

DIODES
INCORPORATED®

AUTOMOTIVE

diodes.com



COMPANY OVERVIEW

DIODES INCORPORATED'S DISCRETE, ANALOG, MIXED-SIGNAL AND LOGIC PRODUCTS PROVIDE OUR CUSTOMERS WITH LEADING EDGE SOLUTIONS FOR NEXT GENERATION SYSTEMS.

Discrete products include Bipolar Transistors, MOSFETs, Diodes and Rectifiers, Protection products and Functional Specific Arrays.

Analog and Mixed-signal products cover these main areas: Power Management ICs, Standard Linear, LED Drivers, Sensors and Motor Control, Switching, Signal Integrity, Connectivity and Timing products.

Diodes Incorporated's Logic products include Single-Gate, Dual-Gate and Standard-Logic Gates as well as Level Translators, Analog Switches, Registers and Multiplexers.

INFOTAINMENT & TELEMATICS

BODY CONTROL ELECTRONICS

POWER TRAIN

RECTIFIERS

CONNECTIVITY ICs

DIODES AUTOMOTIVE

SEMICONDUCTORS FORM AN INTEGRAL PART OF MODERN AUTOMOBILES. A TYPICAL VEHICLE MAY HAVE UP TO 100 ELECTRONIC CONTROL UNITS (ECU'S) EMBEDDED IN SYSTEMS WHICH INCLUDE THOSE GOVERNING ENGINE, TRANSMISSION, ACTIVE SAFETY, PASSENGER COMFORT AND INFOTAINMENT.

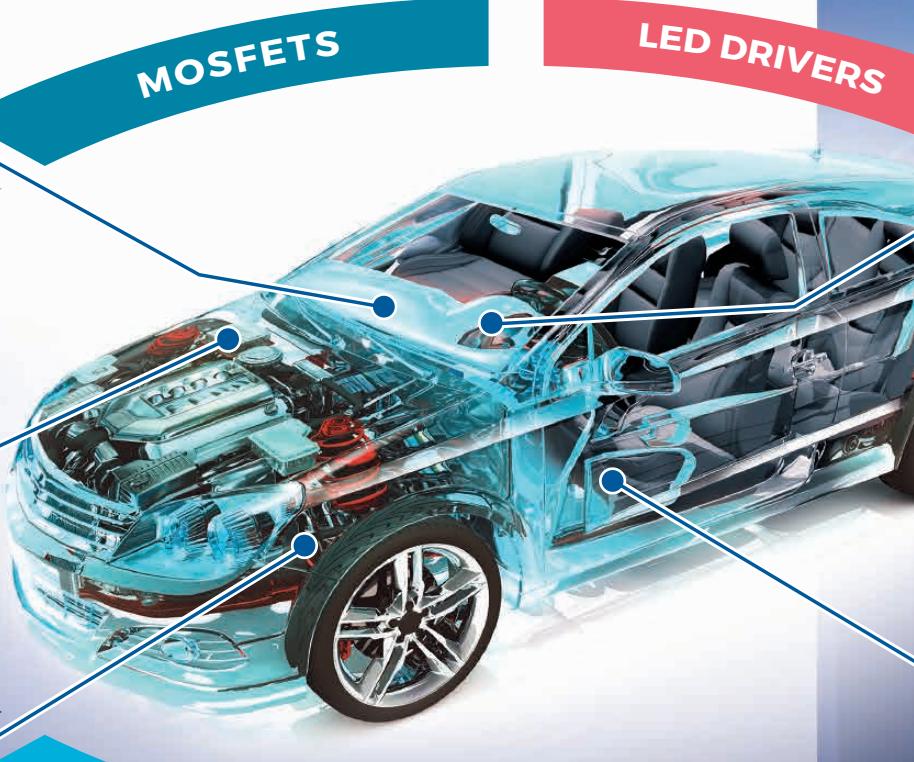
Diodes Incorporated has created a wide portfolio of automotive-compliant analog, discrete and timing products.

These parts are clearly identified by a 'Q' at the end of the part number.



Diodes' fully automotive-compliant 'Q' parts are all qualified to AEC-Q100, AEC-Q101 and AEC-Q200 respectively, and are manufactured in facilities qualified to the rigorous TS16949 standard, and capable of customer audit to VDA6.3.

These parts are all supported by PPAP (Production Part Approval Process) documentation, thus meeting all the requirements of the Automotive electronics industry





AUTOMOTIVE

HOW DIODES CATEGORIZES PRODUCTS

AUTOMOTIVE COMPLIANT 'Q' PRODUCT	Products with a Q suffix: <ul style="list-style-type: none">■ Are fully supported for Automotive customers with PPAP in TS16949 approved manufacturing sites. AND■ Passed the rigorous AEC-Q reliability standard.
COMMERCIAL GRADE PRODUCT	Products fit for commercial applications made and supplied to within Diodes standard quality control envelope

ADVANCED DRIVER ASSISTANCE SYSTEMS

INTERIOR AND EXTERIOR LIGHTING

MOTOR CONTROL MODULES

HALL SENSORS

ANALOG ICs

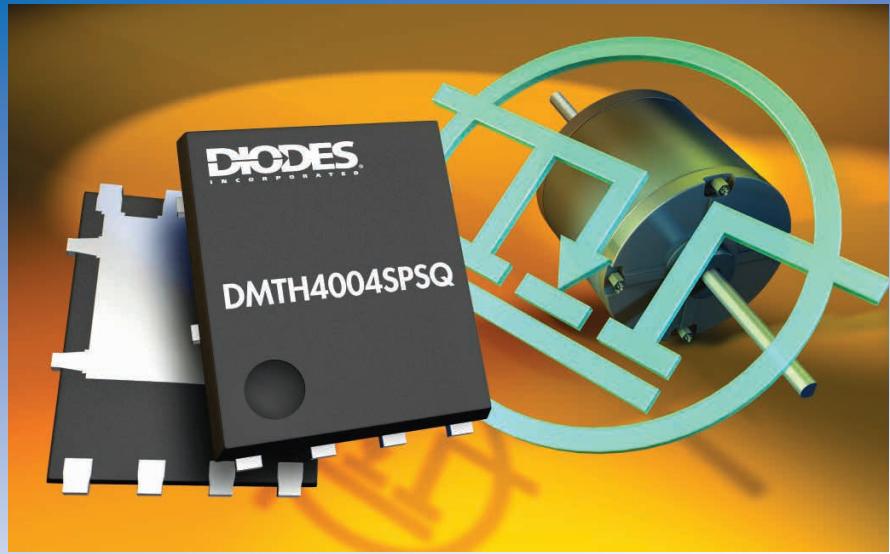
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MOSFET AUTOMOTIVE 'Q' PORTFOLIO

THE DIODES ADVANTAGE

- **DMTHxxx series** – optimized for low figure of merit ($R_{DS(ON)} * Q_G$) to minimize switching losses
- **DMNHxxx series** – Optimized for $R_{DS(ON)}$ with superior avalanche rating for robust applications
- **Qualified to 175°C** – Suitable for use in high ambient environments
- **100% avalanche tested** – Ensures robust design able to withstand reverse avalanche energy from inductive loads
- **AEC-Q101** – Qualified to AEC-Q101 to ensure high reliability
- **PPAP supported** – Production Part Approval documents supplied



HIGH TEMPERATURE MOSFET AUTOMOTIVE 'Q' PORTFOLIO

Part	Polarity	V_{DS} (V)	V_{GSS} (V)	I_D (A)	V_{GSTH} (V)	$R_{DS(ON)}$ max (mΩ)		Q_G Typ @ $V_{GS} = 10$ V (nc)	Typ C_{ISS} (pF) @ $25V_{DSS}$	E_{AR} (mJ)	I_{AR} (A)	T_J max	Package	Availability
						@10V	@4.5V							
DMNH4006SK3Q	N	40	20	80	2 - 4	5	-	54	2492	260	70	175	TO252-3L	Released
DMNH4006SPSQ	N	40	20	80	2 - 4	5	-	54	2492	260	70	175	PowerDI5060	Released
DMNH4011SK3Q	N	40	20	50	2 - 4	10	-	25.5	1374	170	18	175	TO252-3L	Released
DMNH4011SPSQ	N	40	20	20	2 - 4	10	-	25.5	1374	170	18	175	PowerDI5060	Released
DMNH4015SSDQ	N+N	40	20	8.4*	1-3	15	20	14.5	1795	36	27	175	SO8	Released
DMNH6008SPSQ	N	60	20	50	2-4	8	-	75.4	3290	300	26	175	PowerDI5060	Released
DMNH6008SCTQ	N	60	20	120	2-4	8	-	62	3290	230	68	175	TO220	Released
DMNH6011LK3Q	N	60	20	50	1-2	12	18	38	2119	1000	45	175	TO252-3L	Q3 2018
DMNH6012LK3Q	N	60	20	50	1-3	12	18	48.5	2221	168	58	175	TO252-3L	Released
DMNH6012SPSQ	N	60	20	20	2-4	11	-	48.5	2221	168	58	175	PowerDI5060	Released
DMNH6021SPDQ	N+N	60	20	40	1-3	23	28	19.7	1030	68	37	175	PowerDI5060	Released
DMNH6021SK3Q	N	60	20	40	1-3	23	28	19.7	1030	68	37	175	TO252-3L	Released
DMNH6022SSDQ	N+N	60	20	10.5	1-3	24	30	19.7	1030	68	37	175	SO8	Released
DMNH6021SPSQ	N	60	20	50.8	1-3	23	28	19.7	1016	63.7	35.7	175	PowerDI5060	Released
DMNH6035SPDWQ	N+N	60	20	33	1-3	35	44	10	879	108	47	175	PowerDI5060	Q2 2018
DMNH6042SPDQ	N+N	60	20	18	1-3	50	65	15.6	700	106	5	175	PowerDI5060	Released
DMNH6042SK3Q	N	60	20	18	1-3	50	65	15.6	700	106	5	175	TO252-3L	Released
DMNH6042SSDQ	N+N	60	20	6.7	1-4	50	65	15.6	700	106	5	175	SO8	Released
DMNH10HO28SPSQ	N	100	20	50	1.2-2.2	26	32	20	1500	102	44	175	PowerDI5060	Released
DMNH10HO28SK3Q	N	100	20	50	1.2-2.2	26	32	20	1500	102	44	175	TO252-3L	Released
DMPH3004LK3Q	P	-30	20	-23	-1~-2.5	5	7	156	7693	195	-62.5	175	TO252-3L	Q2 2018
DMPH4015SK3Q	P	-40	20	-45	1.2-2.3	11	15	90	4200	260	-22	175	TO252-3L	Released
DMPH4015SPSQ	P	-40	20	-50	-1~-2.5	10	14	42.7	4234	260	-22	175	PowerDI5060	Released
DMPH4025SFVWQ	P	-40	20	-20	-0.8 1.8	25	45	33.7	1293	31	-25	175	PowerDI3333	Q1 2018
DMPH6050SK3Q	P	-60	20	-23.5	-1-3	50	70	25	1377	31	-25	175	TO252-3L	Released
DMPH6050SSDQ	P+P	-60	20	-5.2	-1~-3	50	70	11.9	1293	30.8	-24.8	175	SO8	Released
DMPH6050SFCQ	P	-40	20	-4.8	-1~-3	50	70	11.9	1293	30.8	-24.8	175	PowerDI3333	Released
DMPH6250SQ	P	-60	20	-5.3	-1~-3	155	240	4	512	-	-	175	SOT23	Q1 2018

