Sensor Solutions

Automotive | Industrial | Medical | Consumer

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:

- ISO 9001:2008 (MPS)
- EU RoHS/HF/REACH Compliant (MPS)
- Sony Green Partner (MPS & Suppliers)
- TS16949 (Suppliers)
- ISO 14001 (Suppliers)
- Current Sensor UL Certification # CA-11398-UL 

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

Table of Contents

MagAlpha™, MagDiff™ & MagVector™ Contactless Magnetic Angle Sensors

Advantages of MagAlpha™ & MagDiff™ Sensors:

- Instantaneous, Absolute Angle Sensing
- High Resolution
- Factory-Calibrated Low Error (INL): <0.6°
- Less than 0.1° Error (INL) with In-System Calibration
- High Bandwidth Up to 21kHz
- Robust against Parasitic Stray Fields Exceeding 4kA/m DC
- Ideal for Battery-Powered Applications: 25µA Average Current
- Smallest Footprint: WLCSP (1.6mmx1.6mm) and UTQFN (2mmx2mm)
- Flexible Sensor Location: End-of-Shaft (On-Axis) or Side-Shaft (Off-Axis)

MagAlpha™ and MagDiff™ sensors utilize an array of Hall plates that are sampled successively at very high speeds in such a way that the signal phase represents the angle to be measured. The “phase-to-digital” SpinAxis™ technique captures the angle instantaneously every 1µs without the need for traditional analog-to-digital conversion or arc tangent calculation. This means that the sensor is able to operate across a wider magnetic field range (typically 30mT to 150mT), giving greater flexibility and tolerance for magnet positioning.

The MPS MagDiff™ family is ideal for applications that require stray-field immunity, such as motor control with other motors in close proximity. The angle is extracted from the difference of the magnetic field at several locations on the sensor IC. This differential method eliminates the contribution of parasitic magnetic fields, and is suitable for sensors positioned at the end-of-shaft with a simple target magnet.

Side-Shaft Capability

MagAlpha™ sensors support both end-of-shaft and side-of-shaft topologies. At end-of-shaft, the sensor is placed directly below the magnet connected to the rotating shaft. This topology offers the best performance, but is not always mechanically convenient because the end of a rotating shaft may not be accessible. For example, in a motor, it may be hidden by the shaft bearing, or driving into a gearbox. (see **Figure 1**).

The MagVector™ is our third type of magnetic position sensor. It is different than the MagAlpha™ and MagDiff™ in that it detects the direction and strength of a 3-dimensional (Bx, By, Bz) magnetic field and provides the digitized component data to the MCU via an SPI or I²C interface. Common applications for 3D sensing include power-meter tamper protection, joysticks, and gaming applications.

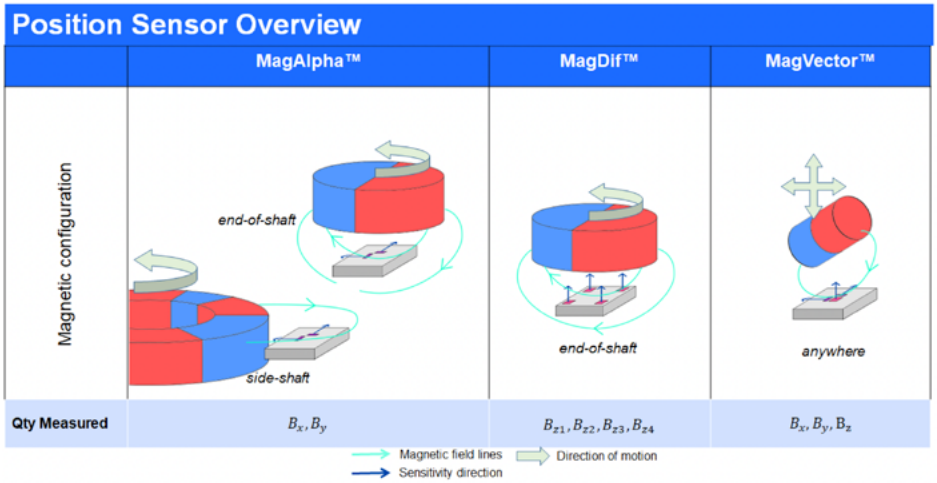


Figure 1: Magnet and Sensor Positioning

Current Sensors

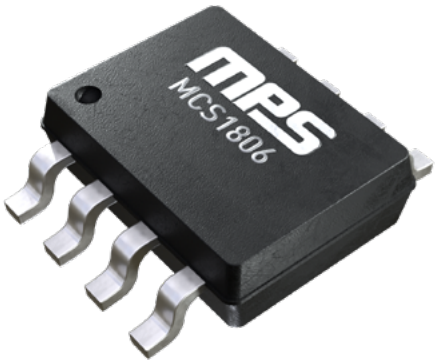
Advantages of MPS Sensors:

- Complete Isolated Current Sensors in SOIC-8 or WSOIC-10/16 packages
- Ultra-Small QFN-12 (3mmx3mm) for Non-Isolated Applications
- Lowest Primary Conductor Resistance for Higher Peak and Smaller Package
- Wide Current-Sensing Range from ±5A to ±400A, AC or DC
- ±2.5% Accuracy over Temp, Factory-Trimmed
- Immune to Stray Magnetic Fields via Differential Sensing
- No Magnetic Hysteresys
- No Magnetic Hysteresis

MPS current sensors integrate galvanic isolation, high-voltage continuous operation, and high-current sensing into a small, industry-standard SOIC-8 or WSOIC-10/16 package. Our current sensors utilize an array of differential, linear Hall sensors that pick up the target induced magnetic field from the primary conductor while rejecting unwanted stray fields. This makes our current sensors ideal for use in magnetically noisy environments. In addition, the low resistance of the integrated conductor results in improved efficiency and reduced power loss compared to a traditional shunt resistor solution.

The primary conducting leads are electrically isolated from the sensor leads on the secondary side, producing a sensor with a high isolation voltage and working voltage. This makes our current sensors ideal for high-side current sensing without the need for expensive, large-footprint optical or inductive isolation alternatives.

