

## MOTOR DRIVER AND POSITION SENSOR SOLUTIONS

STEPPER, BRUSHLESS DC, BRUSHED DC  
SERVO MOTORS, AND SOLENOIDS



**Monolithic Power Systems, Inc.**

**MPS®**  
Simple, Easy Solutions®

# Monolithic Power Systems, Inc.



## Who we are:

We are creative thinkers. We break boundaries. We take technology to new levels. As a leading international semiconductor company, Monolithic Power Systems (MPS) creates cutting-edge solutions to improve the quality of life with green, easy-to-use products.

## What we do:

We make power design fun! With our innovative proprietary technology processes, we thrive on re-imagining and re-defining the possibilities of high-performance power solutions in industrial applications, telecom infrastructures, cloud computing, automotive, and consumer applications.

## Where we come from:

It started with a vision. Michael Hsing, pioneering engineer and CEO, founded Monolithic Power Systems, Inc. in 1997 with the belief that an entire power system could be integrated onto a single chip. Under his leadership, MPS has succeeded not only in developing a monolithic power module that truly integrates an entire power system in a single package, but also it continues to defy industry expectations with its patented groundbreaking technologies.

## Quality Assurance and Reliability Commitment

MPS Quality Assurance organization develops, coordinates, and champions strategic quality initiatives throughout MPS Inc, its foundries, and sub-contractors. Its mission is to enable MPS to design, develop, manufacture, and deliver product to our customers with world-class quality and reliability that meet and exceed our customer expectations.

### MPS and Its Supplier Quality Systems and Certificates:

- ISO9001:2008 (MPS)
- EU RoHS/HF/REACH Compliant (MPS)
- Sony Green Partner (MPS & Suppliers)
- TS16949 (Suppliers)
- ISO14001 (Suppliers)

### Product Quality:

- Automotive Products Qualified per AEC-Q100 Standard
- Standard Products Qualified per JEDEC and Military Standard
- Reliability Failure Rate <10FIT
- Product Quality Level <1.0ppm

### Quality Control and Monitor:

- On-Site Foundry and Assembly Teams for Real Time Actions
- Quarterly Supplier Quality Review and Annual Supplier Audit
- Short Term Reliability Monitor Test – Daily
- Long Term Reliability Monitor Test – Monthly
- Real Time Engineering Actions on Monitor Failure
- Quarterly Reliability Monitor Reports

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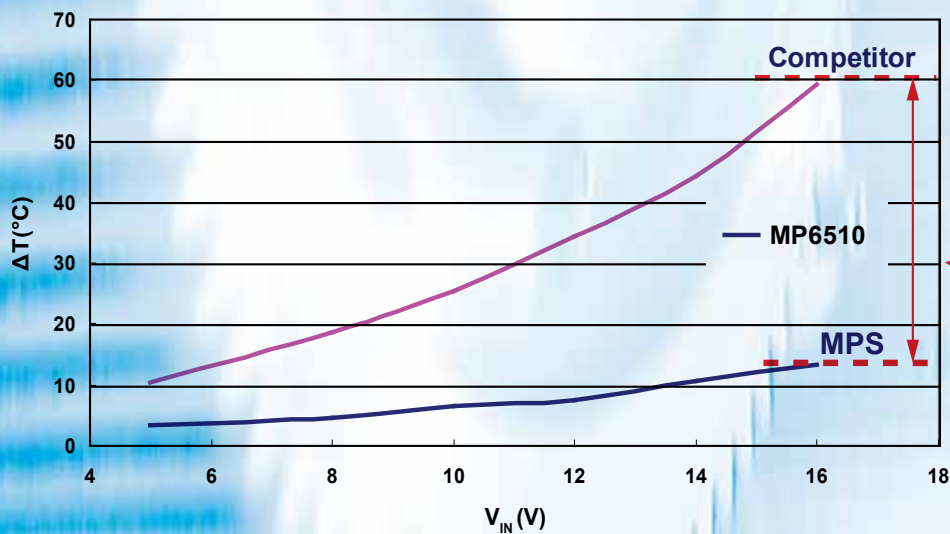
## MPS Motor Drivers

MPS motor drivers solutions offers a wide range of high-performance, cost-effective, and reliable solutions for stepper motors, brushless DC motors, brushed DC motors, and solenoids. Using industry leading semiconductor process and advanced packaging technologies, MPS motor drivers achieve highest efficiency, best thermal performance, and smallest solution size.