MOSFET AUTOMOTIVE 'Q' PORTFOLIO

Part	Polarity	V _{DS} (V)	V _{GSS} (V)	I _D (A)	V _{GSTH} (V)	R _{DS(ON)} max (mΩ)		Q _{GT} Typ @V _{Gs} =10 V (nc)	Typ C _{iss} (pf) @25V _{DSS}	E _{AR} (mJ)	I _{AR} (A)	T _j max	Package	Availability
						@10V	@4.5V							
DMTH3002LPSQ	N	30	20	100	1-2	1.5	2.5	5000	77	600	20	175	PowerDi5060	Released
DMTH3004LK3Q	N	30	20	75	1-3	4	7	2370	20	287	10.7	175	TO252-3L	Released
DMTH3004LFGQ	N	30	20	91	1-3	4.5	7	2370	20	153	17	175	PowerDI3333	Q1 2018
DMTH4M90SPSQ	N	40	20	100	2-4	0.9	-	-	-	-	-	175	PowerDi5060	Q2 2018
DMTH4001SPSQ	N	40	20	316	1-3	1	-	143	11998	3517	240	175	PowerDi5060	Q2 2018
DMTH41M8SPSQ	N	40	20	204	2-4	1.8	-	88	6990	224	67	175	PowerDi5060	Q2 2018
DMTH42M1SPSQ	N	40	20	204	2-5	2.1	-	88	5769	480	31	175	Powerdi5060	Q2 2018
DMTH4004SPSQ	N	40	20	100	2-4	2.7	-	60.1	3714	200	45	175	PowerDI5060	Released
DMTH4003LPSQ	N	40	20	149	2-4	3	5	26.5	3882	117	48	175	PowerDi5060	Q2 2018
DMTH4004LK3Q	N	40	20	100	1-3	2.8	4.8	83	4450	120	30	175	TO252-3L	Released
DMTH4004SCTBQ	N	40	20	100	2-4	3	-	68.8	4305	200	45	175	TO263-3L	Released
DMTH43M8LK3Q	N	40	20	119	1-2.4	3.6	5.2	47	2970	87	13.2	175	TO252-3L	Released
DMTH43M8LFGQ	N	40	20	119	1-2.5	3.6	5.2	38.5	2693	87	13.2	175	PowerDI3333	Released
DMTH43M8LPSQ	N	40	20	115	1-2.5	3.6	5.2	38.5	2693	87	13.2	175	PowerDi5060	Released
DMTH43M8LPDQ	N+N	40	20	100	1-2.5	3.6	5.2	38.5	2693	87	13.2	175	PowerDi5060	Q2 2018
DMTH4005SPSQ	N	40	20	90	2-4	4	-	49.1	3062	52.8	32.5	175	PowerDI5060	Released
DMTH4005LK3Q	N	40	20	90	1-4	4.5	-	49.1	3062	52.8	32.5	175	PowerDI5060	Released
DMTH4007LPSQ	N	40	20	100	1-3	6.5	9.8	29.1	2492	20	20	175	PowerDI5060	Released
DMTH4007LK3Q	N	40	20	70	1-3	7.3	9.8	29.1	1895	20	20	175	TO252-3L	Released
DMTH4007SPDQ	N+N	40	20	18	2-4	8.6	-	41.9	2026	89	24	175	PowerDI5060	Released
DMTH4008LPSQ	N	40	20	12	1-3	11.5	18	7	1030	32	14	175	PowerDI5060	Q1 2018
DMTH4008LFDFWQ	N	40	20	12	1-3	11.5	18	7	1030	32	14	175	DFN2020-6	Q1 2018
DMTH4011SPDQ	N	40	20	55	1-3	12	18.5	15	767	238	30	175	PowerDI3333	Q1 2018
DMTH4014LFVWQ	N	40	20	55.3	1-3	14	18.8	15.1	767	21.4	11.9	175	PowerDI3333	Q1 2018
DMTH4014LPDQ	N+N	40	20	43.6	1-3	15	25	10.2	733	20.5	11.7	175	PowerDI5060	Q1 2018
DMTH61M8LPSQ	N	60	20	100	2-4	1.8	-	123.1	10267	354	14	175	Powerdi5060	Q2 2018
DMTH6002LPSQ	N	60	20	100	1-3	1.8	3	130.8	6555	294	14	175	Powerdi5060	Q2 2018
DMTH6004SPSQ	N	60	20	90	2-4	3.1	-	95.4	4556	200	45	175	PowerDI5060	Released
DMTH6004SCTBQ	N	60	20	100	2-4	3.4	-	95.4	4556	200	45	175	TO263-3L	Released
DMTH6004SK3Q	N	60	20	95	2-4	3.8	-	95.4	4556	200	45	175	TO252-3L	Released
DMTH6005LK3Q	N	60	20	80	1-3	5.6	10	47.1	2962	83.2	40.8	175	TO252-3L	Released
DMTH6005LPSQ	N	60	20	100	1-3	5	10	47.1	2962	83.2	40.8	175	PowerDI5060	Released
DMTH6010LK3Q	N	60	20	50	1-3	8	12	40.2	2615	20	20	175	TO252-3L	Released
DMTH6010LPSQ	N	60	20	50	1-3	8	12	40.2	2615	20	20	175	PowerDI5060	Released
DMTH6010LPDQ	N	60	20	50	1-3	8	12	41.3	2615	20	20	175	PowerDI5060	Released
DMTH6016LPSQ	N	60	20	37	1-2.5	16	24	8.4	864	11.7	15.3	175	Powerdi5060	Released
DMTH6016LFVWQQ	N	60	20	20	1-2.5	17	28	8.4	864	11.7	15.3	175	PowerDI3333	Q1 2018
DMTH6016LSDQ	N+N	60	20	7.8*	1-2.5	18	26	8.4	864	11.7	15.3	175	SO8	Released
DMTH8012LK3Q	N	80	20	72	1-3	17	21	34	1949	10	11	175	TO252-3L	Released
DMTH8012LPSQ	N	80	20	72	1-3	17	21	34	1949	10	11	175	PowerDI5060	Released
DMTH10H010SPSQ	N	100	20	98	2-4	8.5	-	53.7	2592	150	10	175	PowerDi5060	Q1 2018
DMTH10H015LK3Q	N	100	20	52.5	2-4	15	18@6v	33.3	1871	85	7.5	175	TO252-3L	Q2 2018
DMTH10H015LPSQ	N	100	20	44		16	18@6v	33.3	1871	85	7.5	175	PowerDi5060	Q2 2018
DMTH10H030LK3Q	N	100	20	54	1-3	22	30	23	1639	15	12.5	175	TO252-3L	Q2 2018
DMTH10H017LPDQ	N	100	20	60	2-4	17	28	14.4	1968	150	10	175	PowerDi5060	Q1 2018

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SELF-PROTECTED MOSFET AUTOMOTIVE 'Q' PORTFOLIO

SELF-PROTECTED MOSFET (IntelliFET)

Diodes incorporated designs, develops and manufactures a range of high side and low side self protected MOSFETs that are ideal for driving inductive loads such as motors, relay, and lamps at low frequencies.

These devices feature over-temperature, over voltage, and over current protection as well input ESD protection facilities enabling circuit designers to dramatically increase reliability.

The Diodes IntelliFET portfolio is packaged in SOT23F, SOT223, SM8, SO8 and TO252-5L.



THE DIODES ADVANTAGE

- Over-Voltage, Over-Temperature and Over-Current Protection
Improved robustness and reliability for harsh environment
- Typical $R_{DS(on)}$ as Low as 80m Ω
Low $R_{DS(on)}$ minimizes the conduction losses through the device.

- 3V and 5.5V Inputs
IntelliFET portfolio can be driven directly from a microcontroller.
- AEC-Q101 – qualified to AEC-Q101 to ensure high reliability
- PPAP – production part approval documents are provided

LOW-SIDE SELF-PROTECTED MOSFET (IntelliFET)

Part	Configuration	TAB	B_{VDSS}	I_D (A)	P_D	$R_{DS(on)}$ max (m Ω) @ V_{IN}			V_{DS} (S/C)	E_{AS} (mJ)	Package Outlines	Availability
			(V)	$V_{IN} =$	(W)	3V	5V	10V	$V_{IN} = 5V$			
BSP75GQ	Single	Drain	60	1.4	2.5	-	0.675	0.55	36	550	SOT223	Released
BSP75NQ	Single	Source	60	1.2	1.5	-	0.675	0.55	36	550	SOT223	Released
ZXMS6004SGQ	Single	Source	60	1.3	1.6	0.6	0.5	-	36	480	SOT223	Released
ZXMS6004DGQ	Single	Drain	60	1.3	3	0.6	0.5	-	36	490	SOT223	Released
ZXMS6004FFQ	Single	Drain	60	1.3	1.5	0.6	0.5	-	36	90	SOT23F	Released
ZXMS6004DT8Q	Single	Drain	60	1.2	2.3	0.6	0.5	-	36	210	SM-8	Released
ZXMS6005DGQ	Single	N/A	60	2	1.6	0.25	0.2	-	36	490	SOT223	Released
ZXMS6005SGQ	Single	Source	60	2	1.6	0.25	0.2	-	36	490	SOT223	Released
ZXMS6005DT8Q	Dual	N/A	60	1.8	1.6	0.25	0.2	-	36	210	SM-8	Released
ZXMS6006DGQ	Single	Drain	60	2.8	3	0.1	0.125	-	36	490	SOT223	Released
ZXMS6006SGQ	Single	Source	60	2.8	3	0.1	0.125	-	36	490	SOT223	Released
ZXMS6006DT8Q	Dual	N/A	60	-	2.1	0.1	0.125	-	36	210	SM-8	Released

HIGH-SIDE SELF-PROTECTED MOSFET (IntelliFET)

Part	Configuration	V_{IN}	V_{clamp}	$R_{DS(on)}$	Temperature T_J	Package Outlines	Availability
		(V)	(V)	(m Ω)	(°C)		
ZXMS8008LK5Q	Single	5 - 20	42	8	150	TO252-5L	Q4 2018
ZXMS8010LK5Q	Single	5 - 20	42	10	150	TO252-5L	Q4 2018
ZXMS8012LK5Q	Single	5 - 20	42	12	150	TO252-5L	Q4 2018
ZXMS8014LK5Q	Single	5 - 20	42	14	150	TO252-5L	Q4 2018
ZXMS8016LK5Q*	Single	5 - 20	42	16	150	TO252-5L	Q3 2018

*Advance Information: For more details contact Diodes Sales

MOSFET AUTOMOTIVE APPLICATIONS

AUTOMOTIVE 'Q' MOSFETS FOR REVERSE BATTERY PROTECTION

Application Requirements

Protect against reverse polarity connection of the battery during vehicle maintenance. During the reconnection of a vehicle's battery it is possible to reverse the battery polarities causing damage to the vehicle's electronics.