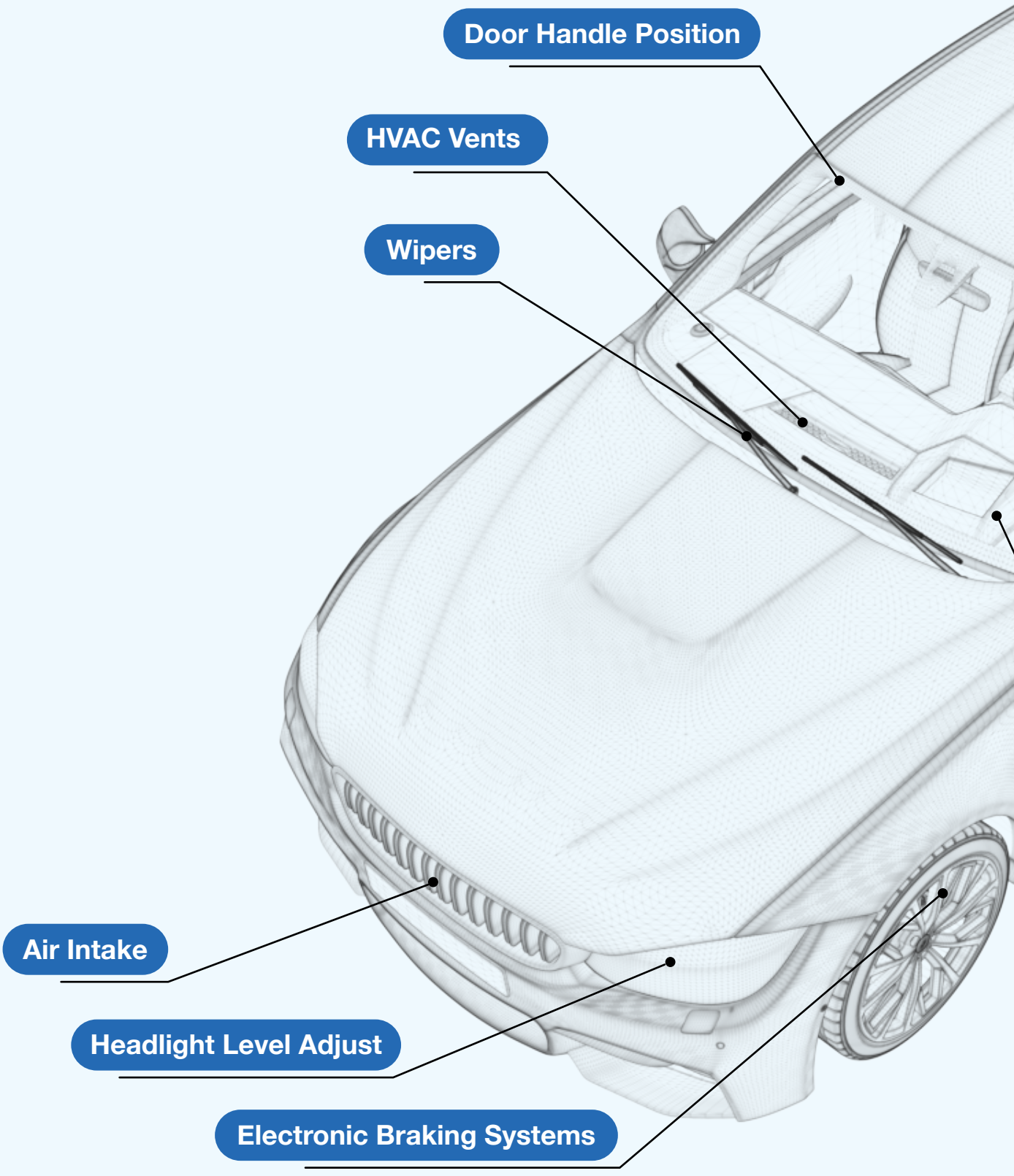
MCS1823

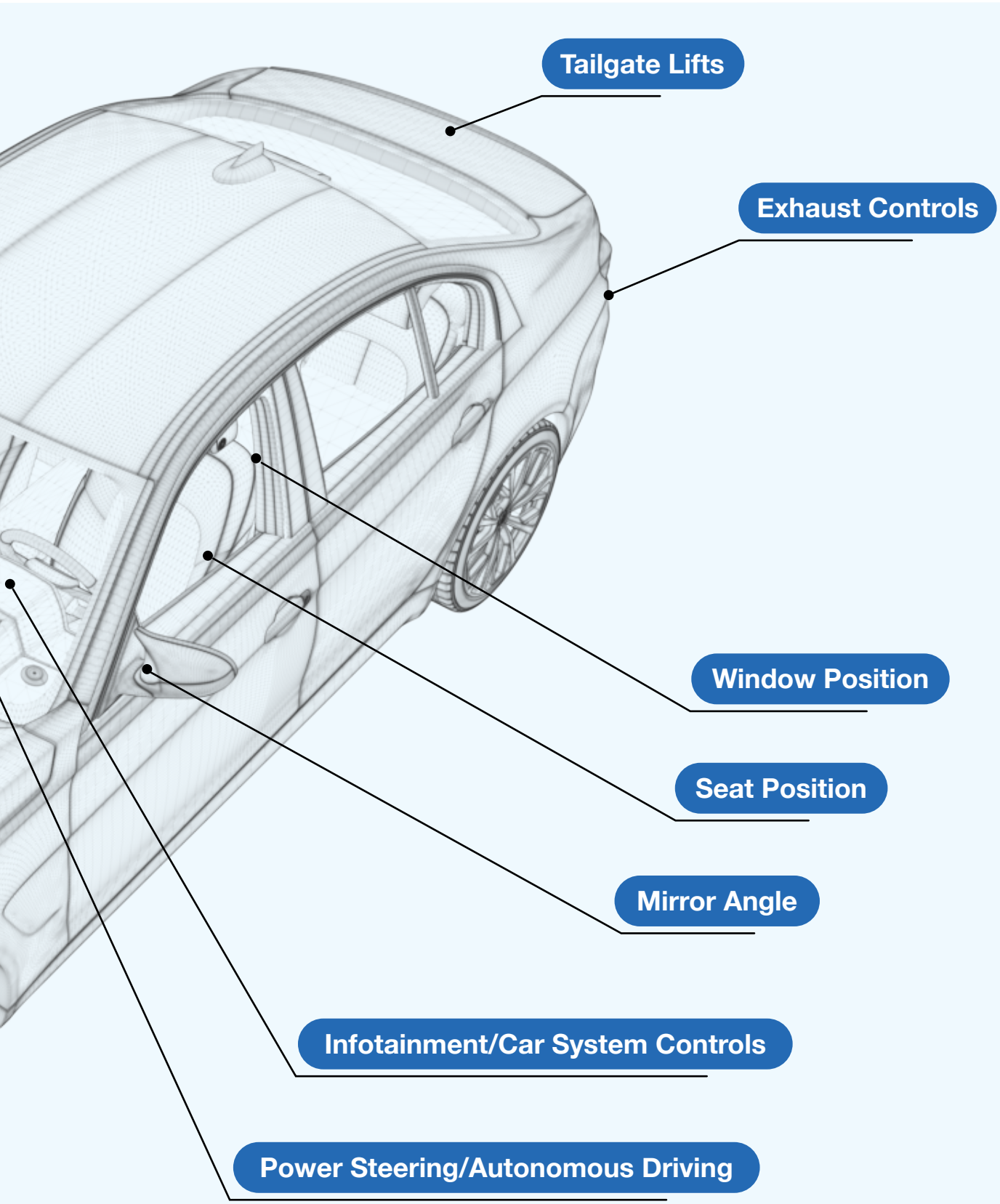


MCS1805/6

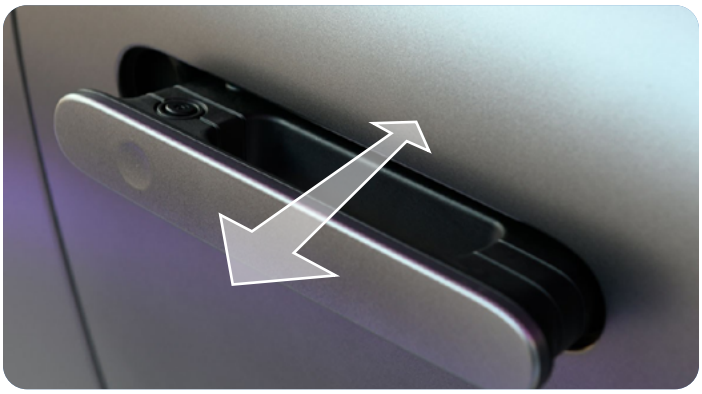
MCS1810/12

Sensors for Motor Position/Speed Control & Current Sensors



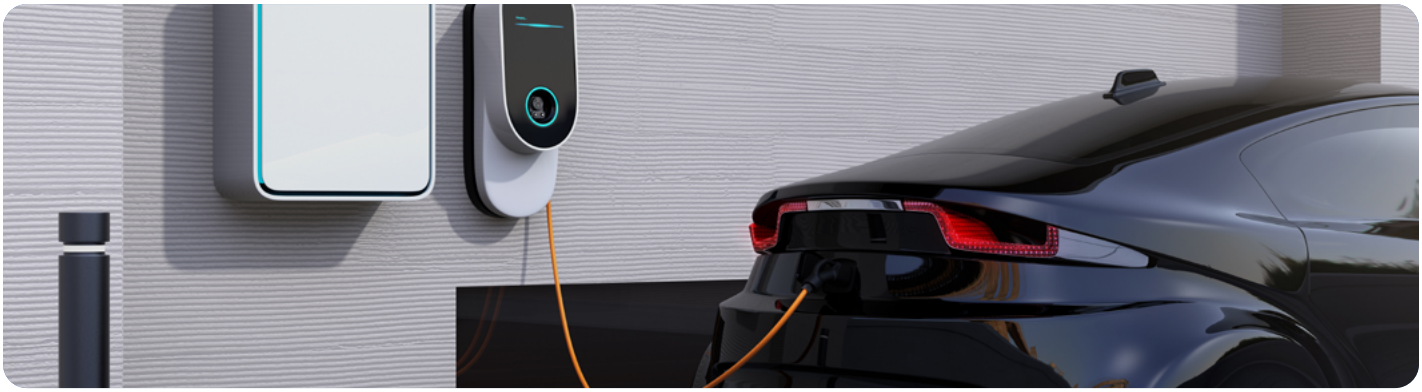

Tailgate Lifts
Exhaust Controls
Window Position
Seat Position
Mirror Angle
Infotainment/Car System Controls
Power Steering/Autonomous Driving

