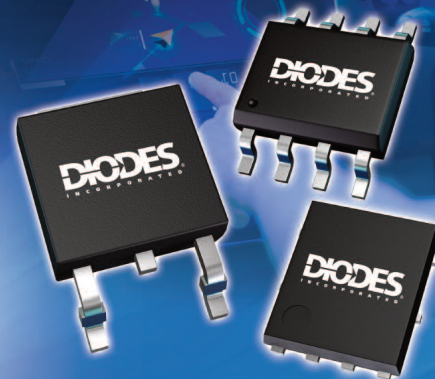




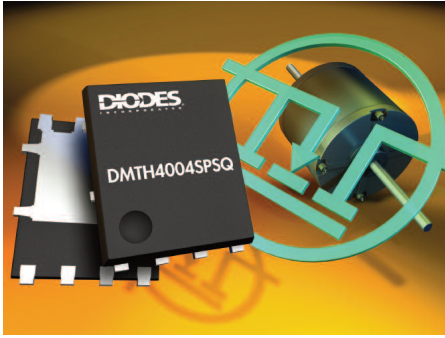
AUTOMOTIVE COMPLIANT

MOSFET

'Q' PORTFOLIO

- RATED TO 175°C
- AVALANCHE RUGGED
- QUALIFIED TO AECQ101 REV D
- SUPPORTED BY A PRODUCTION PART APPROVAL PROCESS (PPAP) DOCUMENT
- MANUFACTURED IN FACILITIES THAT HAVE BEEN AUDITED TO TS16949 AND VDA6.3
- ROHS COMPLIANT

diodes.com



BRUSHLESS DC MOTOR CONTROL

Brushless DC (BLDC) Motor control provides improved performance, longer lifetime, reduced noise and greater ease of use when compared to equivalent mechanical solutions.

Consequently, three phase BLDC systems are widely used in Automotive applications such as fuel pumps, water pumps, Anti-Lock Braking Systems (ABS) and provide additional torque for Power

steering systems. The motor power will depend on the vehicle application and performance.

In BLDC motor systems, MOSFETs are typically configured in a three phase bridge arrangement to drive the DC motor and must be capable of handling start-up and stalled motor currents of up to six times the continuous current rating of the motor.

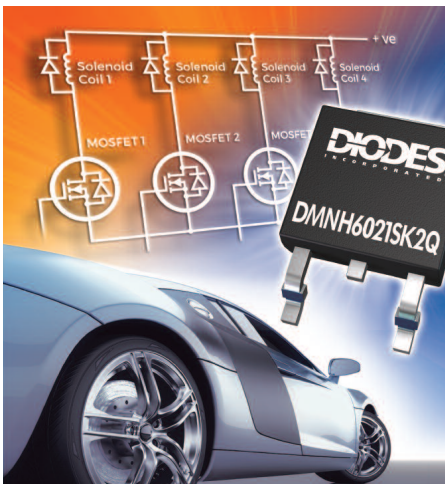
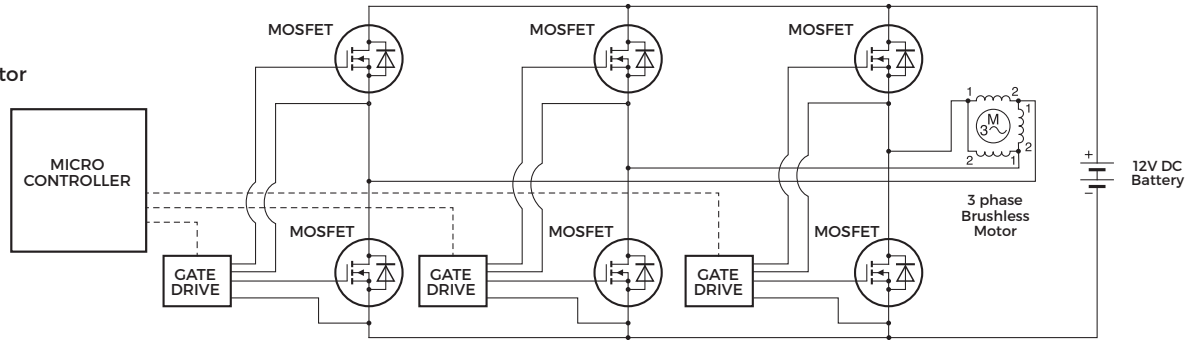
HIGHLIGHTED PRODUCT

Product	Application
DMTH4004SPSQ	High power BLDC designs
DMTH4005SPSQ	Medium power BLDC designs