■ Simple, Low Cost, and Minimal Component Count

■ Minimal Power Losses

■ Pulse Ruggedness to ISO7637

■ AEC-Q101 and PPAP Required

■ EMI Emissions

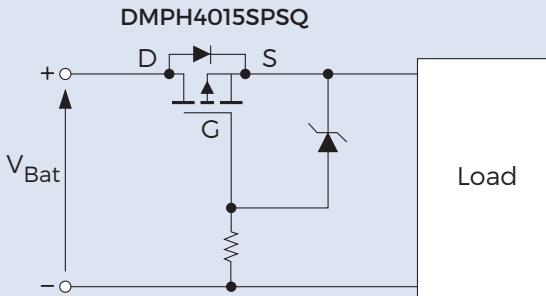
Key Products: 40V P-channel MOSFETs

■ DMPH4015SPSQ in PowerDI5060

■ DMPH4015SK3Q in TO252-3L

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REVERSE BATTERY PROTECTION CIRCUIT



RELAY DRIVERS AUTOMOTIVE 'Q' PORTFOLIO

DMN61D8LQ and DMN61D8LVTQ inductive load-drivers are designed for inductive load-switching applications, such as door relays, solenoids and small DC motors.

On-chip integrated Zener diodes and bias resistors eliminate the need for several external components, saving cost and reducing the PCB footprint.

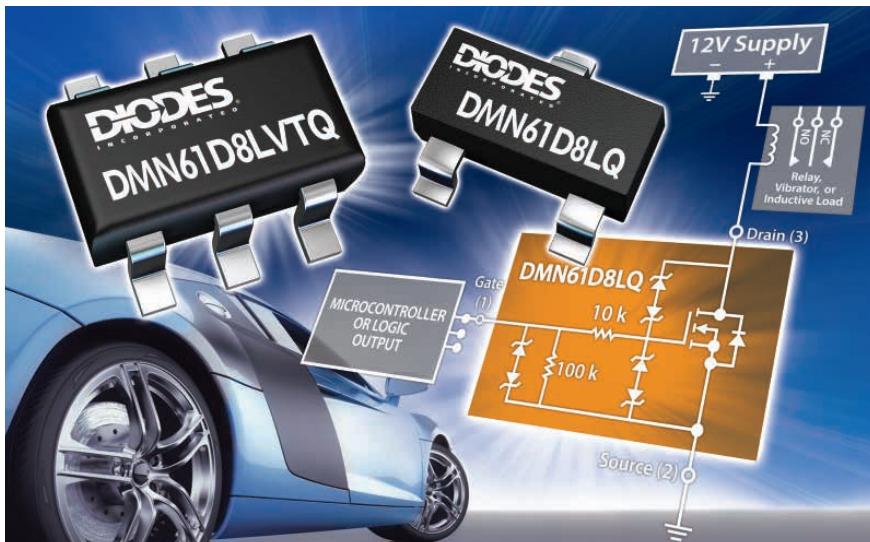
THE DIODES ADVANTAGE

■ Integrated Solution

Replaces 3 to 4 discrete components

■ Integrated Active Clamp

Eliminates the need for external freewheeling diodes



Part	Polarity	ESD Diodes Y/N	V_{DS} (V)	V_{GS} (±V)	$I_{DS} @$ $T_A = +25^\circ\text{C}$ (A)	$P_D @$ $T_A = +25^\circ\text{C}$ (W)	$R_{DS(ON)}$ Max (mΩ) @ V_{GS} 5V	$R_{DS(ON)}$ Max (mΩ) @ V_{GS} 3V	C_{iss} Typ (pF)	Q_G Typ @ V_{GS} = 5V (nc)	Package	Availability
DMN61D8LVTQ	N+N	Y	60	12	0.47	0.61	1800	2400	12.9	0.74	SOT26	Released
DMN61D8LQ	N	Y	60	12	0.47	0.61	1800	2400	12.9	0.74	SOT23	Released

BIPOLAR TRANSISTORS AUTOMOTIVE 'Q' PORTFOLIO

Part		V _{CEO} (V)	I _C (A)	I _{CM} (A)	P _D (W)	h _{FE}				V _{CE(sat)}				Package	Availability
						Min	@ I _C (A)	Min	@ I _{C2} (A)	Max (mV)	@ I _C /I _B (A/mA)	Max 2 (mV)	@ I _C /I _B (A/mA)		
NPN	PNP*														
-	FMMT717Q	12	2.5	10	0.625	300	0.1	180	2.5	17	0.1/10	170	1.5/50	SOT23	Released
FMMT618Q	FMMT718Q	20	2.5	6	0.625	300	0.2	200	2	15	0.1/10	200	2.5/50	SOT23	Released
-	FZT789AQ	25	3	6	2	250	1	200	2	250	1/10	450	2/20	SOT223	Released
FMMT491AQ	FMMT591AQ	40	1	2	0.5	300	0.5	200	1	300	0.5/50	500	1/100	SOT23	Released
DXT690BP5Q	-	45	3	6	3.2	400	1	150	2	360	1/5	320	2/40	PowerD15	Released
ZXT690BKQ	-	45	3	6	3.9	400	1	60	3	360	1/5	320	2/40	TO252-3L	Released
FMMT619Q	-	50	2	6	0.625	300	0.2	100	2	200	1/10	220	2/50	SOT23	Released
FMMT491Q	FMMT591Q	60	1	2	0.5	100	0.5	80	1	150	0.5/50	250	1/100	SOT23	Released
DXT651Q	DXT751Q	60	3	6	2	100	0.5	40	2	300	1/100	600	3/300	SOT89	Released
FZT651Q	FZT751Q	60	3	6	2	100	0.5	40	2	300	1/100	600	3/300	SOT223	Released
ZXTN2010ZQ	ZXTP2012ZQ	60	4.3	15	2.1	100	2	45	5	65	1/100	110	2/200	SOT89	Released
ZXTN2012GQ	ZXTP2012GQ	60	5.5	15	3	100	2	10	10	70	1/100	250	5/500	SOT223	Released
-	ZXT951KQ	60	5	15	3	100	2	10	10	50	0.1/10	460	5/500	TO252-3L	Released
BCX5616Q	BCX5316Q	80	1	1.5	1	100	0.15	25	0.5	500	0.5/50	-	-	SOT89	Released
BCP5616Q	BCP5316Q	80	1	2	2	100	0.15	25	0.5	500	0.5/50	-	-	SOT223	Released
FMMT634Q	-	100	0.9	5	0.625	15,000	1	-	-	960	1/5	-	-	SOT23	Released
FZT653Q	FZT753Q	100	2	6	2	100	0.5	25	2	300	1/100	500	2/200	SOT223	Released
MJD31CUQ	MJD32CUQ	100	3	5	15	25	1	10	3	1200	3/375	-	-	TO252-3L	Released
-	FZT953Q	100	5	10	3	100	1	30	4	50	0.1/10	420	4/400	SOT223	Released
ZXTN4004KQ	-	150	1	3	3.8	60	0.085	100	0.15	250	0.1/5	-	-	TO252-3L	Released
FMMT459Q	-	450	0.15	0.5	0.625	50	0.03	-	-	75	0.02/2	90	0.05/6	SOT23	Released
-	FMMT560Q	500	0.15	0.5	0.625	100	0.001	80	0.05	200	0.02/2	500	0.05/10	SOT23	Released

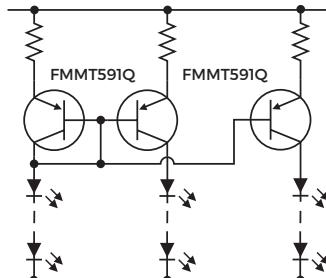
The above table represents a selection from over 250 Bipolar transistors released to support the automotive market. For full listings please refer to www.diodes.com

* Refer to data sheet for any differences to the NPN specs given.

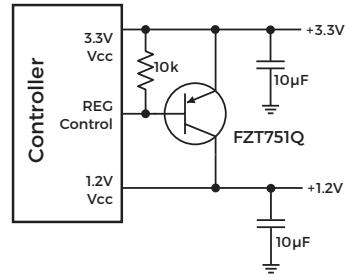
Diodes Incorporated is the market leader when it comes to Bipolar transistors.

The Bipolar transistor portfolio is built on successive generations of our innovative matrix emitter process. Years of knowledge, leading-edge designs and process innovation have extended our leadership in building ultra-low saturation, high-gain and increased power density transistors

By utilizing its wide line up of in-house packaging and superior silicon technology, Diodes is ideally positioned to meet your application needs for Bipolar transistors.



PNP current mirror to equalize current across multiple parallel LED strings



External PNP pass transistor acting as a linear regulator to step down from 3.3V to 1.2V.

THE DIODES ADVANTAGE

- **Broad Portfolio**
NPN, PNP, Darlintons, Matched Pairs, Pre-Biased Transistors, Gate Drivers to meet the majority of customer needs.
- **Low V_{CE(sat)}**
Leading-edge silicon technology gives best-in-class saturation voltage performance with respect to footprint.
- **High Peak Current**
For gate driving, the high peak current handling allows the capacitive load of MOSFET and IGBT gates to be switched quickly.
- **High Gain**
High minimum gains help to reduce the base current requirements and assist in switching faster.
- **AEC-Q101**
High-reliability qualification to meet the demands of the automotive industry.
- **PPAP Supported**
Production Part Approval Process documents provided.

PRE BIAS TRANSISTORS AUTOMOTIVE 'Q' PORTFOLIO

THE DIODES ADVANTAGE

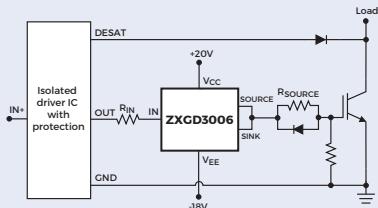
- Reduced PCB Footprint
Integrates 2 resistors and 1 transistor into a single package
- Broad 100mA Portfolio
Wide range of resistor combinations in SOT23 and SOT26
- Qualified to AECQ101
Qualified to AECQ101 to ensure high reliability
- Supported by a PPAP
Production part approval documents provided.



