

# ZXMN3G32DN8

## 30V SO8 dual N-channel enhancement mode MOSFET

### Summary

| $V_{(BR)DSS}$ | $R_{DS(on)}$ ( $\Omega$ ) | $I_D$ (A) |
|---------------|---------------------------|-----------|
| 30            | 0.028 @ $V_{GS} = 10V$    | 7.1       |
|               | 0.045 @ $V_{GS} = 4.5V$   | 5.6       |



### Description

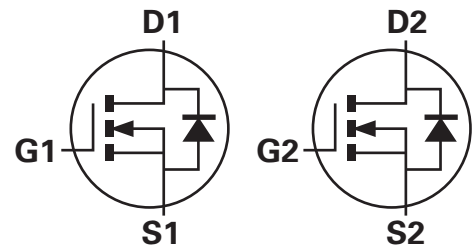
This new generation Trench MOSFET from Zetex features low on-resistance and fast switching speed.

### Features

- Low on-resistance
- 4.5V gate drive capability
- Fast switching bullet

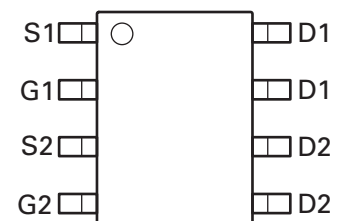
### Applications

- DC-DC Converters
- Power management functions
- Motor Control
- Backlighting



### Ordering information

| DEVICE        | Reel size (inches) | Tape width (mm) | Quantity per reel |
|---------------|--------------------|-----------------|-------------------|
| ZXMN3G32DN8TA | 7                  | 12              | 500               |



### Device marking

ZXMN

3G32D

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## Absolute maximum ratings

| Parameter                                                                                                                                                                   | Symbol         | Limit             | Unit                        |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|-------------------|-----------------------------|
| Drain source voltage                                                                                                                                                        | $V_{DSS}$      | 30                | V                           |
| Gate source voltage                                                                                                                                                         | $V_{GS}$       | $\pm 20$          | V                           |
| Continuous Drain Current @ $V_{GS}=10$ ; $T_A=25^{\circ}\text{C}^{(b)}$<br>@ $V_{GS}=10$ ; $T_A=70^{\circ}\text{C}^{(b)}$<br>@ $V_{GS}=10$ ; $T_A=25^{\circ}\text{C}^{(a)}$ | $I_D$          | 7.1<br>5.7<br>5.5 | A<br>A<br>A                 |
| Pulsed drain current <sup>(c)</sup>                                                                                                                                         | $I_{DM}$       | 33.6              | A                           |
| Continuous source current (body diode) <sup>(b)</sup>                                                                                                                       | $I_S$          | 3.1               | A                           |
| Pulsed source current (body diode) <sup>(c)</sup>                                                                                                                           | $I_{SM}$       | 33.6              | A                           |
| Power dissipation at $T_A=25^{\circ}\text{C}^{(a)(d)}$<br>Linear derating factor                                                                                            | $P_D$          | 1.25<br>10        | W<br>mW/ $^{\circ}\text{C}$ |
| Power dissipation at $T_A=25^{\circ}\text{C}^{(a)(e)}$<br>Linear derating factor                                                                                            | $P_D$          | 1.8<br>14         | W<br>mW/ $^{\circ}\text{C}$ |
| Power dissipation at $T_A=25^{\circ}\text{C}^{(b)(d)}$<br>Linear derating factor                                                                                            | $P_D$          | 2.1<br>17         | W<br>mW/ $^{\circ}\text{C}$ |
| Operating and storage temperature range                                                                                                                                     | $T_j, T_{stg}$ | -55 to 150        | $^{\circ}\text{C}$          |