MPS' proprietary Fourth Generation BCD™ process technology is the key to its competitive advantage. Many conventional analog technologies are handicapped by an inability to support the integration of power devices at high power levels. This results in unacceptably large semiconductors and/or significant levels of power loss. High power loss results in significant heat dissipation. This must be managed to avoid damaging or reducing the overall performance and efficiency of the system.

### Better Thermal Performance ( $T_a = 25^\circ\text{C}$ )

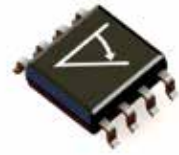
Thermal Performance Comparison



$\Delta=46^\circ\text{C}$

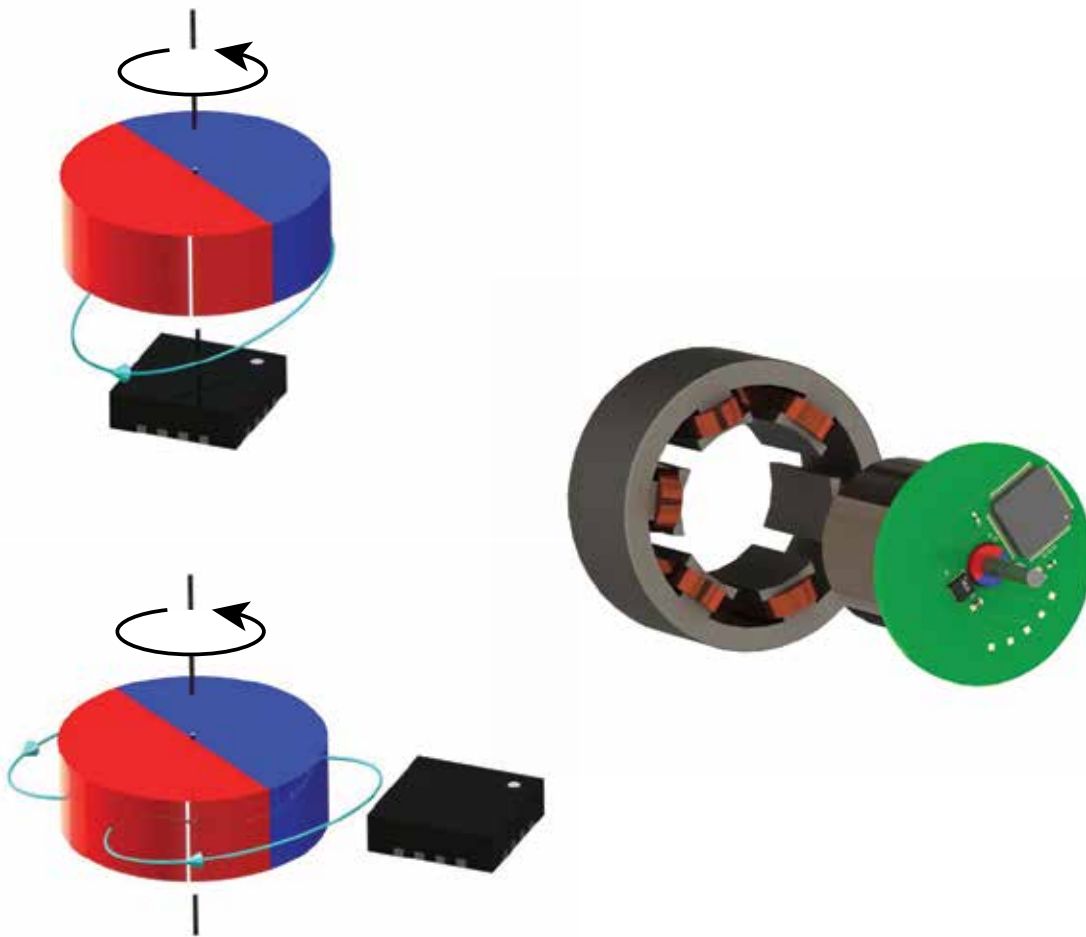
# MPS Position Sensors

MPS offers a revolutionary new way for magnetic sensors to directly measure angles. By leveraging more than a decade of research and development, we are able to provide unique performance capabilities and have become a technology leader in magnetic sensing.



MPS position sensors are based on unique measurement technology that are integrated directly with the signal conditioning. Our MagAlpha family can detect and deliver the angle value in digital format instantaneously without having to calculate the shaft position.