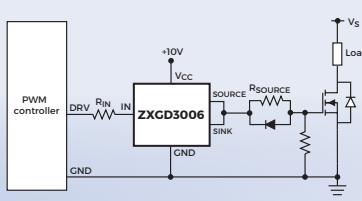
Part	Polarity	R1	R2	Package	Availability
ADTC143TCAQ	NPN	4.7K	-	SOT23	Released
ADTC143ZUAQ		4.7K	47K	SOT323	Released
ADTC124ECAQ		22K	22K	SOT23	Released
ADTC144EUAQ		47K	47K	SOT323	Released
ADTC144WCAQ		47K	22K	SOT23	Released
ADC143ZUQ	NPN + NPN	4.7K	47K	SOT363	Released
ADC114EUQ		10K	10K	SOT363	Released
ADC114YUQ		10K	47K	SOT363	Released
ADC144EUQ		47K	47K	SOT363	Released
ADC124EUQ		22K	22K	SOT363	Released
ADTA114EUAQ	PNP	10K	10K	SOT323	Released
ADTA144ECAQ		47K	47K	SOT23	Released
ADA114EUQ	PNP + PNP	10K	10K	SOT363	Released
ADA114YUQ		10K	47K	SOT363	Released
ACX143ZUQ	NPN + PNP	4.7K	47K	SOT363	Released
ACX114YUQ		10K	47K	SOT363	Released
ACX114EUQ		10K	10K	SOT363	Released
ACX124EUQ		22K	22K	SOT363	Released
ADTC143TUAQ	NPN	4.7K	-	SOT323	Released
ADTC143ECAQ		4.7K	4.7K	SOT23	Q2 2018
ADTC143XUAQ		4.7K	10K	SOT323	Q2 2018
ADTC114EUAQ		10K	10K	SOT323	Released
ADTC114ECAQ		10K	10K	SOT23	Released
ADTC144ECAQ		47K	47K	SOT23	Q2 2018
ADC143TUQ	NPN + NPN	4.7K	-	SOT363	Released
ADC114EUQ		10K	10K	SOT363	Released
ADTA143ECAQ	PNP	4.7K	4.7K	SOT23	Q2 2018
ADTA143ZUAQ		4.7K	47K	SOT323	Released
ADTA114ECAQ		10K	10K	SOT23	Released
ADTA144EUAQ		47K	47K	SOT323	Released

GATE DRIVERS AUTOMOTIVE 'Q' PORTFOLIO

IGBT Driving



MOSFET Driving



THE DIODES ADVANTAGE

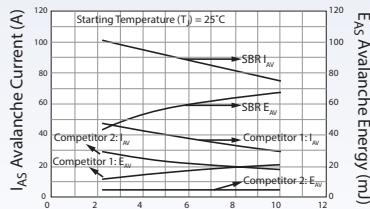
- **4A Output from 1mA Input**
High-gain buffer stage for driving the capacitive load of MOSFET and IGBT gates.
- **40V Wide Operating Voltage**
Full enhancement to minimize on-state losses.
- **Resistant to Latch-up and Shoot-Through**
Bipolar emitter-follower configuration is inherently resistant to latch-up and shoot-through issues.
- **Short Propagation Delay**
Less than 10ns propagation delay can rapidly track input.

Part	VIN & VCC Max V	Isource @ IIN = 1mA A	Isink @ IIN = 1mA A	Ipk A	IIN A	Gate Driver Switching Times (typ)				@ Condition	Package	Availability
						td(rise) ns	tr ns	td(fall) ns	tf ns			
ZXGD3006E6Q	40	4	3.8	10	0.1	1.3	7.3	3	11	CL=1nF; RL=0.18Ω; VCC=15V; VIN=15V; RIN=200Ω	SOT26	Released

SUPER BARRIER RECTIFIER AUTOMOTIVE 'Q' PORTFOLIO

Super Barrier Rectifier (SBR) is a Diodes Incorporated proprietary rectifier technology that combines the low reverse leakage (I_R) and fast switching characteristics (T_{RR}) of ultrafast rectifiers, with the low forward voltage drop (V_F) of Schottky diodes.

Furthermore, SBR has a proven, best-in-class repetitive avalanche rating, high temperature stability and wide safe operating area (SOA) that improves the reliability of the end application. These characteristics make it ideal for use as a reverse battery blocking or freewheel diode in Automotive applications.



Comparison of SBR I_{AV} and E_{AV} performance versus equivalent schottky diodes.



THE DIODES ADVANTAGE

- **Avalanche Rated**
Reverse Avalanche capability that is up to 10 times greater than competing solutions. 100% Avalanche tested, ensuring more rugged and reliable end applications.
- **Low Reverse Leakage Current (I_R)**
Low reverse leakage (I_R) at high temperatures provides increased reliability against thermal runaway.
- **Low Forward Voltage (V_F)**
- The lower SBR forward voltage drop ensures power dissipation is minimized.
- **Qualified to AEC-Q101**
Proven reliability for harsh automotive environment.
- **PPAP Supported**
Production Part Approval Process documents provided.

SBR® is a registered trademark of Diodes Incorporated

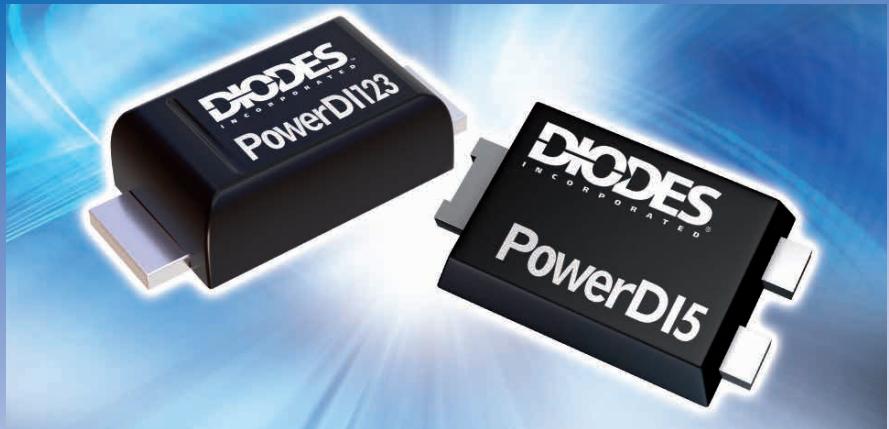
SUPER BARRIER RECTIFIER AUTOMOTIVE 'Q' PORTFOLIO (CONTINUED)

Part	Configuration	V _{RRM} (V)	I _o (A)	I _{FSM} (A)	V _F Max (V)	I _R Max (mA)	Typical C _T (pF) @ V _R	E _{AS} (mJ)	Junction Temperature (T _J)	Package	Availability
SBRTO5U20LPQ	Single	20	0.5	10	0.39	0.05	-	-	150	DFN1006	Released
SBR1A20T5Q	Single	20	1	10	0.52	0.2	10	-	150	SOD523	Q2 2018
SBR8U20SP5Q	Single	20	8	180	0.51	0.3	360	146	150	PowerD15	Released
SBR15U30SP5Q	Single	30	15	200	0.49	0.5	500	1074	150	PowerD15	Released
SBR1A30T5Q	Single	30	1	10	0.55	0.1	55	-	150	SOD523	Q2 2018
SBR1A30S3Q	Single	30	1	10	0.51	0.1	55	-	150	SOD323	Q2 2018
SBR40U30CTBQ	Single	30	40	400	0.55	0.5	2300		175	TO263AB (D2PAK)	Q2 2018
SBR1A40S3Q	Single	40	1	20	0.55	0.5	55	-	150	SOD323	Released
SBR140S1FQ	Single	40	1	30	0.51	0.1	50	-	150	SOD123F	Q2 2018
SBR2A40P1Q	Single	40	2	50	0.5	0.1	60	-	150	PowerD1123	Released
SBR3TU40P1Q-7	Single	40	3	50	0.49	0.1	45	-	150	PowerD1123	Released
SBR3U40S1FQ	Single	40	3	90	0.49	0.1	45	-	150	SOD123F	Released
SBR3A40SAQ	Single	40	3	45	0.5	0.4	45	-	150	SMA	Released
SBR3U40P1Q	Single	40	3	75	0.47	0.4	-	-	150	PowerD1123	Released
SBR1045D1Q	Single	45	10	90	0.58	0.3	400	200	150	TO252-3L (DPAK)	Released
SBR10U45D1Q	Single	45	10	125	0.57	0.3	300	620	150	TO252 (DPAK)	Released
SBR1045SP5Q	Single	45	10	180	0.55	0.45	500	-	150	PowerD15	Released
SBR10A45SP5Q	Single	45	10	45	0.53	0.4	45	-	150	PowerD15	Released
SBR1045CTLQ	Dual	45	10	90	0.55	0.3	80	100	150	TO252-3L (DPAK)	Released
SBR10U45SP5Q	Single	45	10	125	0.47	0.3	600	530	150	PowerD15	Released
SBR20M45D1Q	Single	45	20	140	0.61	0.1	350	-	175	TO252-3L (DPAK)	Released
SBR30A45CTBQ	Dual	45	30	175	0.55	0.55	500	135	150	TO263AB (D2PAK)	Released
SBR3045CTBQ	Dual	45	30	180	0.7	0.5	-	180	150	TO263AB (D2PAK)	Released
SBRT20U50SLPQ	Single	50	20	200	0.5	0.5	350		150	PowerD15060-8	Released
SBR0560S1Q	Single	60	0.5	15	0.5	100	-	-	150	SOD123	Released
SBR2M60S1FQ	Single	60	2	30	0.7	0.008	35	-	175	SOD123F	Released
SBR2U60S1FQ	Single	60	2	35	0.51	0.15	35	-	175	SOD123F	Released
SBR3U60P5Q	Single	60	3	80	0.6	0.06	35	120	175	PowerD15	Released
SBR3U60P5Q	Single	60	3	80	0.6	0.06	35	120	175	PowerD16	Released
SBR0560S1Q	Single	60	0.5	15	0.5	100	-	-	150	SOD123	Released
SBR5U60P5Q	Single	60	5	160	0.69	0.15	200	-	150	PowerD15	Q2 2018
SBR660CTLQ	Dual	60	6	80	0.57	0.3	130	190	150	TO252-3L (DPAK)	Released
SBR20A60CTBQ	Dual	60	20	150	0.7	0.1	400	500	150	TO263AB (D2PAK)	Released
SBR30A60CTBQ	Dual	60	30	180	0.63	0.33	450	600	150	TO263AB (D2PAK)	Released
SBR02U100LPQ	Single	100	0.25	5	0.8	1	-	-	150	X1-DFN1006-2	Released
SBR6100CTLQ	Dual	100	6	78	0.74	0.1	80	120	150	TO252-3L (DPAK)	Released
SBR8M100P5Q	Single	100	8	130	0.88	2	245	350	175	PowerD15	Released
SBR10M100P5Q	Single	100	10	220	0.65 (TYP)	2	245	-	175	PowerD15	Q2 2018
SBR12U100P5Q	Single	100	12	250	0.71	0.25	300	592	150	PowerD15	Released
SBR15U100CTLQ	Dual	100	15	100	0.8	0.1	150	192	150	TO252-3L (DPAK)	Released
SBR1U150SAQ	Single	150	1	42	0.7	0.1	-	-	150	SMA	Released
SBR1U200P1Q	Single	200	1	40	0.82	50	-	-	150	PowerD1123	Released
SBR10U200P5Q	Single	200	10	180	0.88	0.1	200	-	150	PowerD15	Released

SCHOTTKY DIODES AUTOMOTIVE 'Q' PORTFOLIO

The PowerDI123 and PowerDI5 packages feature a proprietary clip die attach that improves IFSM and reliability.

