MOTOR DRIVERS

Motion Control Solutions

MonolithicPower.com

Quality Assurance & Reliability Commitment

The MPS Quality Assurance organization develops, coordinates, and champions strategic quality initiatives throughout MPS Inc., its foundries, and subcontractors. Its mission is to enable MPS to design, develop, manufacture, and deliver products to our customers with world-class quality and reliability that meet and exceed our customers' 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 Standards
- Standard Products Qualified per JEDEC and Military Standards
- Reliability Failure Rate <10FIT
- Product Quality Level <1.0ppm

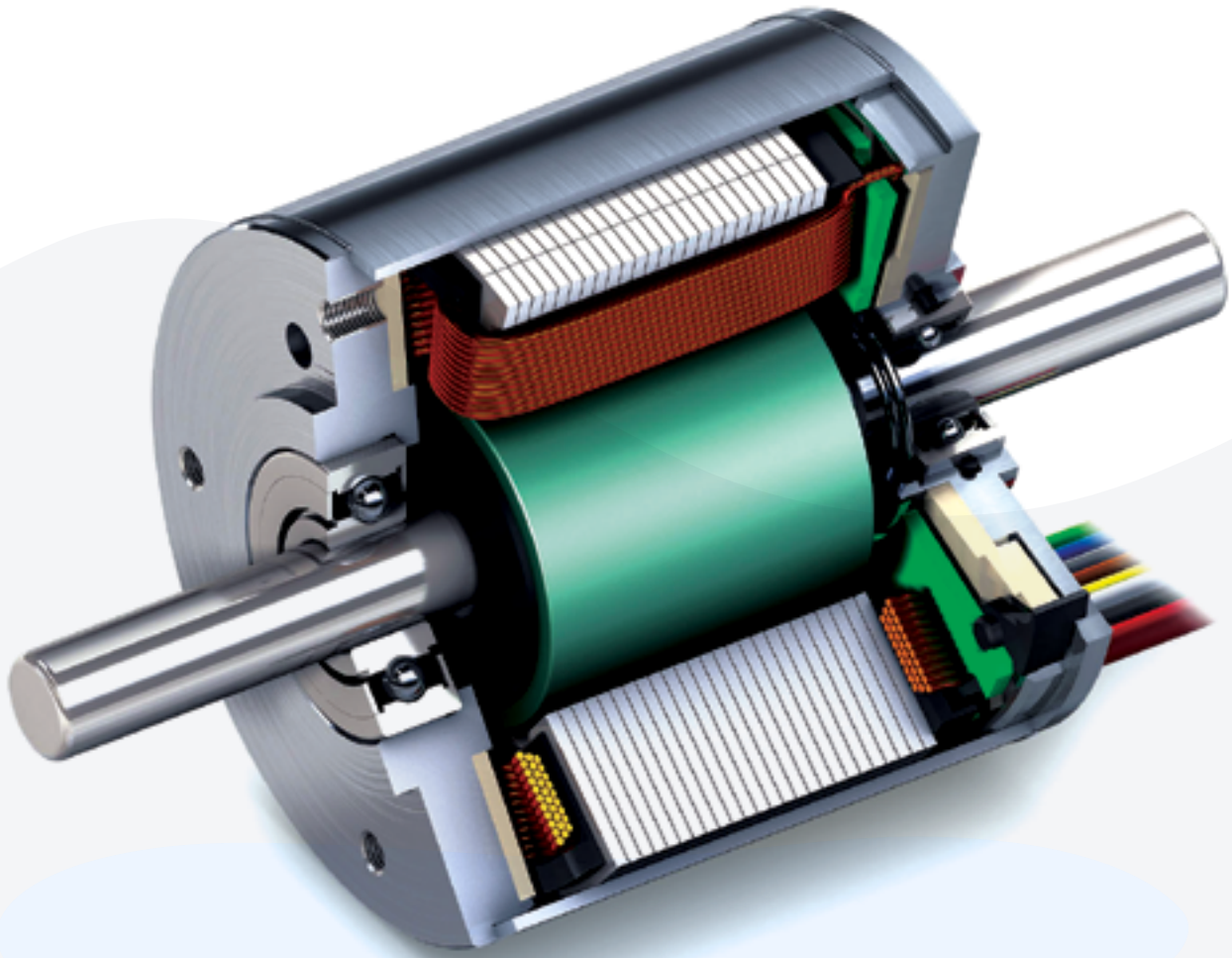
Quality Control and Monitoring:

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

IN THIS GUIDE

DRIVING THE MARKET IN RELIABILITY & EFFICIENCY

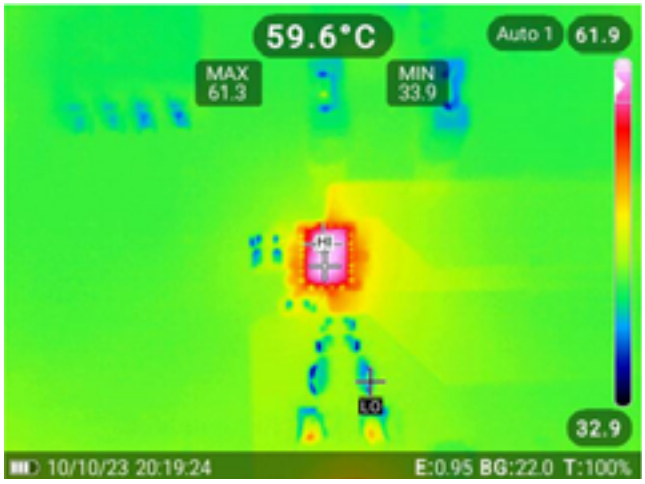
MPS motor driver solutions offer a wide range of high-performance, cost-effective, and reliable solutions for stepper motors, brushless DC (BLDC) motors, brushed DC motors, and solenoids. Using industry-leading semiconductor processes and advanced packaging technologies, MPS motor drivers achieve the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



SUPERIOR MOTOR DRIVER SOLUTIONS

Thermal Performance

Low Power Loss



Conditions: V_{IN} = 13.5V, I_{RMS} = 3A, f = 20kHz

MPS's proprietary Sixth-Generation BCD™ process technology is the key to its competitive advantage. Many conventional analog technologies are hindered 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, which must be managed to avoid damaging or reducing the overall performance and efficiency of the system. To address this, MPS has created superior motor driver solutions for multiple applications.

Integration & Packaging

Small Package Sizes

EVQ6612A-L-00A: **6.35cmx6.35cm**

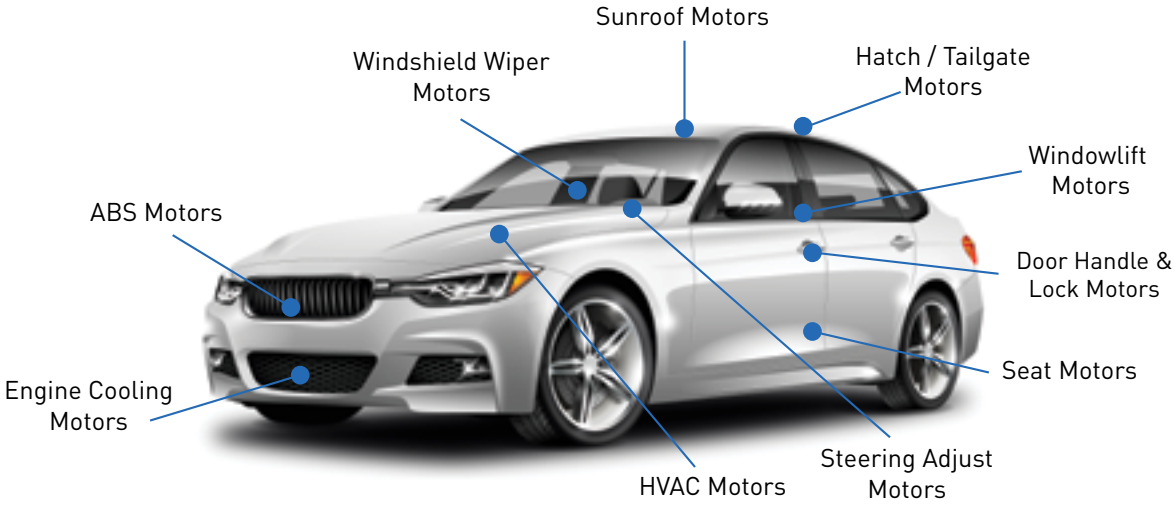
Multiple package options, including tiny flip-chip QFN packages, allow the implementation of motor driver systems in the smallest possible PCB area.

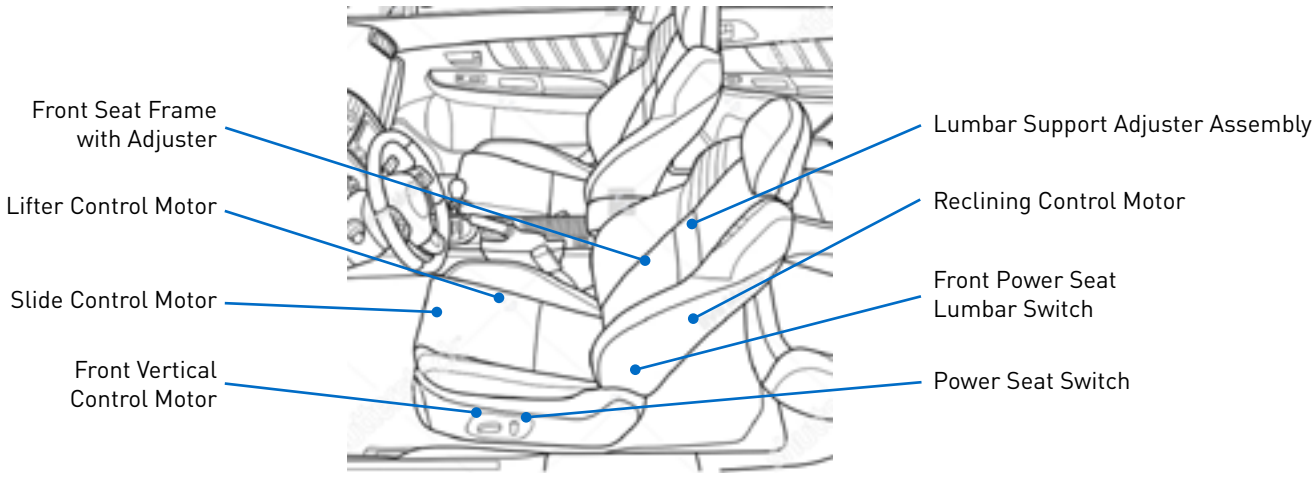
High integration, including the integration of features such as internal current sensing and slew rate control, allows for a dramatic reduction in the system component count. This lowers cost and increases reliability.

TYPICAL APPLICATIONS

AUTOMOTIVE

MPS offers motor drivers specifically tailored to automotive applications. From tiny brushed DC motors that direct airflow inside a climate control unit to body control like power liftgates, latches, and compact brushless DC (BLDC) motor drivers used in LiDAR, MPS has a motor driver solution for your automotive application.





