

## ZXMN6A09G

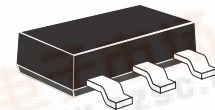
### 60V N-CHANNEL ENHANCEMENT MODE MOSFET

#### SUMMARY

$V_{(BR)DSS} = 60V$ ;  $R_{DS(ON)} = 0.045\Omega$   $I_D = 5.1A$

#### DESCRIPTION

This new generation of TRENCH MOSFETs from Zetex utilizes a unique structure that combines the benefits of low on-resistance with fast switching speed. This makes them ideal for high efficiency, low voltage, power management applications.



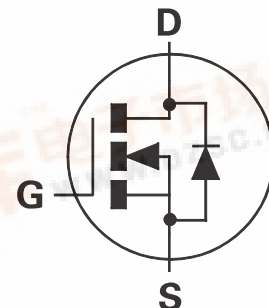
SOT223

#### FEATURES

- Low on-resistance
- Fast switching speed
- Low threshold
- Low gate drive
- Low profile SOIC package

#### APPLICATIONS

- DC - DC Converters
- Power Management Functions
- Relay and Solenoid driving
- Motor control

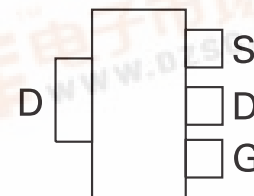


#### ORDERING INFORMATION

| DEVICE      | REEL SIZE | TAPE WIDTH | QUANTITY PER REEL |
|-------------|-----------|------------|-------------------|
| ZXMN6A09GTA | 7"        | 12mm       | 1000 units        |
| ZXMN6A09GTC | 13"       | 12mm       | 4000 units        |

#### DEVICE MARKING

- ZXMN  
6A09



Top View

# ZXMN6A09G

## ABSOLUTE MAXIMUM RATINGS.

| PARAMETER                                                                                                                                                                               | SYMBOL         | LIMIT             | UNIT                |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|-------------------|---------------------|
| Drain-Source Voltage                                                                                                                                                                    | $V_{DSS}$      | 60                | V                   |
| Gate Source Voltage                                                                                                                                                                     | $V_{GS}$       | $\pm 20$          | V                   |
| Continuous Drain Current ( $V_{GS}=10V$ ; $T_A=25^\circ C$ ) <sup>(b)</sup><br>( $V_{GS}=10V$ ; $T_A=70^\circ C$ ) <sup>(b)</sup><br>( $V_{GS}=10V$ ; $T_A=25^\circ C$ ) <sup>(a)</sup> | $I_D$          | 6.9<br>5.6<br>5.0 | A                   |
| Pulsed Drain Current <sup>(c)</sup>                                                                                                                                                     | $I_{DM}$       | 30.6              | A                   |
| Continuous Source Current (Body Diode) <sup>(b)</sup>                                                                                                                                   | $I_S$          | 3.5               | A                   |
| Pulsed Source Current (Body Diode) <sup>(c)</sup>                                                                                                                                       | $I_{SM}$       | 30.6              | A                   |
| Power Dissipation at $T_A=25^\circ C$ <sup>(a)(d)</sup><br>Linear Derating Factor                                                                                                       | $P_D$          | 2.0<br>16         | W<br>mW/ $^\circ C$ |
| Power Dissipation at $T_A=25^\circ C$ <sup>(b)(d)</sup><br>Linear Derating Factor                                                                                                       | $P_D$          | 3.9<br>31         | W<br>mW/ $^\circ C$ |
| Operating and Storage Temperature Range                                                                                                                                                 | $T_j; T_{stg}$ | -55 to +150       | $^\circ C$          |

## THERMAL RESISTANCE

| PARAMETER                             | SYMBOL          | VALUE | UNIT         |
|---------------------------------------|-----------------|-------|--------------|
| Junction to Ambient <sup>(a)(d)</sup> | $R_{\theta JA}$ | 62.5  | $^\circ C/W$ |
| Junction to Ambient <sup>(b)(d)</sup> | $R_{\theta JA}$ | 32.2  | $^\circ C/W$ |