Furthermore, both the PowerDI5 and PowerDI123 feature off-board profiles of just 1.1mm and 1mm respectively, providing designers with a high-density, low-profile Schottky portfolio.



THE DIODES ADVANTAGE

- **Small Form Factor Package**
PowerDI5 occupies just 26mm², 55% smaller than DPAK.
PowerDI123 PCB footprint is just 7.5mm², 60% smaller than SMA package.
- **AEC-Q101** - High-reliability qualification in association with AEC-Q101.

- **Low Forward Voltage (V_F)** - Diodes schottky portfolio features low forward voltage that minimizes conduction losses reducing power dissipation.
- **PPAP Supported** - Production Part Approval Process documents provided.

SCHOTTKY DIODES AUTOMOTIVE 'Q' PORTFOLIO

Part	V_{RRM} (V)	I_o (A)	I_{FSM} (A)	V_F Max (V)	I_R Max (mA)	Typical C_f (pF) @ V_R	Junction Temperature (T_J)	Package	Availability
PD3S120LQ	20	1	33	0.42	0.16	200	150	PowerDI123	Released
DFLS120LQ	20	1	22	0.36	1	75	150	PowerDI123	Released
PD3S130HQ	30	1	22	0.45	0.1	200	150	PowerDI123	Released
PD3S130LQ	30	1	22	0.42	1.5	150	150	PowerDI123	Released
DFLS130LQ	30	1	33	0.36	1	75	150	PowerDI123	Released
DFLS140Q	40	1	40	0.55	0.01	28	150	PowerDI123	Released
DFLS140LQ	40	1	50	0.51	0.1	90	150	PowerDI123	Released
SDM160S1FQ	60	1	50	0.53	0.06	50	175	SOD123F	Released
DFLS160Q	60	1	50	0.5	0.1	67	150	PowerDI123	Released
DFLS1100Q	100	1	40	0.77	2	28	150	PowerDI123	Released
SDM1U100S1FQ	100	1	40	0.77	0.15	-	150	SOD123F	Q2 2018
DFLS1200Q	200	1	40	0.85	2	23	150	PowerDI123	Released
PD3S230LQ	30	2	30	0.45	1.4	150	150	PowerDI123	Released
DFLS230Q	30	2	22	0.49	1	75	150	PowerDI123	Released
DFLS230LQ	30	2	33	0.42	1	76	150	PowerDI123	Released
DFLS240LQ	40	2	50	0.5	1	90	150	PowerDI123	Released
DFLS260Q	60	2	50	0.62	1	67	150	PowerDI123	Released
SDM2100S1FQ	100	2	50	0.83	0.15	-	150	SOD123F	Q2 2018
PDS340Q	40	3	90	0.49	0.5	490	150	PowerDI5	Released
PDS360Q	60	3	100	0.62	0.15	380	150	PowerDI5	Released
PDS3100Q	100	3	90	0.76	0.1	260	150	PowerDI5	Released
PDS3200Q	200	3	180	0.78	0.1	520	150	PowerDI5	Released
PDS4150Q	150	4	180	0.76	0.01	530	150	PowerDI5	Released
PDS540Q	40	5	100	0.52	0.25	700	150	PowerDI5	Released
PDS560Q	60	5	150	0.67	0.15	500	150	PowerDI5	Released
PDS5100Q	100	5	250	0.78	0.2	310	150	PowerDI5	Released
PDS760Q	60	7	275	0.62	0.2	1050	150	PowerDI5	Released

TVS AUTOMOTIVE 'Q' PORTFOLIO

THE DIODES ADVANTAGE

- AEC-Q101 - High-reliability qualification in association with AEC-Q101.
- PPAP Supported - Production Part Approval Process documents provided.
- IEC Compliant - IEC61000-4-2 and 6100-4-5 compliant against electrostatic discharge.
- Small Form Factor Package

1800W AUTOMOTIVE COMPLIANT TVS

D28V01HU2P5Q

4.05 mm
1.15 mm
6.6 mm

Part	Configuration	Power Dissipation (W)	Channel Input Capacitance C _T Typ (pF)	V _{RWM} (V)	V _{BR} Min (V)	I _{RM} @ V _{RWM} (nA)	I _{PP} @ 8x20μs Max (A)	V _{CL} Max (V)	V _{ESD} Contact Discharge (+/-kV)	Junction Temperature (T _j)	Package	Availability
D5V0F2U3LPSQ	1ch uni-directional	0.3	0.5	5.5	6	100	1.5	12	30	150	DFN1006-2	Released
D5V0L1B2LPSQ	2ch uni-directional	0.25	0.5	5.5	6	100	1.5	12	30	150	DFN1006-3	Released
DRTR5V0U2SRQ	2ch uni-directional	0.5	16	5.5	6	100	5	10	15	150	SOT143	Q3 2018
D24V0L1B2LPSQ	1ch bi-directional	0.25	6	24	26	100	2	46	20	150	DFN1006-2	Released
D20V0L1B2WSQ	2ch bi-directional	0.25	15	20	21	100	3	30	30	150	SOD323	Released
DUP1105SOQ	1ch bi-directional	0.3	25	24	26.2	100	8	44	30	150	SOT23	Released
DUP2105SOQ	2ch bi-directional	0.3	25	24	26.2	100	8	44	30	150	SOT23	Released
DUP3105SOQ	3ch bi-directional	0.3	25	32	35.6	100	8	59	30	150	SOT23	Released
DESD1CAN2SOQ	2ch bi-directional	0.3	11	24	26.2	50	3	70	30	150	SOT23	Released
DESD1CAN2WSQ	2ch bi-directional	0.3	9.3	24	25.4	50	3	70	30	150	SOT323	Q2 2018
DESD2CAN2SOQ	2ch bi-directional	0.3	25	24	25.4	10	5	35	30	150	SOT23	Released
DESD2FLEX2SOQ	2ch bi-directional	0.3	25	25	25	10	5	34	30	150	SOT23	Released
DESD1LIN2WSQ	1ch bi-directional	0.3	13	17.1	17.1	50	5	35	30	150	SOD323	Released
D28V0H1U2P5Q	1ch uni-directional	1800	-	28	31	100	40	44	30	150	PowerDI5	Released
D55V0M1B2WSQ	1ch uni-directional	0.35	14	55	57	100	2	86	30	150	SOD323	Released
DPD5VO - DPD36AWFQ	1ch uni-directional	220	-	5 - 36	5.2 - 44.1	400	24.5 - 3.5	9.2 - 70.5	30	150	SOD123F	Q2 2018
DTVS3V3 - DTVS36SIURQ	1ch uni-directional	400	-	3.3 - 36	5.2 - 44.2	400	38 - 5.7	10.5 - 70.5	30	150	SOD123F	Q2 2018
SMAJ5VO - SMAJ36AQ	1ch uni-directional /bi-directional	400	-	5 - 170	6.4 - 189	500	43 - 1.5	9.2 - 275	30	150	SMA	Q3 2018
SMBJ5VO - SMAJ36AQ	1ch uni-directional /bi-directional	600	-	5 - 170	6.4 - 189	500	44 - 1.5	9.2 - 275	30	150	SMB	Q3 2018
SMCJ5VO - SMAJ36AQ	1ch uni-directional /bi-directional	1500	-	5 - 170	6.4 - 189	500	45 - 1.5	9.2 - 275	30	150	SMC	Q3 2018

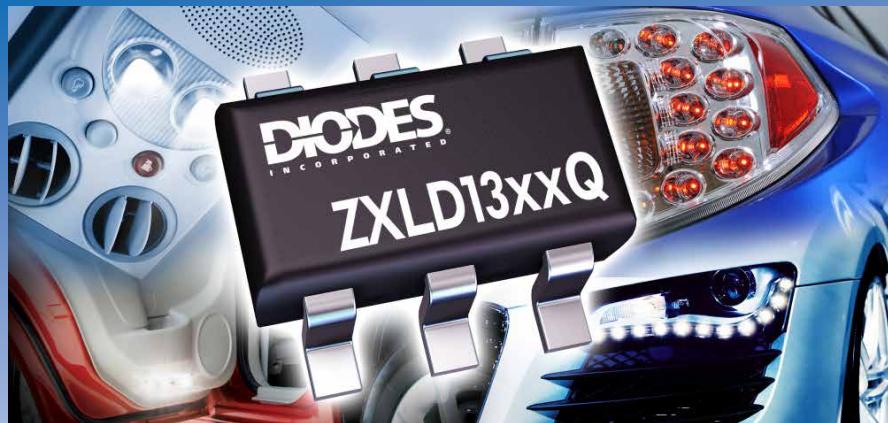
ZENER DIODES AUTOMOTIVE 'Q' PORTFOLIO

Part	Configuration	P _D (W)	V _Z (nom) (V) @ 25°C	@ I _{ZT} @25°C	V, Tolerance (%) Typ	I _{R, Max} (μA)	Package	Availability
DFLZ5VIQ - DFLZ39Q	Single	1	5.1 - 39	100 - 10	5	5	PowerDI123	Released

LED DRIVERS AUTOMOTIVE 'Q' PORTFOLIO

The best Analog ICs provide circuit designers with the most advantageous combination of efficiency, functionality and package size.

Diodes Incorporated's automotive LED lighting solutions are not only recognized for their high efficiency and simplicity, but also for their flexibility and versatility, making them well suited for Automotive applications.



THE DIODES ADVANTAGE

- Reduced Switching Noise and Ringing Solves EMI issues.
- Open LED, Short LED and Overtemperature Protection
Open LED - automatically stops switching.
Short LED - duty cycle reduction.
- 5% Initial LED Average Current Accuracy
Meets the accuracy requirements of Automotive lighting.
- AEC-Q100 - High-reliability qualification in association with AEC-Q100.
- PPAP Supported - Production Part Approval Process documents provided.

