN48(7x7 mm)
Low voltage 2P2N gate driver	EU5821T	−	−	−	√	−	−	−	−	−	24	6	0.512	8	√	−	√	−	−	1	1	1	−	−	−	4	1	1	−	−	−	√	28	90	180	√	−	−	−	−	1	6	10	4	6\4	−	−	5	3–28V: −40~85°C / 3–15V: −40~105°C	TSSOP16(5x6.4 mm)

Note: " − " means no such function; " √ " means yes, have such function; " * " means active low

PRODUCT SELECTION

3-phase ASIC selection

Product Description	Model	Package	Min (V)	Max (V)	6N Pre-Driver	3P3N Pre-Driver	6 Commutia PWM	Built-in MOS	Max DC bus voltage	Max DC bus current	Working temperature Ta (°C)
3-phase sensorless sinusoidal 5V 500mA PWM, fully built-in	ET3206N	DFN10 3*3*0.55	2	6	—	—	—	√	6	0.5	Ta:-40~105°C
3-phase 3-HALL sinusoidal 12v/700mA, 24/400mA closed loop, fully built-in	ET1215Q	QFN24	4.5	28	—	—	—	√	28	0.7	Ta:-40~85°C
3-phase sensorless FOC 12V/1A, fully built-in	ET8213Q	QFN28 5*5*0.75	5	18	—	—	—	√	18	1	I(VCC)>0.5A, Ta:-40~85°C / I(VCC)≤0.5A, Ta:-40~105°C
3-phase sensorless FOC 12V/2A, fully built-in	ET8215Q	QFN24	5	18	—	—	—	√	18	2	Tj:-40~150°C
3-phase sensorless/sensor FOC, or SVPWM 12V, 24V, high power (built-in gate driver)	ET8132Q	QFN24	6	28	√	—	—	—	—	—	Tj:-40~150°C
	ET8132S	SSOP24	6	28	√	—	—	—	—	—	Tj:-40~150°C
3-phase sensorless FOC, Middle voltage/Low voltage with 8N gate driver (gate driver voltage up to 140V)	ET8161S	SSOP24	7	18	√	—	—	—	18	—	Ta:-40~85°C, VCC<12V, Ivcc<30mA, Ta:-40~125°C
3-phase sensorless FOC or SVPWM(fully built-in)	ES9336AS	IPMFA-A36	13	20	—	—	—	√	400	1.5	Tj:-40~150°C
	ES93376AS	IPMFA-A36	13	20	—	—	—	√	400	2.5	Tj:-40~150°C

Single-phase ASIC selection

Product Description	Model	Package	Drive Mode	Hall Type	Voltage of Power	Maximum DC bus voltage	Maximum DC bus current	FG Output	RD Output	Analog voltage	PWM	Speed control mode	Soft Start	Automatic Restart	Speed Closed Loop	Soft Current Switching
PWM speed control	EAI611	SOP8L(4.9*6)	integrated power MOSFETs	Internal	3.3-18	18V	0.5A	√	√	—	√	√	√	√	√	√

Note: " - " means no such function; " √ " means yes, have such function; " * " means active low

Gate Driver selection

Model	Channel	Topology	VIS(V)	Io+ (mA)	Io- (mA)	Power of Voltage	Input Logic	Single Input	Enable Shutdown/Reset	Integrated BSD	Through Prevention	Overcurrent Protection	UVLO	VCCUV+/UV- (V)	VBSUV+/UV- (V)	Dead Zone (ns)	Package
ED2607S	2	Half Bridge	600	250	410	10-20V	HIN,LIN	—	—	—	√	—	Vcc	9.2/8.4	—	360	SOP8
ED2203S	2	Half Bridge	250	1600	2300	8-20V	HIN,LIN*	—	—	—	√	—	Vcc/Vbs	6.9/6.5	6.9/6.5	250	SOP8
ED2103S	2	Half Bridge	180	1000	1000	10-20V	HIN,LIN*	—	—	—	√	—	Vcc	8.9/8.2	—	100	SOP8
ED2108M	2	Half Bridge	180	5000	5000	5-18V	IN	√	√	—	√	—	Vcc/Vbs	4.3/4.0	4.3/4.0	30-2000 Adjustable	MSOP10
ED2105M	2	Half Bridge	40	1200	1800	3-21V	IN	√	√	—	√	—	Vcc	2.9/2.7	—	30-2000 Adjustable	MSOP10
ED2024S	2	low-side mosfet driver	—	1200	1300	4-18V	IN1,IN2	—	—	—	√	—	Vcc	3.5/3.3	—	—	SOT23-6
ED6636S	6	Three Half Bridge	600	210	360	10-20V	HIN*,LIN*	√	√	—	√	√	Vcc/Vbs	8.8/8.8	8.8/8.8	300	SOP28
ED6288T	6	Three Half Bridge	250	1500	1800	5-20V	HIN,LIN	—	—	—	√	—	Vcc/Vbs	4.6/4.3	4.6/4.3	200	TSSOP20
ED6288Q	6	Three Half Bridge	250	1500	1800	5-20V	HIN,LIN	—	—	—	√	—	Vcc/Vbs	4.6/4.3	4.6/4.3	200	QFN24-4×4
ED6187T	6	Three Half Bridge	180	800	800	5-22V	HIN,LIN*	—	—	—	√	—	Vcc	4.4/4.1	—	100	TSSOP20

IPM selection

Model	Channel	Topology	Voltage	I@25°C (A)	I@80°C (A)	RDSON (typ) @25°C	Input Logic	Single Input	Enable Shutdown/Reset	Integrated BSD	Through Prevention	UVLO	VCCUV+/UV- (V)	VBSUV+/UV- (V)	Package
ES236BQ	2	Half Bridge	600	3	2.1	2.4Ω	HIN,LIN	—	—	—	√	Vcc/Vbs	12/11V	10.2/9.2V	QFN10 -5×6
ES256AQ	2	Half Bridge	600	5	3.5	1.5Ω	HIN,LIN	—	—	—	√	Vcc/Vbs	12/11V	10.2/9.2V	QFN17 -7×7
ES276AQ	2	Half Bridge	600	7	5	1.0Ω	HIN,LIN	—	—	—	√	Vcc/Vbs	12/11V	10.2/9.2V	QFN17 -7×7
ES8003E	8	Dual H Bridge	15	0.7	0.58	950mΩ	AIN/BIN	√	√	√	√	Vcc	2.7V	—	eTSS18L -5×4.4
ES4005S	4	H Bridge	10	1.75	1.45	300mΩ	INI/IN2	√	√	√	√	Vcc	1.8V	—	SOP8
ES4005D	4	H Bridge	10	1.8	1.5	280mΩ	INI/IN2	√	√	√	√	Vcc	1.8V	—	DFN8 -2×2

MOSFET selection

Model	VDSS(V)	ID(A)	RDSON (typ)(Ω)	trf(typ)(ns)	Package
EMD3N60E5	600	3	2.6	85	TO-252T
EMD5N60E5	600	5	1.5	140	TO-252T
EMD7N60P5	600	7	1.1	198	TO-220F
EMD7N60E5	600	7	1.1	198	TO-252T
ECD4N60E2	600	4	0.92	88	TO-252