MOSFET REQUIREMENTS

- **Low $R_{DS(ON)}$** – Reduced conduction losses
- **Low Q_{GD}** – Reduced switching losses
- **100% Avalanche Rated** – Ensures robust design able to withstand the reverse avalanche energy generated by the BLDC
- **Rated to 175°C** – For use in high ambient temperature environments
- **Low Thermal Resistance Package** – Maintain low operating temperature

MOSFETs driving 3 phase BLDC motor



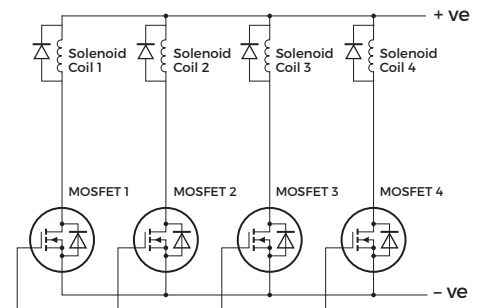
DRIVING SOLENOIDS

Solenoids are simple electromechanical devices that consist of an electromagnet and a ferromagnetic piston that is 'pushed' or 'pulled' as current flows through the inductive component.

A MOSFET is typically used to drive a solenoid as it can provide the voltage across the solenoid winding for it to energize and also provides, via the body diode, an alternate path for when the solenoid is de-energized.

When the solenoid de-energizes the current will flow via the recirculating diode but will also present reverse avalanche energy to the MOSFET.

MOSFETs driving solenoids



Therefore, it is essential that MOSFETs used to drive solenoids are avalanche rugged.

HIGHLIGHTED PRODUCT

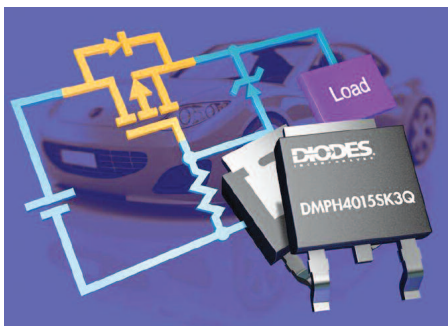
Product	Application
DMNH6021SPDQ	Driving two Solenoids
DMNH6021SK3Q	Driving a single Solenoid

MOSFET REQUIREMENTS

- **Low $R_{DS(ON)}$** – Reduced conduction losses
- **100% Avalanche Rated** – Ensures robust design able to withstand the reverse avalanche energy generated by the solenoid coil
- **Rated to 175°C** – For use in high ambient temperature environments

