

# ZXMN3F31DN8

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

### Summary

| $V_{(BR)DSS}$ | $R_{DS(on)}$ ( $\Omega$ ) | $I_D$ (A) |
|---------------|---------------------------|-----------|
| 30            | 0.024 @ $V_{GS} = 10V$    | 7.3       |
|               | 0.039 @ $V_{GS} = 4.5V$   | 5.7       |



### Description

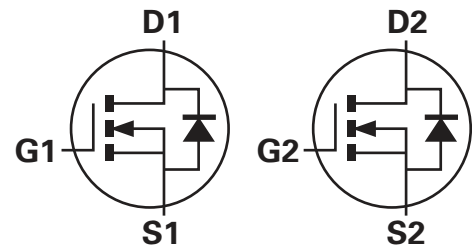
This new generation Trench MOSFET from Zetex features low on-resistance achievable with 4.5V gate drive.

### Features

- Low on-resistance
- 4.5V gate drive capability

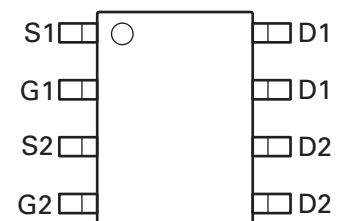
### Applications

- DC-DC Converters
- Power management functions
- Load switching
- Motor control
- Back lighting



### Ordering information

| DEVICE        | Reel size (inches) | Tape width (mm) | Quantity per reel |
|---------------|--------------------|-----------------|-------------------|
| ZXMN3F31DN8TA | 7                  | 12              | 500               |



### Device marking

ZXMN  
3F31D

# ZXMN3F31DN8

## 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>@ $V_{GS}=10$ ; $T_A=25^\circ\text{C}^{(a)}$ | $I_D$          | 7.3        | A     |
|   |                | 5.9        | A     |
|   |                | 5.7        | A     |
| Pulsed drain current <sup>(c)</sup>   | $I_{DM}$       | 33         | A     |
| Continuous source current (body diode) <sup>(b)</sup>   | $I_S$          | 3.5        | A     |
| Pulsed source current (body diode) <sup>(c)</sup>   | $I_{SM}$       | 33         | A     |
| Power dissipation at $T_A=25^\circ\text{C}^{(a)(d)}$  | $P_D$          | 1.25       | W     |
| Linear derating factor  |                | 10         | mW/°C |
| Power dissipation at $T_A=25^\circ\text{C}^{(a)(e)}$  | $P_D$          | 1.8        | W     |
| Linear derating factor  |                | 14         | mW/°C |
| Power dissipation at $T_A=25^\circ\text{C}^{(b)(d)}$  | $P_D$          | 2.1        | W     |
| Linear derating factor  |                | 17         | mW/°C |
| Operating and storage temperature range   | $T_j, T_{stg}$ | -55 to 150 | °C    |