## Thermal resistance

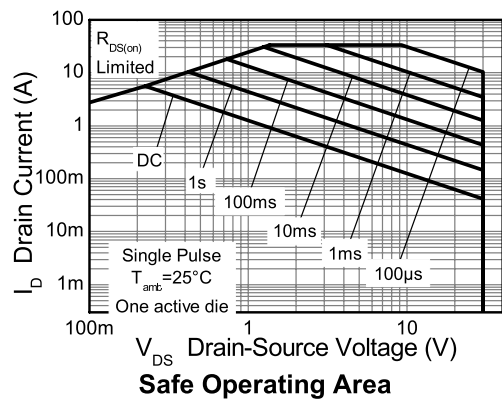
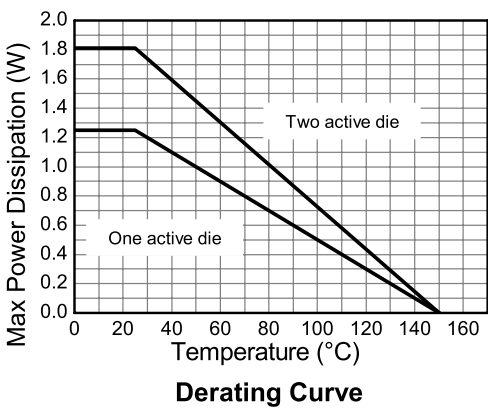
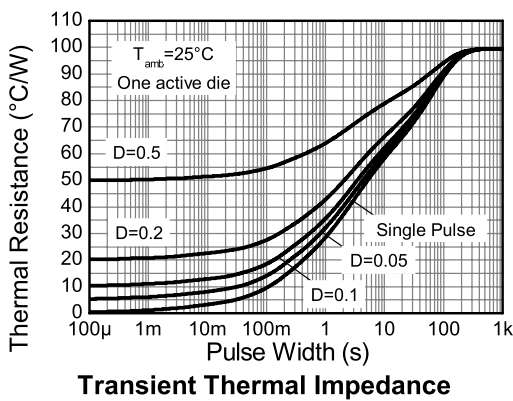
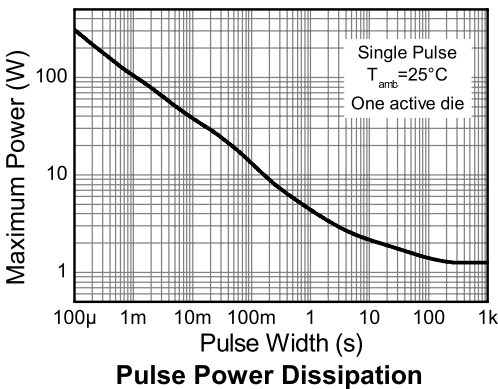
| Parameter                             | Symbol          | Limit | Unit                        |
|---------------------------------------|-----------------|-------|-----------------------------|
| Junction to ambient <sup>(a)(d)</sup> | $R_{\theta JA}$ | 100   | $^{\circ}\text{C}/\text{W}$ |
| Junction to ambient <sup>(a)(e)</sup> | $R_{\theta JA}$ | 70    | $^{\circ}\text{C}/\text{W}$ |
| Junction to ambient <sup>(b)(d)</sup> | $R_{\theta JA}$ | 60    | $^{\circ}\text{C}/\text{W}$ |
| Junction to lead <sup>(f)</sup>       | $R_{\theta JL}$ | 51    | $^{\circ}\text{C}/\text{W}$ |

### 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  $t \leq 10$  sec.
- (c) Repetitive rating - 25mm x 25mm FR4 PCB,  $D=0.02$ , pulse width 300 $\mu\text{s}$  - pulse width limited by maximum junction temperature.
- (d) For a dual device with one active die.
- (e) For a device with two active die running at equal power.
- (f) Thermal resistance from junction to solder-point (at end of drain lead).

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## Thermal characteristics



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## Electrical characteristics (at $T_{amb} = 25^{\circ}\text{C}$ unless otherwise stated)