ROBOTICS

MPS offers the smallest, most highly integrated drivers for brushless and stepper motors used in robotics. Our three-phase power stages can deliver up to 10A of current and pack an entire drive stage into a tiny, single-chip solution, enabling electronics to be integrated right at the motor. Our stepper motor drivers offer better current control and require less PCB area than other drivers on the market.

PRINTERS

From tiny, low-power point-of-sale (POS) printers all the way up to large office printers and copiers, MPS has motor drivers for all types of printers. The portfolio includes small brushed DC motor drivers, stepper motor drivers for small and large motors alike, and pre-drivers for large brushless motors, such as those used in copiers.

POWER TOOLS

All kinds of power tools are moving away from gasoline engines to rechargeable electric power. MPS's brushless motor drivers and pre-drivers power all kinds of tools, such as small power screwdrivers and electric lawn mowers. Our portfolio showcases a wide range of drivers up to 100V.

INDUSTRIAL

Many types of small- and medium-sized industrial equipment — such as textile machinery, 3D printers, and laser engravers — require stepper and brushless DC motors. MPS motors are well-suited for many of these applications.

STEPPER MOTOR DRIVERS

MPS stepper motor drivers are optimized to drive bipolar stepper motors used in printers, document scanners, robots, and other office and factory automation equipment. The MPS stepper motor driver family includes both low-voltage and high-voltage devices, as well as parts with or without indexer or translator logic. Several MPS parts feature internal current regulation with no shunt resistors, and feature the most accurate current control in the industry, providing microstepping capability.

Features

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

MPS Advantages

- Low On Resistance Significantly Improves Thermal Performance
- Smooth Torque and Accurate Stepping Control
- Extensive Protection Functions Increase System Reliability

STEPPER MOTOR DRIVERS | MOTOR DRIVERS

Part Number	V_{IN} (Min) (V)	V_{IN} (Max) (V)	I_{OUT} (Max) (A)	$R_{DS(ON)}$ (HS + LS) (mΩ)	Step Mode	Control Interface	Package	Notes
MP6506	2.7	15	0.5	500 + 500	1, ½	Parallel	QFN-16 (3x3)	Bipolar stepper
MP6507	2.7	15	0.7	500 + 500	1, ½	Parallel	TSSOP-16EP, QFN-16 (3x3), QFN-16 (4x4), TSSOP-16	Bipolar stepper
MP6508	2.7	18	1.2	250 + 250	1, ½	Parallel	TSSOP-16EP, QFN-16 (4x4)	Bipolar stepper
MP6508A	2.7	18	1.2	250 + 250	1, ½	Parallel	QFN-16 (3x3)	Bipolar stepper
MP6509	2.7	18	1.2	250 + 250	1, ½	Parallel	TSSOP-20EP	Bipolar stepper, current attenuation
MP6518	8	35	1.5	300 + 300	1, ½, ¼, ⅛,	Indexer	TSSOP-28EP	Bipolar stepper, microstepping
MP6520	8	32	1.5	300 + 300	1, ½, ¼, ⅛	Indexer	QFN-28 (4x5)	Stepper, integrated MOSFETs
MP6600	4.5	35	1.5	195 + 170	1, ½, ¼, ⅛	Indexer	QFN-24 (4x4)	Bipolar stepper, microstepping, internal current sense
MP6600L	4.5	35	1.5	195 + 170	1, ½, ¼, ⅛	Indexer	QFN-24 (4x4)	Bipolar stepper, microstepping, internal current sense, latch-off function
MP6504	8	32	2	220 + 220	1, ½, ¼, ⅛	Indexer	QFN-28 (4x5)	Bipolar stepper, microstepping
MP6501A	8	35	2.5	220 + 220	1, ½, ¼, ⅛	Indexer	TSSOP-28EP	Bipolar stepper, microstepping
MP6601	4.5	35	2.5	170 + 150	1, ½, ¼	Parallel	QFN-24 (5x5), TSSOP-28EP	Stepper, internal current sense
MP6500	4.5	35	2.5	195 + 170	1, ½, ¼, ⅛	Indexer	QFN-24 (5x5), TSSOP-28	Bipolar stepper, microstepping, internal current sense

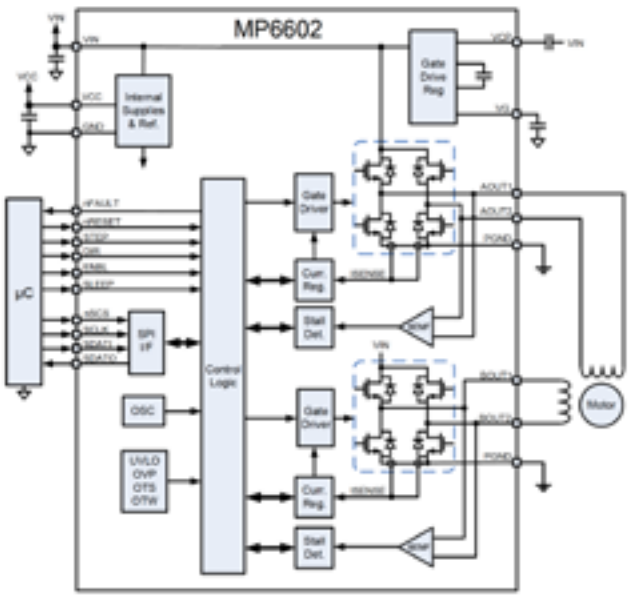
S - Sampling Product

STEPPER MOTOR DRIVERS | MOTOR DRIVERS

Part Number	V_{IN} (Min) (V)	V_{IN} (Max) (V)	I_{OUT} (Max) (A)	$R_{DS(ON)}$ (HS + LS) (mΩ)	Step Mode	Control Interface	Package	Notes
MP6500A	4.5	35	2.5	195 + 170	1, ½, ¼, ⅛	Indexer	TSSOP-28EP, QFN-24 (5x5)	Bipolar stepper, microstepping, internal current sense, programmable voltage
MP6500L	4.5	35	2.5	195 + 170	1, ½, ¼, ⅛	Indexer	QFN-24 (5x5)	Bipolar stepper, microstepping, internal current sense, latch-off function
MP6602	4.5	35	4	60 + 30	1, ½, ¼, ⅛, 1/16, 1/32	SPI, Indexer	QFN-25 (4x5)	Stepper, stall detection
S **MP6603**	8	55	6	70 + 50	1, ½, ¼, ⅛	Parallel, Indexer	QFN-25 (4x5)	Dual full-bridge driver, selectable input interface
MP6604A	4.5	45	2.5	150 + 150	-	IN/EN	QFN-28 (4x5), TSSOP-28EP	Simple dual H-bridge driver
MP6604B	4.5	45	2.5	150 + 150	-	PHASE/EN	QFN-28 (4x5), TSSOP-28EP	Simple dual H-bridge driver
MP6604C	4.5	45	2.5	150 + 150	-	HS/LS	QFN-28 (4x5), TSSOP-28EP	Simple dual H-bridge driver
MP6605C	4.5	60	1.5	LS: 350	-	I²C	QFN-24 (4x4)	4-channel low-side driver
MP6605D	4.5	60	1.5	LS: 350	-	Parallel	QFN-24 (4x4)	4-channel low-side driver
MP6605E	4.5	60	1.5	LS: 350	-	SPI	QFN-24 (4x4)	4-channel low-side driver
MP6606	4.5	60	0.75	LS: 700	-	SPI	TSSOP-20EP	8-channel low-side driver
S **MPQ6600L-AEC1**	4.5	35	1.5	195 + 170	1, ½, ¼, ⅛	Indexer	QFN-24 (4x4)	Bipolar stepper, microstepping, internal current sense, latch-off function, AEC-Q100 qualified

MP6602

Bipolar Stepper Motor Driver with Stall Detection & Back EMF Measurement



Features

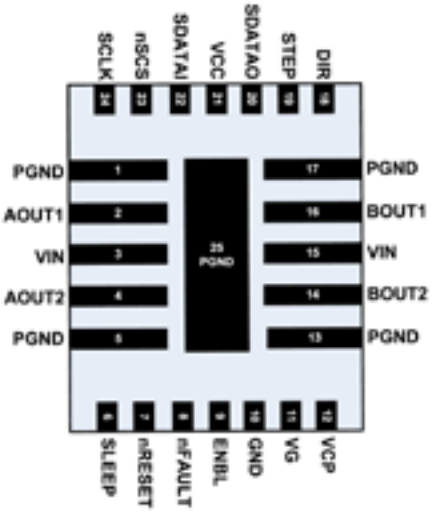
- 4.5V to 35V Operating Supply Voltage Range
  - 40V Absolute Maximum Voltage
- Two Internal Full-Bridge Drivers
- Up to 1/32-Step Microstepping
- Internal Current Sensing and Regulation
- Low On Resistance (HS = 60mΩ, LS = 30mΩ)
- Serial Control Interface
- Enable and Step Input Pins
- 3.3V and 5V Compatible Logic Supply
- Over-Current Protection (OCP)
- 4A Maximum Output Current
- Automatic Hold Current
- Automatic Current Decay
- Diagnostic Functions, Including:
  - Rotor Stall Detection
  - Back EMF Measurement
  - Over-Current Protection (OCP)
  - Open-Load Detection
  - Over-Voltage and Under-Voltage Protection (OVP and UVP, Respectively)
  - Thermal Warning and Shutdown
- Available in a Space-Saving QFN-25 (4mmx5mm) Package
- Fault Indication Output

Small Solution Size with Integrated Current Sensing

The MP6602 has the ability to measure the back EMF of the stepper motor. Logic in the MP6602 processes the digitized back EMF information, and can provide an indication of rotor stall. These features are configured using an SPI interface. The back EMF value can also be directly read via a microcontroller, allowing for the use of more advanced diagnostics like load torque measurement.

Low $R_{DS(ON)}$ and Internal Current Sensing

The MP6602 H-bridges' $R_{DS(ON)}$ is very low, which allows up to 4A of motor winding current with very little power loss. In addition, current measurement is internal, so no external current measurement shunt resistors are required. Available in a very small QFN-25 (4mmx5mm) package, the MP6602 is the smallest stepper motor solution currently on the market that is capable of this level of current.



BRUSHED DC MOTOR/SOLENOID DRIVERS

MPS H-bridge drivers are designed to drive brushed DC motors and solenoids in consumer appliances, toys, automotive, and industrial applications. Many different interfaces are supported, including SPI control, PWM interfaces, and separate high-side (HS) and low-side (LS) controls. This product family includes 1/2-H-bridge devices that can be used to regulate current in solenoids, as well as single and dual H-bridge parts to drive brushed DC motors of various sizes, from 2V to 60V and up to 5A. Some parts are also qualified for automotive use (AEC-Q100).

