

# AUTOMOTIVE POWER MANAGEMENT

AEC-Q100 Solutions



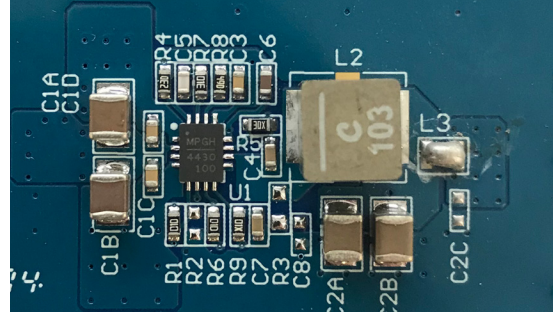
**MPS**  
MonolithicPower.com

## Automotive Qualified Products

When only the best will do, MPS offers its automotive-grade AEC-Q100 products. These solutions are rigorously stress-tested to ensure optimum reliability under demanding AEC-Q100 Grade 1 temperature conditions. Additionally, each part is put through a comprehensive, industry-leading 300-point application "road test" to ensure robustness in the face of harsh automotive conditions such as load dump and cold cranking transients.

## Evaluation Boards

Evaluation boards are available for all automotive-grade products. Contact MPS for details.



## Quality Assurance & Reliability Commitment

Quality is the bedrock of everything that we do at MPS, and we zealously pursue continuous improvement programs to instill a zero defect mentality across the company. Our mission is to design, develop, manufacture and deliver products to our customers with world-class quality and reliability that go above and beyond customer expectations.

### Quality Control and Monitor:

- On-Site Foundry and Assembly Teams
- Daily Short-Term Reliability Monitoring
- Monthly Long-Term Reliability Monitoring
- Quarterly Reliability Monitoring Reports and Supplier Quality Review
- Annual Supplier Audits

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

- ISO9001:2015 (MPS)
- EU RoHS/HF/REACH Compliant (MPS)
- Sony Green Partner (MPS & Suppliers)
- TS16949 (Suppliers)
- ISO14001 (Suppliers)



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## EMC/EMI CISPR 25 Testing

Tomorrow's infotainment, ADAS, and lighting solutions will push the envelope in performance, and in doing so they'll face increasingly complex challenges of meeting strict EMC/EMI emissions requirements. To help support automotive engineers in this effort, MPS now offers EMC/EMI testing in our internal pre-compliance labs — both radiated and conducted emissions may be tested. Our first lab in Hangzhou, China is now operational, and several others are on the way.

Hangzhou, China **NOW OPEN**



## Additional EMC Labs

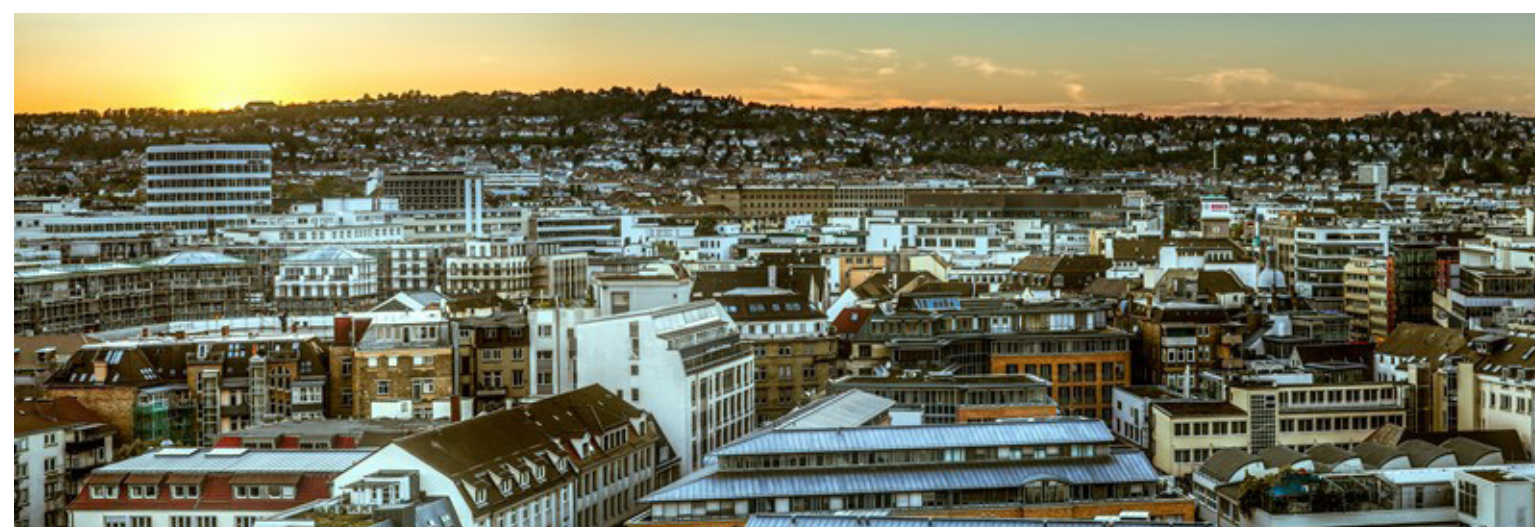
Detroit, USA **PLANNED**



Shanghai, China **PLANNED**

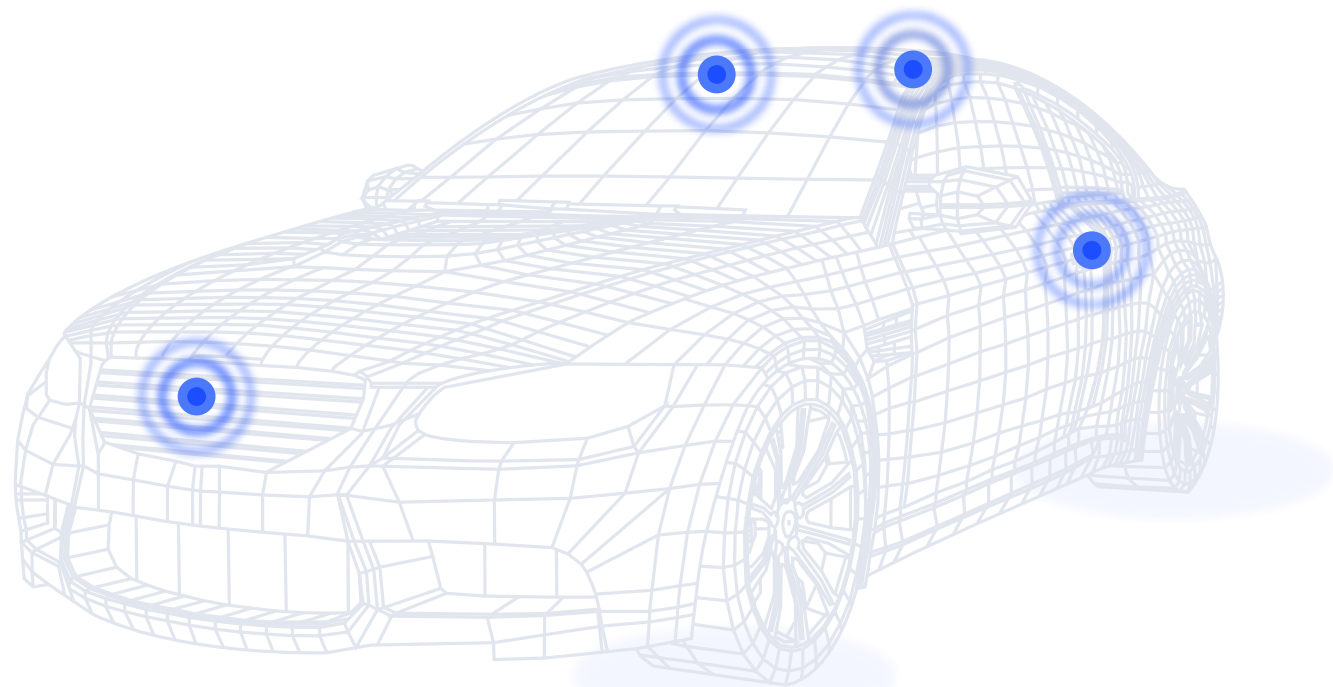


Germany **PLANNED**





# We've got you covered, inside and out.



## PRODUCT CATEGORIES:

DC/DC

LED Driver

LDO

USB Charging

Supervisor

Audio

General Analog

Motor Driver

Magnetic Sensor

High-Side Switch



### Driver Information

- Infotainment
- Telematics
- HUD
- Cluster
- USB Charging
- Wireless Charging
- E-Call



### Lighting

- High & Low Beam
- Fog
- Daytime Running Light
- Signaling
- Ambient
- Puddle
- CHMSL
- Dynamic Effect



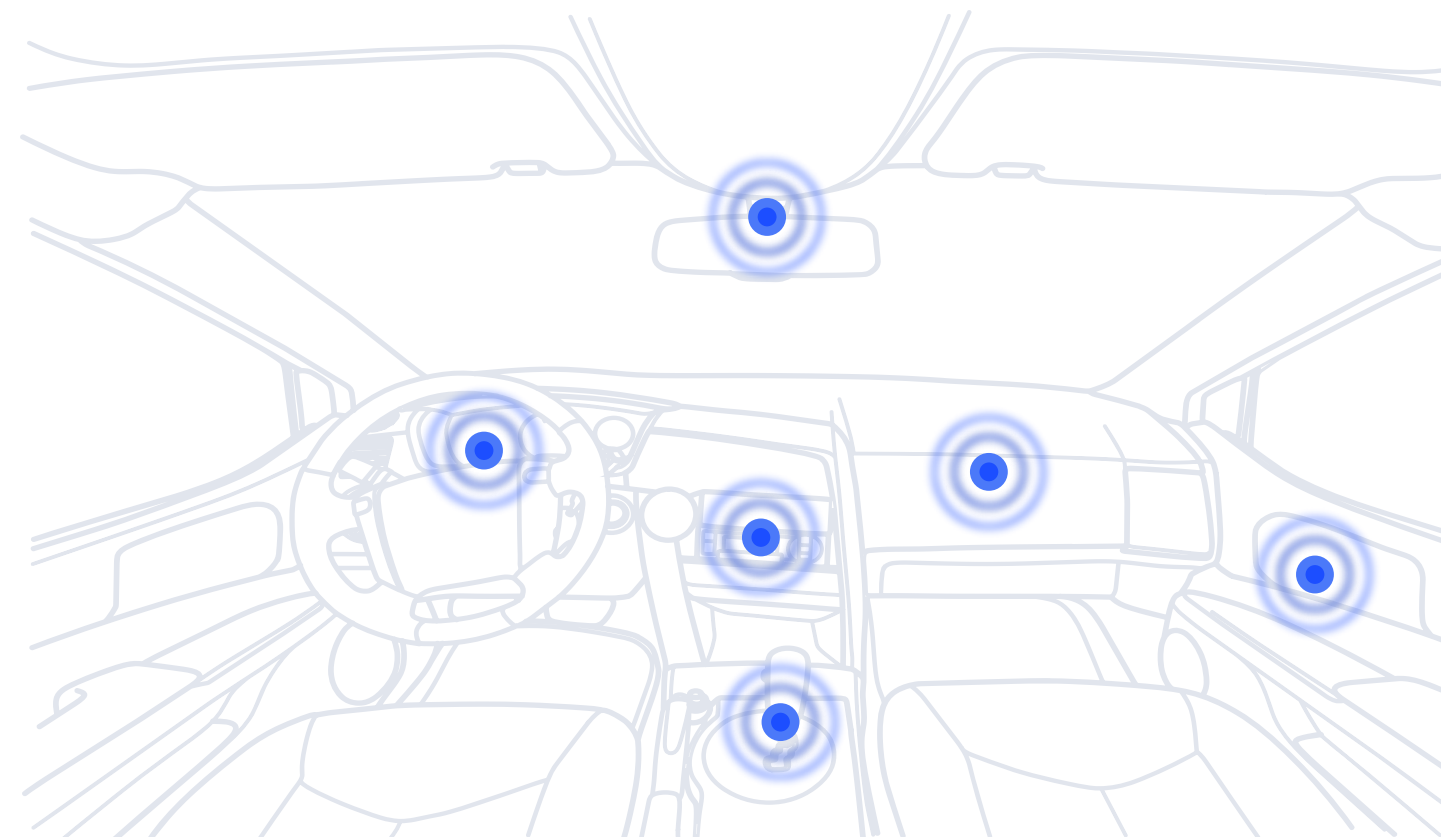
### Body Electronics

- HVAC
- Power Seat
- Side Mirror
- Liftgate
- Moonroof
- Retracting Door Handle
- Body Control Module
- Gateway
- Keyless Entry



### ADAS

- Radar
- LIDAR
- 360 Camera
- Rear Camera
- Ultrasonic
- Domain Controller
- Sensor Fusion
- A/V Compute
- V2X





## Buck Regulators

MPS offers a full variety of DC/DC step-down solutions designed to operate directly from a 12V/24V battery or at the point of load. Choose from highly power dense integrated converters with low RDS(ON) MOSFETs, or flexible controllers with external MOSFETs to easily address high-current requirements. Our solutions help address common automotive design challenges like load-dump tolerance, EMI limits, and operation above or below the AM band.