| Parameter                                              | Symbol               | Min. | Typ. | Max.           | Unit   | Conditions                                                                                    |
|--------------------------------------------------------|----------------------|------|------|----------------|--------|-----------------------------------------------------------------------------------------------|
| Static                                                 |                      |      |      |                |        |                                                                                               |
| Drain-Source Breakdown Voltage                         | V <sub>(BR)DSS</sub> | 30   |      |                | V      | I <sub>D</sub> = 250μA, V <sub>GS</sub> =0V                                                   |
| Zero Gate Voltage Drain Current                        | I <sub>DSS</sub>     |      |      | 0.5            | μA     | V <sub>DS</sub> = 30V, 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  |      | 3.0            | V      | I <sub>D</sub> = 250μA, V <sub>DS</sub> =V <sub>GS</sub>                                      |
| Static Drain-Source On-State Resistance <sup>(*)</sup> | R <sub>DS(on)</sub>  |      |      | 0.028<br>0.045 | Ω<br>Ω | V <sub>GS</sub> = 10V, I <sub>D</sub> = 6.0A<br>V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 4.9A |
| Forward Transconductance <sup>(*)(†)</sup>             | g <sub>fs</sub>      |      | 12   |                | S      | V <sub>DS</sub> = 15V, I <sub>D</sub> = 6.0A                                                  |
| Dynamic <sup>(†)</sup>                                 |                      |      |      |                |        |                                                                                               |
| Input Capacitance                                      | C <sub>iss</sub>     |      | 472  |                | pF     | V <sub>DS</sub> = 15V, V <sub>GS</sub> =0V<br>f=1MHz                                          |
| Output Capacitance                                     | C <sub>oss</sub>     |      | 178  |                | pF     |                                                                                               |
| Reverse Transfer Capacitance                           | C <sub>rss</sub>     |      | 65   |                | pF     |                                                                                               |
| Switching <sup>(‡)(†)</sup>                            |                      |      |      |                |        |                                                                                               |
| Turn-On-Delay Time                                     | t <sub>d(on)</sub>   |      | 2.5  |                | ns     | V <sub>DD</sub> = 15V, I <sub>D</sub> = 1A<br>R <sub>G</sub> ≅ 6.0Ω, V <sub>GS</sub> =10V     |
| Rise Time                                              | t <sub>r</sub>       |      | 3.1  |                | ns     |                                                                                               |
| Turn-Off Delay Time                                    | t <sub>d(off)</sub>  |      | 14   |                | ns     |                                                                                               |
| Fall Time                                              | t <sub>f</sub>       |      | 9.7  |                | ns     |                                                                                               |
| Total Gate Charge                                      | Q <sub>g</sub>       |      | 10.5 |                | nC     | V <sub>DS</sub> = 15V, V <sub>GS</sub> = 10V<br>I <sub>D</sub> = 6A                           |
| Gate-Source Charge                                     | Q <sub>gs</sub>      |      | 1.86 |                | nC     |                                                                                               |
| Gate Drain Charge                                      | Q <sub>gd</sub>      |      | 2.3  |                | nC     |                                                                                               |
| Source-drain diode                                     |                      |      |      |                |        |                                                                                               |
| Diode Forward Voltage <sup>(*)</sup>                   | V <sub>SD</sub>      |      | 0.68 | 1.2            | V      | T <sub>j</sub> =25°C, I <sub>S</sub> = 1.7A,<br>V <sub>GS</sub> =0V                           |

### NOTES:

(\*) Measured under pulsed conditions. Pulse width  $\leq 300\mu\text{s}$ ; duty cycle  $\leq 2\%$ .

(†) For design aid only, not subject to production testing

(‡) Switching characteristics are independent of operating junction temperature.