Conventional systems obtain the angle by using complex calculations of feedback loops with long time constants. MagAlpha uses a straightforward way to measure the angle without the need of analog to digital conversion or feedback loops. It yields instant information about the actual rotor position.



# Complete MPS Motor Driver Solutions

## Stepper Motor Solutions

### MP6500 Solution Kit (EVKT6500) \$99

- Simple solution kit for the MP6500 stepper motor driver with internal current sense
- Connect to power, a bipolar stepper motor, and a pulse generator
- Small size: 30x35mm



### MP6501A Solution Kit (EVKT6510A) \$119

- Solution kit for the MP6501A stepper motor driver
- Built-in microcontroller and USB interface connects with the included easy-to-use Windows GUI
- Can also be controlled externally



## Brushless DC Motor Solutions

### MP6530 Solution Kit (EVKT6530) \$119

- Solution kit for the MP6530 3-phase pre-driver to drive a brushless DC motor
- Microcontroller with open-loop speed control and Hall commutation built in
- 3mΩ FETs on-board can drive up to 60V, 15A motors



### MP6532 Solution Kit (EVKT6532) \$119

- Solution kit for the MP6532 3-phase pre-driver with Hall sensor inputs
- Microcontroller with open-loop PWM speed control built-in
- 3mΩ FETs on-board can drive up to 60V, 15A motors



## Brushed DC Motor and Solenoid Solutions

### MP6513 Solution Kit (EVKT6513) \$79

- Simple solution kit for the MP6513 H-bridge motor driver
- Open-loop PWM speed control built-in
- Small size: 30x35mm



### MP6515 Solution Kit (EVKT6515) \$79

- Simple solution kit for the MP6515 H-bridge motor driver
- Open-loop PWM speed control built-in
- Small size: 30x35mm



## Product Highlights

# Stepper Motor Drivers

A stepper motor allows for precise position control without the need for a feedback system. It is widely used in open-loop position control systems. MPS stepper motor drivers are optimized to drive bipolar stepper motors used in printers, document scanners, office/factory automation, security system, scientific, and medical equipment.

## Features

- Two Internal Full-Bridge Drivers
- Stepper Indexer or Parallel Control
- Low On Resistance
- No Control Supply Required
- Sink and Source Over-Current Protection
- Thermal Shutdown and UVLO Protection
- Thermally-Enhanced Packages
- High Breakdown Voltage