Low Power

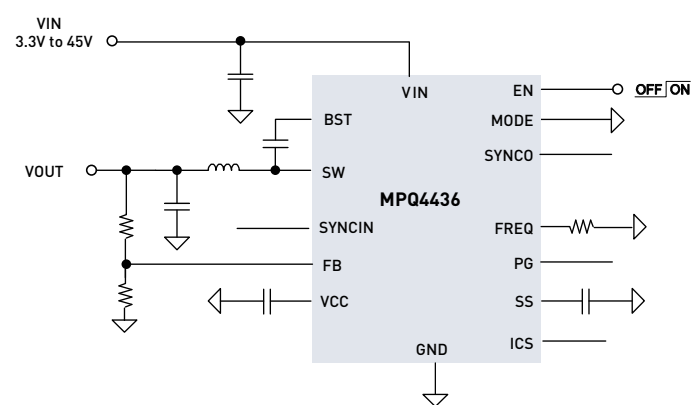
EMI Optimized

High Power Density



### MPQ4436-AEC1 SAMPLING WETTABLE FLANK

45V, 6A Low  $I_Q$  Multi-Phase Synchronous Step-Down Converter with Spread Spectrum

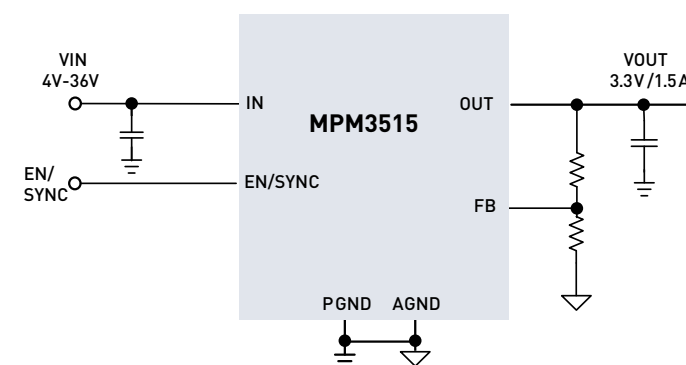


#### Features

- Wide 3.3V to 45V Operating Voltage Range
- 6A Continuous Output Current
- 1 $\mu$ A Low Shutdown Supply Current
- 10 $\mu$ A Sleep Mode Quiescent Current
- Internal 40m $\Omega$  High-Side and 17m $\Omega$  Low-Side MOSFET
- 350kHz to 500kHz Programmable Switching Frequency
- Synchronize to External Clock
- Multiphase Capability
- Out-of-Phase Synchronized Clock Output
- Fixed Output Options: 3.3V, 3.8V, 5V
- Frequency Spread Spectrum Option for Low EMI
- Symmetric  $V_{IN}$  for Low EMI
- Power Good Output
- External Soft Start
- 70ns Minimum On Time
- Selectable Advanced Asynchronous Mode (AAM) or Forced Continuous Conduction Mode (CCM)
- Low Dropout Mode
- Hiccup Over-Current Protection
- Available in a QFN-20 (4mmx4mm) Package

### MPM3515-AEC1 FEATURED WETTABLE FLANK

36V, 1.5A Synchronous Step-Down Power Module with Integrated Inductor and Power Good

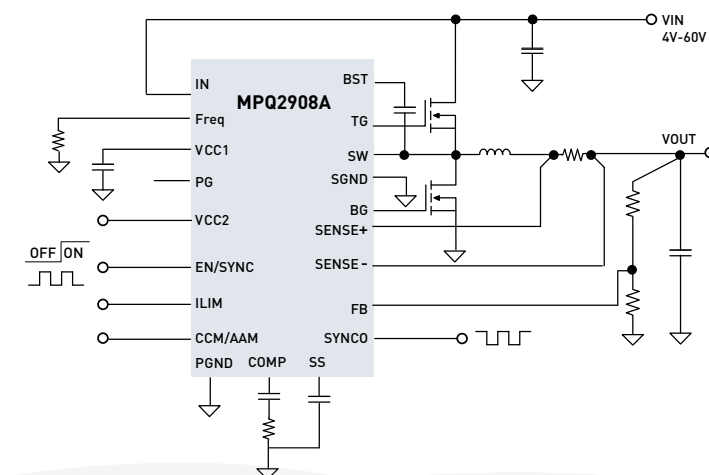


#### Features

- Complete Switch-Mode Power Supply
- Wide 4V to 36V Operating Input Range
- 1.5A Continuous Load Current
- 90m $\Omega$ /50m $\Omega$  Low RDS(ON) Internal Power MOSFETs
- Fixed 2.2MHz Switching Frequency
- Frequency Foldback at a High Input Voltage
- 450kHz to 2.2MHz Frequency Sync
- Forced Continuous Conduction Mode (CCM)
- Power Good (PG) Indicator
- Over-Current Protection (OCP) with Valley-Current Detection and Hiccup
- Thermal Shutdown
- Output Adjustable from 0.8V
- Available in a QFN-17 (3mmx5mmx1.6mm) Package
- CISPR25 Class 5 Compliant

### MPQ2908A-AEC1 NEW WETTABLE FLANK

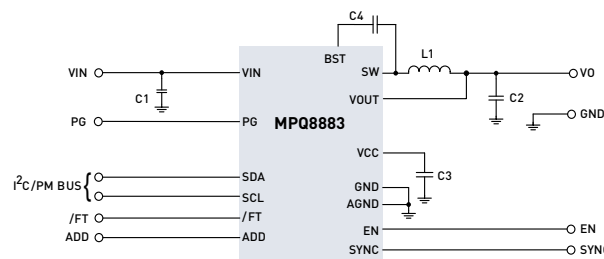
60V Current Mode Synchronous Step-Down Controller



#### Features

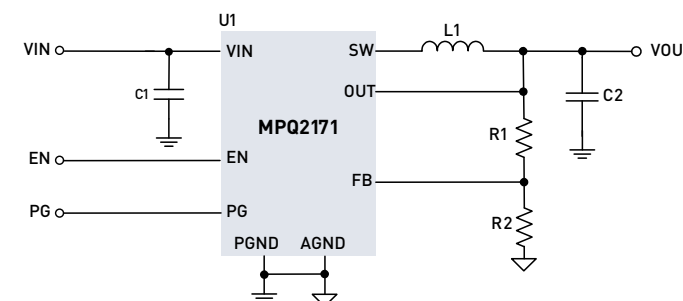
- Wide 4V to 60V Operating Input Range
- Dual N-Channel MOSFET Driver
- 0.8V Voltage Reference with  $\pm 1.5\%$  Accuracy Over Temperature
- Low Dropout Operation: Maximum Duty Cycle at 99.5%
- Programmable Frequency Range: 100kHz - 1000kHz
- External Sync Clock Range: 100kHz - 1000kHz
- 180 $^\circ$  Out-of-Phase SYNCO Pin
- Programmable Soft Start (SS)
- Power Good (PG) Output Voltage Monitor
- Selectable Cycle-by-Cycle Current Limit
- Output Over-Voltage Protection (OVP)
- Over-Current Protection (OCP)
- Internal LDO with External Power Supply Option
- Programmable Forced CCM and AAM
- Available in TSSOP20EP and QFN-20 (3mmx4mm) Packages



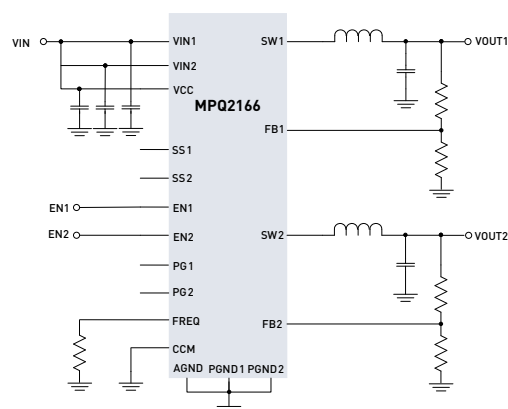
**MPQ8883-AEC1** **FEATURED** **WETTABLE FLANK****45V, 3A Digitally Programmable Synchronous Step-Down Converter****Features**

- Wide 3.5V to 45V Operating Input Range
- 3A Continuous Output Current
- High-Efficiency Synchronous Mode Control
- Internal 80mΩ/40mΩ Low RDS(ON) MOSFETs
- Power Good and Fault Indications
- OVP, OCP, and OTP
- Internal Soft Start
- Programmable Address by Resistor
- CISPR25 Class 5 Compliant

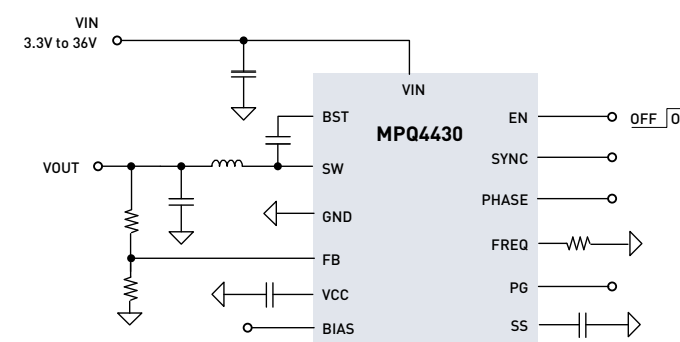
- Programmability via I<sup>2</sup>C Interface
  - Output Range from 0.6V to 12V
  - Switching Frequency
  - Compensation Network
  - Slope Compensation
  - EN Threshold
  - Input UVLO Threshold
  - PG Threshold
  - AAM, CCM Selection
  - Light-load Mode Threshold
  - SCP Mode Selection
  - Current Limit Threshold
  - OVP Mode Selection
  - Input /Output OVP Threshold
  - OTP Threshold
  - Switching Slew Rate
  - Output Slew Rate (SS Time)
  - SYNC Input/Output Selection
  - Phase Shift
  - Frequency Dithering for Low-EMI Operation
- Multi-Page One-Time Programmable Memory for Permanent Storage
- Available in a QFN-16 (3mmx3mm) Package

**MPQ2171/2172-AEC1** **FEATURED****5.5V, 1A / 2A 2.6MHz Synchronous Step-Down Converter****Features**

- Wide 2.5V to 5.5V Operating Input Range
- Output Voltage as Low as 0.6V
- 100% Duty Cycle in Dropout
- Up to 1A Output Current (MPQ2171)
- Up to 2A Output Current (MPQ2172)
- 80mΩ and 45mΩ Internal Power MOSFET Switches (MPQ2171)
- 90mΩ and 50mΩ Internal Power MOSFET Switches (MPQ2172)
- Default 2.6MHz Switching Frequency with 3.3V Input and 1.8V Output
- EN and Power Good for Power Sequencing
- Cycle-by-Cycle Over-Current Protection (OCP)
- Auto-Discharge at Power-Off
- Short-Circuit Protection (SCP) with Hiccup Mode
- Stable with Low ESR Output Ceramic Capacitors
- Available in a TSOT23-8 Package