### NOTES

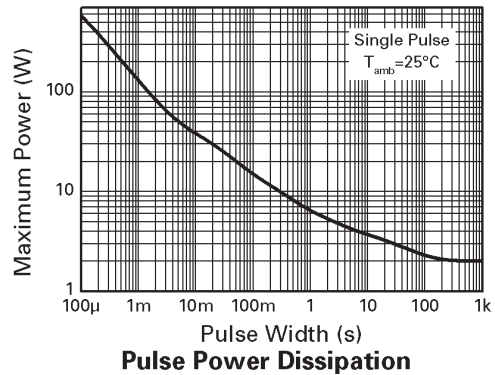
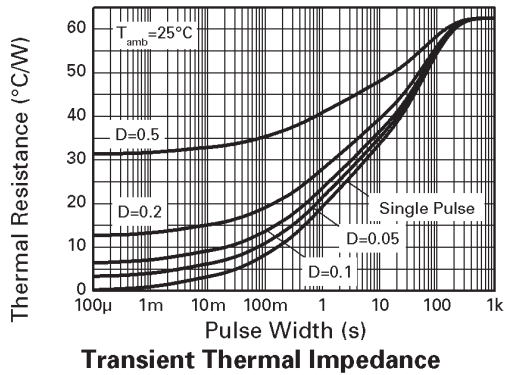
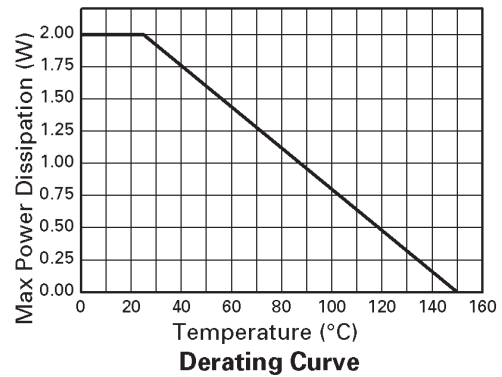
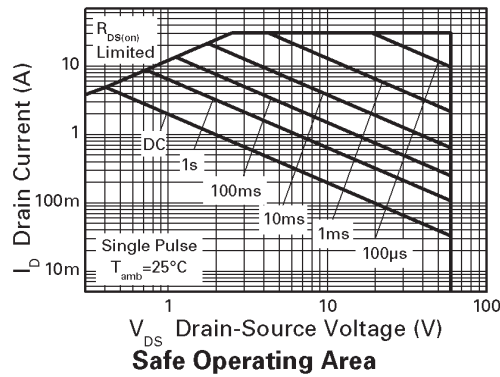
(a) For a device surface mounted on 25mm x 25mm FR4 PCB with high coverage of single sided 1oz copper, in still air conditions

(b) For a device surface mounted on FR4 PCB measured at  $t \leq 5$  secs.

(c) Repetitive rating 25mm x 25mm FR4 PCB, D=0.02 pulse width=300 $\mu$ s - pulse width limited by maximum junction temperature.

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## CHARACTERISTICS



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## ELECTRICAL CHARACTERISTICS (at $T_A = 25^\circ\text{C}$ unless otherwise stated).