Features

- Integrated Half-/Full-Bridge Drivers
- Low On Resistance
- Internal Charge Pump
- Low Quiescent/Sleep Current
- Over-Current and Over-Temperature Protections (OCP and OTP, Respectively)
- Thermally Enhanced Packages

MPS Advantages

- Low On Resistance Significantly Improves Thermal Performance
- Extensive Protection Functions Increase System Reliability

BRUSHED DC MOTORS/SOLENOID DRIVERS | MOTOR DRIVERS

Part Number	V_{IN} (Min) (V)	V_{IN} (Max) (V)	# of Half-Bridges	I_{OUT} (Max) (A)	$R_{DS(ON)}$ (HS + LS) (mΩ)	Control Interface	Package	Notes
MP6610	4	55	1	3	100 + 120	EN/IN	TSOT23-8, SOIC-8	Half-bridge
MP8040	7.5	24	1	9	100	PWM	SOIC-8EP	H-bridge driver
S **MP1930**	9	18	1	10	11	HS/LS	QFN-26 (7x7)	Half-bridge, 18V to 75V V_{IN} for MOSFETs
MP6513L	2.5	5.5	2	0.6	500 + 500	IN1/IN2	TSOT23-6	Low-power H-bridge
MP6513	2.5	21	2	0.8	500 + 500	IN1/IN2	TSOT23-6	Simple H-bridge
MP6550	1.8	22	2	2	120 + 120	IN1/IN2	QFN-12 (2x2)	H-bridge
MP6614	5	35	2	2	280 + 220	IN1/IN2	SOIC-8EP	H-bridge
MP6515	5.4	35	2	2.8	250 + 250	PHASE/EN	QFN-20 (3x4), TSSOP-16EP	H-bridge motor driver
MP6516	5.4	35	2	2.8	250 + 250	EN/IN	TSSOP-16EP	Dual half-bridge driver
MP6522	5.4	35	2	3.2	250 + 250	IN1/IN2	QFN-24 (5x5)	Simple H-bridge motor driver
MP8046	7.5	28	2	5	165	PWM	TSSOP-20F	Full-bridge driver
MP6519	2.5	28	2	5	65 + 65	PWM	QFN-19 (3x3)	H-bridge current regulator
MP6551	2.5	14	2	5	15 + 12	EN/IN	QFN-14 (2.5x3)	Dual half-bridge driver
MP6619	5.4	28	2	5	65 + 65	IN1/IN2	QFN-19 (3x3)	H-bridge
MP6619L	2.5	28	2	5	65 + 65	IN1/IN2	QFN-19 (3x3)	H-bridge with external VCC and OCP_SET pin
MP6613	4.5	45	2	5	75 + 75	Prog	QFN-28 (4x5), TSSOP-28EP	Simple H-bridge with three prog. control modes
N **MP6612**	4	40	2	5	70 + 45	IN1/IN2	TSSOP-20EP	H-bridge with current sense
N **MP6612D**	4	40	2	5	70 + 45	ENBL/DIR	TSSOP-20EP	H-bridge with current sense
N **MP6615**	4.75	40	2	8	11 + 11	Prog	TQFN-26 (6x6)	H-bridge with 3 configurable input logics
MP6523	7	28	3	0.9	1100	SPI	QFN-24 (4x4)	Motor driver with serial input control

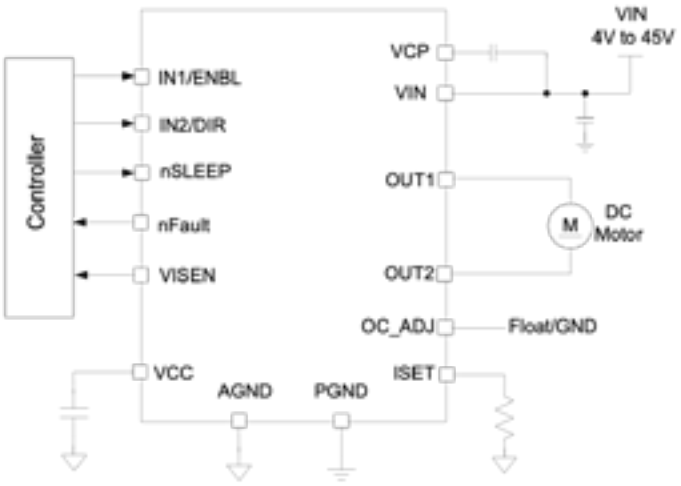
BRUSHED DC MOTOR/SOLENOID DRIVERS | MOTOR DRIVERS

Part Number	V_{IN} (Min) (V)	V_{IN} (Max) (V)	# of Half-Bridges	I_{OUT} (Max) (A)	$R_{DS(ON)}$ (HS + LS) (mΩ)	Control Interface	Package	Notes
MP6507	2.7	15	4	0.7	500 + 500	IN1/IN2	TSSOP-16EP, QFN-16 (3x3), QFN-16 (4x4)	Dual H-bridges
MP6508	2.7	18	4	1.2	250 + 250	IN1/IN2	TSSOP-16EP, QFN-16 (4x4)	Dual H-bridges
MP6508A	2.7	18	4	1.2	250 + 250	IN1/IN2	QFN-16 (3x3)	Dual H-bridges
MP6604A	4.5	45	4	2.5	150 + 150	EN/IN	QFN-28 (4x5), TSSOP-28EP	Simple dual H-bridge driver
MP6604B	4.5	45	4	2.5	150 + 150	PHASE/EN	QFN-28 (4x5), TSSOP-28EP	Simple dual H-bridge driver
MP6604C	4.5	45	4	2.5	150 + 150	HS/LS	QFN-28 (4x5), TSSOP-28EP	Simple dual H-bridge driver
MP8049S	5	26	4	5.5	140	PWM	QFN-40 (5x5)	Dual full-bridge driver
S **MP6603**	8	55	4	6	70 + 50	PWM	QFN-25 (4x5)	Dual full-bridge driver, selectable input interface
MP6526	7	28	6	0.9	1100	SPI	SOIC-28, QFN-24 (4x4), QFN-24 (5x5)	Serial input control
MP6527	5.5	40	10	0.8	1300	SPI	TSSOP-28EP	Serial input control
MPQ6610-AEC1	4	55	1	3	100 + 120	EN/IN	TSOT23-8, SOIC-8	Half-bridge, AEC-Q100 qualified
MPQ6614-AEC1	5	35	2	1.5	280 + 220	IN1/IN2	QFN-8 (2x3)	H-bridge DC motor driver, AEC-Q100 qualified
MPQ6519-AEC1	3	28	2	5	65 + 65	PWM	QFN-19 (4x4)	H-bridge current regulator, AEC-Q100 qualified
S **MPQ6619-AEC1**	2.7	28	2	5	65 + 65	IN1/IN2	QFN-19 (4x4)	H-bridge, AEC-Q100 qualified
S **MPQ6612A-AEC1**	4	40	2	5	63 + 40	IN1/IN2	QFN-18 (3x4)	H-bridge with current sense, AEC-Q100 qualified
S **MPQ6612A-D-AEC1**	4	40	2	5	63 + 40	ENBL/DIR	QFN-18 (3x4)	H-bridge with current sense, AEC-Q100 qualified
N **MPQ6615-AEC1**	4.75	40	2	8	11 + 11	Prog	TQFN-26 (6x6)	H-bridge with 3 configurable input logics, AEC-Q100 qualified
MPQ6523-AEC1	7	28	3	0.9	1100	SPI	QFN-24 (4x4)	Serial input control, AEC-Q100 qualified
MPQ6524-AEC1	7	28	4	0.9	1100	SPI	QFN-24 (4x4)	Serial input control, AEC-Q100 qualified
MPQ6526-AEC1	7	28	6	0.9	1100	SPI	QFN-24 (4x4), QFN-24 (5x5)	Serial input control, AEC-Q100 qualified
MPQ6626-AEC1	5.5	40	6	0.8	1300	SPI	TSSOP-28EP	Serial input control, AEC-Q100 qualified
MPQ6628-AEC1	5.5	40	8	0.8	1300	SPI	TSSOP-28EP	Serial input control, AEC-Q100 qualified
MPQ6527-AEC1	5.5	40	10	0.8	1300	SPI	TSSOP-28EP	Serial input control, AEC-Q100 qualified

N - New Product S - Sampling Product

MP6612/MP6612D/MPQ6612A/MPQ6612A-D

45V, 5A, H-Bridge DC Motor Drivers with Current Sense



Features

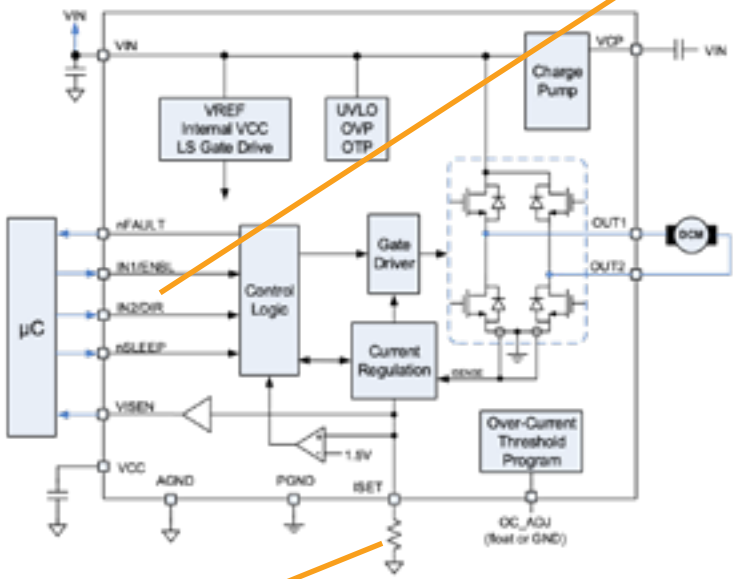
- Wide 4V to 45V Operating Input Voltage Range
- Internal Full H-Bridge Driver Supports 100% Duty Cycle with Internal Charge Pump
- Current Sense: <10% Accuracy
- 5A Continuous Driver Current
- Low On Resistance
- Cycle-by-Cycle Current Regulation/Limit
- IN1/IN2 and ENBL/DIR Logic Inputs
- Low I_Q (30μA) Brake Mode
- Configurable Current Limit and Protection
- Fault Indicator for Over-Current Protection (OCP) and Over-Temperature Protection (OTP)

MP6612 Family Introduction

Part Number	Input Interface	$R_{DS(ON)}$ (HS + LS) (mΩ)	Package (mm)	Notes
MP6612	IN1/IN2	70 + 45	TSSOP-20EP	-
MP6612D	ENBL/DIR	70 + 45	TSSOP-20EP	-
MPQ6612A	IN1/IN2	63 + 40	QFN-18 (3x4)	AEC-Q100 qualified
MPQ6612A-D	ENBL/DIR	63 + 40	QFN-18 (3x4)	AEC-Q100 qualified

Current Limit and Brake Mode

If IN1 = IN2 = H or ENBL = L for ~1ms, then the part enters low-I_Q brake mode



To set the output current, I_{OUT} (A) = 15 / R_{ISET} (kΩ)

Internal current-sense output waveform (V_{ISEN}) scaled by R_{ISET}

BRUSHLESS DC PRE-DRIVERS

MPS brushless DC (BLDC) motor pre-drivers are designed to drive BLDC motors and permanent magnet synchronous motors (PMSMs) used in robotics, industrial, automotive, and consumer applications, such as power tools, fans, pumps, and e-bikes. These MPS parts can operate from 5V to 100V, and can spin motors larger than 1,000W. Unique features include boosted gate drive supplies, configurable dead time, full protection features, and 100% duty cycle capability. Single-channel and three-channel parts are available with optional features like built-in buck regulators, current-sense amplifiers, and Hall commutation logic. Some parts are qualified for automotive use (AEC-Q100).