Body Electronics



- Retracting Door Handles
- Tailgate Lifts
- Suspension Sensors
- Wiper Motors
- Spoiler Actuation

Power Management



Precision, High-Current Sensing and Control:

- Wallbox Chargers
- Qi Chargers
- Power Monitoring Systems

Thermal Management

- Fluid Pumps
- Air-Grill Shutters
- Cooling Fan Modules

Interior Cabin Control & Car Audio

- Contactless Infotainment Consoles
- Audio Amplifier Current-Sensing
- Contactless Gearshift Control
- Seat Position Motor Control
- Sunroof Motor Control

Electronic Power Steering (EPS)

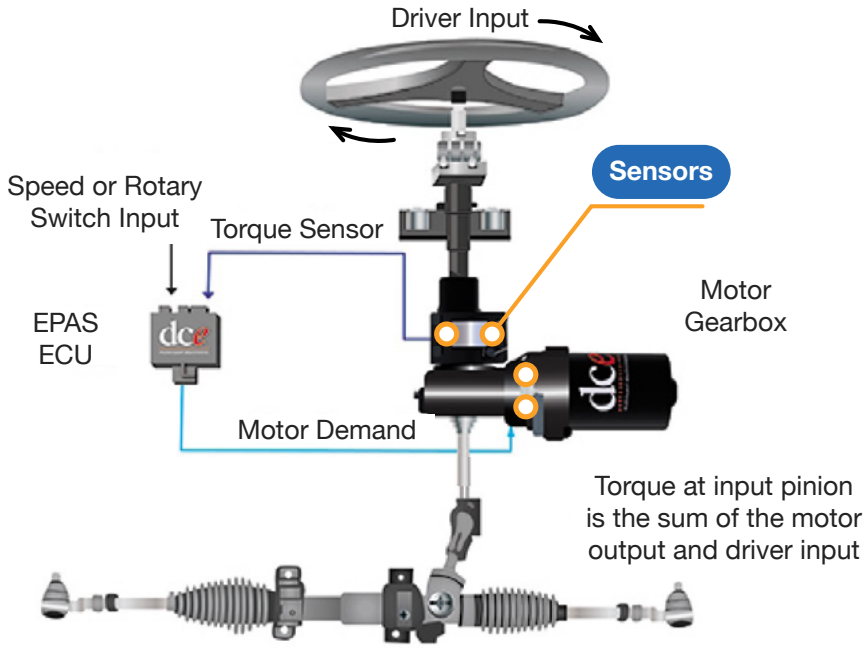
Replace Optical Sensors in Automotive Power-Assisted Steering (PAS)

MAQ600, MAQ473, and MAQ79010FS

- Cost-Effective, Contactless Alternative to Optical Sensing
- AEC-Q100 Grade 1 Qualified
- Wide Operating Temperature Range: -40°C to +150°C

MAQ79010FS

- Differential Sensing, Immune to Stray Magnetic Fields in Excess of 4kA/m DC
- ASIL-B Compliant with Functional Safety



Automotive Product Selector Guide

Integrated Current Sensors

	Part Number	Current Range (A)	V_{CC} (V)	Over-Temperature Accuracy	Temp Range (°C)	Isolation Voltage (V_{RMS})	Working Voltage for Basic Isolation (V_{RMS})	Working Voltage for Reinforced Isolation (V_{RMS})	Bandwidth (kHz)	Over-Current Detection (OCD)	Voltage Reference	Primary Conductor Resistanc	UL Certification	Package	Notes
N	**MCQ1805**	±5, ±10, ±20, ±30, ±40, ±50	3.3, 5	2.5%	-40 to +125	3000	500	-	100	✓	-	0.9	✓ + TUV	SOIC-8	AEC-Q100, coreless, ratiometric analog output, immune to external magnetic field gradients
	MCQ1806	±5, ±10, ±20, ±30, ±40, ±50	3.3, 5	2.5%	-40 to +125	3000	500	-	100	-	-	0.9	✓	SOIC-8	AEC-Q100, coreless, ratiomentric analog output
S	**MCQ1810**	±10, ±20, ±30, ±40, ±50, ±65, ±80, ±100	3.3, 5	2%	-40 to +150	5000	1100	560	350	✓	✓	0.3	Planned	SOIC-10W	AEC-Q100, coreless, zero current reference, 0.3mΩ low primary conductor resistance, bi- or unidirectional sensing, ratiometric or absolute analog output, OCD with 1µs response time
S	**MCQ1812**	±10, ±20, ±30, ±40, ±50, ±65, ±80	3.3, 5	2%	-40 to +150	5000	1100	560	350	✓	✓	0.45	Planned	SOIC-16W	AEC-Q100, coreless, zero current reference, bi- or unidirectional sensing, ratiomentric or absolute analog output, prog. OCD with 1µs response time
S	**MCQ1814**	±5, ±10, ±20, ±30, ±40, ±50, ±65, ±80	3.3, 5	2%	-40 to +150	5000	1100	560	350	✓	✓	0.45	Planned	SOIC-16W	AEC-Q100, coreless, zero current reference, bi- or unidirectional sensing, ratiomentric or absolute analog output, prog. OCD with 1µs response time
	MCQ1823	±5, ±10, ±20, ±30, ±40, ±50	3.3, 5	2.5%	-40 to +125	100	100	-	120	✓	-	0.6	✓	QFN-12 (3x3)	AEC-Q100, coreless, bi- or unidirectional sensing, ratiometric or absolute analog output, immune to external magnetic field gradients
S	**MCQ1880**	±50, ±100, ±150, ±200	3.3, 5	2%	-40 to +150	100	100	-	350	-	-	0.2	-	PSOF-7	AEC-Q100, bi- or unidirectional sensing, 0.2mΩ primary conductor resistance, high precison, ratiometric or absolute analog output
P	**MCQ1809**	±5, ±10, ±20, ±30, ±40, ±50	3.3, 5	2%	-40 to +125	3000	550	-	350	✓	-	0.5	-	SOIC-8	AEC-Q100, coreless, ratiometric analog output