**MPQ2166-AEC1** **NEW** **WETTABLE FLANK****6V, Dual 2A/2A Low Quiescent Current Synchronous Buck****Features**

- 2.7V to 6V Operating Input Range
- 2A/2A or 3A/1A Continuous Current
- 55mΩ/20mΩ R<sub>DS(ON)</sub>
- Programmed Frequency up to 3MHz
- External Sync Clock Up to 3MHz
- 180° Phase-Shifted Operation
- PG Indicators
- External SS and Track
- Adjustable Advanced Asynchronous Mode (AAM) or Forced Continuous Conduction Mode (CCM)
- Peak Efficiency >90%
- Output Adjustable from 0.6V to V<sub>IN</sub>
- 100% Duty Cycle Operation
- 60μA Quiescent Current
- Cycle-by-Cycle Over-Current Protection (OCP)
- Short-Circuit Protection (SCP) with Hiccup Mode and Valley Current Detection
- Thermal Shutdown
- Available in a QFN-18 (2mmx3mm) Package

**MPQ4430-AEC1** **FEATURED** **WETTABLE FLANK****36V, 3.5A Low I<sub>Q</sub> Synchronous Step-Down Converter****Features**

- Wide 3.3V to 36V Operating Input Range
- 3.5A Continuous Output Current
- 1μA Low Shutdown Mode Current
- 10μA Sleep Mode Quiescent Current
- Internal 90mΩ High-Side and 40mΩ Low-Side MOSFETs
- 350kHz to 2.5MHz Programmable Switching Frequency
- Fixed Output Options: 3.3V, 3.8V, 5V
- Synchronize to External Clock Selectable In-Phase or 180° Out-of-Phase
- Power Good Indicator
- Programmable Soft-Start Time
- 80ns Minimum On Time
- Selectable Forced CCM or AAM
- Low Dropout Mode
- OCP with Valley-Current Detection and Hiccup
- Available in a QFN-16 (3mmx4mm) Package



**BUCK REGULATORS**

**5-6V Secondary Synchronous**

	Part Number	V <sub>IN</sub> (Min) [V]	V <sub>IN</sub> (Max) [V]	I <sub>OUT</sub> [A]	I <sub>SW</sub> Limit (Typ) [A]	I <sub>Q</sub> (Typ) [μA]	V <sub>FB</sub> [V]	F <sub>SW</sub> [kHz]	R <sub>DS(on)</sub> [mΩ]	Fixed Output Versions [V]	Soft Start	Ext Sync	Forced CCM	AAM	COT Control	Fixed Frequency	Package	Notes	
NEW	MPM3805A-AEC1	2.6	6	0.6	1	17	0.6	3500	120 / 70	1.2, 1.8	Int	✓	✓	✓	✓	QFN-12 (2.5x3.0x0.9)	Module with integrated inductor	+WF	
NEW	MPQ2171-AEC1	2.5	5.5	1	4.5		0.6	2800	80 / 40		Int	✓	✓	✓	✓	TSOT23-8	Output discharge, 100% duty cycle	+WF	
NEW	MPM3810A-AEC1	2.6	6	1.2	2.1	17	0.6	3500	120 / 70		Int	✓	✓	✓	✓	QFN-12 (2.5x3.0x0.9)	Module with integrated inductor	+WF	
NEW	MPQ2172-AEC1	2.5	5.5	2	4.5		0.6	2800	80 / 40		Int	✓	✓	✓	✓	TSOT23-8	Output discharge, 100% duty cycle	+WF	
NEW	MPQ2169-AEC1	2.7	6	1.4+1.4	2	60	0.6	350 to 3000	55 / 20		Ext	✓	✓	✓	✓	QFN-18 (2.5x3.5)	Dual outputs of 1.4A/1.4A or 0.8A/2A, 100% duty cycle op.	+WF	
	MPQ2143-AEC1	2.5	5.5	3	4.8	40	0.6	1200	80 / 40		Int	✓	✓	✓	✓	TSOT23-8	Output discharge, 100% duty cycle	+WF	
	MPQ2166-AEC1	2.7	6	2+2	2	60	0.6	350 to 3000	55 / 20		Ext	✓	✓	✓	✓	QFN-18 (2.5x3.5), QFN-18 (2x3)	Dual outputs of 2A/2A or 1A/3A, 100% duty cycle operation	+WF	
Sampling	MPQ2167-AEC1	2.7	6	4	6.7	42	0.6	300 to 2200	35 / 30		Ext	✓	✓	✓	✓	QFN-11 (2x3)	100% duty cycle	+WF	
Sampling	MPQ2167B-AEC1	2.7	6	4	6.7	42	0.6	300 to 2200	35 / 30		Ext	✓	✓	✓	✓	QFN-11 (2x3)	100% duty cycle	+WF	

**36-45V Primary Synchronous**

	Part Number	V <sub>IN</sub> (Min) [V]	V <sub>IN</sub> (ABS Max) [V]	I <sub>OUT</sub> [A]	I <sub>SW</sub> Limit (Typ) [A]	I <sub>Q</sub> (Typ) [μA]	V <sub>FB</sub> [V]	F <sub>SW</sub> [kHz]	R <sub>DS(on)</sub> [mΩ]	Fixed Output Versions [V]	Soft Start	Ext Sync	Spread Spectrum	Forced CCM	AAM	Fixed Frequency	Package	Notes	
Sampling	MPQ4300-AEC1	3.5	50	0.5	2			470 / 2200	95 / 50	5, 3.8, 3.3	Int	✓	✓	✓	✓	QFN-16 (4x3), QFN-16 (3x3)	MPQ4300 spread spectrum family, low component count	+WF	
Sampling	MPM3509B-AEC1	4	40	0.6	5	600	0.8	410	90 / 50		Int	✓	✓	✓	✓	QFN-17 (3x5x1.6)	Ultra-compact module, integrated inductor, BST/VCC capacitors	+WF	
NEW	MPM3509-AEC1	4	40	0.9	3	600	0.8	2200	90 / 50		Int	✓	✓	✓	✓	QFN-17 (3x5x1.6)	Ultra-compact module, integrated inductor, BST/VCC capacitors	+WF	
Sampling	MPQ4301-AEC1	3.5	50	1	3			470 / 2200	95 / 50	5, 3.8, 3.3	Int	✓	✓	✓	✓	QFN-16 (4x3), QFN-16 (3x3)	MPQ4300 spread spectrum family, low component count	+WF	
NEW	MPQ4431-AEC1	3.3	40	1	2.5	10	0.8	350 to 2500	90 / 80		Ext	✓	✓	✓	✓	QFN-16 (3x4)	Low I <sub>Q</sub> , good EMI, and low dropout mode	+WF	
	MPM3515-AEC1	4	40	1.5	4	600	0.8	2200	90 / 50		Int	✓	✓	✓	✓	QFN-17 (3x5x1.6)	Ultra-compact module, integrated inductor, BST/VCC capacitors	+WF	
NEW	MPQ4415A-AEC1	4	40	1.5	4	600	0.8	450 to 2200	90 / 50		Int	✓	✓	✓	✓	QFN-13 (2.5x3)		+WF	
Sampling	MPQ4302-AEC1	3.5	50	2	5			470 / 2200	95 / 50	5, 3.8, 3.3	Int	✓	✓	✓	✓	QFN-16 (4x3), QFN-16 (3x3)	MPQ4300 spread spectrum family, low component count	+WF	
Sampling	MPQ4312-AEC1	3.3	50	2	5.5	10	0.8	350 to 500	40 / 17		Ext	✓	✓	✓	✓	QFN-20 (4x4)	MPQ4312 low I <sub>Q</sub> spread spectrum family	+WF	
	MPQ4420H-AEC1	4	40	2	4.2	500	0.8	410	90 / 55		Int	✓	✓	✓	✓	TSOT23-8		+WF	
	MPQ4420A-AEC1	4	40	2	5.6	500	0.8	410	90 / 55		Int	✓	✓	✓	✓	TSOT23-8		+WF	
NEW	MPQ4432-AEC1	3.3	40	2.2	5.2	10	0.8	350 to 2500	90 / 40		Ext	✓	✓	✓	✓	QFN-16 (3x4)	Low I <sub>Q</sub> , good EMI, and low dropout mode	+WF	

Note: +WF Available with Wettable Flank

CONTINUE NEXT PAGE >

**BUCK REGULATORS**

**36-45V Primary Synchronous**

	Part Number	V <sub>IN</sub> (Min) [V]	V <sub>IN</sub> (ABS Max) [V]	I <sub>OUT</sub> [A]	I <sub>SW</sub> Limit (Typ) [A]	I <sub>Q</sub> (Typ) [μA]	V <sub>FB</sub> [V]	F <sub>SW</sub> [kHz]	R <sub>DS(on)</sub> [mΩ]	Fixed Output Versions [V]	Soft Start	Ext Sync	Spread Spectrum	Forced CCM	AAM	Fixed Frequency	Package	Notes	
Sampling	MPQ4303-AEC1	3.5	50	3	6			470 / 2200	95 / 50	5, 3.8, 3.3	Int	✓	✓	✓	✓	QFN-16 (4x3), QFN-16 (3x3)	MPQ4300 spread spectrum family, low component count	+WF	
Sampling	MPQ4313-AEC1	3.3	50	3	5.5	10	0.8	350 to 500	40 / 17		Ext	✓	✓	✓	✓	QFN-20 (4x4)	MPQ4312 low I <sub>Q</sub> spread spectrum family	+WF	
NEW	MPQ4433-AEC1	3.3	40	3	5.8	10	0.8	350 to 2500	90 / 40		Ext	✓	✓	✓	✓	QFN-16 (3x4)	Low I <sub>Q</sub> , good EMI, and low dropout mode	+WF	
	MPQ4423H-AEC1	4	40	3	4.4	500	0.8	410	85 / 55		Int	✓	✓	✓	✓	QFN-8 (3x3)		+WF	
	MPQ4423A-AEC1	4	40	3	5.7	600	0.8	410	85 / 55		Int	✓	✓	✓	✓	QFN-8 (3x3)		+WF	
Sampling	MPQ8883-AEC1	3.5	50	3	1 to 8			250 to 2500	95 / 50	1.8 to 12	Int	✓	✓	✓	✓	QFN-16 (3x3)	I <sup>2</sup> C interface, OTP, digitally prog. output voltage, frequency, comp., protection, slew rate, & more	+WF	
	MPQ4473-AEC1	4.5	40	3.5	6.6	500	0.8	200 to 1000	40 / 20		Ext	✓	✓	✓	✓	QFN-8 (3x3)	COT control	+WF	
NEW	MPQ4430-AEC1	3.3	40	3.5	5.8	10	0.8	350 to 2500	90 / 40		Ext	✓	✓	✓	✓	QFN-16 (3x4)	Low I <sub>Q</sub> , good EMI, and low dropout mode	+WF	
Sampling	MPQ4314-AEC1	3.3	50	4	8	10	0.8	350 to 500	40 / 17		Ext	✓	✓	✓	✓	QFN-20 (4x4)	MPQ4312 low I <sub>Q</sub> spread spectrum family	+WF	
	MPQ4470-AEC1	4.5	40	5	8	500	0.8	100 to 1000	40 / 20		Ext	✓	✓	✓	✓	QFN-20 (3x4)	Prog. soft-start time, SCP, OCP, OVP latch, COT control	+WF	
	MPQ4470A-AEC1	4.5	40	5	8	500	0.8	100 to 1000	40 / 20		Ext	✓	✓	✓	✓	QFN-20 (3x4)	Prog. soft-start time, SCP, OCP, COT control	+WF	
Sampling	MPQ4315-AEC1	3.3	50	5	8	10	0.8	350 to 500	40 / 17		Ext	✓	✓	✓	✓	QFN-20 (4x4)	MPQ4312 low I <sub>Q</sub> spread spectrum family	+WF	
Sampling	MPQ4316-AEC1	3.3	50	6	13	10	0.8	350 to 500	40 / 17		Ext	✓	✓	✓	✓	QFN-20 (4x4)	MPQ4312 low I <sub>Q</sub> spread spectrum family	+WF	
Sampling	MPQ4436-AEC1	3.3	50	6	13	10	0.8	350 to 500	40 / 17		Ext	✓	✓	✓	✓	QFN-20 (4x4)	Multiphase, low I <sub>Q</sub>	+WF	
Sampling	MPQ4317-AEC1	3.3	50	7	13	10	0.8	350 to 500	40 / 17		Ext	✓	✓	✓	✓	QFN-20 (4x4)	MPQ4312 low I <sub>Q</sub> spread spectrum family	+WF	
NEW	MPQ2918-AEC1	4	40	Controller	750	0.8		100 to 1000			Ext	✓	✓	✓	✓	TSSOP-20 EP, QFN-20 (3x4)	High max duty cycle (99.5%)	+WF	