## Thermal resistance

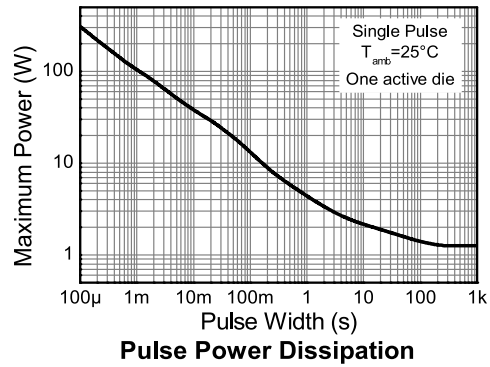
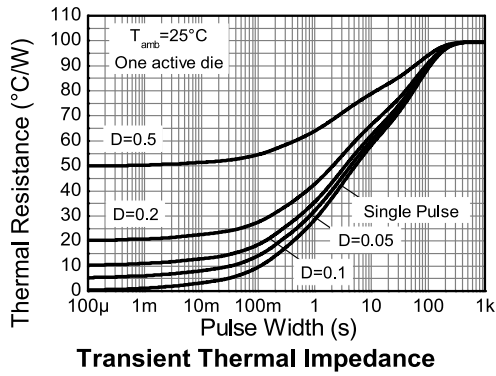
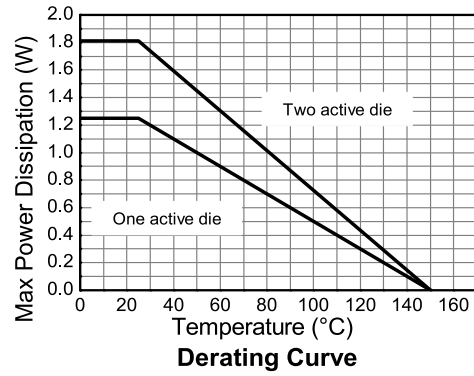
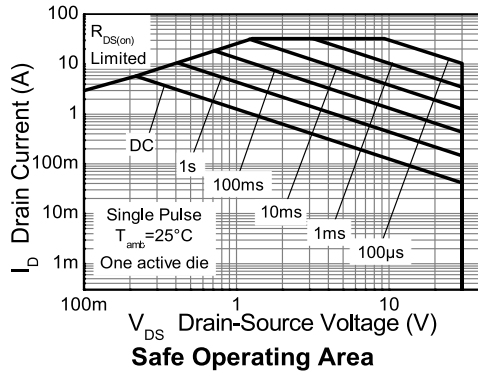
| Parameter                             | Symbol          | Limit | Unit |
|---------------------------------------|-----------------|-------|------|
| Junction to ambient <sup>(a)(d)</sup> | $R_{\theta JA}$ | 100   | °C/W |
| Junction to ambient <sup>(a)(e)</sup> | $R_{\theta JA}$ | 70    | °C/W |
| Junction to ambient <sup>(b)(d)</sup> | $R_{\theta JA}$ | 60    | °C/W |
| Junction to lead <sup>(f)</sup>       | $R_{\theta JL}$ | 53    | °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  $t \leq 10$  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  |
|---|---------------|------|------|----------------|----------------------|---|
| <b>Static</b>                               |               |      |      |                |                      |   |
| Drain-Source breakdown voltage              | $V_{(BR)DSS}$ | 30   |      |                | V                    | $I_D = 250\mu\text{A}$ , $V_{GS} = 0\text{V}$   |
| Zero Gate voltage drain current             | $I_{DSS}$     |      |      | 0.5            | $\mu\text{A}$        | $V_{DS} = 30\text{V}$ , $V_{GS} = 0\text{V}$  |
| Gate-Body leakage                           | $I_{GSS}$     |      |      | 100            | nA                   | $V_{GS} = \pm 20\text{V}$ , $V_{DS} = 0\text{V}$  |
| Gate-Source threshold voltage               | $V_{GS(th)}$  | 1.0  |      | 3.0            | V                    | $I_D = 250\mu\text{A}$ , $V_{DS} = V_{GS}$  |
| Static Drain-Source on-state resistance (*) | $R_{DS(on)}$  |      |      | 0.024<br>0.039 | $\Omega$<br>$\Omega$ | $V_{GS} = 10\text{V}$ , $I_D = 7.0\text{A}$<br>$V_{GS} = 4.5\text{V}$ , $I_D = 6.0\text{A}$ |
| Forward transconductance(*)†                | $g_{fs}$      |      | 16.5 |                | S                    | $V_{DS} = 15\text{V}$ , $I_D = 7\text{A}$   |
| <b>Dynamic (†)</b>                          |               |      |      |                |                      |   |
| Input capacitance                           | $C_{iss}$     |      | 608  |                | pF                   | $V_{DS} = 15\text{V}$ , $V_{GS} = 0\text{V}$<br>$f = 1\text{MHz}$                           |
| Output capacitance                          | $C_{oss}$     |      | 132  |                | pF                   |   |
| Reverse transfer capacitance                | $C_{rss}$     |      | 71   |                | pF                   |   |
| <b>Switching (‡)†</b>                       |               |      |      |                |                      |   |
| Turn-on-delay time                          | $t_{d(on)}$   |      | 2.9  |                | ns                   | $V_{DD} = 15\text{V}$ , $I_D = 1\text{A}$<br>$R_G \cong 6.0\Omega$ , $V_{GS} = 10\text{V}$  |
| Rise time                                   | $t_r$         |      | 3.3  |                | ns                   |   |
| Turn-off delay time                         | $t_{d(off)}$  |      | 16   |                | ns                   |   |
| Fall time                                   | $t_f$         |      | 8    |                | ns                   |   |
| Total gate charge                           | $Q_g$         |      | 12.9 |                | nC                   | $V_{DS} = 15\text{V}$ , $V_{GS} = 10\text{V}$<br>$I_D = 7\text{A}$                          |
| Gate-source charge                          | $Q_{gs}$      |      | 2.5  |                | nC                   |   |
| Gate drain charge                           | $Q_{gd}$      |      | 2.52 |                | nC                   |   |
| <b>Source-drain diode</b>                   |               |      |      |                |                      |   |
| Diode Forward Voltage(*)                    | $V_{SD}$      |      | 0.82 | 1.2            | V                    | $T_j = 25^{\circ}\text{C}$ , $I_S = 1.7\text{A}$ ,<br>$V_{GS} = 0\text{V}$                  |
| Reverse recovery time(†)                    | $t_{rr}$      |      | 12   |                | ns                   | $T_j = 25^{\circ}\text{C}$ , $I_S = 2.2\text{A}$  |
| Reverse recovery charge(†)                  | $Q_{rr}$      |      | 4.8  |                | nC                   | $di/dt = 100\text{A}/\mu\text{s}$   |