MagAlpha™ Magnetic Position Sensors

	Part Number	±3σ Resolution	Interface	Supply Voltage (V)	Supply Current (mA)	Sensing Range (mT)	Cutoff Frequency (Hz)	Latency at Constant Speed (µs)	Magnetic Field Detection	Temperature Range (°C)	Package	Wettable Flanks	Notes
	MAQ430	12-Bit	SPI, UVW, ABZ	3 to 3.6	11.7	30+ (No Upper Limit)	390	8	-	-40 to +150	QFN-16 (3x3)	✓	AEC-Q100
	MAQ470	12-Bit	SPI, SSI, PWM, ABZ	3 to 3.6	11.7	30+ (No Upper Limit)	390	8	✓	-40 to +150	QFN-16 (3x3)	✓	AEC-Q100
	MAQ473	10-Bit to 14-Bit	SPI, SSI, PWM, ABZ	3 to 3.6	11.7	30+ (No Upper Limit)	23 to 6k	8	✓	-40 to +150	QFN-16 (3x3)	✓	AEC-Q100, prog. filter
	MAQ800	8-Bit	SPI, SSI	3 to 3.6	11.7	30+ (No Upper Limit)	90	4000	✓	-40 to +125	QFN-16 (3x3)	✓	Optimized for automotive HMI applications, SSI output
	MAQ820	8-Bit	SPI, ABZ	3 to 3.6	11.7	30+ (No Upper Limit)	90	4000	✓	-40 to +125	QFN-16 (3x3)	✓	Optimized for automotive HMI applications, SSI output
	MAQ850	8-Bit	SPI, PWM	3 to 3.6	11.7	30+ (No Upper Limit)	90	4000	✓	-40 to +125	QFN-16 (3x3)	✓	Optimized for automotive HMI applications, SSI output
N	**MAQ600A**	12-Bit to 15-Bit	SPI, ABZ, PWM, UVW, SSI	3 to 3.6	7.5	20+ (No Upper Limit)	75 to 17k	0	✓	-40 to +150	QFN-16 (3x3)	✓	AEC-Q100, TMR front-end, high accuracy and BW, 0.6° INL (<0.1° INL through user calibration w/ 32-word lookup table)

MagDiff™ Magnetic Position Sensors with Stray Field Immunity

	Part Number	±3σ Resolution	Interface	Supply Voltage (V)	Supply Current (mA)	Sensing Range (mT)	Cutoff Frequency (Hz)	Latency at Constant Speed (µs)	Magnetic Field Detection	Temperature Range (°C)	Package	Wettable Flanks	Notes
S	**MAQ79010**	10-Bit to 14.5-Bit	SPI, SSI, I²C, UVW, SENT, ABZ	3.3V, 5V	12	8+ (No Upper Limit)	12 to 100k	0	✓	-40 to +150	QFN-16 (3x3)	✓	AEC-Q100, ASIL-B compliant, robust against parasitic stray fields >4kA/m DC, or 5mT
P	**MAQ79016**	10-Bit to 14.5-Bit	SPI, SSI, I²C, UVW, SENT, ABZ	Up to 26V	12	8+ (No Upper Limit)	12 to 100k	0	✓	-40 to +150	QFN-16 (3x3)	✓	AEC-Q100, ASIL-B compliant, 26V with reverse polatity protection, robust against parasitic stray fields >4kA/m DC, or 5mT
S	**MAQ900**	10-Bit to 14.5-Bit	SPI, SSI, I²C, UVW, SENT, ABZ	3.3V, 5V	12	8+ (No Upper Limit)	12 to 100k	0	✓	-40 to +150	QFN-16 (3x3)	✓	AEC-Q100, robust against parasitic stray fields >4kA/m DC, or 5mT
P	**MAQ79020**	12-Bit to 14.5-Bit	ABZ, PWM, SPI, I²C, SSI, UVW	3.3V, 5V	12	8+ (No Upper Limit)	12 to 100k	0	✓	-40 to +150	QFN-32 (5x5)	✓	AEC-Q100, ASIL-D compliant w/ functional safety, robust against parasitic stray fields >4kA/m DC or 5mT, wettable flanks

MagVector™ 3D Magnetic Position Sensors

	Part Number	Data Length	Interface	Supply Voltage (V)	Supply Current (mA)	Sensing Range (mT)	Conversion Time (µs)	Temperature Range (°C)	Package	Notes
P	**MVQ310**	12-Bit	I²C, SPI	3.3	25nA to 2.5	±125 or ±250	40	-40 to +150	TSOT23-6	AEC-Q100, digital component output, selectable operating power modes and sensing axis

Safety & Security

- Access Control
- Automated Doors
- Smart Door Locks
- Elevators and Escalators
- Fire Prevention

Power Management

- Solar Inverters
- Power Monitoring
- Power Access
- Light Monitoring

Solar Inverters

Maintain Maximum Power Point Tracking

MCS1823, MCS1805, and MCS1806

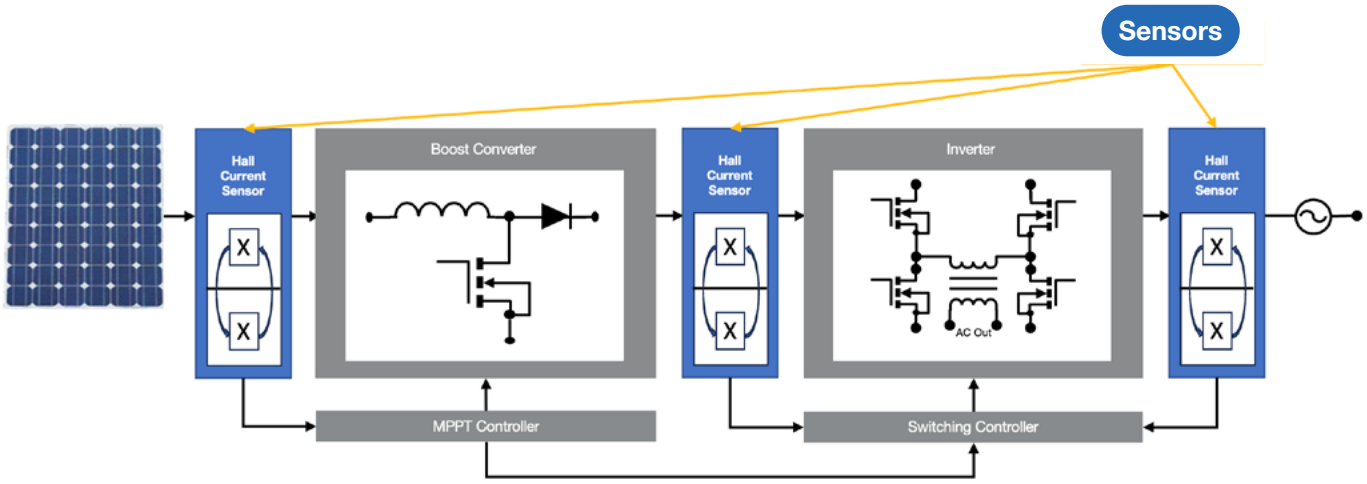
- Accurate High-Side or Low-Side Current Sensing
- Up to 3kV$_{RMS}$ High Isolation from Line Voltage
- Fast Over-Current Detection Flag <1µs
- UL Certified

Boost Modules

- Accurate Current Sampling to Detect the Power Output from the PV Cells
- Control the PWM Duty Cycle to Increase or Decrease the Downstream Impedance

Inverter Stage

- Accurately Track Current Phase to Match Line Current
- Accurately Track Power Delivered to the Line



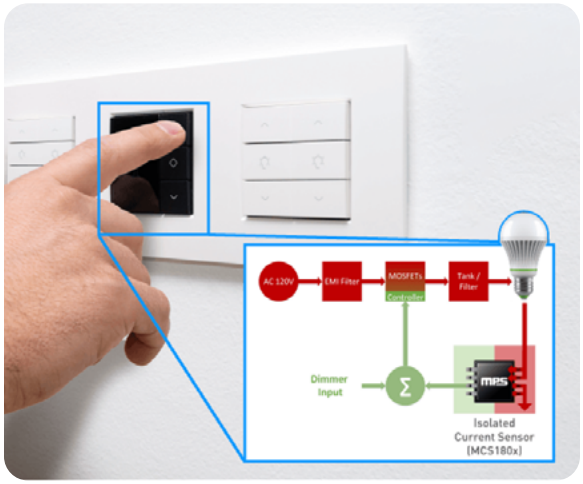
Climate & Energy Efficiency

- Shutters and Blinds
- HVAC – Compressors, Blowers, Flow Control
- Climate Control – Thermostats
- Lighting Dimmer Control