Note: +WF Available with Wettable Flank



## BUCK REGULATORS

## HV Synchronous

	Part Number	V <sub>IN</sub> (Min) [V]	V <sub>IN</sub> (ABS Max) [V]	I <sub>OUT</sub> (Max) [A]	I <sub>SW</sub> Limit (Typ) [A]	I <sub>o</sub> (Typ) [μA]	V <sub>FB</sub> [V]	F <sub>SW</sub> [kHz]	R <sub>DS(ON)</sub> [mΩ]	Soft Start	Ext Sync	Forced CCM	AAM	Hysteric Control	Fixed Frequency	Package	Notes
	MPQ4569-AEC1	4.5	80	0.3	0.72	20	1		1200 / 450	Ext		✓	✓		QFN-10 (3x3) SOIC-8E	Programmable soft start	
NEW	MPQ4569A-AEC1	4.5	80	0.3	0.72	20	1		1200 / 500	Ext		✓	✓		QFN-10 (3x3)	Programmable soft start	
	MPQ2420-AEC1	4.5	80	0.3	0.72	20	1		1200 / 450	Ext		✓	✓		TSSOP16	Integrated separate windowed watchdog die	
NEW	MPQ2420A-AEC1	4.5	80	0.3	0.72	20	1		1200 / 450	Ext		✓	✓		TSSOP16	Integrated separate windowed watchdog die, default enable on	
NEW	MPQ4590-AEC1	7.5	700	0.4	0.66	200	1.7		13.5	Int	✓		✓		SOIC-8E	Primary-side CV control, supporting buck, buck-boost, boost & flyback topologies	
Sampling	MPQ4571-AEC1	4.5	65	1	1.9	0.8		200 to 2200	200 / 45	Int	✓	✓		✓	QFN-12 (2.5x3)	Compact	
Sampling	MPQ4572-AEC1	4.5	65	2	3.5	0.8		200 to 2200	200 / 45	Int	✓	✓		✓	QFN-12 (2.5x3)	Compact	
	MPQ4570-AEC1	4.5	60	3	5.7	520	1	100 to 1000	90 / 70	Ext	✓		✓		TSSOP20 EP	Programmable soft-start time	
NEW	MPQ2908A-AEC1	4	60	Controller	750	0.8		100 to 1000		Ext	✓	✓	✓	✓	TSSOP20 EP QFN-20 (3x4)	High max duty cycle (99.5%)	

## Controllers

	Part Number	V <sub>IN</sub> (Min) [V]	V <sub>IN</sub> (Max) [V]	I <sub>o</sub> (Typ) [μA]	I <sub>SD</sub> (Typ) [μA]	V <sub>FB</sub> [V]	F <sub>SW</sub> [kHz]	Soft Start	Ext Sync	Forced CCM	AAM	Fixed Frequency	Package	Notes
NEW	MPQ2908A-AEC1	4	60	750	0.5	0.8	100 to 1000	Ext	✓	✓	✓	✓	TSSOP20 EP QFN-20 (3x4)	High max duty cycle (99.5%) +WF
NEW	MPQ2918-AEC1	4	40	750	0.5	0.8	100 to 1000	Ext	✓	✓	✓	✓	TSSOP20 EP QFN-20 (3x4)	High max duty cycle (99.5%) +WF

## Modules

	Part Number	V <sub>IN</sub> (Min) [V]	V <sub>IN</sub> (Max) [V]	I <sub>OUT</sub> [A]	I <sub>SW</sub> Limit (Typ) [A]	I <sub>o</sub> (Typ) [μA]	V <sub>FB</sub> [V]	F <sub>SW</sub> [kHz]	R <sub>DS(ON)</sub> [mΩ]	Fixed Output Versions [V]	Soft Start	Ext Sync	Forced CCM	Package	Notes
NEW	MPM3805A-AEC1	2.6	6	0.6	1	17	0.6	3500	120 / 70	1.2, 1.8	Int		✓	QFN-12 (2.5x3.0x0.9)	Module with integrated inductor +WF
NEW	MPM3810A-AEC1	2.6	6	1.2	2.1	17	0.6	3500	120 / 70		Int		✓	QFN-12 (2.5x3.0x0.9)	Module with integrated inductor +WF
Sampling	MPM3509B-AEC1	4	40	0.6	5	600	0.8	410	90 / 50		Int	✓	✓	QFN-17 (3x5x1.6)	Ultra-compact module with integrated inductor, BST/VCC capacitors +WF
NEW	MPM3509-AEC1	4	40	0.9	3	600	0.8	2200	90 / 50		Int	✓	✓	QFN-17 (3x5x1.6)	Ultra-compact module with integrated inductor, BST/VCC capacitors +WF
	MPM3515-AEC1	4	40	1.5	4	600	0.8	2200	90 / 50		Int	✓	✓	QFN-17 (3x5x1.6)	Ultra-compact module with integrated inductor, BST/VCC capacitors +WF

Note: +WF Available with Wettable Flank

## BUCK REGULATORS

## Non-Synchronous

	Part Number	V <sub>IN</sub> (Min) [V]	V <sub>IN</sub> (ABS Max) [V]	I <sub>OUT</sub> (Max) [A]	I <sub>SW</sub> Limit (Typ) [A]	I <sub>o</sub> (Typ) [μA]	V <sub>FB</sub> [V]	F <sub>SW</sub> [kHz]	R <sub>DS(ON)</sub> [mΩ]	Soft Start	Ext Sync	Forced CCM	Fixed Frequency	Package	Notes
	MPQ2459-AEC1	4.5	60	0.5	1.25	730	0.8	480	1000	Int		✓	✓	TSOT23-6	Superior light-load efficiency
	MPQ2451-AEC1	3.3	40	0.6	1	130	0.8	2000	500	Int		✓	✓	TSOT23-6L QFN-6L	Internal comp and SS, programmable, fixed output versions: 3.3V, 5V
	MPQ2454-AEC1	4.5	40	0.6	1.8	60	0.8	350 to 2300	200	Ext	✓	✓	✓	QFN-10 (3x3) MSOP-10 EP	Superior light-load efficiency
	MPQ4558-AEC1	3.8	60	1	1.9	140	0.8	200 to 2000	250	Int		✓	✓	QFN-10 (3x3) SOIC-8E	Superior light-load efficiency
	MPQ4559-AEC1	3.8	60	1.5	2.3	140	0.8	200 to 2000	250	Int		✓	✓	QFN-10 (3x3)	Superior light-load efficiency
	MPQ4561-AEC1	3.8	60	1.5	2.5	140	0.8	250 to 2000	300	Ext		✓	✓	QFN-10 (3x3)	Superior light-load efficiency
	MPQ4560-AEC1	3.8	60	2	3.2	140	0.8	250 to 2000	250	Int		✓	✓	QFN-10 (3x3) SOIC-8E	Superior light-load efficiency
	MPQ4462-AEC1	3.8	60	3.5	5.5	120	0.8	250 to 4000	150	Int		✓	✓	QFN-10 (3x3) SOIC-8E	Superior light-load efficiency
Sampling	MPQ4467-AEC1	3.3	40	2.5	5.6	10	0.8	250 to 2500	95	Ext	✓	✓	✓	QFN-16 (3x4)	Low dropout, selectable in-phase or 180° out-of-phase
NEW	MPQ4468-AEC1	3.3	40	3	5.8	10	0.8	350 to 2500	90	Ext	✓	✓	✓	QFN-16 (3x4)	Low dropout, selectable in-phase or 180° out-of-phase
Sampling	MPQ4469-AEC1	3.3	40	5	7.7	10	0.8	350 to 2500	90	Ext	✓	✓	✓	QFN-20 (4x5)	Low dropout, selectable in-phase or 180° out-of-phase
	MPQ2362-AEC1	4.75	25	Dual 2	3.4	2000	1.222	380	180	Int	✓	✓	✓	TSSOP20F	Dual output

Note: +WF Available with Wettable Flank



# Boost Regulators

MPS offers a full variety of DC/DC step-up solutions designed to operate directly from a 12V/24V battery or at the point of load. Choose from highly power dense integrated converters with low  $R_{DS(ON)}$  MOSFETs, or flexible controllers with external MOSFETs to easily address high-current requirements. Our solutions help address common automotive design challenges like cold crank, EMI limits, and operation above or below the AM band.

High Efficiency

EMI Optimized

Compact Solution



## BOOST REGULATORS

### Synchronous

Part Number	$V_{IN}$ (Min) (V)	$V_{IN}$ (Max) (V)	$V_{OUT}$ (Max) (V)	$I_{SW}$ Limit (Typ) (A)	$I_o$ (Typ) ( $\mu$ A)	$V_{FB}$ (V)	$F_{SW}$ (kHz)	$R_{DS(ON)}$ (m $\Omega$ )	Fixed Output Versions	Fixed Frequency	Package	Notes
MPQ3410-AEC1	1.8	6	6	1.3	360	1.19	550	530 / 300	✓		TSOT23-5	Output disconnect
NEW MPQ3428A-AEC1	3	20	22	19	110	1.2	600	18	✓		QFN-22 (3x4)	Input disconnect function, external high-side gate drive
Sampling MPQ3431-AEC1	0.8	13	16	21.5	450	1.0	410	15 / 11.5	✓		QFN-13 (3x4)	Programmable input current limit
Sampling MPQ3414B-5-AEC1	1.8	5.5	5	3.6	8		2200	80 / 70	5	✓	TSOT23-8	True output disconnect from input

### Controllers

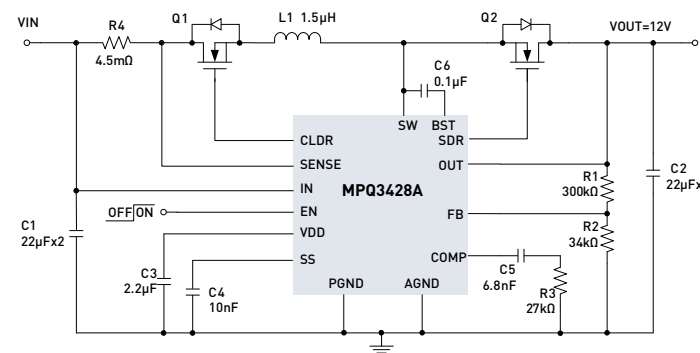
Part Number	$V_{IN}$ (Min) (V)	$V_{IN}$ (Max) (V)	$I_o$ (Typ) ( $\mu$ A)	$I_{SD}$ (Typ) ( $\mu$ A)	$V_{FB}$ (V)	$F_{SW}$ (kHz)	Soft Start	Sync	Package	Notes
NEW MPQ3910-AEC1	5	35	290	1	1.5	30 to 400	Ext	✓	MSOP-10	Peak current mode, light load operation, supports >10A, OVP, SCP, OTP

### Non-Synchronous

Part Number	$V_{IN}$ (Min) (V)	$V_{SW}$ (Max) (V)	$V_{OUT}$ (Max) (V)	$I_{SW}$ Limit (Typ) (A)	$I_o$ (Typ) ( $\mu$ A)	$V_{FB}$ (V)	$F_{SW}$ (kHz)	$R_{DS(ON)}$ (m $\Omega$ )	Fixed Frequency	Package	Notes
MPQ3425-AEC1	3.1	55	55	5	650	1.23	300 to 2000	90	✓	QFN-14 (3x4)	Programmable UVLO and EN hysteresis
MPQ3426-AEC1	3.2	45	35	8.5	650	1.23	300 to 2000	90	✓	QFN-14 (3x4)	Programmable UVLO and EN hysteresis