### NOTES:

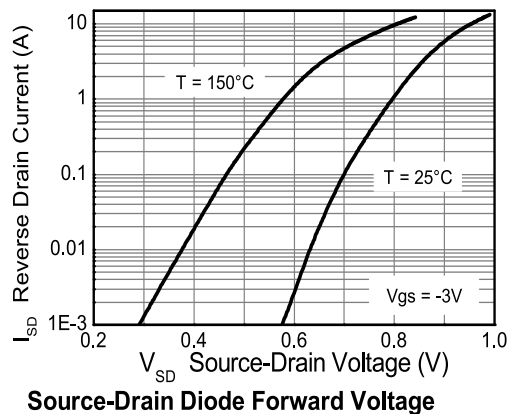
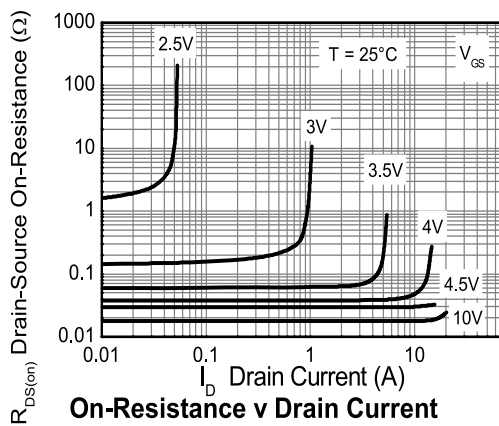
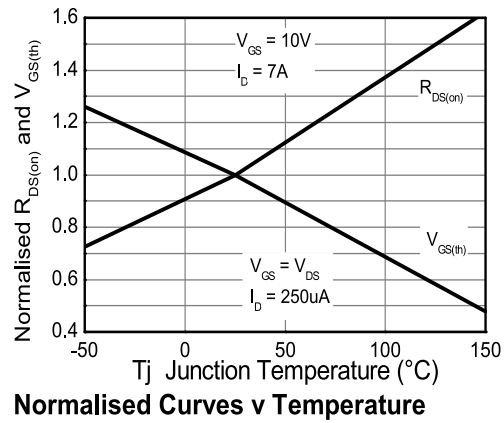
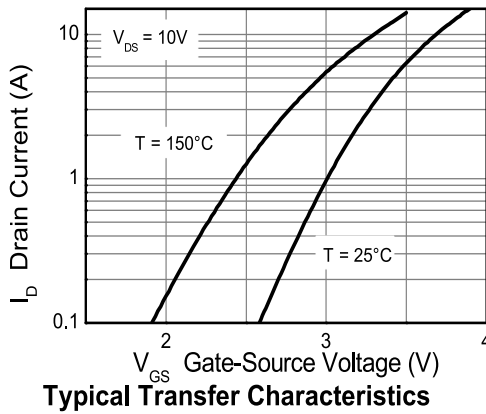
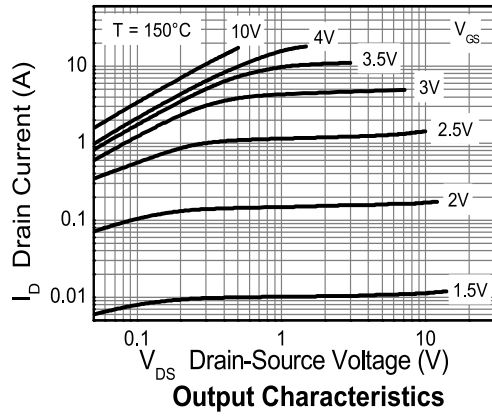
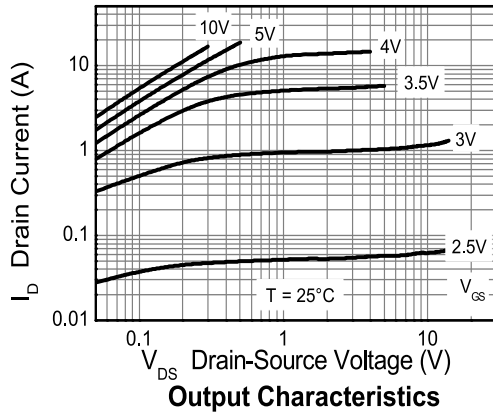
(\*) Measured under pulsed conditions. Pulse width  $\leq 300\mu\text{s}$ ; duty cycle  $\leq 2\%$ .