Smart Lighting Dimmers

MCS1806

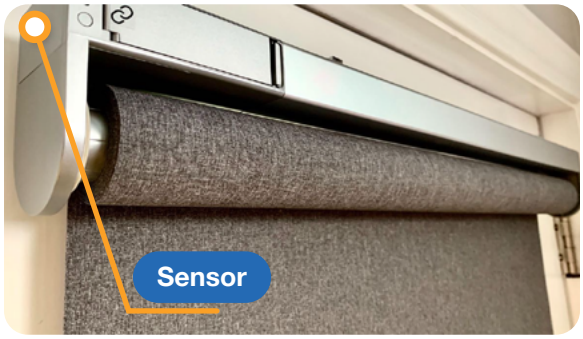
- Direct Sensing in Industry-Standard SOIC-8 Package
- Wide ±5A to ±50A Sensing Range
- Low 0.9mΩ Primary Conductor Resistance
- 3000V_{RMS} Isolation



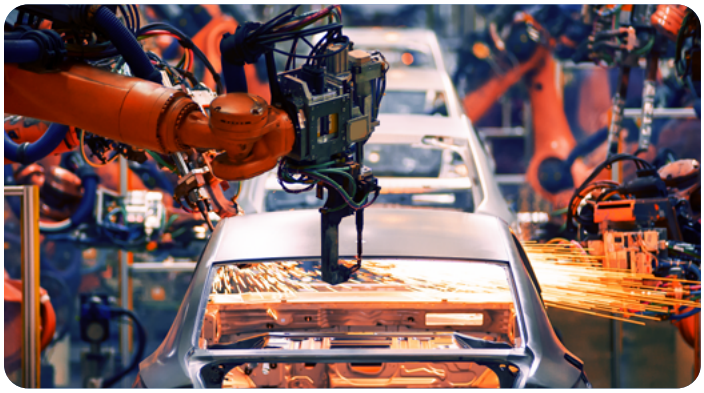
Smart Shades

MA732, MA330, MA735, MA736, and MA782

- Motor Commutation and/or Position Feedback
- Provides Absolute Feedback
- Operates with a Low-Cost Magnet
- Works with All Types of Motors
- Can Be Operated at Side-Shaft or End-of-Shaft Locations
- Ideal for Space-Constrained Applications
  - MA735, MA736, MA782: UTQFN (2mmx2mm) Package
- MA782 Is Ideal for Battery-Powered Applications
  - Includes Wake-Up on Angle Detection
  - 0.5µA Standby Current



Industrial Automation



Precision Robotic Joint Control

MA600

- Factory-Calibrated: 0.6° Error (INL) over Temp
- <0.1° Error (INL) after User Calibration with On-Board Chip Look-Up Table
- 12-Bit to 15-Bit Noise-Free Resolution
- 17kHz Bandwidth
- Zero Latency to Minimize Speed Errors

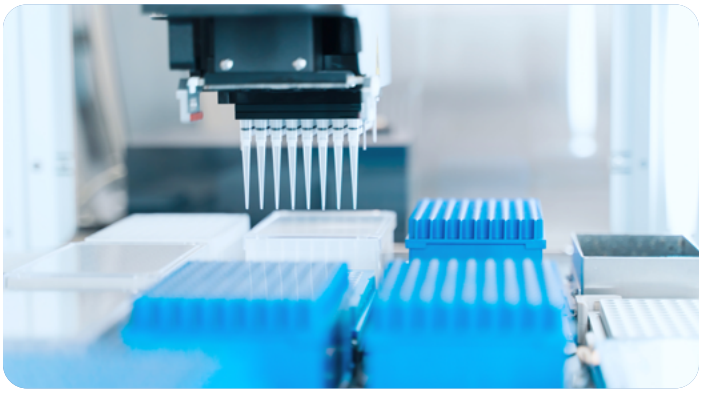
MA900

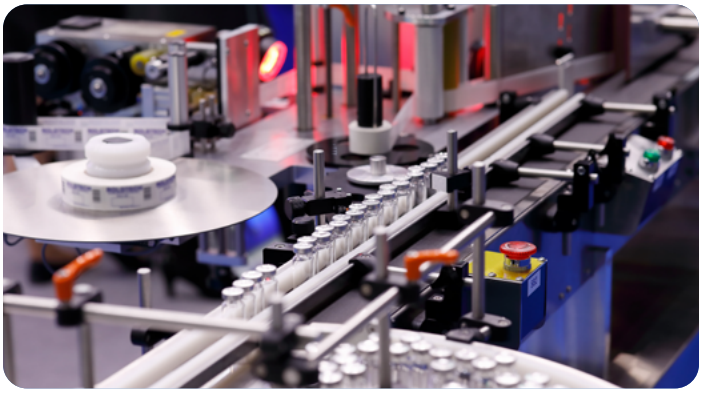
- Differential Sensing, Immune to Stray Magnetic Fields in Excess of 4kA/m DC
- 10-Bit to 14.5-Bit Noise-Free Resolution
- Available in a Tiny QFN-16 (3mmx3mm) Package

Cost-Effective Solution for Managing:

- High-Speed Torque
- Position
- Speed Control

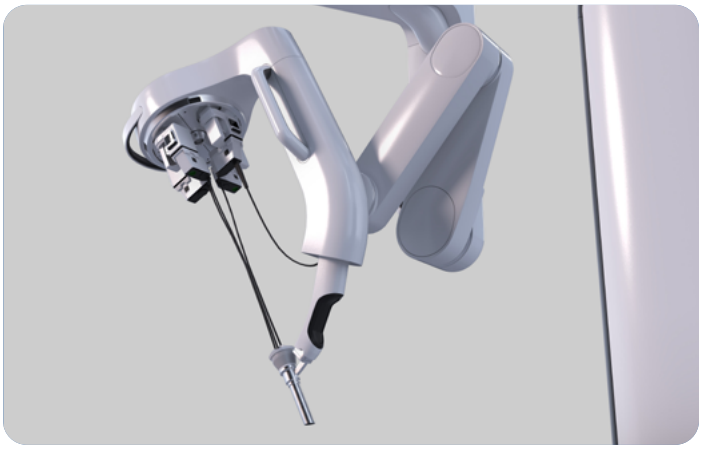
Lab Automation

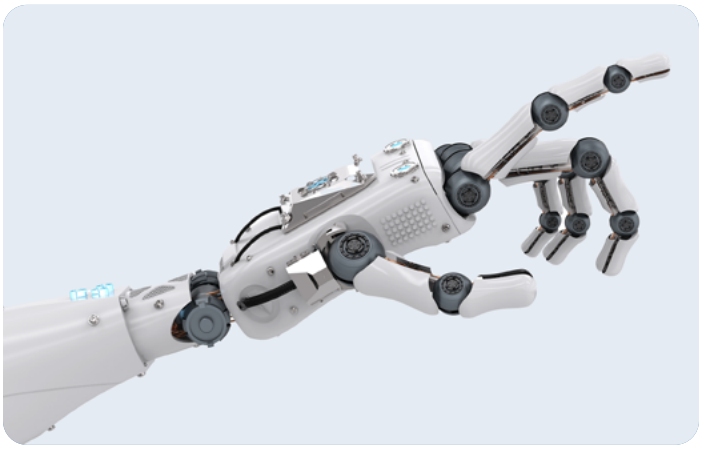




- Robot Control
- Probe Processing
- Pump Motor Control
  - Infusion Pumps
  - Insulin Pumps