Features

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

MPS Advantages

- Small Package Option Significantly Reduces PCB Space
- Wide Input Range to Support Different Applications
- Extensive Protection Functions Increase System Reliability

BRUSHLESS DC PRE-DRIVERS | MOTOR DRIVERS

Part Number	Supply Voltage (Min) (V)	Supply Voltage (Max) (V)	V_{SW} (Max) (V)	# of Half-Bridges	I_{SINK} / I_{SOURCE} (A)	Control Interface	Package	Notes
(S) **MP6590A**	7.5	80	80	-	1	ENBL/ON	QFN-11 (3x4)	High-side MOSFET driver
MP1921A	9	18	100	1	2.5/1.5	INH/INL	SOIC-8EP, QFN-8 (3x3), QFN-9 (3x3), QFN-10 (4x4)	Half-bridge gate driver
MP1921B	9	18	100	1	2.5/1.5	INH/INL	QFN-10 (3x3)	Half-bridge gate driver
MP1924A	8	15	100	1	4.5/3	INH/INL	QFN-10 (4x4), SOIC-8, SOIC-8E	Half-bridge gate driver
MP1925	8	15	100	1	4.5/3	INH/INL	QFN-8 (4x4)	Half-bridge gate driver
MP1922	5	15	100	1	4/3	INH/INL	QFN-22 (4x5)	Half-bridge pre-driver, current-sense amplifier, slew rate control
MP1923	5	17	100	1	8/7	INH/INL	QFN-8 (4x4), QFN-10 (4x4), SOIC-8	High-frequency half-bridge gate driver
MP6528	5	60	60	2	1/0.8	EN/PWM	QFN-28 (4x4)	H-bridge pre-driver
MP6530	5	60	60	3	1/0.8	EN/PWM	QFN-28 (4x4), TSSOP-28EP	3-phase pre-driver

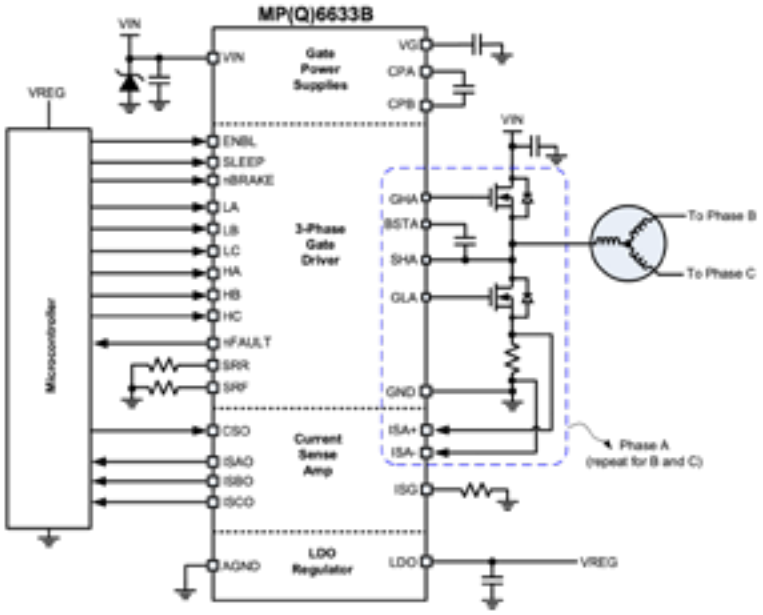
(N) - New Product (S) - Sampling Product

BRUSHLESS DC PRE-DRIVERS | MOTOR DRIVERS

	Part Number	Supply Voltage (Min) (V)	Supply Voltage (Max) (V)	V_{SW} (Max) (V)	# of Half-Bridges	I_{SINK} /I_{SOURCE} (A)	Control Interface	Package	Notes
	MP6531A	5	60	60	3	1/0.8	HS/LS	QFN-28 (4x4), TSSOP-28EP	3-phase pre-driver
	MP6532	5	60	60	3	1/0.8	PWM/DIR, 3 Hall Inputs	QFN-28 (4x4), TSSOP-28EP	3-phase pre-driver with commutation logic
	MP6534	5	55	55	3	1/0.8	EN/PWM	QFN-40 (5x5)	3-phase pre-driver with buck regulator
	MP6535	5	55	55	3	1/0.8	PWM/DIR, 3 Hall Inputs	QFN-40 (5x5)	3-phase pre-driver with commutation logic and buck regulator
S	**MP6633A**	5	50	-	3	1/0.8	HS/LS	QFN-34 (4x5)	3-phase pre-driver with voltage regulator and single-channel sense amplifier
S	**MP6633B**	5	50	-	3	1/0.8	HS/LS	QFN-34 (4x5)	3-phase pre-driver with voltage regulator and 3-channel sense amplifier
	MP6537	8	100	100	3	1/0.8	EN/PWM	QFN-28 (4x5)	3-phase pre-driver
	MP6538	8	100	100	3	1/0.8	PWM/DIR, 3 Hall Inputs	QFN-28 (4x5)	3-phase pre-driver with Hall commutation logic
	MP6539	8	100	100	3	1/0.8	HS/LS	QFN-28 (4x5), TSSOP-28EP	3-phase pre-driver with internal LDO, prog. OCP
	MP6539B	8.5	14	100	3	1/0.8	HS/LS	QFN-28 (4x5), TSSOP-28EP	3-phase pre-driver
S	**MP6539C**	8.5	14	80	3	1/0.8	HS/LS	QFN-28 (4x5)	3-phase pre-driver
S	**MPQ6590A-AEC1**	7.5	80	80	-	1	ENBL/ON	QFN-11 (3x4)	High-side MOSFET driver
	MPQ1922-AEC1	5	15	100	1	4/3	INH/INL	QFN-22 (4x5)	Half-bridge pre-driver, current-sense amplifier, slew rate control
	MPQ1923-AEC1	5	17	100	1	8/7	INH/INL	QFN-8 (4x4), QFN-10 (4x4)	High-frequency half-bridge gate driver
	MPQ6528-AEC1	5	60	60	2	1/0.8	EN/PWM	QFN-28 (4x5)	H-bridge pre-driver with PWM/EN inputs, AEC-Q100 qualified
N	**MPQ6641-AEC1**	6	40	-	2	1/0.8	EN/IN, SPI	QFN-32 (5x5)	H-bridge pre-driver with SPI, AEC-Q100 qualified
	MPQ6531-AEC1	5	60	60	3	1/0.8	HS/LS	QFN-28 (4x5)	3-phase pre-driver, AEC-Q100 qualified
	MPQ6532-AEC1	5	60	60	3	1/0.8	PWM/DIR, 3 Hall Inputs	QFN-28 (4x5)	3-phase pre-driver with commutation logic, AEC-Q100 qualified
	MPQ6533-AEC1	6	40	-	3	1/0.8	EN/IN, SPI	QFN-32 (5x5)	3-channel pre-driver with SPI interface, AEC-Q100 qualified
S	**MPQ6539-AEC1**	8	80	80	3	1/0.8	HS/LS	QFN-28 (4x5)	3-phase pre-driver with internal LDO, prog. OCP, AEC-Q100 qualified
S	**MPQ6539C-AEC1**	8.5	14	80	3	1/0.8	HS/LS	QFN-28 (4x5)	3-phase pre-driver, AEC-Q100 qualified