## Typical characteristics

Fig1.  $I_D - V_{DS}$

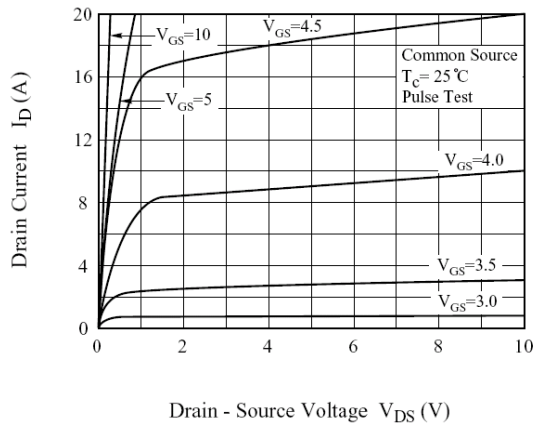


Fig2.  $R_{DS(on)} - I_D$

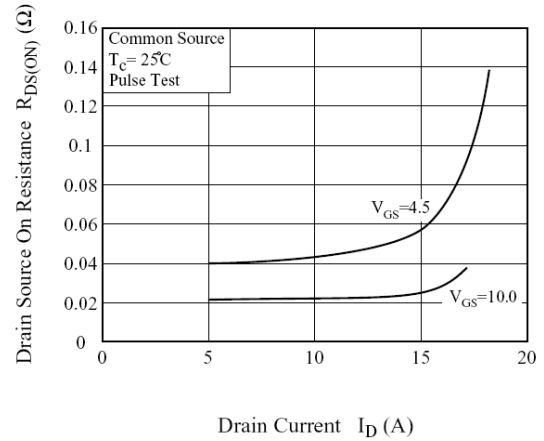


Fig3.  $I_D - V_{GS}$

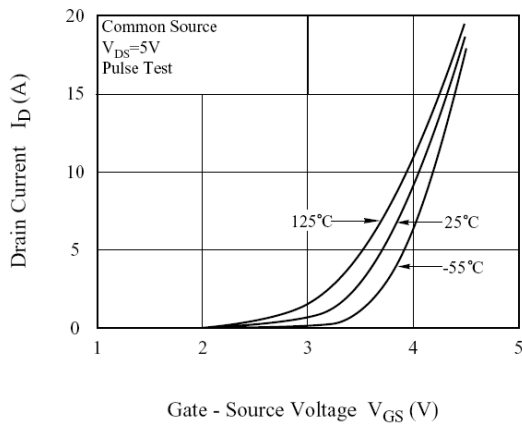


Fig4.  $R_{DS(on)} - T_j$

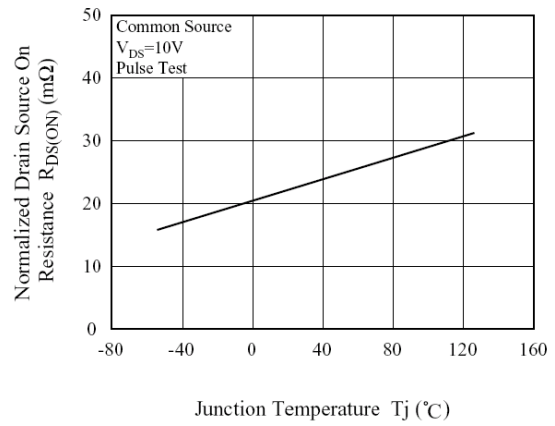


Fig5.  $V_{th} - T_j$

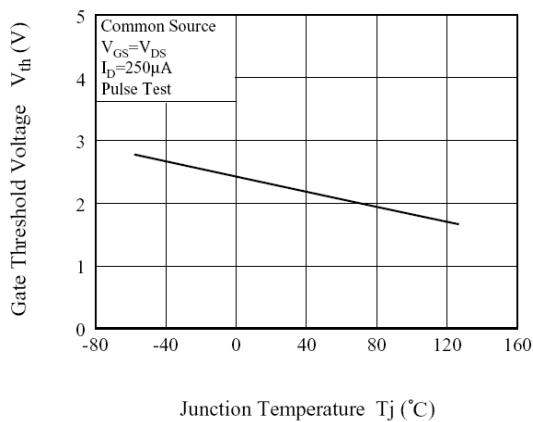
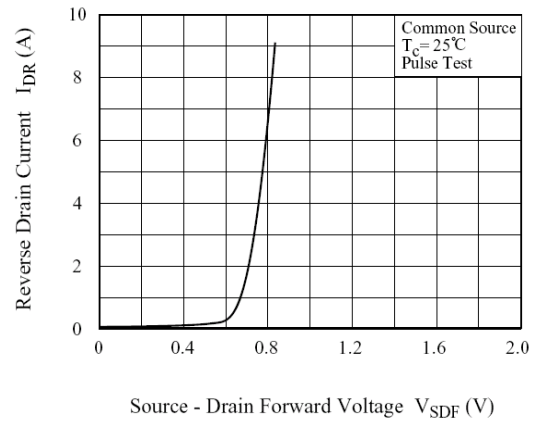
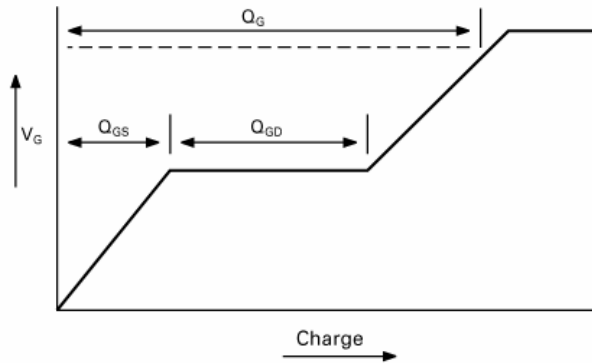


Fig6.  $I_{DR} - V_{SDF}$

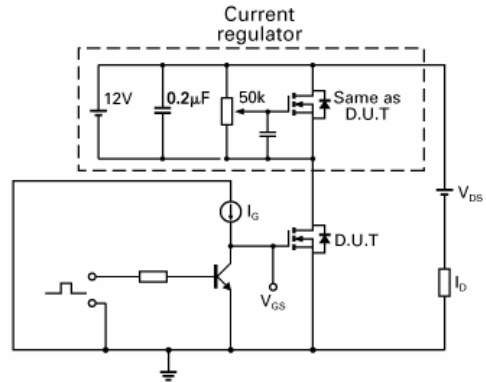


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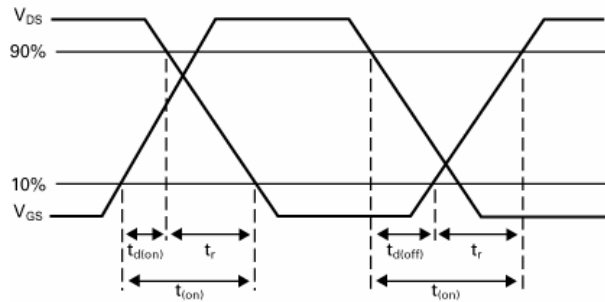
## Test circuits