Humanoid & Surgical Robotics



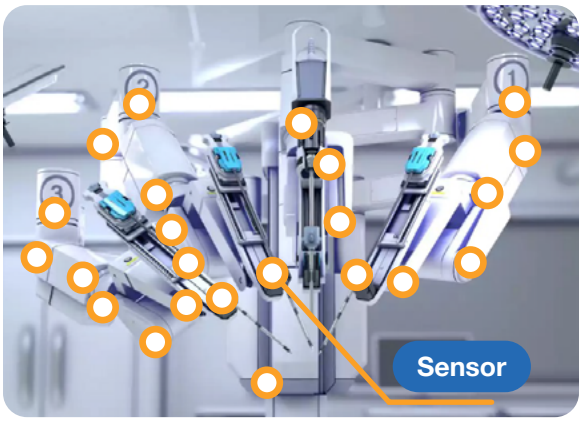


- Automated and Remote Surgical Robots
- Dental Processing

Surgical Robotics

MA600

- Factory-Calibrated: 0.6° Error (INL) over Temp
- <0.1° Error (INL) after User Calibration with On-Board Chip Look-Up Table
- 12-Bit to 15-Bit Noise-Free Resolution
- 21kHz Bandwidth
- Zero Latency to Minimize Speed Errors



MA900

- Differential Sensing, Immune to Stray Magnetic Fields in Excess of 4kA/m DC
- 10-Bit to 14.5-Bit Noise-Free Resolution
- Available in a Tiny QFN-16 (3mmx3mm) Package

Cost-Effective Solution for Managing:

- High-Speed Torque
- Position
- Speed Control

Insulin Pumps

Accuracy and Reliability in Tiny Form Factor

MA980

- 9-Bit To 13-Bit Absolute Resolution
- Differential Sensing Rejects Stray Fields
- µPower Operation through Duty Cycle Control
- CSP-16 (1.6mmx1.6mm) Package Is Ideal for Space-Constrained Applications

Mobile Phones, Laptops, and VR Headsets

- Foldable Mobile Flip-Phone Angle Management
- Foldable Tablet Angle Sensing
- Precision Open/Close Angle Management
- HMI Contactless Knobs & Buttons

No-Bezel Laptops and Foldable Phones

MA782 or MA980

- Smallest Open/Close-Detection Solution
- Helps Minimize or Eliminate Bezel
- Can Be Placed in the Folding Axis
- Smallest WLCSP Package (1.6mmx1.6mm)
- Lowest Power: 25μA Duty Cycle
- Wake-On-Change Angle Detection
- Very Small (<1mmx1mm) Magnet
- Provides Absolute Angle Output without MCU Support

Kitchen Appliances/Mixers with Cooking Options

Main Motor Position Detection

MA732, MA735, MA736, and MA900

- Motor Commutation and/or Position Feedback
- Ideal for Space-Constraint Applications
  - MA735, MA736: UTQFN (2mmx2mm) Package
- Differential Sensing Rejects Stray Fields
  - MA900: End-of-Shaft Only

Secure Lid Closure Detection

MV300, MV310

- Senses Position of Magnets in Lid
- Flexible I^2C or SPI Interface

Control and Menu Buttons

MA800

- Contactless Sensing for Long Life with No Wear
- 8-Bit Resolution Absolute Angle Encoder
- Push and Pull Detection with Configurable Thresholds

Current Sensing

(Heating, Motor Control, Power Supplies)

MCS1806, MCS1810/12

- Complete Isolated Current Sensor
- Wide Sensing Range
  - ±5A to ±160A, AC or DC

E-Bikes & Scooters

- BLDC Motors – Smaller, Lighter, Increased Reliability
- Enables Highest Power Density
- Provides Absolute Angle, Position, and Torque

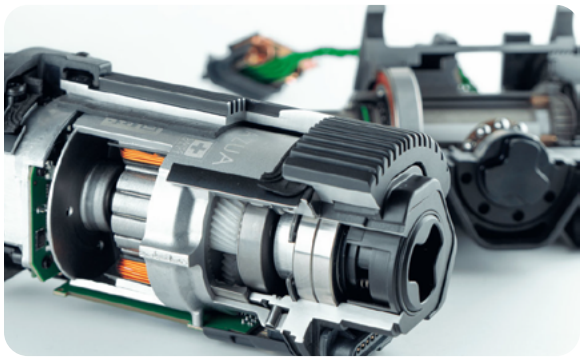
Flexible Interface:

- SPI Commutation for UVW Commutation
- ABZ Speed Control

Sensors for E-Bike Ultra-Small BLDC Motors

MA302

- Speed, Torque, and Absolute Position Control
- Smallest QFN (3mmx3mm) Package
- No Customer Calibration Required
- Factory Calibrated
- On-Chip Non-Volatile Memory (NVM)
- Wide -40°C to +125°C Operating Temp Range
- Flexible Interface
  - SPI for Digital Angle Readout and Sensor Configuration
  - ABZ/UVW for Motor Control, Commutation, and Incremental Output
  - No Firmware Changes Required when Replacing Optical Encoders; ABZ Output Is Compatible with Optical Outputs



Consumer & Industrial Product Selector Guide

Integrated Current Sensors

	Part Number	Current Range (A)	V_{CC} (V)	Over-Temp. Accuracy	Temperature Range (°C)	Isolation Voltage (V_{RMS})	Working Voltage for Basic (V_{RMS})	Working Voltage for Reinforced Isolation (V_{RMS})	Bandwidth (kHz)	Over-Current Detection (OCD)	Voltage Reference	Primary Conductor Resistance (mΩ)	UL Certification	Package	Notes
	MCS1800	±12.5, ±25	3.3	3%	-40 to +125	1000	200	-	100	-	-	1.2	-	SOIC-8	Coreless, ratiometric analog output
	MCS1801	±12.5, ±25	5	3%	-40 to +125	1000	200	-	100	-	-	1.2	-	SOIC-8	Coreless, ratiometric analog output
	MCS1802	±5, ±10, ±20, ±30, ±40, ±50	3.3	2.5%	-40 to +125	2200	250	-	100	-	-	0.9	✓	SOIC-8	Coreless, ratiometric analog output
	MCS1803	±5, ±10, ±20, ±30, ±40, ±50	5	2.5%	-40 to +125	2200	250	-	100	-	-	0.9	✓	SOIC-8	Coreless, ratiometric analog output
	MCS1805	±5, ±10, ±20, ±30, ±40, ±50	3.3, 5	2.5%	-40 to +125	3000	500	-	100	✓	-	0.9	✓ + TUV	SOIC-8	Coreless, ratiometric analog output, immune to external magnetic field gradients
	MCS1806	±5, ±10, ±20, ±30, ±40, ±50	3.3, 5	2.5%	-40 to +125	3000	500	-	100	-	-	0.9	✓	SOIC-8	Coreless, ratiometric analog output
S	**MCS1810**	±10, ±20, ±30, ±40, ±50, ±65, ±80, ±100	3.3, 5	2%	-40 to +125	5000	1100	560	350	✓	✓	0.3	Planned	SOIC-10W	Coreless, zero current reference, low primary conductor resistance, bi- or unidirectional sensing, ratometric or absolute analog output, prog. OCD with 1µs response time
S	**MCS1812**	±10, ±20, ±30, ±40, ±50, ±65, ±80, ±100	3.3, 5	2%	-40 to +125	5000	1100	560	350	✓	✓	0.45	Planned	SOIC-16W	Coreless, zero current reference, bi- or unidirectional sensing, ratiomentric or absolute analog output, prog. OCD with 1µs response time
S	**MCS1814**	±10, ±20, ±30, ±40, ±50, ±65, ±80, ±100	3.3, 5	2%	-40 to +125	5000	1100	560	350	✓	✓	0.45	Planned	SOIC-16W	Coreless, zero current reference, bi- or unidirectional sensing, ratiomentric or absolute analog output, prog. OCD with 1µs response time
	MCS1823	±5, ±10, ±20, ±30, ±40, ±50	3.3, 5	2.5%	-40 to +125	100	100	-	120	✓	-	0.6	✓	QFN-12 (3x3)	Coreless, bi- or unidirectional sensing, ratiometric or absolute analog output, immune to external magnetic field gradients
	MCS1826	±15.5, ±31	3.3 to 5	3%	-40 to +125	100	100	-	120	✓	-	0.6	✓	QFN-12 (3x3)	Coreless, bidirectional sensing, ratiometric analog output, immune to external magnetic field gradients
S	**MCS1880**	±50, ±100, ±150, ±200	3.3, 5	2%	-40 to +125	100	100	-	350	-	-	0.2	-	PSOF-7	Bi- or unidirectional sensing, 0.2mΩ primary conductor resistance, high precison, ratiometric or absolute analog output
P	**MCS1809**	±5, ±10, ±20, ±30, ±40, ±50	3.3, 5	2%	-40 to +125	3000	550	-	350	✓	-	0.5	-	SOIC-8	Coreless, ratiometric analog output