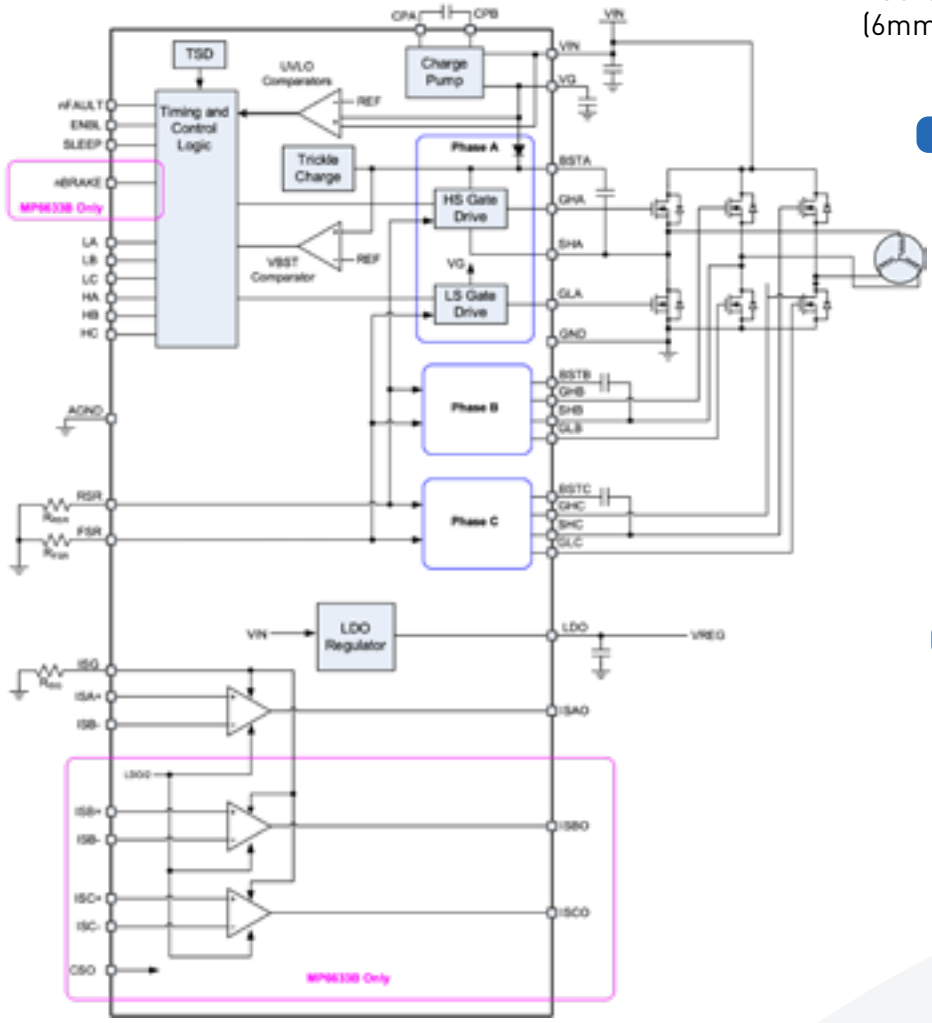
MP6633A/MP6633B

50V, 3-Phase BLDC Pre-Drivers

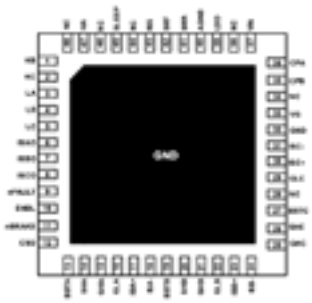


Features

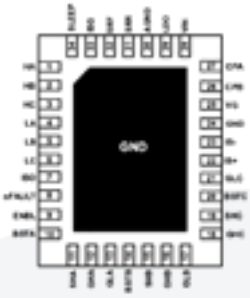
- 5V to 50V Input Voltage Range
- 1.5A Sink Gate Drive Current
- Bootstrap Gate Driver with Trickle-Charge Circuit Supports 100% Duty Cycle Operation
- Integrated 50mA, 2% Accuracy LDO Voltage Regulator
- Configurable Slew Rate
- Global Enable Input for Safety Shutdown
- Single-Channel Current-Sense Amplifier (MP6633A)
- Three-Channel Current-Sense Amplifier (MP6633B)
- Protection Features:
  - Automatic Dead Time Generation
  - Over-Temperature Protection (OTP) and Under-Voltage Lockout (UVLO)
  - Fault Indication Output
- Available in a QFN-34 (4mmx5mm) Package (MP6633A) or a QFN-48 (6mmx6mm) Package (MP6633B)



MPQ6633B – QFN-48 (6mmx6mm)



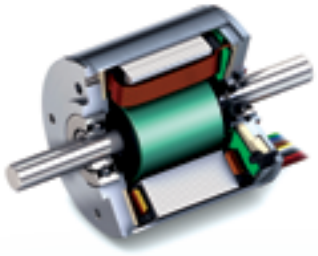
MP6633A – QFN-34 (4mmx5mm)



S - Sampling Product

INTEGRATED BLDC MOTOR DRIVERS

These integrated BLDC motor drivers use MPS's unique IC process technology, which allows for the integration of large, low-$R_{DS(ON)}$ power MOSFETs into ICs to directly drive BLDC motors, enabling the smallest single-chip BLDC driver solutions available on the market. MPS's integrated BLDC motor drivers are designed to drive BLDC motors and permanent magnet synchronous motors (PMSMs) used in robotics, industrial, automotive, and consumer applications, such as power tools, fans, pumps, and e-bikes. MPS solutions offer a variety of selectable input modes, such as PWM/ENBL inputs, HS/LS inputs, Hall signal inputs, and more. They also feature 100% duty cycle operation, robust protection functions, and an integrated current-sense amplifier. Some parts are qualified for automotive use (AEC-Q100).



MPS Advantages

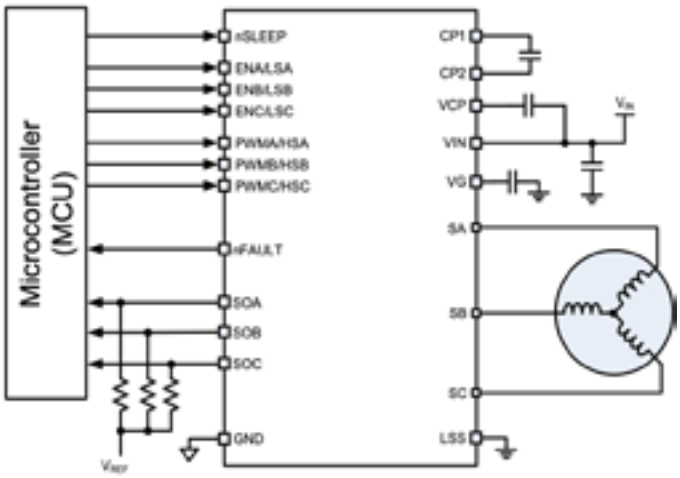
- Low On Resistance Significantly Improves Thermal Performance
- Wide Input Range to Support Different Applications
- Extensive Protection Functions Increase System Reliability
- Integrated Current-Sense Amplifier Reduces BOM Cost

INTEGRATED BLDC MOTOR DRIVERS | MOTOR DRIVERS

Part Number	V_{IN} (Min) (V)	V_{IN} (Max) (V)	# of Half-Bridges	I_{OUT} (Max) (A)	$R_{DS(ON)}$ (HS + LS) (mΩ)	Control Interface	Package	Notes
MP6543C	3	22	3	1.2	110 + 110	ENBL/PWM	QFN-24 (3x4)	3-phase power stage with 3 current-sense amplifers
MP6543	3	12	3	2	110 + 110	ENBL/PWM	QFN-24 (3x4)	3-phase power stage with 3 current-sense amplifers
MP6543A	3	12	3	2	110 + 110	HS/LS	QFN-24 (3x4)	3-phase power stage with 3 current-sense amplifers
MP6543B	3	12	3	2	110 + 110	PWM/DIR, 3 Hall Inputs	QFN-24 (3x4)	3-phase power stage with 3 current-sense amplifers
MP6543H	3	22	3	2	110 + 110	ENBL/PWM	QFN-24 (3x4)	3-phase power stage with 3 current-sense amplifers
MP6543H-A	3	22	3	2	110 + 110	HS/LS	QFN-24 (3x4)	3-phase power stage with 3 current-sense amplifers
MP6543H-B	3	22	3	2	110 + 110	PWM/DIR, 3 Hall Inputs	QFN-24 (3x4)	3-phase power stage with 3 current-sense amplifers
MP6545	4.5	45	3	2.5	150 + 150	HS/LS	QFN-28 (4x5), TSSOP-28EP	3-channel power stage
MP6545A	4.5	45	3	2.5	150 + 150	HS/LS	QFN-28 (4x5), TSSOP-28EP	3-channel power stage, separate GND for A/B/C phases
MP6546	3.5	22	3	3	150 + 150	I²C Hall, Angle Sensor Inputs	QFN-20 (3x4)	3-phase power stage,1MHz I²C Interface
MP6536	5	26	3	5.5	140 + 140	ENBL/PWM	QFN-40 (5x5)	3-channel half-bridge driver
MP6540	5.5	35	3	3	50 + 50	ENBL/PWM	QFN-26 (5x5)	3-phase power stage with 3 current-sense amplifers
MP6540A	5.5	35	3	3	50 + 50	HS/LS	QFN-26 (5x5)	3-phase power stage with 3 current-sense amplifers
MP6540H	5.5	50	3	5	45 + 45	ENBL/PWM	QFN-26 (5x5)	3-phase power stage with 3 current-sense amplifers
MP6540HA	5.5	50	3	5	45 + 45	HS/LS	QFN-26 (5x5)	3-phase power stage with 3 current-sense amplifers
MP6541	4.75	40	3	8	15 + 15	ENBL/PWM	TQFN-26 (6x6)	3-phase power stage with 3 current-sense amplifers
MP6541A	4.75	40	3	8	15 + 15	HS/LS	TQFN-26 (6x6)	3-phase power stage with 3 current-sense amplifers
S **MPQ6547-AEC1**	4	30	3	1.5	60 + 50	PWM	QFN-18 (3x4)	3-phase power stage
MPQ6541-AEC1	4.75	40	3	8	15 + 15	ENBL/PWM	TQFN-26 (6x6)	3-phase power stage with 3 current-sense amplifiers, AEC-Q100 qualified
MPQ6541A-AEC1	4.75	40	3	8	15 + 15	HS/LS	TQFN-26 (6x6)	3-phase power stage with 3 current-sense amplifiers, AEC-Q100 qualified

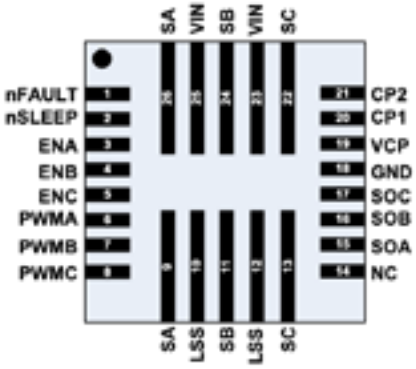
MP6541/MP6541A/MPQ6541/MPQ6541

40V, 8A, Three-Phase Power Stages

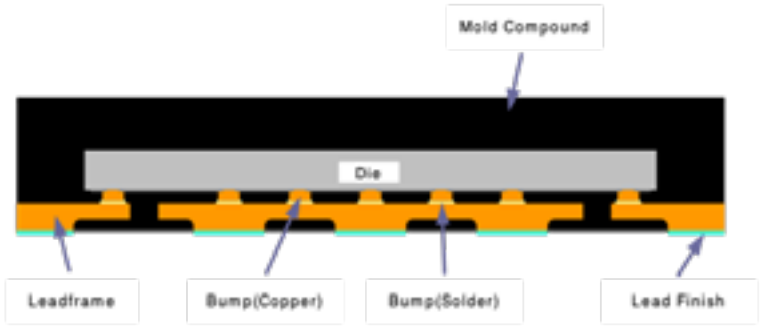


Features

- 4.75V to 40V Operating Supply Voltage
- Three Integrated Half-Bridge Drivers
- 8A of Continuous Output Current (I_{OUT})
- MOSFET On Resistance: 15mΩ per FET
- MP6541 & MPQ6541: PWM/ENBL Inputs, MP6541A & MPQ6541A: HS/LS Inputs
- Internal Charge Pump Supports 100% Duty Cycle Operation
- Automatic Synchronous Rectification
- Under-Voltage Lockout (UVLO) and Over -Voltage Protection (OVP)
- Thermal Shutdown Protection and Over -Current Protection (OCP)
- Integrated, Bidirectional Current-Sense Amplifiers
- Available in a TQFN-26 (6mmx6mm) Package
- The MPQ6541 & MPQ6541A Are Available in AEC-Q100 Grade 1



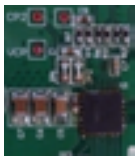
TQFN-26 (6mmx6mm)



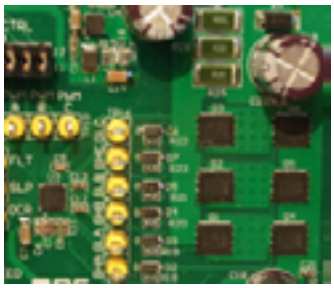
Mesh Connect™ (No Wire Bond)