## MPQ3428A-AEC1 NEW WETTABLE FLANK

20V, 19A, 600kHz Synchronous Boost Converter with Input Disconnect Function



### Features

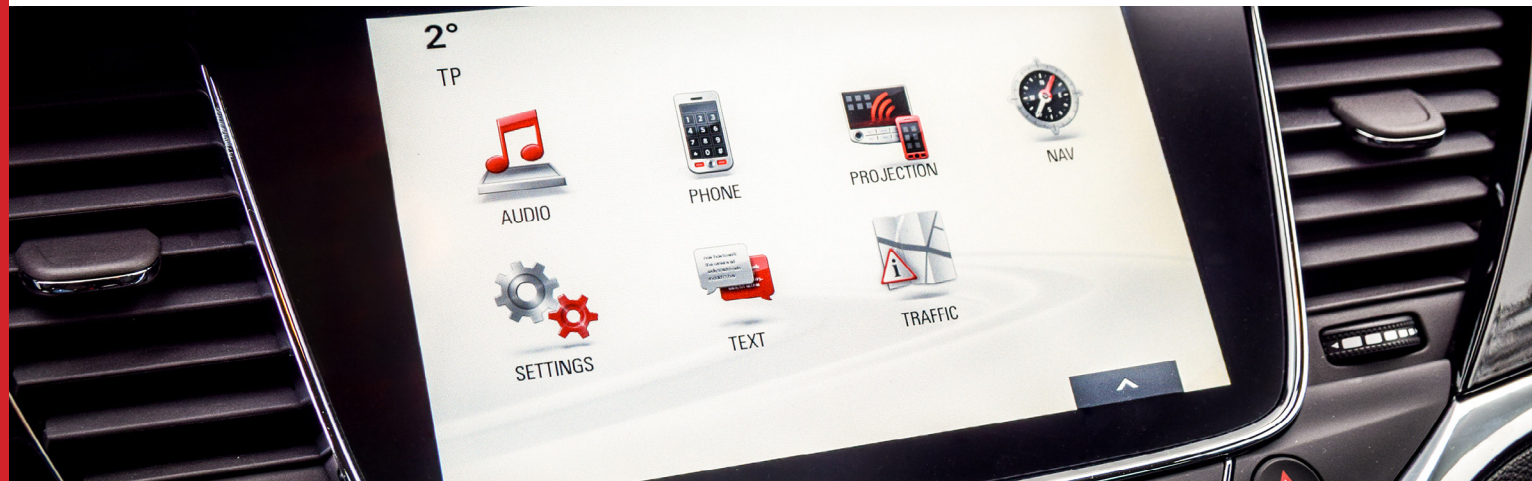
- 3V to 20V Wide Input Range
- Integrated 18m $\Omega$  Low-Side Power MOSFET
- SDR Driver for Synchronous Solution
- 19A Internal Switch Current Limit or External Programmable Input Current Limit
- Input Disconnect and Output SCP
- External Soft Start and Compensation for Higher Flexibility
- Programmable UVLO and Hysteresis
- <1 $\mu$ A Shutdown Current
- Thermal Shutdown at 150 $^{\circ}$ C
- Available in a QFN-22 (3mmx4mm) Package



## Audio, Analog Switches & Load Switches

Automotive load switches enable precise power distribution control throughout the vehicle and can protect against unwanted events like over-voltage and over-current faults.

Integrated Safety Features    Small Solution Size    Fast Protection Response



## USB Chargers

MPS automotive USB chargers are fully integrated USB charging solutions combining high efficiency DC/DC step-down converters and current-limit switches, with the option of single or dual output Type-A, Type-C ports. These advanced charging port products incorporate many common protocols, such as USB Type-C (15W), USB Type-C power delivery, DCP, CDP and BC1.2, and help automotive customers design compact and thermally optimized USB charge ports for use throughout the vehicle.

Low EMI    High Efficiency    Thermally Optimized



### AUDIO PRODUCTS (CLASS-D AUDIO AMPLIFIERS)

	Part Number	V <sub>IN</sub> (Min) [V]	V <sub>IN</sub> (Max) [V]	P <sub>OUT</sub> [W]	Efficiency [%]	THD+N [%]	PSRR [dB]	Package	Notes
Sampling	MPQ7790-AEC1	5	18	10	93	0.79 @ 1W	20	TSSOP20 EP	Low EMI, analog input Class-D for mono speaker in bridge-tied load configuration

### ANALOG SWITCHES

	Part Number	V <sub>IN</sub> (Min) [V]	V <sub>IN</sub> (Max) [V]	Switcher Current [A]	T <sub>ON</sub> [ns]	T <sub>OFF</sub> [ns]	Power Supply Current [μA]	Bandwidth [MHz]	R <sub>DS(ON)</sub> [Ω]	Package	Notes
	MPQ2735-AEC1	1.65	5.5	0.1	29	23	1	50	0.25	QFN-10 (1.4x1.8)	Low-voltage 0.45Ω dual SPDT analog switches, separate control inputs

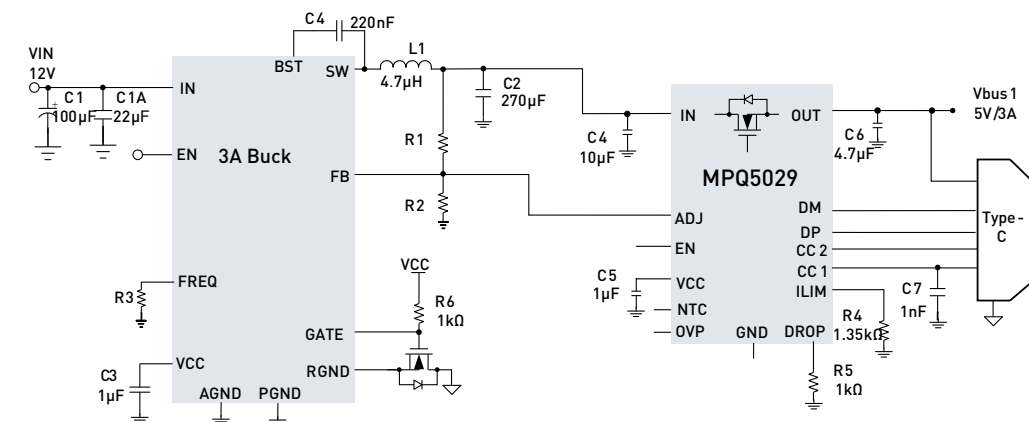
### LOAD SWITCHES

	Part Number	V <sub>IN</sub> (Min) [V]	V <sub>IN</sub> (Max) [V]	Load Current	I <sub>o</sub> [Typ] [mA]	R <sub>DS(ON)</sub> [mΩ]	Package	Notes
	MPQ5073-AEC1	0.5	5.5	2	0.18	50	QFN-12 (2x2)	Adjustable current limit
NEW	MPQ5069-AEC1	4.5	28	10	1.5	7	QFN-22 (3x5)	Adjustable current limit

### MPQ5029-AEC1

**SAMPLING**    **WETTABLE FLANK**

USB Charging Type-A & Type-C Port Controller with Integrated Current Limit Switch and Short-to-Battery Protection



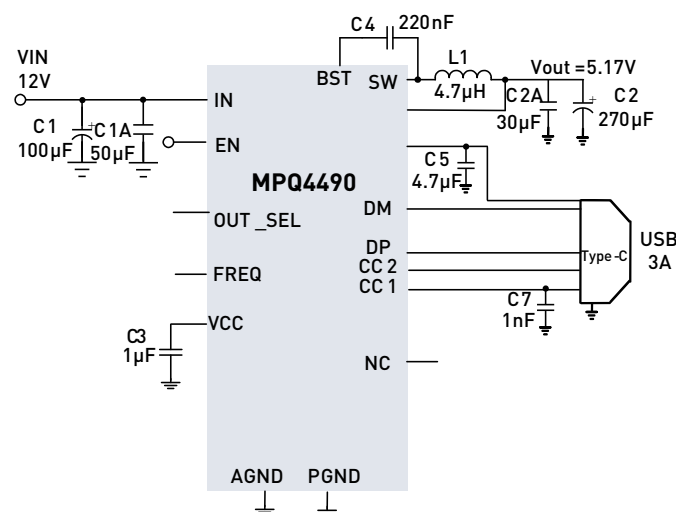
#### Features

- Up to 22V Voltage Rating for Input and Output
- Support Type-C 5V@3A DFP Mode
- Support QC 3.0 (3.6V-12V Output) Mode
- Support 5V DCP schemes for BC 1.2, Divider Mode, 1.2V/1.2V Mode
- I/O pins (DP, DM, CC1 and CC2) Support Short to Battery Protection
- OUT Short to Battery Protection when Vbus is Enabled
- Line Drop Compensation for 5V Output
- Programmable High Accuracy Current Limit
- 25mΩ Low-RDS(ON) Power MOSFET
- NTC pin for Thermal Management
- OVP pin to Program Charging Mode
- Input Over Voltage Discharge
- USB-IF Type-C Certified
- ±4kV HBM ESD Rating for I/O pins: OUT, DP, DM, CC1 and CC2



## MPQ4490-AEC1 SAMPLING WETTABLE FLANK

Low  $I_q$ , Smart Single Port 3A, 36V USB Type A/Type C Charger with Integrated Buck Converter, Current Limit Switch, and Protocol Detection

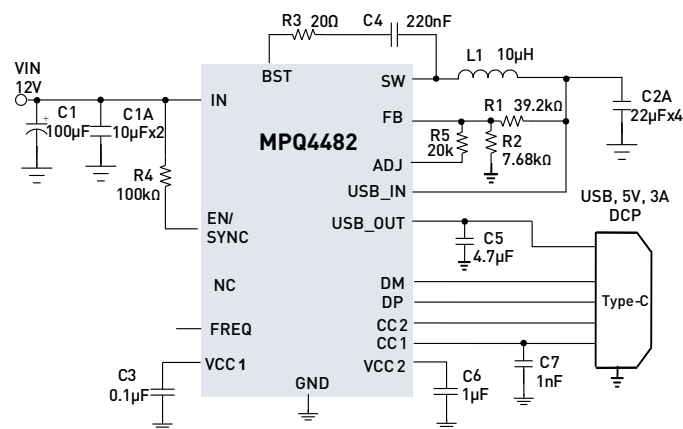


### Features

- Low Quiescent Current when Type-C Port is Unattached
- Wide 6V to 36V Operating Input Voltage Range
- Selectable Output Voltage: 5.1V, 5.17V, and 5.3V
- 90mV Line Drop Compensation
- Accurate USB Output Current Limit
- 18mΩ/15mΩ Low  $R_{DS(ON)}$  Internal Buck Power MOSFETs
- 18mΩ Low  $R_{DS(ON)}$  Internal USB Power MOSFETs
- Frequency Adjustable (250kHz to 2.2MHz)
- Forced Continuous Conduction Mode (CCM) Operation
- Load Shedding Versus Temperature
- Hiccup Current Limit for both Buck and USB
- Supports DCP Schemes for BC1.2, Divider Mode, and 1.2V/1.2V Mode
- Supports USB Type-C 5V @ 3A DFP Mode
- ±8kV HBM ESD Rating for USB, DP, and DM Pins
- Available in a QFN-26 (5mmx5mm) Package

## MPQ4482-AEC1 SAMPLING WETTABLE FLANK

All-in-One USB Type-C Solution Supporting 36V<sub>IN</sub>, 5V@3A DRP Port and BC1.2 DCP Mode



### Features

- USB\_OUT, DP/DM, CC1/CC2 Pins Support Short-to-Battery Protection
- Wide 4V to 36V Continuous Operating Input Range
- 450kHz/270kHz Selectable Switching Frequency
- 3A Output Current
- Line Drop Compensation
- Accurate 3.55A/2.75A USB Current Limit
- Forced CCM Operation
- Frequency Sync from 200kHz to 2.2MHz
- Load Shedding versus Temperature
- Hiccup Current Limit for both Buck and USB
- OVP for USB Switch
- ±8kV HBM ESD Rating for USB\_OUT Pin, CC1, CC2, DP and DM Pins
- Available in a QFN-22 (4mmx4mm) Package