Part	Buck	Buck-boost	Boost	Linear	Driver/Controller	Input Voltage		Drop-Out Voltage	Maximum Output Voltage	LED Current	LED Current Accuracy	Dimming		Efficiency	Operating Temp Range	Sense Voltage	Package	
						Min	Max					PWM	Analog					
						V	V											
AL5801Q	-	-	-	Y	D	5	100	2	100	350	-	N/A	Y	N	-	-40 to +125	560	SOT26
AL5809Q				Y	D	2.5	60	2.5	60	15, 20, 25, 30, 40, 50, 60, 90, 120, 150	5	N/A	Ext	N	-	-40 to +125	N/A	POWERDI-123
AL8400Q	-	-	-	Y	C	2	18	0.5		Ext. /BJT	3	N/A	Ext	N	-	-40 to +125	200	SOT353
AL8806Q	Y	-	-	-	D	6	36	-	36	1500	5	1000	Y	Y	98	-40 to +125	100	MSOP-8EP
AL8807BQ	Y	-	-	-	D	6	36	-	36	1300	5	1000	Y	-	97	-40 to +125	100	MSOP-8EP
AL8807Q	Y	-	-	-	D	6	36	-	36	1300	5	1000	Y	Y	98	-40 to +125	100	MSOP-8EP
AL8860Q/61Q*	Y	-	-	-	D	4.5	40	-	40	1500	5	1000	Y	Y	97	-40 to +125	100	MSOP-8EP
BCR420UW6Q	-	-	-	Y	D	1.4	40	1.4	40	10 to 200	10	N/A	N	N	-	-55 to +150	700	SOT26
BCR421UW6Q	-	-	-	Y	D	1.4	40	1.4	40	10 to 350	10	N/A	Y	N	-	-55 to +150	700	SOT26
BCR420UFDQ	-	-	-	Y	D	1.4	40	1.4	40	10 to 200	10	N/A	N	N	-	-55 to +150	700	U-DFN2020-6
BCR421UFDQ	-	-	-	Y	D	1.4	40	1.4	40	10 to 350	10	N/A	Y	N	-	-55 to +150	700	U-DFN2020-6
BCR401UW6Q	-	-	-	Y	D	1.4	40	1.4	40	10 to 100	10	N/A	Y	N	-	-55 to +150	700	SOT26
BCR402UW6Q	-	-	-	Y	D	1.4	40	1.4	40	20 to 100	10	N/A	Y	N	-	-55 to +150	700	SOT26
BCR405UW6Q	-	-	-	Y	D	1.4	40	1.4	40	50 to 100	10	N/A	Y	N	-	-55 to +150	700	SOT26
ZXLD1350Q	Y	-	-	-	D	7	30		30	380	5	1000	Y	Y	95	-40 to +105	100	TSOT25
ZXLD1356Q	Y	-	-	-	D	6	60		60	550	3	1000	Y	Y	97	-40 to +125	200	TSOT25, V-DFN3030-6
ZXLD1360Q	Y	-	-	-	D	7	30		30	1000	5	1000	Y	Y	95	-40 to +125	100	TSOT25
ZXLD1362Q	Y	-	-	-	D	6	60		60	1000	5	1000	Y	Y	95	-40 to +125	100	TSOT25
ZXLD1366Q	Y	-	-	-	D	6	60		60	1000	2.5	500	Y	Y	95	-40 to +125	200	SO-8EP, TSOT25, V-DFN3030-6
ZXLD1370Q	Y	Y	Y	-	C	6.5	60		Ext. MOSFET		2	1000	Y	Y	95	-40 to +125	218	TSSOP-16EP
ZXLD1371Q	Y	Y	Y	-	C	5	60		Ext. MOSFET		2	1000	Y	Y	95	-40 to +125	218	TSSOP-16EP
ZXLD1374Q	Y	Y	Y	-	D	6.5	60		60	1500	2	1000	Y	Y	95	-40 to +125	218	TSSOP-20EP
ZXLD1615Q	-	-	Y	-	D	2.70	5.5		28	-	-	350	N	N	85	-40 to +85	1250	TSOT25

*Undergoing AEC-Q100 qualification - expected Q2 2018

LED LIGHTING AUTOMOTIVE APPLICATIONS

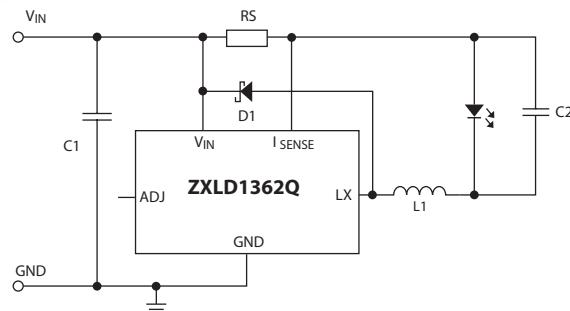
LED DOOR LIGHTING

Application Requirements

- 9~16V typical input voltage range
- High efficiency drive of 1 LED in series
- Wide temperature range >+85°C
- Withstand load dump
- Meet AEC-Q100 automotive quality requirements

THE DIODES ADVANTAGE

- 7~60V input range → supports normal battery range and load dumps
- 1A switch → Drives 0.5, 1 and 3W LEDs
- Qualified to AEC-Q100 Grade 1
- High accuracy:
ZXLD1356/66Q: 2.5%
ZXLD1362Q: 5%



KEY PRODUCTS

- ZXLD1362Q
- ZXLD1356Q
- ZXLD1366Q
- PDS3S140Q D1

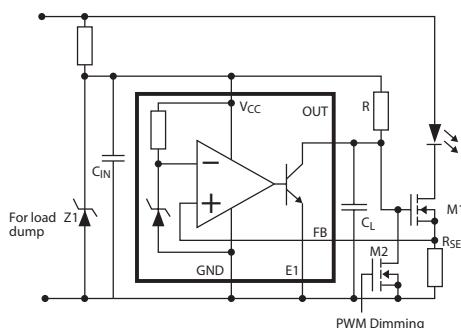
INTERIOR LAMP

Application Requirements

- Operate over whole battery (9~16V) voltage range
- Wide temperature range >+85°C
- Simple cost-effective solution for driving 50~150mA LEDs
- Meet AEC-Q100 automotive quality requirements

THE DIODES ADVANTAGE

- Qualified to AEC-Q100 Grade 1
- Drives external transistor → determines LED current and Power Dissipation capability
- Simple cost-effective solution



KEY PRODUCTS

- AL8400Q
- ZXNMN4A06CQ DMN6068SEQ M1
- BZT52C12Q Z1
- 2N7002M2Q M2

LED LIGHTING AUTOMOTIVE APPLICATIONS

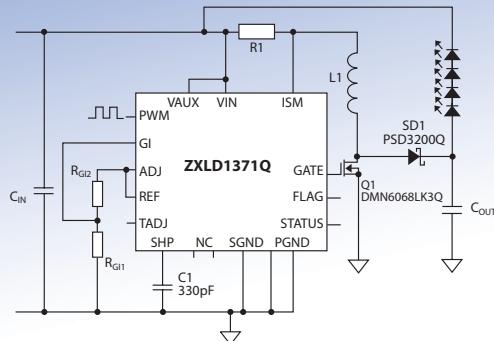
DAYTIME RUNNING LIGHTS

Application Requirements

- Operate over whole battery (9~16V) voltage range
- High efficiency drive of LEDs
- Wide temperature range >+85°C
- Withstand load dump
- Meet AEC-Q100 automotive quality requirements

THE DIODES ADVANTAGE

- Multitopology LED drivers → Buck-boost mode works over V_{BATT} range driving LED chain used in DRL.
- ZXLD operates from 60V down to 5V
- 2% accuracy → better matching between DRL pair.
- Qualified to AEC-Q100 Grade 1.
- Ambient temperature range up to +125°C.
- LED Thermal protection loop.



KEY PRODUCTS

- ZXLD1371Q
- ZXLD1374Q
- DMN6068LK3Q Q1
- PDS3200Q SD1

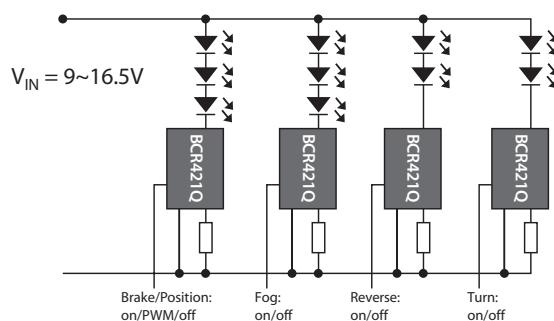
REAR LAMP CLUSTER

Application Requirements

- Operate over whole battery (9~16V) voltage range
- Wide temperature range >+85°C
- Simple cost-effective solution for driving 20~50mA LEDs
- Meet automotive quality requirements

THE DIODES ADVANTAGE

- Qualified to AEC-Q10x in TS16949 certified facilities.
- Ambient temperature range > +85°C
- Simple cost-effective solution.



LINEAR REGULATORS AUTOMOTIVE 'Q' PORTFOLIO

THE DIODES ADVANTAGE

- ZLDO1117Q with Extended -40 to +125°C Ambient Temperature Range
Meets requirements for automotive applications except under the hood
- Industry-Standard Pin-Out and Packages
- AEC-Q100 Qualification
Meets automotive requirements



Part	Output Voltage (V)	Min Input Voltage (V)	Max Input Voltage (V)	Output Current (A)	Dropout Voltage Typical (V)	Output Discharge	Ambient Temperature Range (°C)	AEC-Q100 Grade	Package
QUASI-LDO REGULATORS									
ZLDO1117Q	Adj. 1.2, 1.5, 1.8, 2.5, 3.3, 5.0	V _{out} +1.4	20	1	1.35	N	-40 to +125	1	SOT223; TO252
AP7315Q	1.1; 1.2; 1.5; 1.8; 2.5; 3.3	1.7	5.25	0.15	0.3	N	-40 to +125	Undergoing AEC-Q100 Grade Qualification, Expected Q2 2018	SOT25
AP7315DQ		1.7	5.25	0.15	0.3	Y	-40 to +125		
AP7343Q	0.9; 1.0; 1.2; 1.5; 1.8; 2.5; 3.3	1.7	5.25	0.3	0.3	N	-40 to +125	SOT25	
AP7343DQ		1.7	5.25	0.3	0.3	Y	-40 to +125		
LINEAR VOLTAGE REGULATORS									
ZMR250Q	2.5	4.2	22.5	0.05	1.4	N	-40 to +85	3	SOT23
ZMR330Q	3.3	4.8	24	0.05	1.44	N	-40 to +85	3	
ZMR500Q	5	7	25	0.05	1.2	N	-40 to +85	3	
ZXTR2105FQ	5	7	60	0.15	1.7	N	-65 to +150	AEC-Q101	SOT23
ZXTR2108FQ	8	10	60	0.015	1.2	N	-65 to +150	AEC-Q101	
ZXTR2112FQ	12	15	60	0.015	1.8	N	-65 to +150	AEC-Q101	