	Part Number	Current Range (A)	V_{CC} (V)	Over-Temp. Accuracy	Temperature Range (°C)	Isolation Voltage (V_{RMS})	Working Voltage for Basic (V_{RMS})	Working Voltage for Reinforced Isolation (V_{RMS})	Bandwidth (kHz)	Over-Current Detection (OCD)	Voltage Reference	Primary Conductor Resistance (mΩ)	UL Certification	Package	Notes
N	**MCQ1805**	±5, ±10, ±20, ±30, ±40, ±50	3.3, 5	2.5%	-40 to +125	3000	500	-	100	✓	-	0.9	✓ + TUV	SOIC-8	AEC-Q100, coreless, ratiometric analog output, immune to external magnetic field gradients
	MCQ1806	±5, ±10, ±20, ±30, ±40, ±50	3.3, 5	2.5%	-40 to +125	3000	500	-	100	-	-	0.9	✓	SOIC-8	AEC-Q100, coreless, ratiomentric analog output
S	**MCQ1810**	±10, ±20, ±30, ±40, ±50, ±65, ±80, ±100	3.3, 5	2%	-40 to +150	5000	1100	560	350	✓	✓	0.3	Planned	SOIC-10W	AEC-Q100, coreless, zero current reference, 0.3mΩ low primary conductor resistance, bi- or unidirectional sensing, ratiometric or absolute analog output, OCD with 1µs response time
S	**MCQ1812**	±10, ±20, ±30, ±40, ±50, ±65, ±80	3.3, 5	2%	-40 to +150	5000	1100	560	350	✓	✓	0.45	Planned	SOIC-16W	AEC-Q100, coreless, zero current reference, bi- or unidirectional sensing, ratiomentric or absolute analog output, prog. OCD with 1µs response time
S	**MCQ1814**	±5, ±10, ±20, ±30, ±40, ±50, ±65, ±80	3.3, 5	2%	-40 to +150	5000	1100	560	350	✓	✓	0.45	Planned	SOIC-16W	AEC-Q100, coreless, zero current reference, bi- or unidirectional sensing, ratiomentric or absolute analog output, prog. OCD with 1µs response time
	MCQ1823	±5, ±10, ±20, ±30, ±40, ±50	3.3, 5	2.5%	-40 to +125	100	100	-	120	✓	-	0.6	✓	QFN-12 (3x3)	AEC-Q100, coreless, bi- or unidirectional sensing, ratiometric or absolute analog output, immune to external magnetic field gradients
S	**MCQ1880**	±50, ±100, ±150, ±200	3.3, 5	2%	-40 to +150	100	100	-	350	-	-	0.2	-	PSOF-7	AEC-Q100, bi- or unidirectional sensing, 0.2mΩ primary conductor resistance, high precison, ratiometric or absolute analog output
P	**MCQ1809**	±5, ±10, ±20, ±30, ±40, ±50	3.3, 5	2%	-40 to +125	3000	550	-	350	✓	-	0.5	-	SOIC-8	AEC-Q100, coreless, ratiometric analog output

MagVector™ 3D Magnetic Position Sensors

	Part Number	Data Length	Interface	Supply Voltage (V)	Supply Current (mA)	Sensing Range (mT)	Conversion Time (µs)	Temperature Range (°C)	Package	Notes
	MV300	12-Bit	I²C, SPI	3.3	10nA to 2.5	±50 or ±180	40	-40 to +125	TSOT23-6	Digital component output, selectable operating power modes
P	**MV310**	12-Bit	I²C, SPI	3.3	25nA to 2.3	±125 or ±250	40	-40 to +125	TSOT23-6	Digital component output, selectable operating power modes and sensing axis
P	**MVQ310**	12-Bit	I²C, SPI	3.3	25nA to 2.3	±125 or ±250	40	-40 to +150	TSOT23-6	AEC-Q100, digital component output, selectable operating power modes and sensing axis

MagDiff™ Magnetic Position Sensors with Stray Field Immunity

	Part Number	±3σ Resolution	Interface	Supply Voltage (V)	Supply Current (mA)	Sensing Range (mT)	Cutoff Frequency (Hz)	Latency at Constant Speed (µs)	Temperature Range (°C)	Package	Notes
S	**MA900**	10-Bit to 14.5-Bit	SPI, SSI, I²C, UVW, ABZ	3.3, 5	12	8+ (No Upper Limit)	12 to 100k	0	-40 to +125	QFN-16 (3x3)	Robust against parasitic stray fields exceeding 4kA/m DC, or 5mT
S	**MA980**	9-Bit to 13-Bit	SPI	3.3, 5	25µA (256µs On Time)	8+ (No Upper Limit)	5 to 160k	5 to 4100	-40 to +125	WLCSP (1.6x1.6)	Micropower, smallest footprint, robust against parasitic stray fields
S	**MAQ79010**	10-Bit to 14.5-Bit	SPI, SSI, I²C, UVW, SENT, ABZ	3.3, 5	12	8+ (No Upper Limit)	12 to 100k	0	-40 to +150	QFN-16 (3x3)	AEC-Q100, ASIL-B compliant with functional safety, robust against parasitic stray fields exceeding 4kA/m DC, or 5mT, wettable flanks
P	**MAQ79016**	10-Bit to 14.5-Bit	SPI, SSI, I²C, UVW, SENT, ABZ	Up to 26	12	8+ (No Upper Limit)	12 to 100k	0	-40 to +150	QFN-16 (3x3)	AEC-Q100, ASIL-B compliant with functional safety, 26V with reverse polarity protection, robust against parasitic stray fields >4kA/m DC, or 5mT
S	**MAQ900**	10-Bit to 14.5-Bit	SPI, SSI, I²C, UVW, SENT, ABZ	3.3, 5	12	8+ (No Upper Limit)	12 to 100k	0	-40 to +150	QFN-16 (3x3)	AEC-Q100, robust against parasitic stray fields >4kA/m DC, or 5mT
S	**MAQ980**	9-Bit to 13-Bit	SPI	3.3, 5	25µA (256µs On Time)	8+ (No Upper Limit)	5 to 160k	0	-40 to +125	UTQFN (2x2)	AEC-Q100, micropower, smallest footprint, robust against parasitic stray fields >4kA/m DC, or 5mT
P	**MAQ79020**	12-Bit to 14.5-Bit	ABZ, PWM, SPI, I²C, SSI, UVW	3.3, 5	12	8+ (No Upper Limit)	12 to 100k	0	-40 to +150	QFN-32 (5x5)	AEC-Q100, ASIL-D compliant w/ functional safety, robust against parasitic stray fields >4kA/m DC or 5mT, wettable flanks