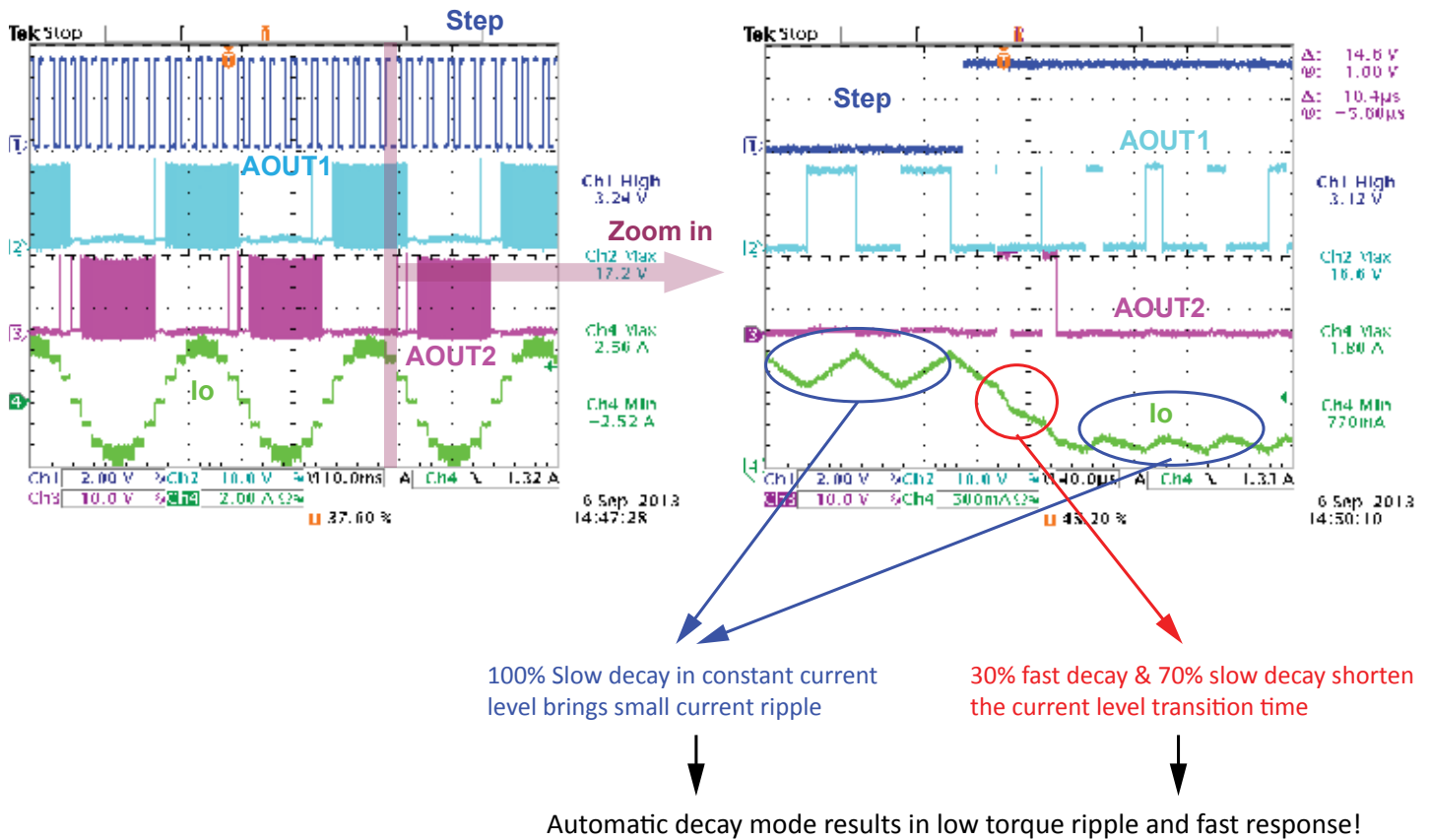
## Product Highlights

### Stepper Motor Drivers

| Part Number | Description                                                                           | Min Input (V) | Max Input (V) | Max Current (A) | Step Mode                   | Control Interface | Other Features         | Status       |
|-------------|---------------------------------------------------------------------------------------|---------------|---------------|-----------------|-----------------------------|-------------------|------------------------|--------------|
| MP6506      | 15V, 0.5A Bipolar Stepper Motor Driver                                                | 2.7           | 15            | 0.5             | Full, Half                  | Parallel          | -                      | Released     |
| MP6507      | 15V, 0.7A Bipolar Stepper Motor Driver                                                | 2.7           | 15            | 0.7             | Full, Half                  | Parallel          | -                      | Released     |
| MP6508      | 18V, 1.2A Bipolar Stepper Motor Driver                                                | 2.7           | 18            | 1.2             | Full, Half                  | Parallel          | -                      | Released     |
| MP6509      | 18V, 1.2A Bipolar Stepper Motor Driver with Current Attenuation                       | 2.7           | 18            | 1.2             | Full, Half                  | Parallel          | Current Attenuation    | Released     |
| MP6520      | 35V, 1.3A Bipolar Stepper Motor Driver with Micro-Stepping                            | 8.5           | 35            | 1.2             | Full, Half, Quarter, Eighth | Indexer           | -                      | Call Factory |
| MP6518      | 35V, 1.5A Bipolar Stepper Motor Driver with Micro-Stepping                            | 8.5           | 35            | 1.5             | Full, Half, Quarter, Eighth | Indexer           | -                      | Released     |
| MP6501A     | 35V, 2.5A Bipolar Stepper Motor Driver with Micro-Stepping                            | 8.5           | 35            | 2.5             | Full, Half, Quarter, Eighth | Indexer           | -                      | Released     |
| MP6500      | 35V, 2.8A Bipolar Stepper Motor Driver with Micro-Stepping and Internal Current Sense | 8.5           | 35            | 2.8             | Full, Half, Quarter, Eighth | Indexer           | Internal Current Sense | Call Factory |



# MPS Stepper Motor Drivers Advantages



## MPS Advantage

- Low on resistance significantly improves thermal performance
- Smooth torque and accurate stepping control
- Extensive protection functions increase system reliability

# Brushed DC Motor and Solenoid Drivers

A brushed DC motor is a mechanically commutated motor running from a DC power source. It's widely used in many consumer and industrial applications due to its simplicity and cost-effectiveness. MPS H-bridge drivers are designed to drive brushed DC motors and solenoids in consumer appliances, toys, automotive, and industrial applications.