MPQ6541 Size Comparison

The MPQ6541 circuit can be 90% smaller than a pre-driver plus MOSFET solution

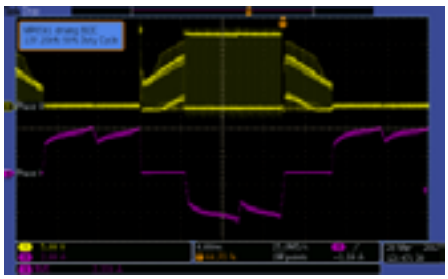


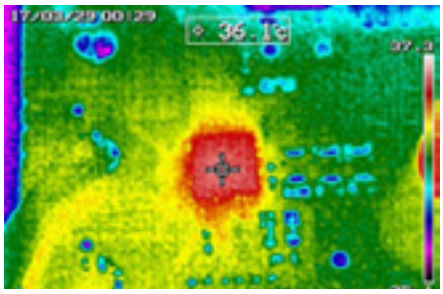
MPQ6541: 15mmx10mm



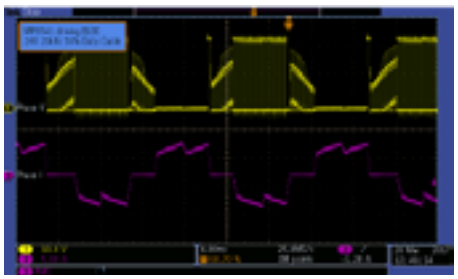
Pre-Driver plus 6 MOSFETs: 50mmx30mm

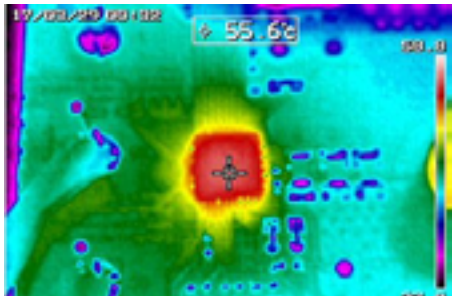
MPQ6541A Thermal Test Data



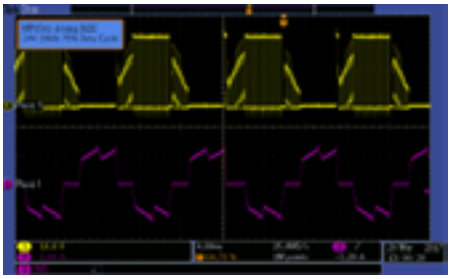


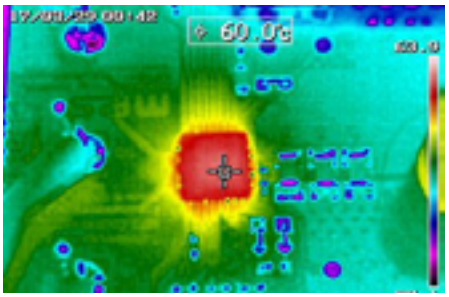
13V, 20kHz, 50% DC, 2.8A peak, 14°C temperature rise





24V, 20kHz, 50% DC, 5A peak, 33°C temperature rise





24V, 20kHz, 75% DC, 6A peak, 38°C temperature rise

BRUSHLESS DC COOLING FAN DRIVERS

MPS fan drivers are designed to drive consumer fans, industrial fans, automotive fans, notebook fans, PC fans, and more. These products include single-phase and three-phase drivers. Sine-wave control functionality can be optionally selected to meet different application scenarios. MPS fan drivers feature highly integrated, digital programming and open-/closed-loop speed control, as well as proprietary packaging and wafer process technology. Together, these advantages simplify design and minimize BOM for system applications. Some parts are qualified for automotive use (AEC-Q100).

MPS Advantages

- Integrated MOSFETs and Hall Sensor Minimize Solution Size
- Digital Programming Capability Simplifies Design
- Proprietary Packaging Technology Improves Thermal Performance
- Extensive Protection Functions Enhance System Reliability

FAN DRIVERS | MOTOR DRIVERS

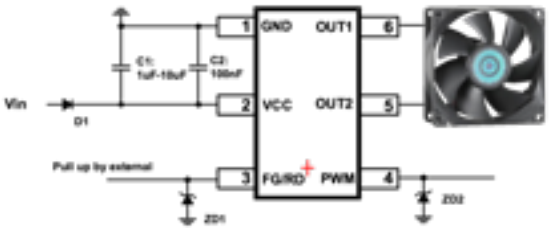
Part Number	V_{IN} (Min) (V)	V_{IN} (Max) (V)	# of Half-Bridges	I_{OUT} (Max) (A)	$R_{DS(ON)}$ (HS + LS) (mΩ)	Hall Sensor	Package	Notes
MP6505	4.5	16	2	0.4	600	External	TSSOP-16EP	Single-phase BLDC
MP6510	4.5	16	2	1.2	600	External	TSSOP-16EP	Single-phase BLDC
MP6517	3.3	18	2	1.2	850	Integrated	TSOT23-6, TSOT23-6-SL	Single-phase BLDC, prog. speed curve, open-loop control
MP6517A	3.3	16	2	2	850	Integrated	TSOT23-6, TSOT23-6-SL	Single-phase BLDC, prog. speed curve, open-loop control
MP6517B	3.3	16	2	2	850	Integrated	TSOT23-6-L, TSOT23-6-R, TSOT23-6-SL, TSOT23-6-RSL	Single-phase BLDC, prog. speed curve, open-loop control
MP6650	3.3	18	2	2	850	Integrated	TSOT23-6-L, TSOT23-6-R, TSOT23-6-SL, TSOT23-6-RSL	Single-phase BLDC, open-loop speed control
MP9517	3.3	18	2	2	850	Integrated	TSOT23-6-L, TSOT23-6-SL	Single-phase BLDC, open-loop speed control
MP9518	3.3	18	2	1.2	850	Integrated	TSOT23-6, TSOT23-6-SL	Single-phase BLDC, open-loop speed control
MP6652	3	18	2	1.3	850	Integrated	TSOT23-6-L, TSOT23-6-SL	Single-phase BLDC, prog. speed curve, open-loop control
MP6652A	3	18	2	1	850	Integrated	TSOT23-6-L, TSOT23-6-SL	ESD enhanced
S **MP6655**	3.5	18	2	2.5	350	Integrated	TSOT23-6-L, TSOT23-6-SL	Single-phase BLDC, prog. speed curve, open-/closed-loop control
S **MP6653**	5.5	35	2	1.2	960	Integrated	TSOT23-6-L, TSOT23-6-SL	Single-phase BLDC, prog. speed curve, open-/closed-loop control
MP6616	3.3	18	2	4	100	Integrated	QFN-10 (2x3)	Single-phase BLDC, prog. speed curve, open-/closed-loop control
MP6616A	3.3	18	2	4	100	Integrated	QFN-10 (2x3)	I_{STB} ≤ 0.5mA compared to the MP6616
S **MP6616B**	3.3	18	2	4	100	Integrated	QFN-10 (2x3)	ESD enhanced
MP6651	3.3	18	2	4	QFN: 100, SOIC: 215	Integrated	QFN-10 (2x3), SOIC-8SL	Single-phase BLDC, prog. speed curve, open-loop control
S **MP6617**	3.3	18	2	6	60	Integrated	QFN-10 (2.5x3)	Single-phase BLDC, prog. speed curve, open-/closed-loop control
MP6630	2	5.5	3	1.4	800	Integrated	UTQFN-8 (2x3)	3-phase BLDC, prog. speed curve, open-loop control
MP6630H	2	16	3	1.4	800	Integrated	UTQFN-8 (2x3)	3-phase BLDC, prog. speed curve, open-loop control
MP6631	3.6	24	3	3	160	External	QFN-26 (3x4)	3-phase BLDC, prog. speed curve, open-/closed-loop control
MP6631H	3.6	35	3	3	160	External	QFN-26 (3x4)	3-phase BLDC, prog. speed curve, open-/closed-loop control
S **MP6631A**	3.6	35	3	3	160	External	QFN-26 (3x4)	FG output function at the align stage, based on the MP6631H
S **MP6631B**	3.6	35	3	3	160	External	QFN-26 (3x4)	Minimum soft-start time less than 0.5s, based on the MP6631H
S **MP6637**	2.5	5.5	3	1	350	Sensorless	SOT583	3-phase BLDC, open-loop speed control
S **MP6636**	3.3	18	3	4	190	Sensorless	SOIC-8EP, TQFN-10 (4x4)	3-phase BLDC, prog. speed curve, open-/closed-loop control
N **MP6632A**	6	50	3	External FETs	External FETs	External	QFN-32 (4x4)	3-phase BLDC, prog. speed curve, open-/closed-loop control, trapezoid drive
N **MP6632**	6	50	3	External FETs	External FETs	External	QFN-32 (4x4)	3-phase BLDC, prog. speed curve, open-/closed-loop control, sine drive

N - New Product S - Sampling Product

Part Number	V_{IN} (Min) (V)	V_{IN} (Max) (V)	# of Half-Bridges	I_{OUT} (Max) (A)	$R_{DS(ON)}$ (HS + LS) (mΩ)	Hall Sensor	Package	Notes
S **MP6635**	6	35	3	External FETs	External FETs	Sensorless	QFN-28 (5x5)	3-phase BLDC, prog. speed curve, open-/closed-loop control
MPQ6517B-AEC1	3.3	16	2	2	850	Integrated	TSOT23-6, TSOT23-6-SL	3-phase BLDC, prog. speed curve, open-loop control, AEC-Q100 qualified
S **MPQ6653-AEC1**	5.5	35	2	1.2	960	Integrated	TSOT23-6, TSOT23-6-SL	Single-phase BLDC, prog. speed curve, open-/closed-loop control, AEC-Q100 qualified
S **MPQ6632-AEC1**	6	50	3	External FETs	External FETs	External	QFN-32 (4x4)	3-phase BLDC, prog. speed curve, open-/closed-loop control, AEC-Q100 qualified
S **MPQ6635-AEC1**	6	35	3	External FETs	External FETs	Sensorless	QFN-28 (5x5)	3-phase BLDC, prog. speed curve, open-/closed-loop control, AEC-Q100 qualified