MOSFET 'Q' PORTFOLIO

Part Number	Package	Polarity	V _{DS} (V)	V _{CS} (V)	I _D (A)	V _{GS} (V)	R _{DS(ON)} MAX (mOhm)		Q _c typ @V _{GS} =10V (nc)	Typ.C _{iss} (pf) @25V _{DSS}	E _{AS} (mJ)	I _{AS} (A)	T _J max	Availability
							@10V	@4.5V						
DMTH4004SPSQ	PowerDI5060	N	40	20	100	2-4	2.7	-	60.1	3714	200	45	175	Now
DMTH4004LK3Q	TO252-3L	N	40	20	100	1-3	2.8	4.8	83	4450	120	30	175	Now
DMTH4004SCTBQ	TO263-3L	N	40	20	100	2-4	3	-	68.8	4305	200	45	175	Now
DMTH4005SPSQ	PowerDI5060	N	40	20	90	2-4	4	-	49.1	3062	52.8	32.5	175	Now
DMNH4006SK3Q	TO252-3L	N	40	20	80	2-4	5	-	54	2492	260	70	175	Now
DMNH4006SPSQ	PowerDI5060	N	40	20	80	2-4	5	-	54	2492	260	70	175	Now
DMTH4007LPSQ	PowerDI5060	N	40	20	100	1-3	6.5	9.8	29.1	2492	20	20	175	Now
DMTH4007LK3Q	TO252-3L	N	40	20	70	1-3	7.3	9.8	29.1	1895	20	20	175	Now
DMTH4007SPDQ	PowerDI5060	N+N	40	20		2-4	8.6	-	41.9	2026	89	24	175	Now
DMNH4011SK3Q	TO252-3L	N	40	20	50	2-4	10	-	25.5	1374	170	18	175	Now
DMNH4011SPSQ	PowerDI5060	N	40	20	20	2-4	10	-	25.5	1374	170	18	175	April-16
DMTH6004SCTBQ	TO263-3L	N	60	20	100	2-4	3.4	-	95.4	4556	200	45	175	April-16
DMTH6004SPSQ	PowerDI5060	N	60	20	90	2-4	3.1	-	95.4	4556	200	45	175	Now
DMTH6004SK3Q	TO252-3L	N	60	20	95	2-4	3.8	-	95.4	4556	200	45	175	April-16
DMTH6005LK3Q	TO252-3L	N	60	20	80	1-3	5.6	10	47.1	2962	83.2	40.8	175	April-16
DMTH6005LPSQ	PowerDI5060	N	60	20	100	1-3	5	10	47.1	2962	83.2	40.8	175	Now
DMTH6010LK3Q	TO252-3L	N	60	20	50	1-3	8	12	41.3	2090	64	20	175	April-16
DMTH6010LPSQ	PowerDI5060	N	60	20	50	1-3	8	12	41.3	2090	20	20	175	Now
DMNH6008SPSQ	PowerDI5060	N	60	20	50	2-4	8	-	75.4	3290	300	26	175	April-16
DMNH6008SCTQ	TO220	N	60	20	120	2-4	8	-	62	3290	230	68	175	April-16
DMNH6012LK3Q	TO252-3L	N	60	20	50	1-3	12	18	48.5	2221	168	58	175	April-16
DMNH6012SPSQ	PowerDI5060	N	60	20	20	2-4	11	-	48.5	2221	168	58	175	April-16
DMNH6021SPDQ	PowerDI5060	N+N	60	20	40	1-3	23	28	19.7	1030	68	37	175	May-16
DMNH6021SK3Q	TO252-3L	N	60	20	40	1-3	23	28	19.7	1030	68	37	175	May-16
DMNH6022SSDQ	SO8	N+N	60	20	10.5	1-3	24	30	19.7	1030	68	37	175	May-16
DMNH6021SPSQ	PowerDI5060	N	60	20	50.8	1-3	23	28	19.7	1016	63.7	35.7	175	May-16
DMNH6042SPDQ	PowerDI5060	N+N	60	20	18	1-3	50	65	15.6	700	106	5	175	May-16
DMNH6042SK3Q	TO252-3L	N	60	20	18	1-3	50	65	15.6	700	106	5	175	May-16
DMNH6042SSDQ	SO8	N+N	60	20	6.7	1-4	50	65	15.6	700	106	5	175	May-16
DMTH8012LK3Q	TO252-3L	N	80	20	72	1-3	17	21	34	1949	10	11	175	Now
DMTH8012LPSQ	PowerDI5060	N	80	20	72	1-3	17	21	34	1949	10	11	175	April-16
DMNH10H028SPSQ	PowerDI5060	N	100	20	50	1.2-2.2	26	32	20	1500	102	44	175	April-16
DMNH10H028SK3Q	TO252-3L	N	100	20	50	1.2-2.2	26	32	20	1500	102	44	175	April-16
DMPH4015SK3Q	TO252-3L	P	-40	20	-45	1.2-2.3	11	15	90	4200	260	-22	175	April-16
DMPH6050SK3Q	TO252-3L	P	-60	20	-23.5	-1-3	50	70	25	1377	31	-25	175	Now



During the lifetime of a vehicle it is necessary to change a vehicles battery during maintenance or at the end of battery life. There is therefore a risk that the battery could be reconnected in 'reverse' causing a damaging 'short circuit' to be applied across the Electronic Control Units (ECU's) in the vehicle.

HIGHLIGHTED PRODUCT

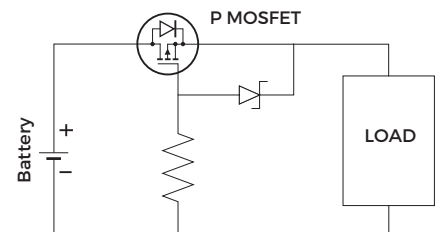
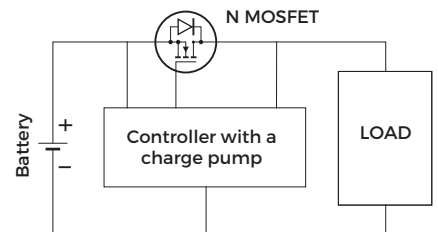
Product	Application
DMTH6004SCTBQ	Reverse polarity protection
DMPH4015SK3Q	Reverse polarity protection

REVERSE BATTERY PROTECTION

For this reason all automotive ECU's include a reverse polarity protection scheme. The simplest solution is a diode in series with the power rail but the power losses are relatively high. A more efficient solution is to use either N or P channel MOSFET.