## Features

- Integrated Half-/Full-Bridge Drivers
- Low On Resistance
- Internal Charge Pump
- Low Quiescent/Sleep Current
- Over-Current and Over-Temperature Protections
- Thermally Enhanced Packages

## MPS Advantage

- Low on resistance significantly improves thermal performance
- Wide input range to support different applications
- Extensive protection functions increase system reliability

| Part Number | Description                                                 | Min Input (V) | Max Input (V) | Number of Half-Bridges | Output Current (A) | Control Interface | Other Features         | Status       |
|-------------|-------------------------------------------------------------|---------------|---------------|------------------------|--------------------|-------------------|------------------------|--------------|
| MP6506      | 15V, 0.5A Dual Full Bridge Driver                           | 2.7           | 15            | 4                      | 0.5                | PWM               | -                      | Released     |
| MP6507      | 15V, 0.7A Dual Full Bridge Driver                           | 2.7           | 15            | 4                      | 0.7                | PWM               | -                      | Released     |
| MP6513      | 21V, 0.8A Full Bridge Driver                                | 2             | 21            | 2                      | 0.8                | PWM               | -                      | Call Factory |
| MP6514      | 21, 0.8A Full Bridge Driver                                 | 2             | 21            | 2                      | 0.8                | Hi/Lo             | -                      | Call Factory |
| MPQ6523     | 40V, 0.9A, Triple Half-Bridge Driver                        | 7             | 40            | 3                      | 0.9                | SPI               | -                      | Call Factory |
| MPQ6526     | 40V, 0.9A, Hex Half-Bridge Driver                           | 7             | 40            | 6                      | 0.9                | SPI               | -                      | Call Factory |
| MP6508      | 18V, 1.2A, Dual Full-Bridge Driver                          | 2.7           | 18            | 4                      | 1.2                | PWM               | -                      | Released     |
| MP6509      | 18V, 1.2A, Dual Full-Bridge Driver with Current Attenuation | 2.7           | 18            | 4                      | 1.2                | PWM               | Current Attenuation    | Released     |
| MP6515      | 35V, 2.8A, Full Bridge Driver with Internal Current Sense   | 8             | 35            | 2                      | 2.8                | PWM               | Internal Current Sense | Call Factory |
| MP6516      | 35V, 2.8A, Full Bridge Driver with Internal Current Sense   | 8             | 35            | 2                      | 2.8                | Hi/Lo             | Internal Current Sense | Call Factory |
| MP8046      | 28V, 5A, Full Bridge Driver                                 | 7.5           | 28            | 2                      | 5                  | PWM               | -                      | Released     |
| MP8049S     | 26V, 5.5A Dual Full Bridge Driver                           | 5             | 26            | 4                      | 5.5                | PWM               | -                      | Released     |
| MP8040      | 24V, 9A Half Bridge Driver                                  | 7.5           | 24            | 1                      | 9                  | PWM               | -                      | Released     |

## Product Highlights

# Brushless DC Motor Pre-Drivers

A brushless DC motor is an electronically commutated motor running from a DC source. Due to its high reliability and ruggedness, it has been used in many speed control system. MPS brushless DC motor pre-drivers are designed to drive high-power brushless DC motors used in various industrial, automotive, and consumer applications such as power tools, fans, pumps, E-bikes, and etc.

## Features

- Single or Triple H-Bridge MOSFET Pre-Drivers
- Wide Input Voltage Range
- Internal Charge Pumps
- Over-Current Protection
- Adjustable Dead Time to Prevent Shoot-Through
- Thermal Shutdown and UVLO Protection