QUALITY AND ENVIRONMENTAL STANDARDS

- ISO/TS 16949:2009 Quality Management System Process-based / customer-focused
- ISO14001 Environmental Management System
- VDA6.3 Compliant Wafer and Assembly Facilities
- RoHS-Compliant All reliability and environmental information available at diodes.com

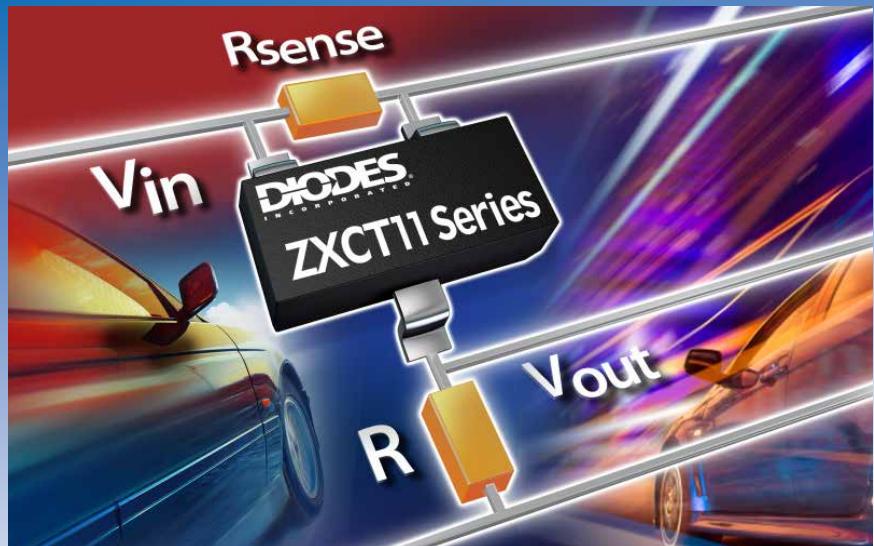
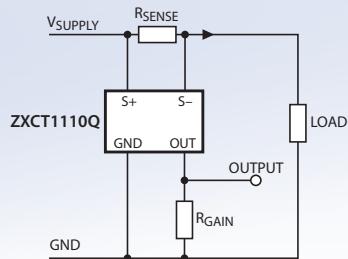
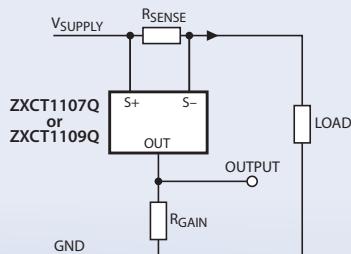


HIGH-SIDE CURRENT MONITORS AUTOMOTIVE 'Q' PORTFOLIO

Diodes' current monitors offer simple, cost-effective solutions to high-sided current measurement.

The current-output versions provide a variable gain, while the voltage-output versions provide fixed gain and require only one external resistor.

All versions have AEC-Q100 qualification.



THE DIODES ADVANTAGE

- **High-Side Current Sensing**
Doesn't disturb the ground plane
- **Up to 2.5V Sense Voltage**
Measures larger transient currents while keeping accuracy at lower currents
- **Up to 60V Common-Mode Sensing**
Withstands Load dump conditions
- **1% Typical Accuracy**
Meets accuracy requirements of applications
- **AEC-Q100 Grade 1 Qualification**
Meets requirements of automotive needs

Part	Description	V _{IN} (V)	V _{CC} (V)	Accuracy @ 100mV	Quiescent Current	$\left(\frac{\text{Gain}}{V_{\text{OUT}} - V_{\text{SENSE}}} \right)$	Bandwidth (MHz)	Package
CURRENT OUTPUT								
ZXCT1008Q/9Q	Cost-effective current monitor	2.5 to 20	N/A	±2.5%	4µA	10mA/V	2	SOT23
ZXCT1082Q	60V improved accuracy	2.7 to 60	2.5 ~ 60	2%	25µA	Prog	0.5	SOT25
ZXCT1083Q	40V improved accuracy	2.7 to 40	2.5 ~ 40	2%	25µA	Prog	0.5	SOT25
ZXCT1107Q/9Q	High-accuracy and cost-effective	2.5 to 36	N/A	±3.4%	3µA	4mA/V	0.3	SOT23
ZXCT1110Q	Improved offset over ZXCT1107/9	2.5 to 36	N/A	±1.8%	3µA	4mA/V	0.3	SOT25
VOLTAGE OUTPUT								
ZXCT1080Q	60V common-mode range	3 to 60	4.5 ~ 12	±3%	30µA	10	0.5	SOT25
ZXCT1081Q	40V common-mode range	3 to 40	4.5 ~ 12	±3%	30µA	10	0.5	SOT25
ZXCT1084Q/5Q	60V/40V common-mode enhanced performance	2.7 to 60/40	2.5 ~ 60/40	2%	25µA	25	0.5	SOT25
ZXCT1086Q/7Q						50	0.2	SOT25

CURRENT MONITORS AUTOMOTIVE APPLICATIONS

WINDOW LIFT

Application Requirements

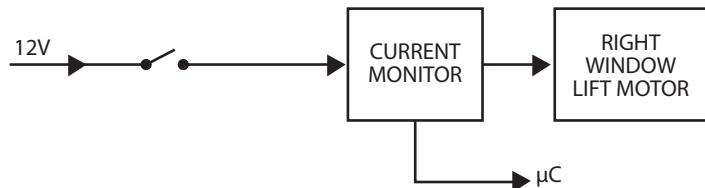
- High-side current measurement so that ground reference point isn't disturbed.
- Wide operating temperature range
- AEC-Q100 qualification

THE DIODES ADVANTAGE

- ZXCT1109Q qualified to AEC-Q100 Grade 1 (up to 125°C ambient)
- Up to 36V common-mode voltage
- Up to 800mV sense voltage (can be extended by couple of resistors)
- Only 2 resistors required to measure current and set gain

KEY PRODUCTS

- ZXCT1008Q
- ZXCT11xxQ Series
- ZXCT108xQ



OP AMPS AND COMPARATORS AUTOMOTIVE 'Q' PORTFOLIO

Part	Number of channels	Supply Voltage		Supply Current (mA)	Input Offset Voltage (mV)	Input Bias Current (nA)	Input Common Mode Voltage		Output Current (mA)	Ambient Temperature Range (°C)	Package
		Min (V)	Max (V)				Min (V)	Max (V)			
OP AMPS											
LM2902Q/AQ	4	3	36	0.7	2/l	-20	0	V _{CC} -1.5	±16	-40 to +125	SO-14, TSSOP-14
LM2904Q/AQ	2	3	36	0.5	2/l	-20	0	V _{CC} -1.5	±16	-40 to +125	SO-8, MSOP-8, TSSOP-8
COMPARATORS											
LM2901Q/AQ	4	3	36	0.9	2/l	-25	0	V _{CC} -1.5	±16	-40 to +125	SO-14, TSSOP-14
LM2903Q/AQ	2	3	36	0.6	2/l	-25	0	V _{CC} -1.5	±16	-40 to +125	SO-8, MSOP-8, TSSOP-8

CONSTANT VOLTAGE AND CONSTANT CURRENT CONTROLLER

Part	Constant Voltage			Constant Current			MAX V _{CC} (V)	Supply Current (mA)	Package
	Reference Voltage (V)	Reference Tolerance (%)	V _{SENSE} (mV)	V _{SENSE} Tolerance (%)					
AP4312Q	1.21	±0.5	70	±3			18	0.18	SOT26

SHUNT REGULATORS/REFERENCES AUTOMOTIVE 'Q' PORTFOLIO

THE DIODES ADVANTAGE

- Extended -40 to +125°C Ambient Temperature Range Meets requirements for automotive applications except under the hood
- Industry-Standard Pin-Out and Packages
- AEC-Q100 Qualification Meets requirements of automotive needs



Part	Reference Voltage (V)	Accuracy (%)	Max input Voltage (V)	Sink Current (mA)	Min Cathode Current for Regulation Typ (µA)	Operating Ambient Temperature Range (°C)	AEC-Q100 Grade	Package
SHUNT REGULATORS								
ZTL431Q	2.5	0.5; 1	20	100	400	-40 to +125	1	SOT23; SOT25; SOT23F
ZTL432Q*	2.5	0.5; 1	20	100	400	-40 to +125	1	SOT23; SOT23F
TLV431Q	1.24	0.2; 0.5; 1	18	15	55	-40 to +125	1	SOT23; SOT25
SHUNT REFERENCES								
LM4040-xxQ	2.5, 3.0, 5.0	0.2; 0.5; 1	N/A	15	60	-40 to +125	1	SOT23
LM4041Q	1.225	0.5; 1	N/A	12	30	-40 to +125	1	SOT23
LM4041_ADJQ	1.233	1	10	12	30	-40 to +125	1	SOT23
ZRC330Q	3.30	2; 1	N/A	5	20	-40 to +85	1	SOT23

* Reverse pinout to ZTL431Q in SOT23

AUDIO – PIEZO SOUNDER DRIVER

THE DIODES ADVANTAGE

- Automotive Compliant (-40 ≤ T_A ≤ 105°C) Meets automotive requirements including PPAP documentation
- 1x, 2x and 3x selectable charge-pump boost gives up to 18V_{PP} Output High sound levels from a low supply voltage with improved system design flexibility and efficiency
- Efficient Solution Automatic standby and wake-up control or manual stand-by control
- Input signal 20Hz to 300kHz Wider input suitable for different Audio or Sounder applications



Part	Description	V _{DD} Range	I Q	Stereo /Mono	BTL/SE	Volume	Gain Min	Gain Max	Ambient Temperature Range		Package
		(V)	(mA)						(dB)	(dB)	
PAM8904Q	18VPP Output Class-D Piezo Sounder Driver	2.3 to 5	1	M	BTL	Three Step	1	3	-40 to +85		U-QFN3030-16

HALL SWITCHES AUTOMOTIVE 'Q' PORTFOLIO

Diodes' Automotive Hall Effect Switches provide simple and reliable solutions to contactless switching in automotive applications

Typical application areas include open and close detection, rotation and position monitoring.

Diodes' Automotive Hall Effect switch portfolio includes three single-channel families:

Latch Latches with one polarity and changes state only when opposite field is applied

Unipolar Responds to either a N or S field; dependent on package (see below)

Omnipolar Responds to any magnetic field polarity. Magnet's polarity not critical.