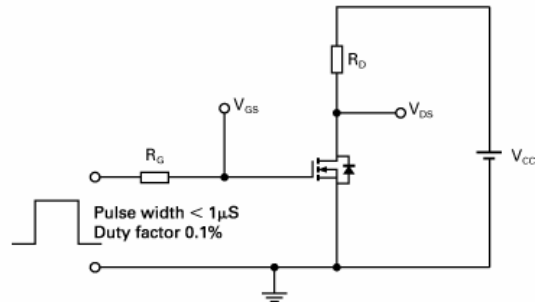
**Basic gate charge waveform**



**Gate charge test circuit**



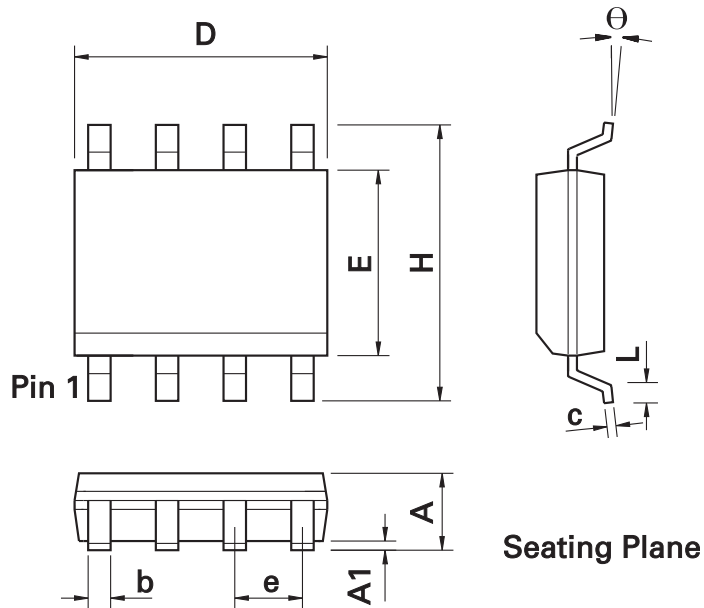
**Switching time waveforms**



**Switching time test circuit**

# ZXMN3G32DN8

## Package outline - SO8



| DIM | Inches |       | Millimeters |      | DIM      | Inches    |       | Millimeters |      |
|-----|--------|-------|-------------|------|----------|-----------|-------|-------------|------|
|     | Min.   | Max.  | Min.        | Max. |          | Min.      | Max.  | Min.        | Max. |
| A   | 0.053  | 0.069 | 1.35        | 1.75 | e        | 0.050 BSC |       | 1.27 BSC    |      |
| A1  | 0.004  | 0.010 | 0.10        | 0.25 | b        | 0.013     | 0.020 | 0.33        | 0.51 |
| D   | 0.189  | 0.197 | 4.80        | 5.00 | c        | 0.008     | 0.010 | 0.19        | 0.25 |
| H   | 0.228  | 0.244 | 5.80        | 6.20 | $\theta$ | 0°        | 8°    | 0°          | 8°   |
| E   | 0.150  | 0.157 | 3.80        | 4.00 | h        | 0.010     | 0.020 | 0.25        | 0.50 |
| L   | 0.016  | 0.050 | 0.40        | 1.27 | -        | -         | -     | -           | -    |

**Note:** Controlling dimensions are in inches. Approximate dimensions are provided in millimeters

# ZXMN3G32DN8

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|                                   |                                                                                |
|-----------------------------------|--------------------------------------------------------------------------------|
| "Preview"                         | Future device intended for production at some point. Samples may be available  |
| "Active"                          | Product status recommended for new designs                                     |
| "Last time buy (LTB)"             | Device will be discontinued and last time buy period and delivery is in effect |
| "Not recommended for new designs" | Device is still in production to support existing designs and production       |
| "Obsolete"                        | Production has been discontinued                                               |

### Datasheet status key:

|                       |                                                                                                                                                                                                             |
|-----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
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