## USB CHARGERS

	Part Number	$V_{IN}$ (Min) (V)	$V_{IN}$ (ABS Max) (V)	Dual / Single Ports	$I_{OUT}$ (A)	$I_b$ (Typ) (mA)	$F_{SW}$ (kHz)	DCP Schemes for BC1.2, Divider Mode, 1.2V/1.2V Mode	Spread Spectrum	Package	Notes	
Sampling	MPQ4480-AEC1	4.2	36	Single	6.0	1	Selectable	✓		QFN-25 (4x5)	Forced PWM and low drop out Mode.	+WF
Sampling	MPQ4482-AEC1	4	40	Single	3.0	0.6	Selectable	✓		QFN-22 (4x4)	Load shedding, battery short protection, ext sync, line drop compensation, forced CCM	+WF
Sampling	MPQ4482-C-AEC1	4	36	Single	3.0	0.6	Selectable			QFN-22 (4x4)	Supports USB Type-A CDP mode, Supports USB Type-C 5V@3A DFP Mode, I/O pins (DP, DM, CC1 and CC2) Support Short-to-Battery Protection, USB_OUT Short to Battery Protection when Vbus is Enabled	+WF
Sampling	MPQ4482-Q-AEC1	4	36	Single	3.0	0.6	Selectable	✓		QFN-22 (4x4)	Supports Quick Charge 3.0 Mode-Class A, Supports USB TYPE-C 5V@3A DFP Mode, USB_OUT, I/O pins (DP, DM, CC1 and CC2), Support Short to Battery Protection	+WF
	MPQ4475-E-AEC1	7	40	Single	2.5	1.6	Selectable	✓	✓	QFN-25 (4x4)	Programmable line drop compensation	
	MPQ4481-AEC1	6	40	Single	3	0.7	Selectable	✓		QFN-26 (5x5)	Selectable $V_{OUT}$ : 5.1V / 5.17V / 5.3V, low dropout mode	
	MPQ4485-AEC1	6	40	Dual	3(x2)	1	450	✓		QFN-26 (5x5)	USB2 supports CDP mode, Type-C 5V @ 3A DFP mode, load shedding versus temperature, forced CCM operation	
	MPQ4487-AEC1	6	40	Dual	3(x2)	1	Selectable		✓	QFN-26 (5x5)	EN control for USB, fault indication, support Type-C 5V @ 3A DFP mode, forced CCM operation, load shedding versus temperature	
	MPQ4488-AEC1	6	40	Dual	3(x2)	1	Selectable	✓	✓	QFN-26 (5x5)	Supporting Type-C 5V @ 3A DFP mode, selectable $V_{OUT}$ : 5.1V / 5.17V / 5.3V	
Sampling	MPQ4480-AEC1	4.2	40		6	1	Selectable			QFN-25 (4x5)	2.75A/3.75A/7.5A CC output current limit, battery short protection, adjustable line drop compensation, forced PWM mode, low dropout mode, 1V to 20V output adj.	+WF
Sampling	MPQ4483-AEC1	4.2	40	Single	3	1	Selectable	✓	✓	QFN-25 (4x5)	Supporting BC1.2 DCP and CDP mode, supporting bidirectional USB 2.0 high-speed data switch, low dropout mode, 3.55A/3.75A CC output current limit	+WF
Sampling	MPQ4210-AEC1	4	40			0.8	Selectable		✓	QFN-27 (5x5)	USB Type-C PD sync buck-boost controller with I <sup>2</sup> C, selectable PSM and FCCM	+WF
Sampling	MPQ4230-AEC1	4	40		5	0.18	Selectable		✓	QFN-21 (4x5)	Supports USB PD 3.0, sync buck-boost converter, line drop compensation, I <sup>2</sup> C interface and two times programmable, battery short-to-ground protection driver, load shedding alert	+WF
Sampling	MPQ5029-AEC1	2.7	24	Single	3	0.25		✓		QFN-14 (2x3)	Selectable QC 3.0 (3.6V - 12V <sub>OUT</sub> ), support Type-C 5V @ 3A DFP mode, support short-to-battery protection, NTC pin for thermal management, adjustable OVP threshold, input over-voltage shutdown protection	+WF
Sampling	MPQ5029-C-AEC1	2.7	24	Single	3	0.25		✓		QFN-14 (2x3)	Support CDP mode, selectable QC 3.0 (3.6V - 12V <sub>OUT</sub> ), Type-C 5V @ 3A DFP mode, Support short-to-battery protection, Type-C load shedding versus temperature feature, line drop compensation for 5V output, fault indication	+WF
Sampling	MPQ4214-AEC1	4.5	40	Prog		0.8	Selectable			QFN-27 (5x5)	Supports USB PD 3.0, USB Type-C PD, synchronous buck-boost controller with I <sup>2</sup> C	+WF
Sampling	MPQ4490-AEC1	6	36		3	0.2	Selectable			QFN-26 (5x5)	Low $I_q$ buck converter with single USB charging port with selectable output voltage	

Note: +WF Available with Wettable Flank

## LED Drivers

MPS offers robust, cost-effective LED drivers to address all types of automotive lighting needs, from headlamp to tail lights and everything inside. Most drivers integrate flexible dimming modes and fault detection features and come in compact packages to help designers achieve exotic new lighting form factors.

### Flexible Dimming Modes

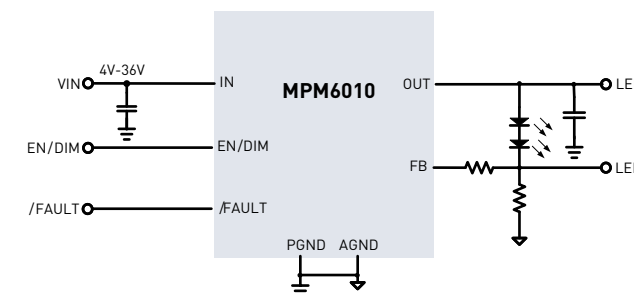
### Compact Package

### Modular Design



## MPM6010-AEC1 FEATURED WETTABLE FLANK

### 36V, 1.5A High-Efficiency Synchronous Step-Down LED Driver Module with Integrated Inductor and Capacitors

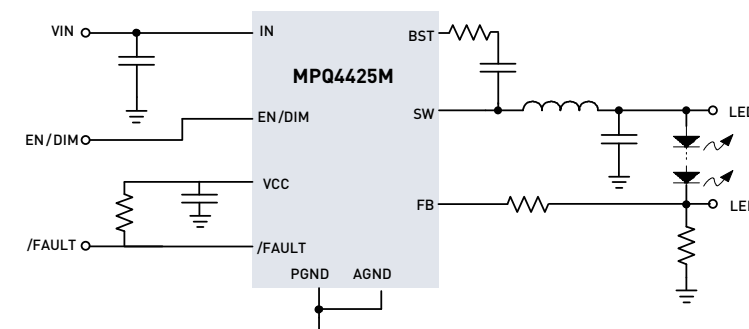


#### Features

- Complete Switch Mode Power Supply
- Wide 4V to 36V Operating Input Range
- 85mΩ/50mΩ Low  $R_{DS(ON)}$  Internal Power MOSFETs
- High-Efficiency Synchronous Mode Operation
- Default 2.2MHz Switching Frequency
- PWM Dimming (Min 100Hz Dimming Frequency)
- Forced CCM
- 0.2V Reference Voltage
- Internal Soft Start
- Fault Indication for LED Short, Open, and Thermal Shutdown
- Over-Current Protection (OCP) with Valley-Current Detection
- Thermal Shutdown
- Available in a QFN-17 (3mmx5mmx1.6mm) Package

## MPQ4425M-AEC1 FEATURED WETTABLE FLANK

### 36V, 1.5A High-Efficiency Synchronous Step-Down LED Driver



#### Features

- EMI Reduction Technique
- Wide 4V to 36V Operating Input Range
- 85mΩ/50mΩ Low  $R_{DS(ON)}$  Internal Power MOSFETs
- High-Efficiency Synchronous Mode Operation
- Default 2.2MHz Switching Frequency
- PWM Dimming (Min 100Hz Dimming Frequency)
- Forced CCM Mode
- 0.2V Reference Voltage
- Internal Soft Start
- Fault Indication for LED Short, Open, and Thermal Shutdown
- Over-Current Protection (OCP) with Valley-Current Detection
- Thermal Shutdown
- Available in a QFN-13 (2.5mmx3mm) Package
- CISPR25 Class 5 Compliant



## LED DRIVERS

## Illumination &amp; Signaling LED Drivers

	Part Number	$V_{IN}$ (Min) [V]	$V_{IN}$ (ABS Max) [V]	LED Power [W]	Max LEDs in Series	Current Limit (Typ) [A]	$R_{DS(ON)}$ [mΩ]	Dimming Modes	Topology	Max Continuous Current [A]	$F_{SW}$ [kHz]	LED Protection	Package	Notes
	MPQ2489-AEC1	6	55	4	10	Adj	500	PWM, Analog	Low-Side Buck	1.4	200 to 600	Open	QFN-6 (3x3)	Stop, turning light applications
	MPQ2483A-AEC1	4.5	55	10	10	3	280	PWM, Analog	Buck, Buck-Boost	2.5	250 to 1350	Open	QFN-10 (3x3) SOIC-8E	Daytime-running, fog applications
Sampling	MPQ24833B-AEC1	4.5	55	12	10	3	150	PWM, Analog	Buck, Buck-Boost	3	250 to 1350	Open	QFN-10 (3x3) SOIC-8E	Output short-circuit protection, daytime-running, fog applications
NEW	MPM6010-AEC1	4	40	12	2	4	85/50	PWM	Buck	1.5	2200	Open, Short	QFN-17 (3x5x1.6)	Module int. AEC-Q200 2.2μH inductor, BST/VCC caps., sync. op., output over-current protection, fault pin, rear & puddle apps. <b>+WF</b>
NEW	MPQ4425A-AEC1	4	40	12	2	4	85/50	PWM	Buck	1.5	2200	Open, Short	QFN-13 (2.5x3)	Synchronous operation, output over-current protection, fault pin, rear & puddle apps. <b>+WF</b>
NEW	MPQ4425B-AEC1	4	40	12	2	4	85/50	PWM	Buck	1.5	410	Open, Short	QFN-13 (2.5x3)	Synchronous operation, output over-current protection, fault pin, rear & puddle apps. <b>+WF</b>
Sampling	MPQ7200-AEC1	4.5	50	20	7	6	40/38	PWM, Analog	Buck, Buck-Boost	3 Buck / 1.2A Buck-Boost	2200 Buck 1000 Buck -Boost	Open, Short	QFN-18 (3x4)	Int current sense, config., 5% LED current acc., fast transient op., thermal derating, 2-step dim., spread spectrum, multiphase, fault pin, daytime-running, fog, low & high beam apps <b>+WF</b>

## Backlight

	Part Number	$V_{IN}$ (Min) [V]	$V_{IN}$ (Max) [V]	Topology	# of Channels	$I_{OUT}$ Per Channel [mA]	$F_{SW}$ [kHz]	PWM, Analog Dimming Modes	Open, Short LED Protection	Channel Current Matching [%]	Interface	Package	Notes
	MPQ3386-AEC1	4.5	25	Boost	6	30	625 or 1250	✓	✓	3	I <sup>2</sup> C	QFN-24 (4x4)	3% current matching accuracy
	MPQ3387L-AEC1	3	25	Boost	6	45	500 or 1250	✓	✓	3	I <sup>2</sup> C	QFN-24 (4x4)	3% current matching accuracy
Sampling	MPQ3367-AEC1	3.5	36	Boost	6	100	200, 400, 1000, 2200	✓	✓	2.5	I <sup>2</sup> C	QFN-24 (4x4) TSSOP28 EP	Spread spectrum, thermal derating, fault pin, rich protection features

## Telltale

	Part Number	$V_{IN}$ (Min) [V]	$V_{IN}$ (Max) [V]	Topology	# of Channels	$I_{OUT}$ Per Channel [mA]	$F_{SW}$ [kHz]	PWM, Analog Dimming Modes	Open, Short LED Protection	Channel Current Matching [%]	Interface	Package	Notes
Sampling	MPQ3326-AEC1	2.7	18	Boost	16	25	Selec.	✓	✓	2	I <sup>2</sup> C	QFN-24 (4x4) TSSOP28 EP	Independent channel control, can be daisy chained, digital configuration
Sampling	MPQ3324-AEC1	2.7	18	Boost	8	25	Selec.	✓	✓	2	I <sup>2</sup> C	QFN-24 (4x4) TSSOP28 EP	Independent channel control, can be daisy chained, digital configuration

Note: **+WF** Available with Wettable Flank

## Motor Drivers

MPS offers a comprehensive portfolio of automotive motor driver solutions including H-bridges, half-bridge drivers and pre-drivers, 3-phase motor drivers, and more. Our solutions are engineered for maximum design flexibility, such as scalable product families that can drive single to multiple output channels.