MagAlpha™ Magnetic Position Sensors

Part Number	±3σ Resolution	Interface	Supply Voltage (V)	Supply Current (mA)	Sensing Range (mT)	Cutoff Frequency (Hz)	Latency at Constant Speed (µs)	Temperature Range (°C)	Package	Notes
MA102	12-Bit	SPI, UVW	3 to 3.6	11.7	30+ (No Upper Limit)	390	8	-40 to +125	QFN-16 (3x3)	Motor commutation angle sensor, UVW multi-pole pair, differential outputs
MA302	12-Bit	SPI, UVW, ABZ	3 to 3.6	11.7	30+ (No Upper Limit)	390	8	-40 to +125	QFN-16 (3x3)	Motor commutation angle sensor, 12-bit SPI output, ABZ & UVW incremental outputs
MA310	12-Bit	SPI, UVW, ABZ	3 to 3.6	11.7	15+ (No Upper Limit)	93	8	-40 to +125	QFN-16 (3x3)	Motor commutation angle sensor, 12-bit SPI output, low magnetic field
MA330	10-Bit to 14-Bit	SPI, UVW, ABZ	3 to 3.6	11.7	30+ (No Upper Limit)	23 to 6k	8	-40 to +125	QFN-16 (3x3)	Motor commutation angle sensor, up to 14-bit SPI output, programmable filter
MA702	12-Bit	SPI, SSI, PWM, ABZ	3 to 3.6	11.7	30+ (No Upper Limit)	390	8	-40 to +125	QFN-16 (3x3)	12-bit SPI output, ABZ incremental & PWM outputs
MA704	10-Bit	SPI, SSI, PWM, ABZ	3 to 3.6	11.7	30+ (No Upper Limit)	2970	8	-40 to +125	QFN-16 (3x3)	12-bit SPI output, high BW, ABZ incremental & PWM outputs
MA710	12-Bit	SPI, SSI, PWM, ABZ	3 to 3.6	11.7	15+ (No Upper Limit)	93	8	-40 to +125	QFN-16 (3x3)	12-bit SPI output, low magnetic field, ABZ incremental & PWM outputs
MA730	14-Bit	SPI, SSI, PWM, ABZ	3 to 3.6	11.7	40+ (No Upper Limit)	23	8	-40 to +125	QFN-16 (3x3)	14-bit SPI output, ABZ incremental & PWM outputs
MA732	10-Bit to 14-Bit	SPI, SSI, PWM, ABZ	3 to 3.6	11.7	30+ (No Upper Limit)	23 to 6k	8	-40 to +125	QFN-16 (3x3)	Prog. filter, ABZ incremental & PWM outputs
MA734	8-Bit to 12.5-Bit	SPI	3 to 3.6	11	30+ (No Upper Limit)	95, 380, 95k	3	-40 to +125	QFN-16 (3x3)	Prog. filter, low latency
MA735	9-Bit to 13-Bit	SPI, SSI, PWM, ABZ	3 to 3.6	11.7	40+ (No Upper Limit)	23 to 6k	8	-40 to +125	UTQFN-14 (2x2)	Ultra-small footprint, prog. filter, ABZ incremental & PWM outputs
MA736	8-Bit to 12.5-Bit	SPI	3 to 3.6	11	30+ (No Upper Limit)	95, 380, 95k	3	-40 to +125	UTQFN-14 (2x2)	Ultra-small footprint, prog. filter, low latency
MA780	8-Bit to 12-Bit	SPI	3 to 3.6	50µA (512µs On Time)	30+ (No Upper Limit)	5 to 160k	4 to 4000	-40 to +125	QFN-16 (3x3)	Optimized for low-power, integrated wake-up and IRQ
MA782	8-Bit to 12-Bit	SPI	3 to 3.6	50µA (512µs On Time)	30+ (No Upper Limit)	5 to 160k	4 to 4000	-40 to +125	UTQFN-14 (2x2)	Micropower, ultra-small footprint, integrated wake-up and IRQ
MA800	8-Bit	SPI, SSI	3 to 3.6	11.7	30+ (No Upper Limit)	90	4000	-40 to +125	QFN-16 (3x3)	Optimized for HMI applications
MA820	8-Bit	SPI, ABZ	3 to 3.6	11.7	30+ (No Upper Limit)	90	4000	-40 to +125	QFN-16 (3x3)	Optimized for HMI applications
MA850	8-Bit	SPI, PWM	3 to 3.6	11.7	30+ (No Upper Limit)	90	4000	-40 to +125	QFN-16 (3x3)	Optimized for HMI applications

	Part Number	±3σ Resolution	Interface	Supply Voltage (V)	Supply Current (mA)	Sensing Range (mT)	Cutoff Frequency (Hz)	Latency at Constant Speed (µs)	Temperature Range (°C)	Package	Notes
	MAQ430	12-Bit	SPI, UVW, ABZ	3 to 3.6	11.7	30+ (No Upper Limit)	390	8	-40 to +150	QFN-16 (3x3)	AEC-Q100, wettable flanks
	MAQ470	12-Bit	SPI, SSI, PWM, ABZ	3 to 3.6	11.7	30+ (No Upper Limit)	390	8	-40 to +150	QFN-16 (3x3)	AEC-Q100, wettable flanks
	MAQ473	10-Bit to 14-Bit	SPI, SSI, PWM, ABZ	3 to 3.6	11.7	30+ (No Upper Limit)	23 to 6k	8	-40 to +150	QFN-16 (3x3)	AEC-Q100, prog. filter, wettable flanks
	MAQ800	8-Bit	SPI, SSI	3 to 3.6	11.7	30+ (No Upper Limit)	90	4000	-40 to +125	QFN-16 (3x3)	Optimized for automotive HMI applications, SSI output, wettable flanks
	MAQ820	8-Bit	SPI, ABZ	3 to 3.6	11.7	30+ (No Upper Limit)	90	4000	-40 to +125	QFN-16 (3x3)	Optimized for automotive HMI applications, SSI output, wettable flanks
	MAQ850	8-Bit	SPI, PWM	3 to 3.6	11.7	30+ (No Upper Limit)	90	4000	-40 to +125	QFN-16 (3x3)	Optimized for automotive HMI applications, SSI output, wettable flanks
N	**MA600A**	12-Bit to 15-Bit	SPI, ABZ, PWM, UVW, SSI	3 to 3.6	7	20+ (No Upper Limit)	75 to 17k	0	-40 to +125	QFN-16 (3x3)	TMR front-end high accuracy and BW, 0.6° INL (<0.1° INL through user calibration w/ 32-word lookup table)
N	**MAQ600A**	12-Bit to 15-Bit	SPI, ABZ, PWM, UVW, SSI	3 to 3.6	7	20+ (No Upper Limit)	75 to 17k	0	-40 to +125	QFN-16 (3x3)	AEC-Q100, TMR front-end, high accuracy and BW, 0.6° INL (<0.1° INL through user calibration w/ 32-word lookup table)

Notes

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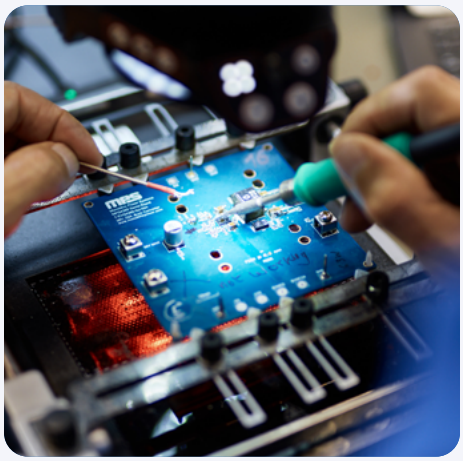

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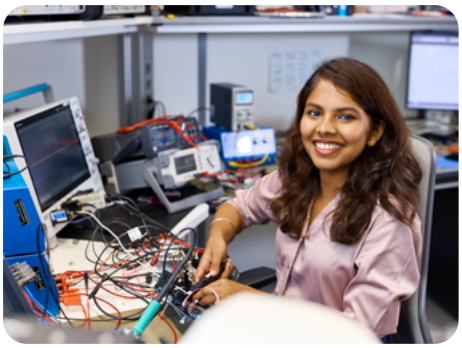

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