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

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

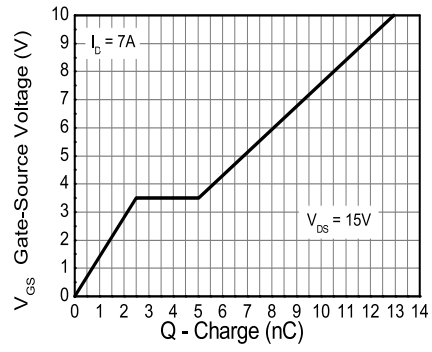
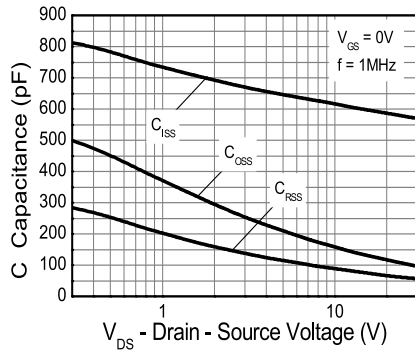
# ZXMN3F31DN8

## Typical characteristics

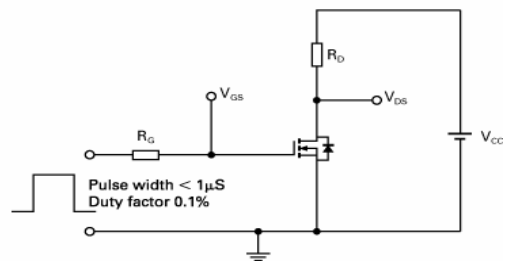
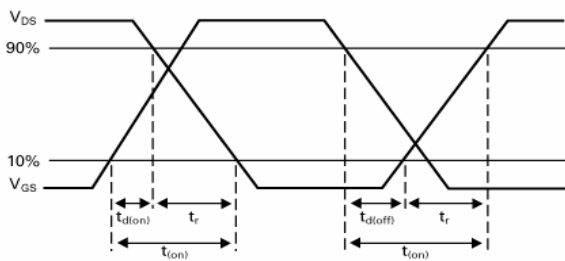
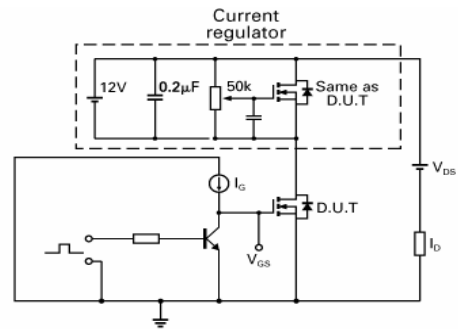
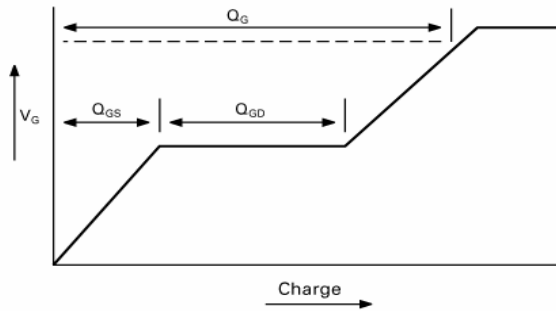


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## Typical characteristics

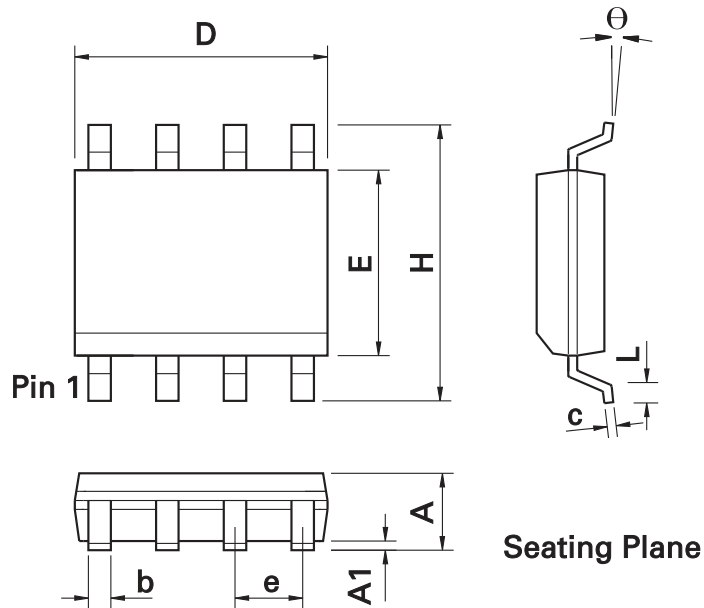


## Test circuits



# ZXMN3F31DN8

## 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 | Θ   | 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

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|                                   |  |
|-----------------------------------|--|
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| "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   |

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