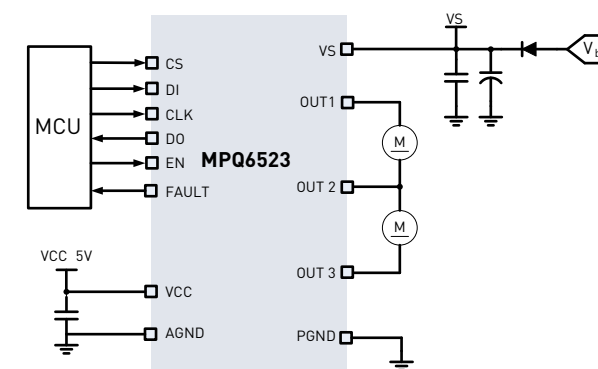
## Built-In Diagnostics

## Small Solution Size

## High-Voltage Operation

MPQ6523-AEC1 **NEW**

## 5V to 60V, Three-Phase Brushless DC Motor Pre-Driver

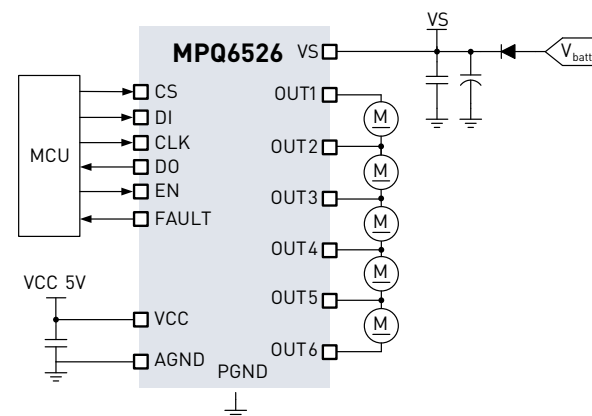


## Features

- Wide 5V to 60V Input Voltage Range
- Charge Pump Gate Drive Supply
- Bootstrap High-Side Driver with Trickle-Charge Circuit Supports 100% Duty Cycle Operation
- Low-Power Sleep Mode
- Programmable Short-Circuit Protection, Over-Current Protection
- Adjustable Dead-Time Control to Prevent Shoot-Through
- Thermal Shutdown and UVLO Protection
- Fault Indication Output
- Thermally Enhanced Surface-Mount Package
- Available in a QFN-24 (4mmx4mm)

## MPQ6526-AEC1 NEW WETTABLE FLANK

### Hex Half-Bridge Motor Driver

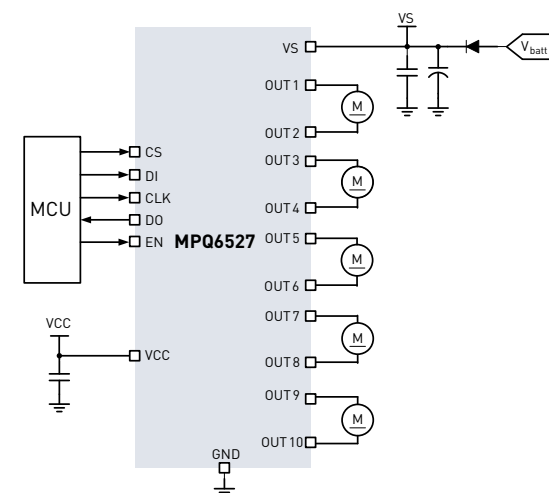


#### Features

- Up to 0.9A Output Current
- Total Max Current 2.4A (All Outputs Combined)
- $R_{DS(ON)}$  HS + LS Typically 1.1Ω at 25°C, Maximum 2Ω at 150°C
- Very Low Quiescent Current  $I_{VS} < 6\mu A$  in Standby Mode Versus Total Temperature Range
- Outputs Short-Circuit Protected
- Over-Temperature Protection and Pre-Warning
- Under-Voltage Protection (UVP)
- Serial Data Interface
- Various Diagnostic Functions: Shorted Output, Open-Load, Over-Temperature, and Under-Voltage
- Fault Output Flag
- Daisy Chaining Possible
- Serial Interface Clock Frequency up to 3MHz, 5V Compatible
- Available in QFN-24 (4mmx4mm) and QFN-24 (5mmx5mm) Packages

## MPQ6527-AEC1 SAMPLING

### 40V, 0.8A Deca Half-Bridge Motor Driver with Serial Input Control

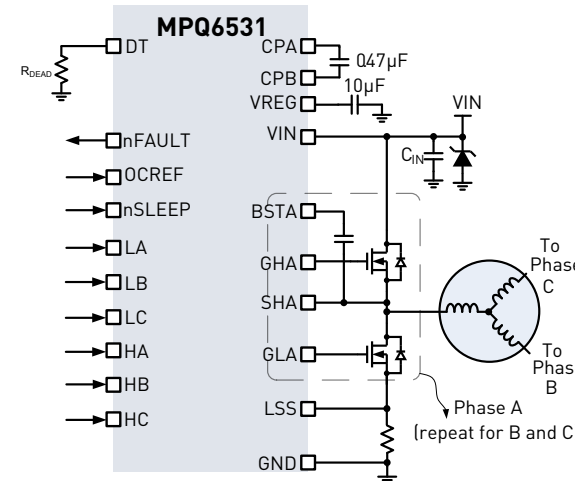


#### Features

- Wide 5.5V to 40V Operating Input Range
- High-Side and Low-Side Drivers Connected in Half-Bridge Configurations
- Up to 0.8A Output Current
- $R_{DS(ON)}$  (HS+LS) Typically 1.3Ω
- Very Low Quiescent Current in Standby Mode Versus Total Temperature Range
- Outputs Short-Circuit Protected
- Over Temperature Protection and Pre-warning
- Under-Voltage and Over-Voltage Lockout
- Serial Data Interface
- Various Diagnostic Functions: Shorted Output, Open-Load, Over-Temperature, Over-Voltage, and Under-Voltage
- Daisy Chaining Possible
- Serial Interface Clock Frequency up to 5MHz
- Compliance with 3.3V and 5V Systems
- Available in a TSSOP28 EP Package

## MPQ6531-AEC1 SAMPLING

### 5V to 60V Three-Phase Brushless DC Motor Pre-Driver



#### Features

- Wide 5V to 60V Input Voltage Range
- Charge Pump Gate Drive Supply
- Bootstrap High-Side Driver with Trickle-Charge Circuit Supports 100% Duty Cycle Operation
- Low-Power Sleep Mode
- Programmable Short-Circuit Protection, Over-Current Protection
- Adjustable Dead-Time Control to Prevent Shoot-Through
- Thermal Shutdown and UVLO Protection
- Fault Indication Output
- Thermally Enhanced Surface-Mount Package
- Available in a QFN-28 (4mmx5mm) Package

## MOTOR DRIVERS

### Half-Bridge Gate Driver

	Part Number	$V_{in}$ (Min) (V)	$V_{in}$ (Max) (V)	$V_{sw}$ (Max) (V)	HS Gate Drive (Max) (V)	# of Channels	Peak Pul[Up] Current (A)	Peak Pul[Down] Current (A)	Rise Time	Fall Time	Turn Off/On Delay	Package	Notes
NEW	MPQ18021-A-AEC1	9	18	100	18	1	2.5	3.5	12ns	9ns	5ns	SOIC-8E	100V half-bridge gate driver
NEW	MPQ18024-AEC1	9	18	100	18	1	4	5.9	15ns	12ns	20ns	SOIC-8E	100V half-bridge gate driver
	MPQ1922-AEC1	4	15	100	15	1			20μs	20μs	20μs	SOIC-8E QFN-10 (4x4)	Integrated current sense amp 9-15ns rise/fall (2.2nF load)

### Half-Bridge Driver (Integrated MOSFET)

	Part Number	$V_{in}$ (Min) (V)	$V_{in}$ (ABS Max) (V)	BST to SW (Max) (V)	# of Channels	$R_{DS(ON)}$ (mΩ)	Standby $I_o$ (Typ) (μA)	Peak Output Current (A)	Rise Time	Fall Time	Turn Off/On Delay	Open-Load Detect	Serial Interface	Package	Notes
	MPQ8039-AEC1	7.5	28	6	1	100	2.5	9	20ns	20ns	70ns			SOIC-8E	General-purpose, high-frequency, half bridge for audio amplifier, wireless charging, and more
	MPQ6523-AEC1	7	40	1	3	1100	6	0.9	20μs	20μs	60μs	✓	✓	QFN-24 (4x4)	Independent control, comp. protections, daisy chainable, serial data interface up to 3MHz
	MPQ6526-AEC1	7	40	1	6	650	6	0.9	20μs	20μs	50μs	✓	✓	QFN-24 (4x4) QFN-24 (5x5)	Independent control, comp. protections, daisy chainable, serial data interface
Sampling	MPQ6527-AEC1	5.5	40	1	10	1300	6	0.8	2μs			✓	✓	TSSOP28 EP	Independent control, comp. protections, daisy chainable, SPI interface up to 5MHz

Note: +WF Available with Wetable Flank



## Magnetic Angular Position Sensors

MPS MagAlpha sensors provide highly reliable, contactless angle sensing for position or speed control in automotive systems. Compact size, multiple angle output formats, and support for end or side shaft magnet topology aid the implementation of cost-effective angle sensing solutions. Typical applications include rotary controls in cabin user interfaces, and motorised electronic actuators in vehicle body applications.

Contactless Sensing

High Reliability

Flexible Magnet Positioning



## MAGNETIC ANGULAR POSITION SENSORS

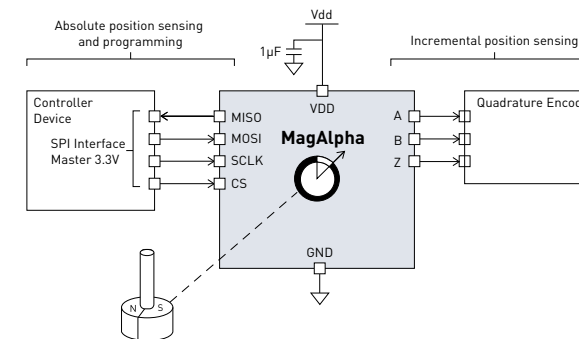
End-of-Shaft, Side-Shaft

	Part Number	V <sub>in</sub> (Min) [V]	V <sub>in</sub> (Max) [V]	Supply Current [mA]	Resolution [bits]	Output Format	ABZ Resolution [bit]	PWM Freq [Hz]	Latency [μs]	Start-Up Time [ms]	Refresh Rate [kHz]	Filter Cut-Off Frequency [Hz]	Magnetic Field Detection	Magnetic Field Range [mT]	Package	
NEW	MAQ430-AEC1	3	3.6	11.7	12	SPI, ABZ, UVW	10	10	12	980	390	✓	30 - 150	QFN-16 (3x3)	+WF	
NEW	MAQ470-AEC1	3	3.6	11.7	12	SPI, ABZ, PWM	10	240	10	12	980	390	✓	30 - 150	QFN-16 (3x3)	+WF