MPQ6653

35V, 1-Phase BLDC Fan Driver with Integrated Hall Sensor, AEC-Q100 Qualified

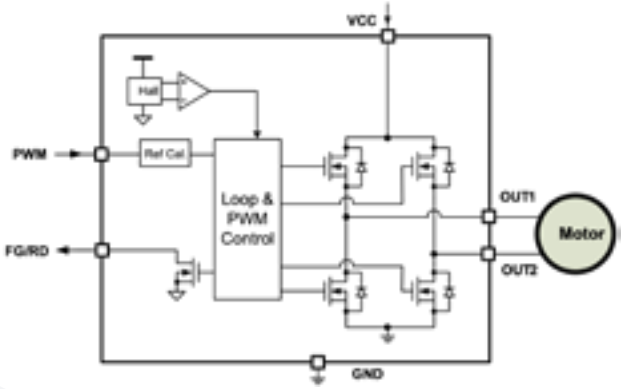


Features

- 5.5V to 35V Input Voltage (V_{IN}), Up to 1.2A Configurable Current Limit
- Embedded Hall Sensor
- Integrated Power MOSFETs: Total 960mΩ (HS + LS)
- Sinusoid or Linear Phase Commutation
- Configurable Speed Curve (4 Points)
- Speed Indicator (FG) or Rotor Lock Indicator (RD) Output
- Open-Loop or Closed-Loop Speed Control
- Configurable Soft-Start Time
- Configurable Hall Leading/Lag Angle
- 50Hz to 100kHz PWM Input or DC Input
- Fixed 24kHz Output Switching Frequency (f_{SW})
- Protection Features:
  - Locked-Rotor Protection (LRP), Over-Voltage Protection (OVP), Under-Voltage Lockout (UVLO), Over-Current Protection (OCP), Short-Circuit Protection (SCP), Over-Temperature Protection (OTP), and Automatic Recovery
  - Available in AEC-Q100 Grade 1
  - Available in TSOT23-6 Package or TQFN-6 (2mmx3mm) Wettable Flank Package

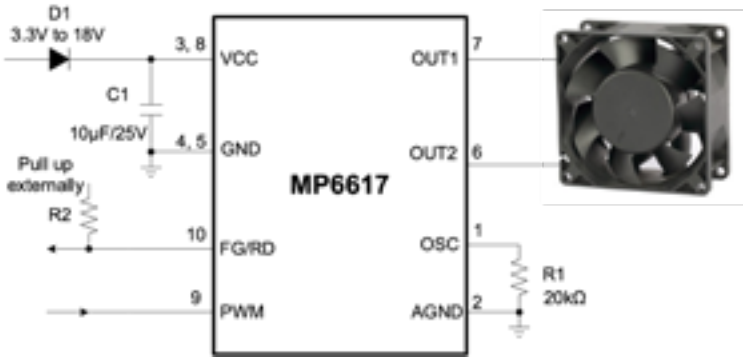
All-in-One, Single-Phase BLDC Fan Driver for Automotive Applications and Industrial Cooling

Small Size, Simple External Components



MP6617

18V, 6A Peak, Single-Phase BLDC Fan Driver with Integrated Hall Sensor and MOSFETs

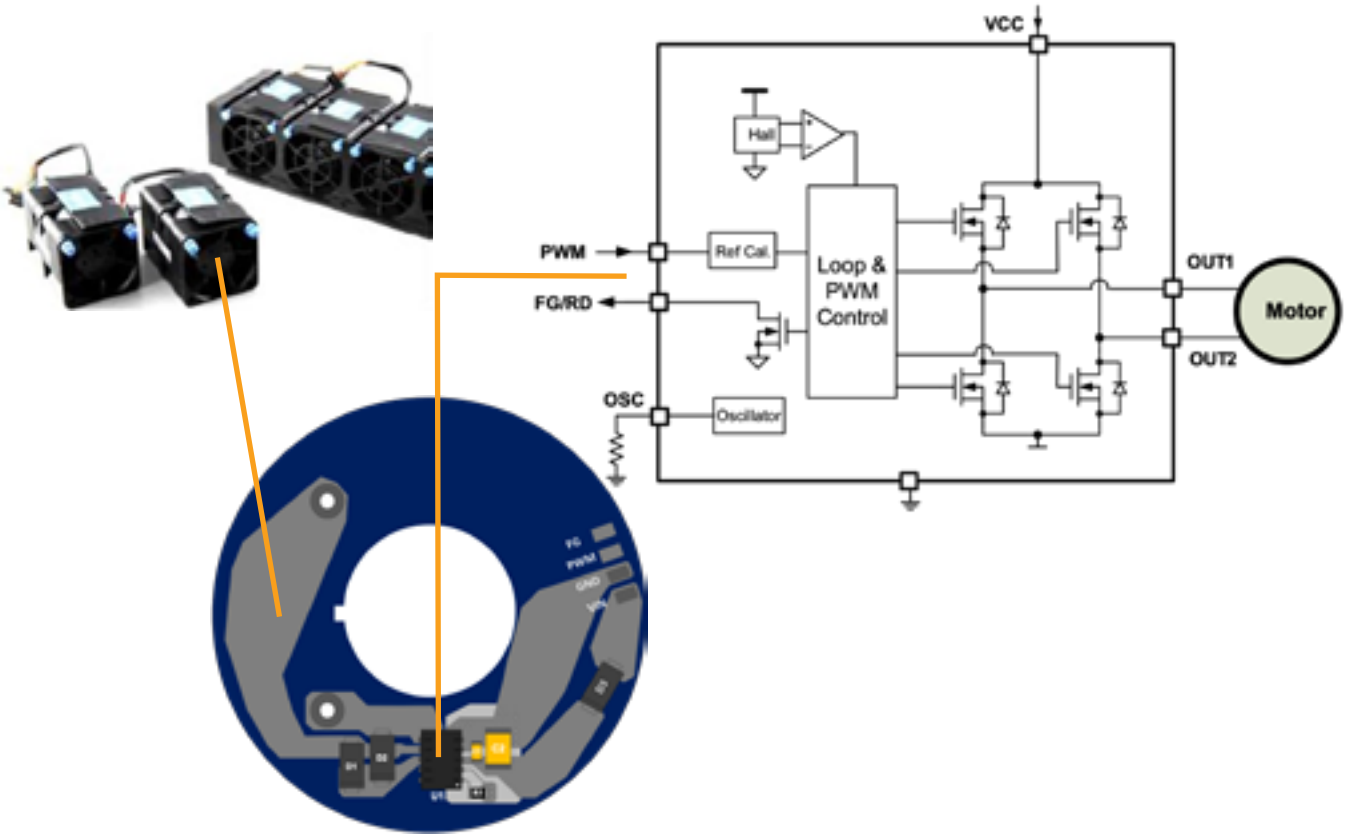


Features

- 3.3V to 18V Input Voltage (V_{IN}), Up to 6A Configurable Current Limit
- On-Chip Hall Sensor
- MOSFET On Resistance: Total 64mΩ (HS + LS)
- Configurable Speed Curve (6 Points)
- Selectable Open-Loop or Closed-Loop Speed Control
- Soft Start
- Power-Save Mode (IST ≤ 50µA)
- Selectable Speed Indicator (FG) and Rotor Lock Indicator (RD) Output
- 60Hz to 100kHz PWM Input
- Fixed 27kHz Output Switching Frequency (f_{SW})
- Protection Features:
  - Rotor Deadlock (RD) Protection, Short-Circuit Protection (SCP), Over-Voltage Protection (OVP), Under-Voltage Lockout (UVLO), Over-Current Protection (OCP), Over-Temperature Protection (OTP), and Automatic Recovery
  - Available in a QFN-10 (2.5mmx3mm) Package

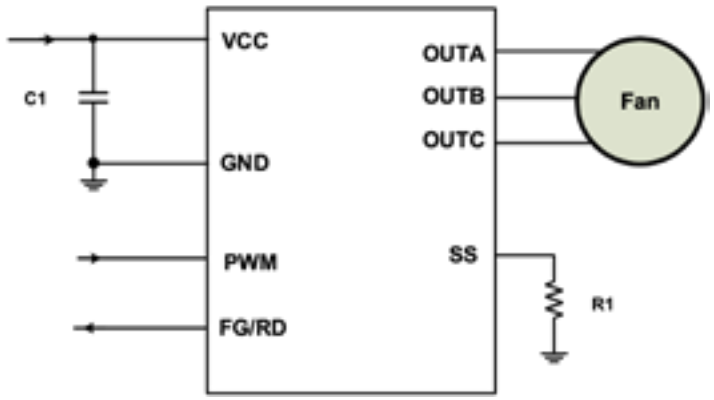
High-Current, All-in-One, Single-Phase BLDC Fan Driver with Closed-Loop Speed Control

Small size, simple external components



MP6637

5.5V, 1A Peak, Sinusoidal Sensorless, 3-Phase BLDC Motor Driver with Integrated MOSFETs



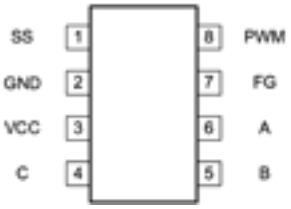
Features

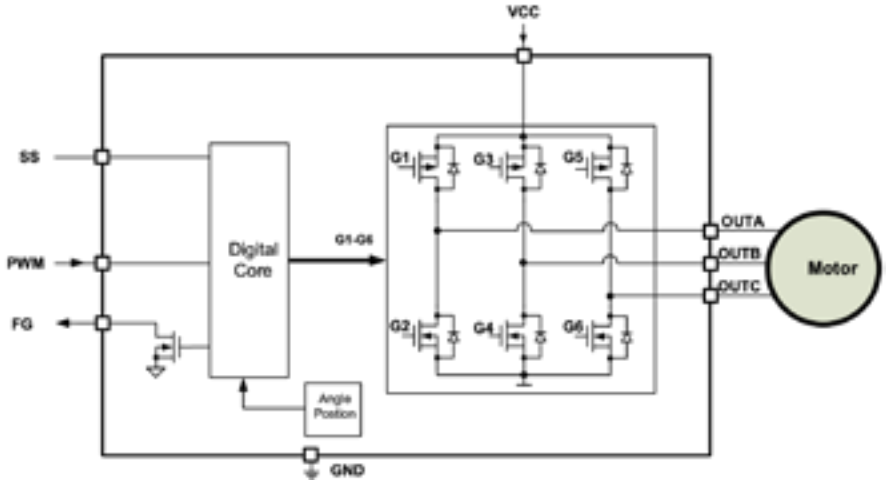
- 2.5V to 5.5V Input Voltage
- Up to 1A Peak Phase Current
- Sinusoidal Sensorless Control
- Integrated Power MOSFETs: Total 350mΩ (HS + LS)
- Power-Save Mode (I_{STB} ⩽ 50μA)
- Current Limit
- Supports 1kHz to 100kHz PWM Input
- 30kHz PWM Output Switching Frequency (f_{SW})
- Soft Start
- Protection Features:
  - Locked-Rotor Protection (LRP), Short-Circuit Protection (SCP), Over-Voltage Protection (OVP), Over-Current Protection (OCP), Over-Temperature Protection (OTP), and Automatic Recovery
  - Speed Indicator (FG) or Rotor Lock Indicator (RD) Output
  - Available in a SOT583 Package

All-in-One, Sinusoidal Sensorless BLDC Motor Driver for Notebooks and Gaming in a Tiny Package