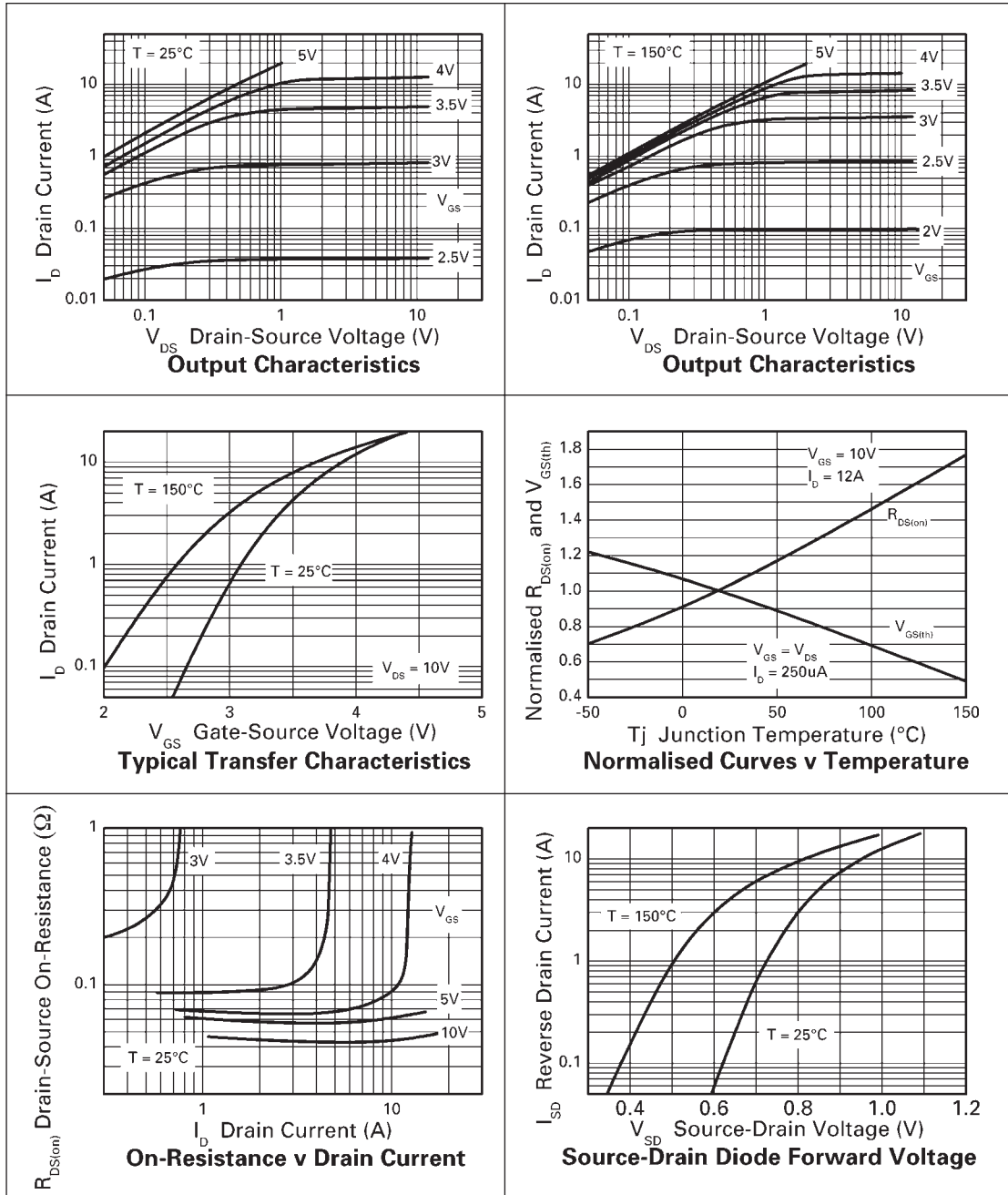
| PARAMETER                                   | SYMBOL               | MIN. | TYP. | MAX.           | UNIT   | CONDITIONS                                                                                                          |
|---------------------------------------------|----------------------|------|------|----------------|--------|---------------------------------------------------------------------------------------------------------------------|
| STATIC                                      |                      |      |      |                |        |                                                                                                                     |
| Drain-Source Breakdown Voltage              | V <sub>(BR)DSS</sub> | 60   |      |                | V      | I <sub>D</sub> =250μA, V <sub>GS</sub> =0V                                                                          |
| Zero Gate Voltage Drain Current             | I <sub>DSS</sub>     |      |      | 1              | μA     | V <sub>DS</sub> =60V, V <sub>GS</sub> =0V                                                                           |
| Gate-Body Leakage                           | I <sub>GSS</sub>     |      |      | 100            | nA     | V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V                                                                          |
| Gate-Source Threshold Voltage               | V <sub>GS(th)</sub>  | 1.0  |      |                | V      | I <sub>D</sub> =250μA, V <sub>DS</sub> = V <sub>GS</sub>                                                            |
| Static Drain-Source On-State Resistance (1) | R <sub>DS(on)</sub>  |      |      | 0.045<br>0.070 | Ω<br>Ω | V <sub>GS</sub> =10V, I <sub>D</sub> =8.2A<br>V <sub>GS</sub> =4.5V, I <sub>D</sub> =7.4A                           |
| Forward Transconductance (3)                | g <sub>fs</sub>      |      | 15   |                | S      | V <sub>DS</sub> =15V,I <sub>D</sub> =8.2A                                                                           |
| DYNAMIC (3)                                 |                      |      |      |                |        |                                                                                                                     |
| Input Capacitance                           | C <sub>iss</sub>     |      | 1407 |                | pF     | V <sub>DS</sub> =40 V, V <sub>GS</sub> =0V,<br>f=1MHz                                                               |
| Output Capacitance                          | C <sub>oss</sub>     |      | 121  |                | pF     |                                                                                                                     |
| Reverse Transfer Capacitance                | C <sub>rss</sub>     |      | 59   |                | pF     |                                                                                                                     |
| SWITCHING(2) (3)                            |                      |      |      |                |        |                                                                                                                     |
| Turn-On Delay Time                          | t <sub>d(on)</sub>   |      | 4.9  |                | ns     | V <sub>DD</sub> =15V, I <sub>D</sub> =3.5A<br>R <sub>G</sub> =6.0Ω, V <sub>GS</sub> =10V<br>(refer to test circuit) |
| Rise Time                                   | t <sub>r</sub>       |      | 5.0  |                | ns     |                                                                                                                     |
| Turn-Off Delay Time                         | t <sub>d(off)</sub>  |      | 25.3 |                | ns     |                                                                                                                     |
| Fall Time                                   | t <sub>f</sub>       |      | 4.6  |                | ns     |                                                                                                                     |
| Gate Charge                                 | Q <sub>g</sub>       |      | 12.4 |                | nC     | V <sub>DS</sub> =15V,V <sub>GS</sub> =5V,<br>I <sub>D</sub> =3.5A                                                   |
| Total Gate Charge                           | Q <sub>g</sub>       |      | 24.2 |                | nC     | V <sub>DS</sub> =15V,V <sub>GS</sub> =10V,<br>I <sub>D</sub> =3.5A                                                  |
| Gate-Source Charge                          | Q <sub>gs</sub>      |      | 5.2  |                | nC     |                                                                                                                     |
| Gate-Drain Charge                           | Q <sub>gd</sub>      |      | 3.5  |                | nC     |                                                                                                                     |
| SOURCE-DRAIN DIODE                          |                      |      |      |                |        |                                                                                                                     |
| Diode Forward Voltage (1)                   | V <sub>SD</sub>      |      | 0.85 | 0.95           | V      | T <sub>J</sub> =25°C, I <sub>S</sub> =6.6A,<br>V <sub>GS</sub> =0V                                                  |
| Reverse Recovery Time (3)                   | t <sub>rr</sub>      |      | 26.3 |                | ns     | T <sub>J</sub> =25°C, I <sub>F</sub> =3.5A,<br>di/dt= 100A/μs                                                       |
| Reverse Recovery Charge (3)                 | Q <sub>rr</sub>      |      | 26.6 |                | nC     |                                                                                                                     |

