



## 60V N-channel Self-Protected IntelliFET Adds Intelligence and Reliability to the Standard MOSFET

Diodes Incorporated has extended the ZXMS6004 family of self-protected, low-side IntelliFETs to include the industry standard SO-8 package in single (ZXMS6004N8) and dual (ZXMS6004DN8) configurations.

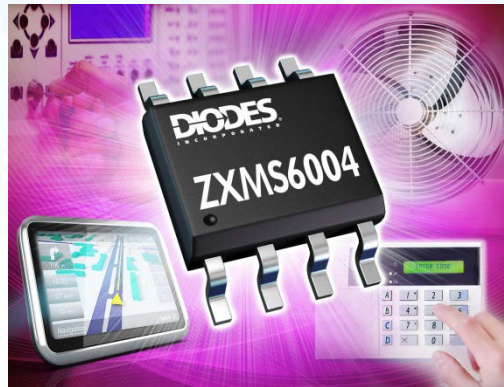
Unlike standard MOSFET switches, ZXMS6004 integrates both the MOSFET and smart circuitry into a single, thermally-efficient package.

ZXMS6004 is designed to protect both the device and the load, featuring overvoltage, overcurrent, over-temperature and ESD protection functions and can be used as a general purpose switch driven from 3.3V or 5V microcontrollers.

ZXMS6004 is designed for use in harsh environments where standard MOSFETs are not rugged enough. Additionally, savings on component count, PCB size, complexity and overall system cost can be achieved.

ZXMS6004 is ideally suited for a range of consumer and industrial applications. These include lamp, relay and solenoid driving, remote I/O controller outputs, distributed I/O modules, alarm systems, GPS systems and HVAC.

The industry standard SO-8 package is ideally suited for today's high-speed, fully-automated assembly processes and is fully green and RoHS-compliant. (See [diodes.com](http://diodes.com) for further details).



### The Diodes' Advantage

#### ESD Protection

The input clamping diodes protect the MOSFET's gate and the protection circuitry to 4kV (Human Body Model). The drain-source is protected by its built-in Miller capacitance, active clamping, and reverse (body-drain) diode.

#### Overvoltage Protection

The active clamping circuit protects the MOSFET and the load. If the circuit detects the presence of voltages above 65V, the active clamp ( $V_{DS(AZ\_TYP)}=65V$ ) allows the whole powered area to turn on and share the overvoltage energy.

#### Overcurrent Protection

The overcurrent protection circuit reduces gate drive which limits the MOSFET's current when  $V_{DS}$  is large enough to cause excess power dissipation.

#### Overtemperature Protection

The over-temperature protection circuit, containing both temperature sensor and hysteresis sub-circuits, turns off the internal gate to interrupt the dissipation when the device reaches a temperature of ( $T_{JT\_TYP}=175^{\circ}C$ ). The internal gate is turned back on when the temperature drops by  $10^{\circ}C$  approximately.

### Circuit Functions

- Overvoltage Protection
- Overcurrent Protection
- Low Side Switch
- Over-temperature Protection
- ESD Protection

### Target Markets

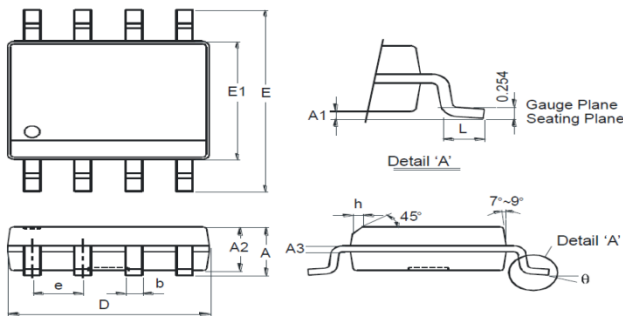
- GPS System
- HVAC
- Distributed I/O Modules
- Alarm System



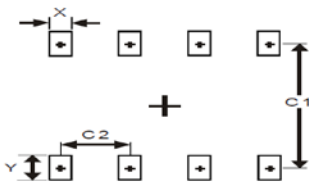
### Product Portfolio

Part Number	Channel	Polarity	Maximum $V_{DS}$ (V)	Minimum $I_D$ (A) @ $V_{IN}=5V$	$P_D$ (W)	Maximum $R_{DS(ON)}$ (m $\Omega$ ) @		Minimum $V_{DS(AZ)}$ (V)	Maximum $V_{DS(SC)}$ (V)	$E_{AS}$ (mJ)	Package
						$V_{IN}=3V$	$V_{IN}=5V$				
ZXMS6004N8	Single	N	60	1.3	1.65	600	500	60	36	120	SO-8
ZXMS6004DN8	Dual	N	60	1.2	1.56	600	500	60	36	120	SO-8

### Package Outline Dimensions & Suggested Pad Layout



SO-8		
Dim	Min	Max
A	-	1.75
A1	0.10	0.20
A2	1.30	1.50
A3	0.15	0.25
b	0.3	0.5
D	4.85	4.95
E	5.90	6.10
E1	3.85	3.95
e	1.27 Typ	
h	-	0.35
L	0.62	0.82
$\theta$	0°	8°
All Dimensions in mm.		



Dimensions	Value (in mm)
X	0.60
Y	1.55
C1	5.4
C2	1.27

### Cross Reference

Diodes Device	Competitors	Cross Reference
ZXMS6004N8	ST	VND1NV04
ZXMS6004DN8	ST, International Rectifier	VNS1NV04DP-E, AUIPS2052G

Deviations may exist between the specifications of the Diodes devices and the specifications of the competitor devices listed above. The customer is encouraged to carefully review the Diodes Inc. and competitor datasheets to verify the suitability of the Diodes device as a cross for any given competitor product. It is solely the responsibility of the customer to determine whether the Diodes device is suitable for any given application.