Tiny Package

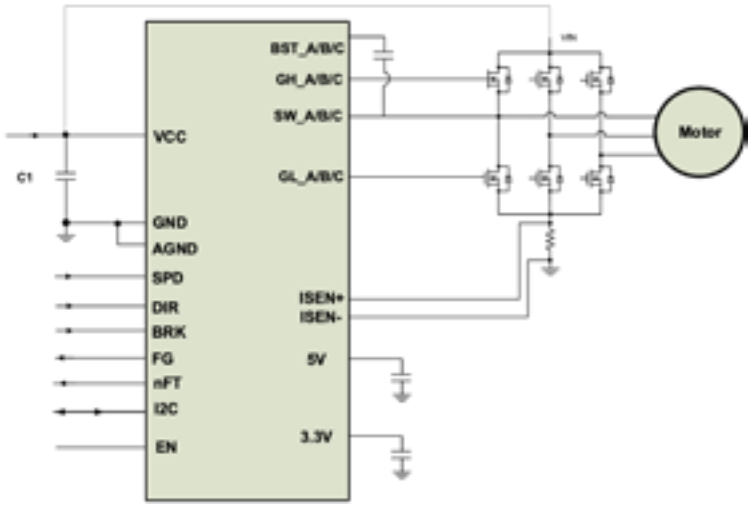
LxWxH: 2.1mmx1.2mmx0.6mm





MPQ6635

Three-Phase, Sensorless Field-Oriented Control BLDC Motor Driver, AEC-Q100 Qualified

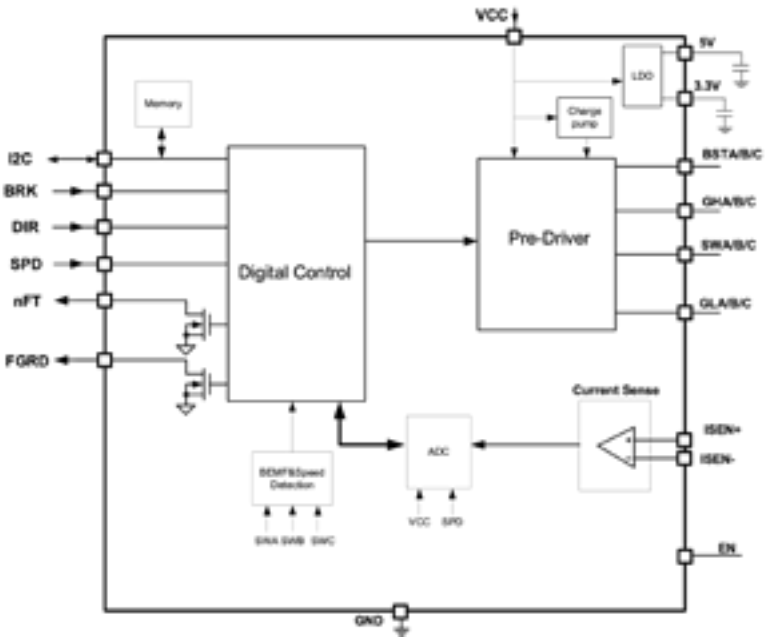


Features

- 6V to 35V Input Voltage
- Gate Driver Up to 0.7A/1A Source/Sink Gate Drive Current
- Supports 0V to 3.3V DC Input or 50Hz to 100kHz PWM Input
- Sensorless Field-Oriented Control (FOC)
- Open-Loop or Closed-Loop Speed Control
- Configurable Speed Curve (6 Points)
- Direction/Brake Input
- Rotational Speed Indicator (FG) Signal
- 24kHz Switching Frequency (f_{SW})
- Configurable Soft-Start Time and Alignment Time
- Protection Features:
  - Over-Current Protection (OCP), Over-Voltage Protection (OVP), Over-Temperature Protection (OTP), Under-Voltage Lockout (UVLO), Locked-Rotor Protection (LRP), Phase Loss Protection (PLP), and Fault Indication Output
  - Available in a QFN-28 (5mmx5mm) Wettable Flank Package
  - Available in AEC-Q100 Grade 1

Code-Free, 3-Phase, Sensorless FOC BLDC Motor Driver with External N+N MOSFETs, AEC-Q100 Qualified

- Code-Free Sensorless FOC
- Motor Parameter Insensitive
- Supports External N+N MOSFETs
- Open-Loop or Closed-Loop Speed Control
- Soft Start, Low Start-Up Noise
- Configurable Curves



MOTOR CONTROLLERS | MOTOR DRIVERS

Part Number	V_{IN} (Min) (V)	V_{IN} (Max) (V)	f_{SW} (Max) (KHh)	Interface	ADC (Bits)	Special Features	Grade	Package	Notes
MP6570	3	3.6	80	SPI, I²C, RS-485	10	Up to 32 Prog Slave Addresses	Catalog	QFN-32 (4x4)	3-phase BLDC controller with high-accuracy angular sensor
MP6710	3	3.6	80	RS-485, External I/O	12	Up to 127 Prog Slave Addresses	Catalog	TQFN-32 (4x4)	Servo motor controller

ABOUT MONOLITHIC POWER SYSTEMS

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 reimagining and redefining 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.

Our values

We cultivate creativity
As a company, we believe in creating an environment that encourages and challenges our employees to collaborate and think outside the box to excel beyond their preconceived capabilities.

We do not accept the status quo
We do not believe in limitations. It is not about what is, but what can be. Possibilities are endless at MPS.

We are passionate about sustainability
It's about the future. From materials to finances, we are committed to conservation. We will not tolerate waste in an effort to improve and preserve the quality of life.

We are committed to providing innovative products to our customers
Let us do the heavy lifting. We relentlessly strive to make system design versatile and effortless to meet our customers'specific needs. We'll do the work, so our customers can have the fun!

CONTACT & ORDERING

FAST RESPONSE

Quotes, Availability, Engineering Support & Samples
MonolithicPower.com/Quote-Samples-Support

US Offices

MPS Kirkland
5808 Lake Washington Blvd. NE
Kirkland, WA 98033, USA
Tel: +1 425-296-9956

MPS Detroit
19499 Victor Parkway
Livonia, MI 48152, USA
Tel: +1 248-907-0222

MPS San Jose
79 Great Oaks Blvd.
San Jose, CA 95119, USA
Tel: +1 408-826-0600

MPS Phoenix
2065 S. Cooper Road Suite 3
Chandler, AZ 85826, USA

MPS North Carolina
Canterbury Hall
4815 Emperor Blvd.
Durham, NC 27703, USA

EU Offices

MPS Barcelona
Av. Josep Tarradellas 123, 5-A
08029 Barcelona, Spain
Tel: +34-931-815-400

MPS Munich
Alte Landstrasse 25
85521 Ottobrunn, Germany
Tel: +49-89-80913512-0

MPS Portugal
Rua D. Manuel II, 290, Piso 7
4050-344 Porto,
Portugal

MPS Ettenheim
Gutenbergstrasse 4,
77955 Ettenheim,
Germany

MPS Lausanne
Route de Lully 5 A
1131 Tolochenaz, Switzerland
Tel: +41-21-805-0100

Order Direct
monolithicpower.com

Online Order Support
monolithicpower.com/onlineorders

Asia Offices

MPS China Chengdu
#8 Kexin Road West Park of Export
Processing Zone West Hi-Tech Zone
Chengdu, Sichuan, 611731
Tel: +86-28-8730-3000

MPS China Hangzhou
Floor 6, Building A2, Xixi Center,
No. 588 West Wenyi Road, Xihu District
Hangzhou, Zhejiang, 310012
Tel: +86-571-8981-8588

MPS China Shanghai
Floor 27, Magnolia Plaza, No. 777,
Hongqiao Road, Xuhui District
Shanghai 20030
Tel: +86-21-2225-1700

MPS China Shenzhen
Room 1401, Kingkey Riverfront Times
Square Branch North,
Binhe Avenue South, Futian District
Shenzhen Guangdong, 518054
Tel: +86-755-3688-5818-5852

MPS Taiwan
29F, No. 97, Section 1, Xintai 5th Road
Xizhi District, New Taipei City
Tel: +886-2-86911600

MPS Japan Tokyo
Shinjuku Sumitomo Bldg. 31F
2-6-1 Nishishinjuku Shinjuku-ku,
Tokyo 163-0231, Japan
Tel: +81-3-5989-0885

MPS Japan Osaka
Room 301, NLC Shin-Osaka Business
Zone III, 3-14-20 Nishinakajima,
Yodogawa-ku, Osaka-shi,
Osaka 532-0011, Japan
Tel: +81-6-6300-7432

MPS Singapore
No. 8 Ubi Road 2
#08-12 Zervex, Singapore 408538

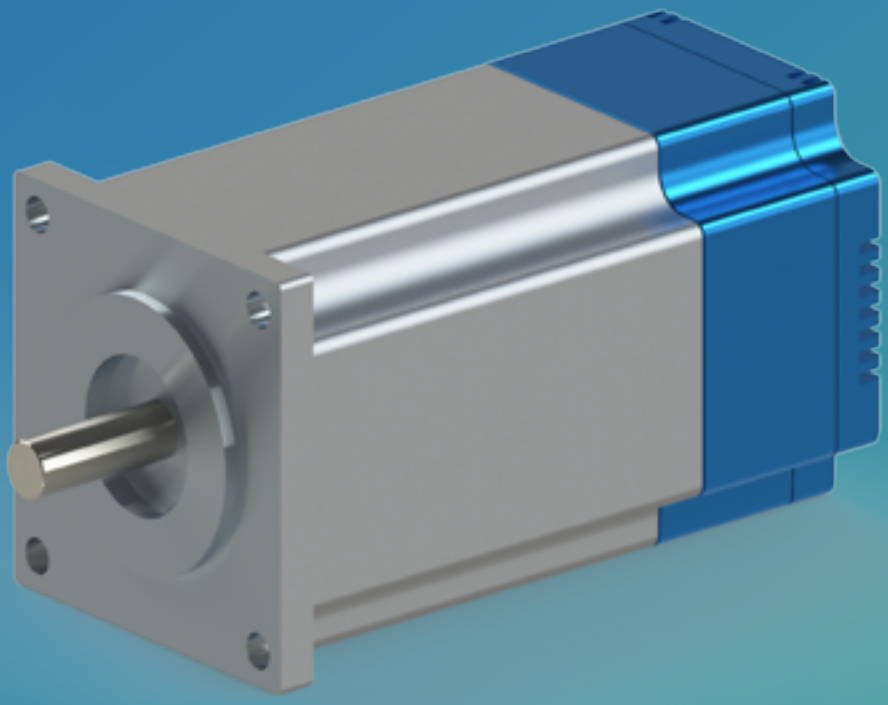
MPS Korea
C 403, 4F Pangyo Digital Center, 242,
Pangyo-ro, Bundang-gu, SeongNam-si,
Gyeonggi-do, Korea 13487
Tel: +82-70-7830-9950

MPS India
Unit G-12, Prestige Towers,
No 99 / 100, Residency Road,
Bangalore 560025
Tel: +91-80-4124-0312 / 20

MPS Investor Relations
monolithicpower.com/investors

MOTOR DRIVERS

Power Management Solutions



MonolithicPower.com