### NOTES

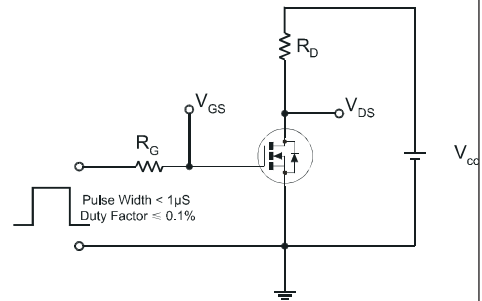
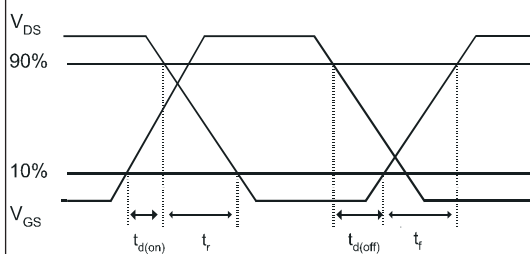
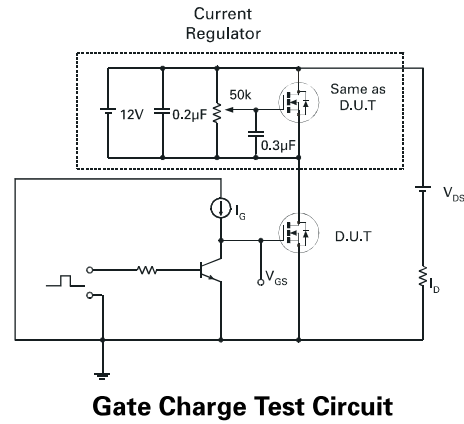
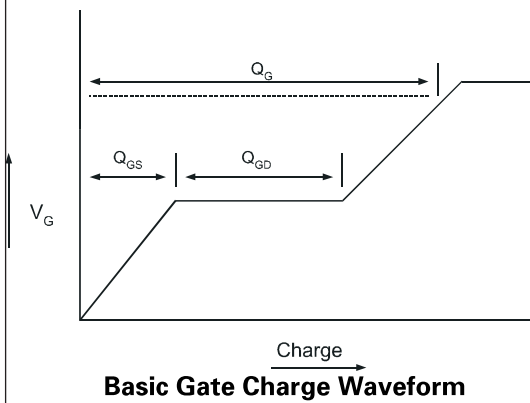
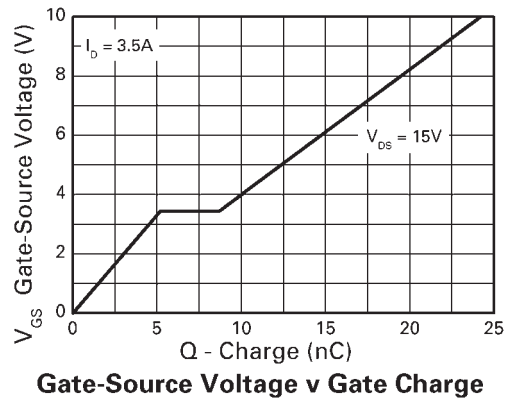
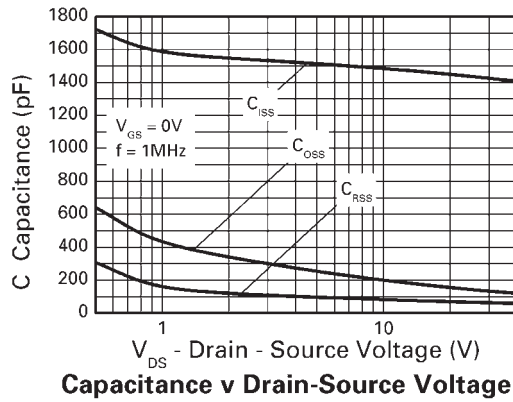
- (1) Measured under pulsed conditions. Width=300 $\mu\text{s}$ . Duty cycle  $\leq 2\%$ .
- (2) Switching characteristics are independent of operating junction temperature.
- (3) For design aid only, not subject to production testing.