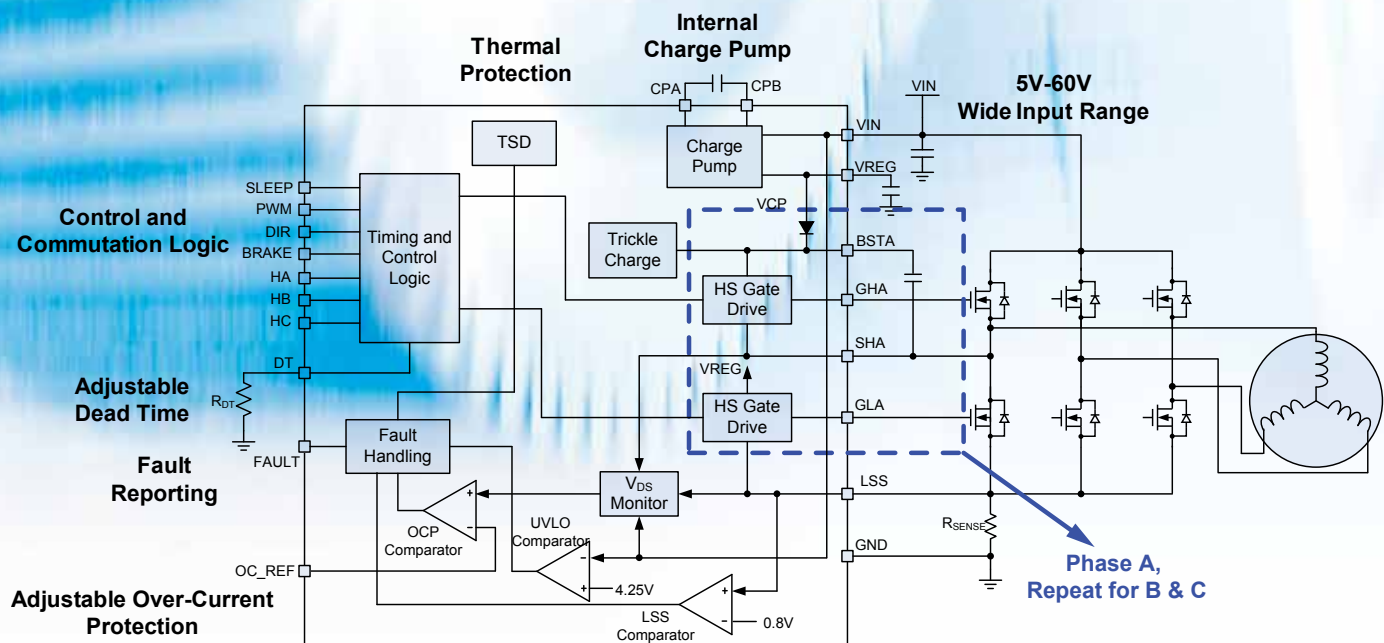
## Product Highlights

# Brushless DC Motor Pre-Drivers

| Part Number | Description                                                          | Min Supply (V) | Max Supply (V) | Max SW Voltage | Number of Half-Bridges | Sink/Source Current (A) | Hall Input | Other Features       | Status       |
|-------------|----------------------------------------------------------------------|----------------|----------------|----------------|------------------------|-------------------------|------------|----------------------|--------------|
| MP6530      | 60V 3-Phase BLDC Motor Pre-Driver                                    | 5              | 60             | 60             | 3                      | 1/0.8                   | No         | -                    | Released     |
| MP6532      | 60V 3-Phase BLDC Motor Pre-Driver with Hall Input                    | 5              | 60             | 60             | 3                      | 1/0.8                   | Yes        | -                    | Released     |
| MP6534      | 60V 3-Phase BLDC Motor Pre-Driver with Buck Regulator                | 5              | 60             | 60             | 3                      | 1/0.8                   | No         | 500mA Buck Regulator | Call Factory |
| MP6535      | 60V 3-Phase BLDC Motor Pre-Driver with Hall Input and Buck Regulator | 5              | 60             | 60             | 3                      | 1/0.8                   | Yes        | 500mA Buck Regulator | Call Factory |
| MP1921A     | 100V, 2.5A Half-Bridge Gate Driver                                   | 9              | 18             | 100            | 1                      | 2.5/1.5                 | No         | -                    | Released     |
| MP1924      | 100V, 4.5A Half-Bridge Gate Driver                                   | 9              | 18             | 100            | 1                      | 4.5/3                   | No         | -                    | Released     |

## MPS Advantage

- Low on resistance significantly improves thermal performance
- Wide input range to support different applications
- Extensive protection functions increase system reliability