Reverse polarity solutions that use P channel MOSFETs generate lower power losses than those using a diode and can be implemented with a minimal number of passive components. By comparison, reverse polarity protection circuits that use N-channel MOSFETs deliver the lowest power losses but require a charge pump to provide the gate drive voltage, adding complexity, cost and component count.

Furthermore, each ECU has to pass the ISO7637-2 pulse tests so it is essential that MOSFET is avalanche rated.



MOSFET REQUIREMENTS

- **Low R_{DS(ON)}** - Minimize conduction losses
- **100% Avalanche Rated** - Withstand ISO7637 pulses
- **Rated to 175°C** - For use in high ambient temperature environments

CROSS REFERENCE GUIDE

Parts	Fairchild	Infineon	NXP	ON Semi	Vishay
DMTH4004SPSQ	FDMS9409_F085	-	-	NVMF55C442N/NVMF55C540N	-
DMTH4004LK3Q	FDD8447L_F085	-	-	NVD5890NL	SQD100N04-3m6L
DMTH4004SCTBQ	FDB9409_F085	IPB80N04S3-03	BUK763R1-40E	-	SQM100N04-2m7
DMTH4005SPSQ	FDMS9409_F085	-	BUK7Y4R4-40E	-	-
DMNH4006SK3Q	FDD8445_F085	IPD90N04S4-05	BUK725R0-40C	NVD5806	SQD50N04-5m6
DMNH4006SPSQ	FDMS9411_F085	-	-	-	-
DMTH4007LPSQ	FDMS9411_F085	IPG24N04S5L-7R4	BUK9Y7R4-40E	NTDV5804N	-
DMTH4007LK3Q	FDD8447L_F085	IPD50N04S4L-08	BUK9209-40B	-	SUD50N04-8m8
DMTH4007SPDQ	-	IPG20N04S4-08	BUK9K8R7-40E	-	-
DMNH4011LK3Q	-	IPD50N04S4-10	BUK7208-40B/BUK6212-40C	-	SQD50N04-5m6L
DMNH4011SPSQ	-	-	BUK7Y08-40E/BUK7Y12-40E	-	-
DMTH6004SCTBQ	-	IPB90N06S4-04	BUK763R1-60E	-	-
DMTH6004SPSQ	FDMS86568_F085	-	-	-	-
DMTH6004SK3Q	FDD86567_F085	IPD038N06N	-	-	-
DMTH6005LK3Q	FDD86569_F085	IPD90N06S4L-06	-	-	SQD97N06-6m3L
DMTH6005LPSQ	FDMS5360L_F085	-	-	-	-
DMTH6010LK3Q	-	IPD50N06S4L-08	-	NVD5863L	SQD50N06-09L
DMTH6010LPSQ	FDMS5361L_F085	-	-	NVMF55826NL	-
DMNH6008SPSQ	-	-	BUK7Y7R2-60E	-	-
DMNH6008SCTQ	-	-	-	-	-
DMNH6012LK3Q	FDD13AN06_F085	IPD50N06S4L-14 or IPD50N06S4L-13	-	-	SQD40N06-14L
DMNH6012SPSQ	-	-	BUK7Y15-60E	-	SQJ464EP
DMNH6021SPDQ	-	IPG20N06S4L-26/A	-	NVMF55C682NL	SQJ952EP or SQJ956EP
DMNH6021SK3Q	FDD26AN06A0_F085	IPD30N06S4L-23	-	-	SQD25N06-22L
DMNH6022SSDQ	FDS8949_F085	-	-	-	SQ4850EY
DMNH6021SPSQ	FDMS5362L_F085	-	BUK7Y25-60E	NVMF55826NL/5C8682NL	SQJ850EP
DMNH6042SPDQ	-	IPG20N06S2L-50/A	BUK9K52-60E	NVMF55485NL	SQJ980EP
DMNH6042SK3Q	HUFA76409D3ST	IPD14N06S2L-64	-	NVD5867L	SQD15N06-42L
DMNH6042SSDQ	HUF76413DK_F085	-	-	-	SQ4946AEY
DMTH8012LK3Q	FDD16AN08A0_F085	IPD50N08S4-13	BUK9217-75B	-	-
DMTH8012LPSQ	-	-	BUK9Y14-805E	-	-
DMNH10H028SPSQ	-	IPG20N10S4L-22	BUK9Y22-100B	-	SQJ488EP
DMNH10H028SK3Q	FDD3672_F085	IPD35N10S3L-26	BUK9230-100B	NVD6828NL	SQD40N10-25
DMPH4015SK3Q	-	IPD50P04P4L	-	-	SQD19P06-60L
DMPH6050SK3Q	-	-	-	-	SQD50P04-13/09L

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