Note: +WF Available with Wetable Flank

### MAQ470 NEW WETTABLE FLANK

#### 12-Bit Automotive Angle Sensor with ABZ Incremental & PWM Outputs

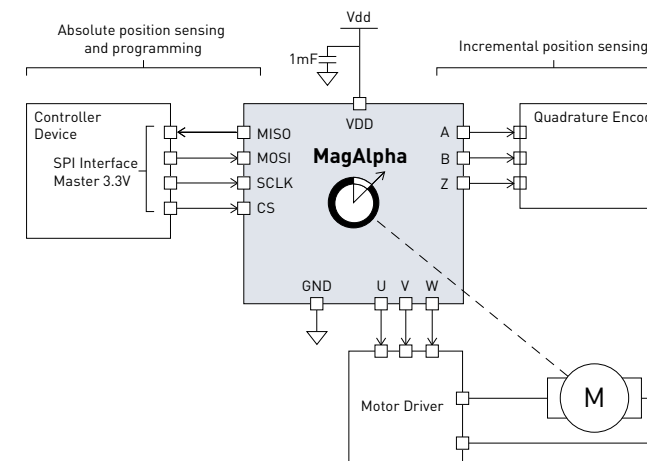


#### Features

- 12-Bit Resolution Absolute Angle Encoder
- Contactless Sensing for Long Life
- Simple and Robust Design
- SPI Serial Interface with Parity Bit for Angle Readout and Chip Configuration
- Programmable Magnetic Field Strength Detection for Diagnostic Checks
- Incremental 10-Bit ABZ Quadrature Encoder Interface with Programmable Pulses Per Turn from 1 to 256
- UVW Interface with 1 to 8 Pole Pair Emulation
- 3.3V, 12mA Supply
- Available in a QFN-16 (3mmx3mm) Package

### MAQ430 NEW WETTABLE FLANK

#### 12-Bit Automotive Angle Sensor with ABZ & UVW Incremental Outputs



#### Features

- 12-Bit Resolution Absolute Angle Encoder
- Contactless Sensing for Long Life
- Simple and Robust Design
- SPI Serial Interface with Parity Bit for Angle Readout and Chip Configuration
- Programmable Magnetic Field Strength Detection for Diagnostic Checks
- Incremental 10-Bit ABZ Quadrature Encoder Interface with Programmable Pulses Per Turn from 1 to 256
- UVW Interface with 1 to 8 Pole Pair Emulation
- 3.3V, 12mA Supply
- Available in a QFN-16 (3mmx3mm) Package



# Linear Regulators

MPS low dropout regulators are a great fit for lower current automotive subsystems that need to minimize battery drain. Our LDOs are designed to run directly off of 12V batteries or 5V power rail and offer great power supply rejection in a compact size.

Low  $I_q$

Compact Package

Customer Configurable



## LINEAR REGULATORS

### 5V Secondary LDO

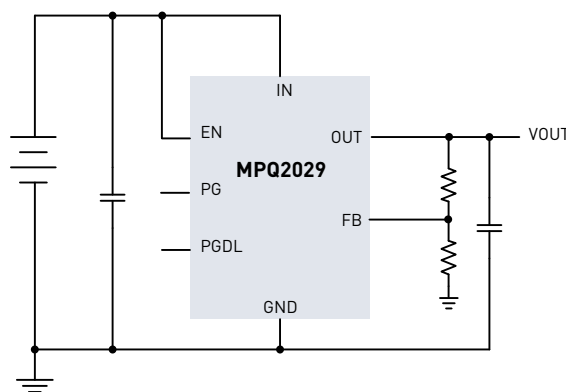
Part Number	$V_{IN}$ (Min) (V)	$V_{IN}$ (Max) (V)	$I_{OUT}$ (mA)	Load Reg (%/mA)	PSRR @ 1kHz (dB)	$V_{FB}$ (V)	$I_o$ (Typ) ( $\mu$ A)	Enable Pin	Adjustable Option (V)	Power Good	Package	Notes
MPQ20056-AEC1	2.5	5.5	250	0.0003	63	0.8	10	✓	0.8 to 5		QFN-8 (2x2) TSOT23-5	Fixed output versions: 1.8V, 2.5V, 3.3V
MPQ8904-AEC1	2.7	6.5	500	0.001	26	0.5		✓	0.5 to 5	✓	QFN-8 (2x3)	
MPQ20051-AEC1	2.5	5.5	1000	0.0003	63	0.8	30	✓	0.8 to 5		QFN-8 (3x3)	

### 40V Primary LDO

Part Number	$V_{IN}$ (Min) (V)	$V_{IN}$ (Max) (V)	$I_{OUT}$ (mA)	Load Reg (%/mA)	PSRR @ 1kHz (dB)	$V_{FB}$ (V)	$I_o$ (Typ) ( $\mu$ A)	Enable Pin	Adjustable Option (V)	Package	Notes
MPQ2016-AEC1	4	42	30	0.0003	50	1.23	12	✓	1.2 to 20	QFN-8 (2x3)	
MPQ2013AGJE-C672-AEC1	2.5	40	100	0.005	41	1.215	3.2	✓	1.215 to 15	TSOT23-4	Fixed output versions: 3.3V, 2.5V, 5V
MPQ2013A-AEC1	2.5	40	150	0.005	41	1.215	3.3	✓	1.215 to 15	QFN-6 (2x2) QFN-8 (3x3)	Fixed output versions: QFN-8: 3.3V, 2.5V, 5V, 1.8V QFN-6: 3.3V, 5V
MPQ2019-AEC1	3	40	300	0.04	45	1.25	10	✓	1.2 to 15	SOIC-8 EP	Fixed output versions: 3.3V, 5V, power good
NEW MPQ2029-AEC1	3	40	450	0.04	45	1.25	10	✓	1.2 to 15	SOIC-8 EP	

## MPQ2029-AEC1 FEATURED

40V, 450mA Low Quiescent Current, Adjustable Output Linear Regulator



### Features

- 3V to 40V Input Range
- 10 $\mu$ A Quiescent Supply Current
- Stable with Low-Value Output Ceramic Capacitor (>0.47 $\mu$ F)
- 450mA Specified Current
- Adjustable Output (1.25V to 15V)
- Output  $\pm$ 2% Accuracy Over-Temperature
- Specified Current Limit
- Power Good (PG)
- Programmable Power Good Delay
- Thermal Shutdown and Short-Circuit Protection (SCP)
- -40°C to +150°C Specified Junction Temperature Range
- Available in a SOIC-8 EP Package



## Supervisor Circuits & DDR Memory

MPS automotive supervisors offer an easy way to enhance system oversight using minimal board space. Our power good supervisors accurately monitor for correct supply voltage conditions, while our watchdog timers help ensure that system microcontrollers are operating correctly.

Low  $I_Q$

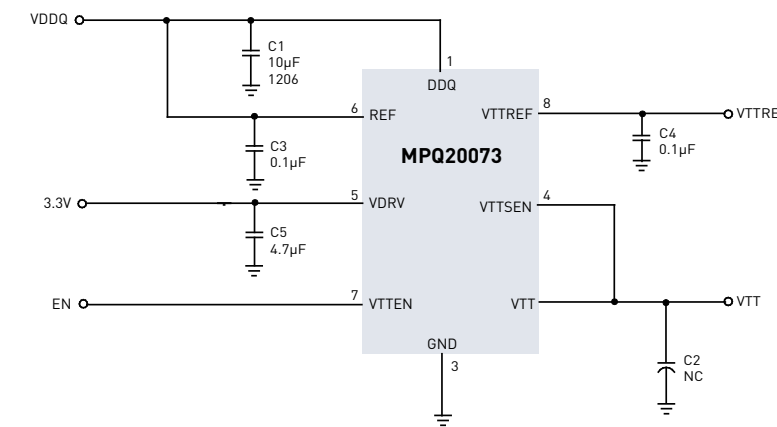
Compact Package

Customer Configurable



### MPQ20073-AEC1 NEW

#### 2A, 1.3V-6.0V DDR Memory Termination Regulator

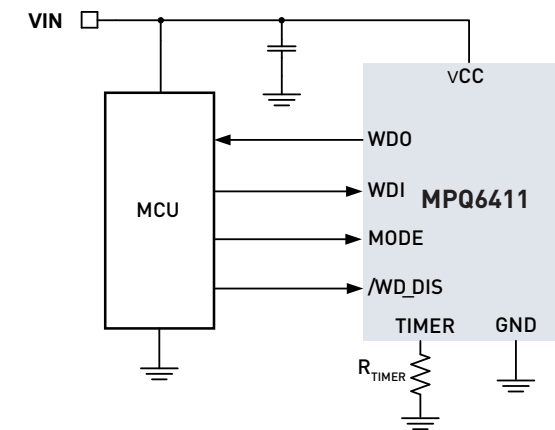


#### Features

- VDDQ Voltage Range: 1.3V to 6.0 V
- Up to 2A Integrated Sink/Source Linear Regulator with Accurate VREF/2 Divider Reference for DDR Termination
- Requires Only 20µF Ceramic Output Capacitance
- Drive Voltage: 3.3V
- 1.3V Input (VDDQ) Helps Reduce Total Power Dissipation
- Integrated Divider Tracks VREF for VTT and VTTREF
- Kelvin Sensing (VTTSEN)
- ±30mV Accuracy for VTT and VTTREF
- Built-In Soft-Start, UVLO, and OCL
- Thermal Shutdown
- Available in an MSOP-8E Package

### MPQ6411-AEC1

#### Window Watchdog Timer



#### Features

- Windowed Watchdog
- Power-On Reset during Power-Up and Under-Voltage
- Programmable Short-Window Mode or Long-Window Mode
- Watchdog Disable Function
- Low Shutdown Mode Current
- Available in an SOIC-8 Package

## SUPERVISOR CIRCUITS

	Part Number	$V_{IN}$ (Min) (V)	$V_{IN}$ (Max) (V)	Reset Threshold (V)	Threshold Accuracy (%)	$I_Q$ (Typ) (µA)	Package	Notes
	MPQ6400-33-AEC1	1.8	5.5	3.07	±1.0	1.6	QFN-6 (2x2)	Voltage supervisor, 3.3V
Sampling	MPQ6400-01-AEC1	0.9	5.5	0.4	±1.0	1.6	QFN-6 (2x2)	Voltage supervisor, adjustable
	MPQ6411-AEC1	4.8	5	4.5		16	SOIC-8E	5V VDD, windowed watchdog, power-on reset
	MPQ6411-33-AEC1	3.1	3.3	2.9		10	SOIC-8E	3.3V VDD, windowed watchdog, power-on reset

## DDR MEMORY

	Part Number	$V_{IN}$ (Min) (V)	$V_{IN}$ (ABS Max) (V)	$I_{OUT}$ (A)	Accuracy for VTT, VTTRef (mV)	V Driver (V)	Package	Notes
NEW	MPQ20073-AEC1	1.3	6	2	30	3.3	MSOP-8E	DDR2/3 termination regulator

## 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 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.

### 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

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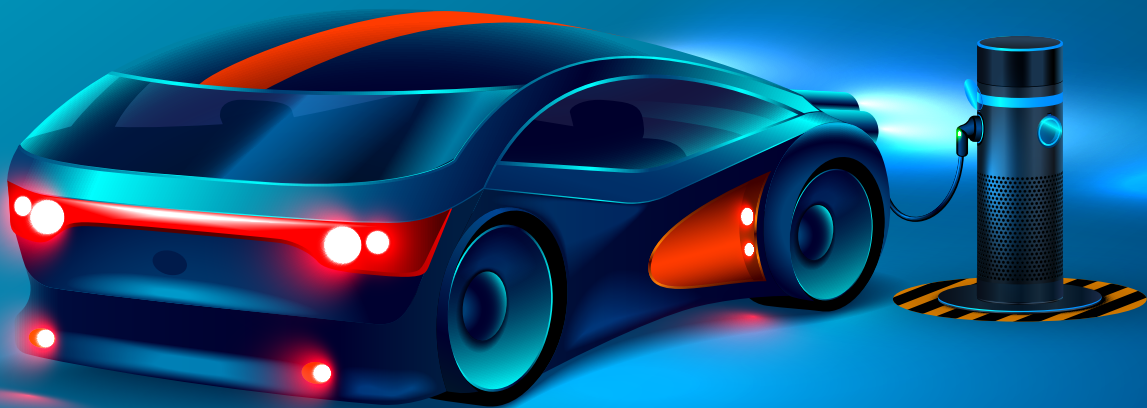
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# AUTOMOTIVE POWER MANAGEMENT

AEC-Q100 Solutions



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