# Fan Drivers and Integrated BLDC Motor Drivers

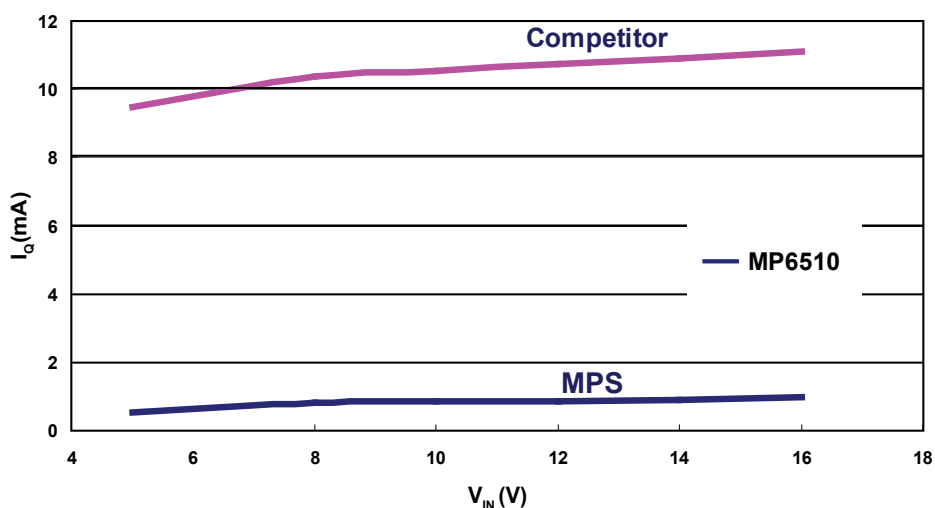
MPS fan drivers and integrated brushless DC motor drivers are optimized to single-phase brushless DC motors used in cooling fans that can be found in many electronic equipments such personal computers, servers, work stations, and etc.

## Features

- Integrated Power FETs with Low On Resistance
- Low Quiescent Current 1.4mA
- Current Limit Proportional with Hall Signal
- Over-Voltage, Over-Temperature, and Locked Rotor Protection with Automatic Recovery
- Speed Control by Input Voltage or PWM Signal
- Programmable Minimum Speed
- Rotation Speed Indication
- Locked-Rotor Indication
- Integrated Hall Bias Voltage