# ZXMN6A09G

## TYPICAL CHARACTERISTICS

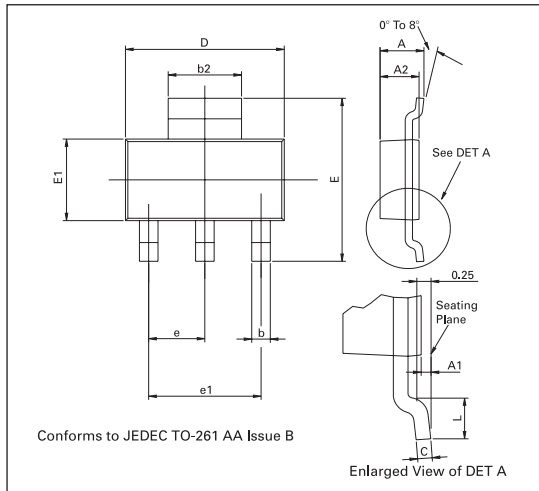


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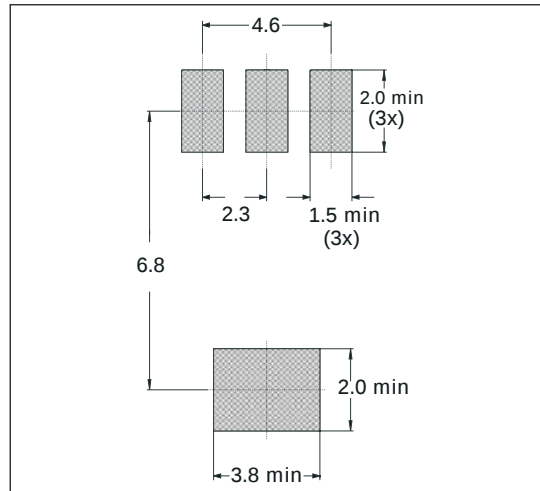


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## PACKAGE OUTLINE



## PAD LAYOUT DETAILS



## PACKAGE DIMENSIONS

| DIM | MILLIMETRES |      | DIM | MILLIMETRES |      |
|-----|-------------|------|-----|-------------|------|
|     | MIN         | MAX  |     | MIN         | MAX  |
| A   | —           | 1.80 | D   | 6.30        | 6.70 |
| A1  | 0.02        | 0.10 | e   | 2.30 BASIC  |      |
| A2  | 1.55        | 1.65 | e1  | 4.60 BASIC  |      |
| b   | 0.66        | 0.84 | E   | 6.70        | 7.30 |
| b2  | 2.90        | 3.10 | E1  | 3.30        | 3.70 |
| C   | 0.23        | 0.33 | L   | 0.90        | —    |

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