THE DIODES ADVANTAGE

- Qualified to AEC-Q100 Grade 0 with PPAP Supported
- Wide Operating Range 3V to 28V over -40 to +150°C
- 8kV ESD Rating
- Comprehensive Portfolio: 8 Latches – Now
10 Unipolar Switches - Now
3 Omnipolar Switches - Q2 2018*
- Simple Cost-Effective Solution

- Wide Protection Features:
 - Low-leakage reverse-blocking diodes
 - Zener clamps on supply and output pins
 - Output (tight tolerance)
Over-current limit
 - 32V load dump capability
- Industry-Standard Pin-Out and Packages SOT23, SC59 and SIP3
SC59 offers reverse polarity to SOT23
- Open-Drain Output
Easily interfaces to 3.3V and 5V µC

Part	Type	Output Type	Operating Voltage	Average Supply Current	Output Current	Operating Point Bop (Gauss)			Release Point Bop (Gauss)			Ambient Temperature Range (°C)	Package
						V	mA	mA	Min	Typ	Max	Min	
AH3362Q	Unipolar	Single, Open Drain, Active Low	3 to 28	3	30	15	30	45	5	20	35	-40 to +150	SC59, SOT23, SIP-3
AH3363Q						40	55	72	20	35	50	-40 to +150	SC59, SOT23, SIP-3
AH3364Q						60	80	100	40	60	80	-40 to +150	SOT23, SIP-3
AH3365Q						80	100	120	60	80	100	-40 to +150	SOT23, SIP-3
AH3366Q						65	100	135	50	85	120	-40 to +150	SC59, SOT23, SIP-3
AH3367Q						95	115	140	70	90	120	-40 to +150	SC59, SOT23, SIP-3
AH3368Q						130	155	180	105	130	160	-40 to +150	SOT23, SIP-3
AH3369Q						150	175	200	125	150	180	-40 to +150	SOT23, SIP-3
AH3390Q						180	220	240	155	195	220	-40 to +150	SC59, SOT23, SIP-3
AH3391Q						235	275	295	210	250	275	-40 to +150	SOT23, SIP-3
AH3762Q	Latch	Single, Open Drain, Active Low	3 to 28	3	30	10	25	40	-40	-25	-10	-40 to +150	SC59, SOT23, SIP-3
AH3763Q						15	30	45	-45	-30	-15	-40 to +150	SC59, SOT23, SIP-3
AH3764Q						20	40	60	-60	-40	-20	-40 to +150	SC59, SOT23, SIP-3
AH3765Q						50	70	90	-90	-70	-50	-40 to +150	SC59, SOT23, SIP-3
AH3766Q						80	110	140	-140	-110	-80	-40 to +150	SOT23, SIP-3
AH3767Q						110	140	170	-170	-140	-110	-40 to +150	SOT23, SIP-3
AH3768Q						140	175	200	-200	-175	-200	-40 to +150	SOT23, SIP-3
AH3769Q						170	220	250	-250	-220	-170	-40 to +150	SOT23, SIP-3
AH3562Q*	Omnipolar	Single, Open Drain, Active Low	3 to 28	3	30	±10	±20	±30	±5	±10	±20	-40 to +150	SOT23, SIP-3
AH3563Q*						±15	±30	±45	±10	±20	±35	-40 to +150	SOT23, SIP-3
AH3564Q*						±20	±40	±60	±10	±25	±45	-40 to +150	SOT23, SIP-3

* Expected Q2 2018

PRECISION TIMING AUTOMOTIVE COMPLIANT 'Q' PORTFOLIO

THE DIODES ADVANTAGE

- Automotive Compliant ($-40 \leq T_A \leq 125^\circ\text{C}$)
Meets automotive requirements including PPAP documentation
- Total Timing Solutions – Frequency Control Products + IC with very broad portfolio for crystals and oscillators
Supports Infotainment, Clusters, Telematics, ADAS, Connected box, TPMS applications
- Diodes' Precision Timing portfolio form part of chipset manufacturers' ref design Provides a verified solution meeting the application needs
- Only Automotive Compliant (AEC-Q100 qualified) PCIe Clock Generators



CRYSTALS AND CRYSTAL OSCILLATORS

Product	Output Type	Family	Package	Frequency Range	Ambient Temperature	Status
Crystal		FYQ	5.0 x 3.2	8 - 125 MHz	-40 to +125°C	Released
		FLQ	3.2 x 2.5	8 - 66 MHz	-40 to +125°C	Released
		FHQ	2.5 x 2.0	12 - 66 MHz	-40 to +125°C	Released
		FWQ	2.0 x 1.6	16 - 66 MHz	-40 to +125°C	Released
Crystal Oscillator	CMOS	FNQ	7.0 x 5.0	1 - 166 MHz	-40 to +85°C	Released
		HXQ71	7.0 x 5.0	1.75 - 60 MHz	-40 to +125°C	Released
		FDQ	5.0 x 3.2	1 - 133 MHz	-40 to +85°C	Released
		HXQ51	5.0 x 3.2	1.75 - 60 MHz	-40 to +125°C	Released
		FKQ	3.2 x 2.5	1 - 106.25 MHz	-40 to +85°C	Released
		HXQ31	3.2 x 2.5	1.75 - 60 MHz	-40 to +125°C	Released
		HXQ21	2.5 x 1.6	1.75 - 60 MHz	-40 to +125°C	Released
		HXQ11	2.0 x 1.6	1.75 - 60 MHz	-40 to +125°C	Released
	LVPECL	HXQ72	7.0 x 5.0	25 - 161 MHz	-40 to +125°C	Released
		HXQ52	5.0 x 3.2	25 - 161 MHz	-40 to +125°C	Released
		HXQ32	3.2 x 2.5	25 - 161 MHz	-40 to +125°C	Released
	LVDS	HXQ73	7.0 x 5.0	25 - 161 MHz	-40 to +125°C	Released
		HXQ53	5.0 x 3.2	25 - 161 MHz	-40 to +125°C	Released
		HXQ33	3.2 x 2.5	25 - 161 MHz	-40 to +125°C	Released

TIMING ICs

Family	Part Number	Description	Package	Ambient Temperature	Status
Clock Generator	PI6C557-05Q	4-output PCIe Gen1/2 clock Generator	TSSOP-20	-40 to +85°C	Released
	PI6C557-03AQ	2-output PCIe Gen1/2 clock Generator	TSSOP-16	-40 to +85°C	Released
	PI6C557-01BQ	1-output PCIe Gen1/2 clock Generator	QFN3030-16	-40 to +85°C	Released
	PI6LC48H02Q	2-output PCIe Gen1/2/3 clock Generator	TSSOP-16	-40 to +85°C	Released
Clock Buffer	PI6C49CB01Q2	1 to 1 Differential-to-CMOS translator, Grade 2	SOIC-8	-40 to +105°C	Q2 2018
	PI6C49CB01Q3	1 to 1 Differential-to-CMOS translator, Grade 3	SOIC-8	-40 to +85°C	Q2 2018
	PI6C49CB02Q2	1 to 2 CMOS fanout buffer, Grade 2	SOIC-8	-40 to +105°C	Q2 2018
	PI6C49CB02Q3	1 to 2 CMOS fanout buffer, Grade 3	SOIC-8	-40 to +85°C	Q2 2018
	PI6C49CB04AQ2	1 to 4 CMOS fanout buffer, 1.5V ~ 3.3V, Grade 2	SOIC-8	-40 to +105°C	Q2 2018
	PI6C49CB04AQ3	1 to 4 CMOS fanout buffer, 1.5V ~ 3.3V, Grade 3	SOIC-8	-40 to +85°C	Q2 2018
	PI6C49CB04BQ2	1 to 4 CMOS fanout buffer, dual VDD, Grade 3	SOIC-8	-40 to +105°C	Q2 2018
	PI6C49CB04BQ3	1 to 4 CMOS fanout buffer, dual VDD, Grade 2	SOIC-8	-40 to +85°C	Q2 2018
	PI6C49CB04CQ2	1 to 4 CMOS fanout buffer, 1.5V ~ 3.3V, OE default on, Grade 2	SOIC-8	-40 to +105°C	Q2 2018
	PI6C49CB04CQ3	1 to 4 CMOS fanout buffer, 1.5V ~ 3.3V, OE default on, Grade 3	SOIC-8	-40 to +85°C	Q2 2018

555 TIMERS

Part	Max Frequency (Mhz)	Supply Current V _{CC} =5V		Min V _{IN} (V)	Max V _{IN} (V)	T _A Range (°C)	Package	Status
		Output Low (mA)	Output High (mA)					
SE555QS-13	0.1	3	2	4.5	15	-40 to +125	SO-8	Released

SERIAL CONNECTIVITY AUTOMOTIVE COMPLIANT 'Q' PORTFOLIO

THE DIODES ADVANTAGE

- **Automotive Compliant ($-40 \leq T_A \leq 85^\circ\text{C}$)**
Meets automotive requirements including PPAP documentation
- **Diodes' Serial Connectivity ICs form part of chipset manufacturers' ref design**
Provides a verified solution meeting the application needs
- **Only Automotive Compliant PCIe Packet Switch available today**
Extends PCIe ports with intelligent Support for Infotainment, Clusters, Telematics and ADAS applications
- **USB Signal Switch family**
MUX/DeMUX for USB3.0/2.0 ports
- **Single & two channel USB ReDriver family**
Extends cable length for high speed signals
- **USB Charger family**
Provides Automotive compliant Charging port solution



PACKET SWITCHES

Part	Description	Package	Ambient Temperature	Status
PI7C9X2G304SLQ	3-port/4-lane PCIe Gen2 packet switch	128-LQFP	-40 to +85°C	Released
PI7C9X2G304ELQ	3-port/4-lane PCIe Gen2 packet switch	QFN100100-136	-40 to +85°C	Released
PI7C9X2G404SLQ	4-port/4-lane PCIe Gen2 packet switch	128-LQFP	-40 to +85°C	Released
PI7C9X2G404ELQ	4-port/4-lane PCIe Gen2 packet switch	QFN100100-136	-40 to +85°C	Released

USB3.0/2.0 SIGNAL SWITCHES

Part	Description	Package	Ambient Temperature	Status
PI3USB3102Q	USB3.0 / USB2.0 combo Signal Switch. Dual USB3.0 2:1 Mux, USB2.0 2:1 Mux	TQFN6030-32	-40 to +85°C	Released

USB3.0 REDRIVERS

Part	Description	Package	Ambient Temperature	Status
PI3EQX501BQ	USB3.0 single channel re-driver	TQFN2020-8	-40 to +85°C	Released
PI3EQX7741AIQ	USB3.0 two channel re-driver	TQFN4040-20	-40 to +85°C	Released

USB CHARGER DEVICES

Part	Description	Package	Ambient Temperature	Status
PI5USB2546Q	USB Controller + Switch Charger with PPC	TQFN3030-16	-40 to +85°C	Released



**CORPORATE
HEADQUARTERS AND
AMERICAS SALES OFFICE**
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Design Building East Wing,
No.8 Gaoxin South 4th Road,
Nanshan District,
Shenzhen 518057, China
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DIODES-KOREA
1601 ho, ParkView Tower
Jeongja 1 dong,
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Gyeonggi-do 463-811, Korea
Tel: (+82) 31-786-0434

DIODES-TAIWAN
7F, No. 50, Min-Chuan Road
Hsin-Tien District
New Taipei City 23141,
Taiwan, R.O.C.
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