## Lower Standby Current

Quiescent Current Comparison

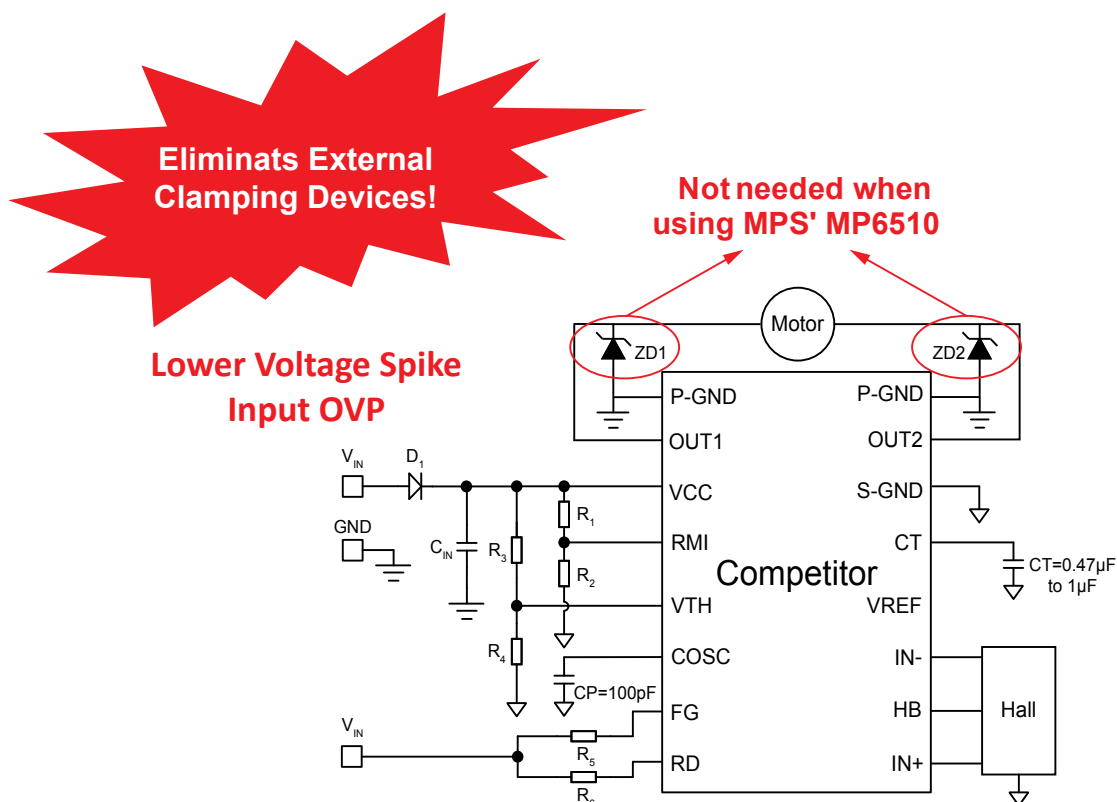


## Fan Drivers and Integrated BLDC Motor Drivers

| Part Number | Description                                                                        | Min Input (V) | Max Input (V) | Number of Half-Bridges | Output Current (A) | Hall Input | Other Features                                                                             | Status       |
|-------------|------------------------------------------------------------------------------------|---------------|---------------|------------------------|--------------------|------------|--------------------------------------------------------------------------------------------|--------------|
| MP6505      | 16V, 0.4A Single Phase BLDC Motor Driver                                           | 4.5           | 16            | 2                      | 0.4                | Yes        | Speed Indicator, Locked Rotor Protection                                                   | Released     |
| MP6510      | 16V, 0.6A Single Phase BLDC Motor Driver                                           | 4.5           | 16            | 2                      | 0.6                | Yes        | Speed Indicator, Locked Rotor Protection                                                   | Released     |
| MP6517      | 18V, 0.6A Single Phase BLDC Motor Driver with Hall Sensor and Full Programmability | 3             | 18            | 2                      | 0.6                | No         | Integrated Hall Sensor, Programmable Speed Curve, Locked Rotor Protection, Speed Indicator | Call Factory |
| MP9518      | 18V, 0.6A Single Phase BLDC Motor Driver with Hall Sensor                          | 3             | 18            | 2                      | 0.6                | No         | Integrated Hall Sensor, Speed Indicator, Locked Rotor Protection                           | Call Factory |
| MP6536      | 26V, 5A 3-Phase Power Stage                                                        | 5             | 26            | 3                      | 5.5                | No         | -                                                                                          | Released     |

## MPS Advantage

- Low on resistance significantly improves thermal performance
- Wide input range to support different applications
- Extensive protection functions increase system reliability
- No need for external clamping devices



## Product Highlights

# Position Sensors

As magnetic angle sensors are now used widely in position control, these sensors are expected to respond accurately and rapidly. Monolithic Power Systems' MagAlpha position sensor technology is an innovative solution, which does not involve complex calculation or feedback loops with long time constraints. It measures the angle directly and yields accurate rotor position instantaneously.

## Features

- 11.5-Bit Resolution Absolute Angle Encoder
- 500kHz Refresh Rate
- Ultra-Low Latency: 3 $\mu$ s
- Serial Interface for Data Readout and Setting
- Built-In Linearization for Side-Shaft Mounting
- Low Supply Current

## MPS Advantages

- High Resolution
- Fast Response
- Small Solutions Size
- Low Supply Current
- Side-Shaft Mounting Capability



| Part Number | Description                                                                                                   | Min Input (V) | Max Input (V) | Supply Current (mA) | Output Type | Resolution | Other Features      | Status   |
|-------------|---------------------------------------------------------------------------------------------------------------|---------------|---------------|---------------------|-------------|------------|---------------------|----------|
| MA100       | Angular Sensor for 3-Phase Motor Commutation with Side-Shaft Positioning Capability                           | 3             | 3.6           | 8.5                 | UVW         | 8          | Side-Shaft Mounting | Released |
| MA120       | Angular Sensor for 3-Phase BLDC Motor Commutation                                                             | 3             | 3.6           | 8.5                 | UVW         | 8          | -                   | Released |
| MA300       | Angular Sensor for 3-Phase BLDC Motor Commutation and Position Control with Side-Shaft Positioning Capability | 3             | 3.6           | 6.6                 | UVW ABZ     | 11.5       | Side-Shaft Mounting | Released |
| MA700       | Angular Sensor for Position Control with Side-Shaft Positioning Capability                                    | 3             | 3.6           | 6.6                 | ABZ         | 11.5       | Side-Shaft Mounting | Released |
| MA750       | Contactless Turning Knob Sensor                                                                               | 3             | 3.6           | 6.6                 | PWM         | 8          | -                   | Released |

## Video Link: MPS High Accuracy, Ultra-Fast Angle Sensing

<https://www.youtube.com/watch?t=13&v=uWW5L44WMQo>

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Scan QR code for more info

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