

## ZXMN2F34MA

### 20V N-channel enhancement mode MOSFET in DFN322

#### Summary

| $V_{(BR)DSS}$ | $R_{DS(on)}$ ( $\Omega$ ) | $I_D$ (A) |
|---------------|---------------------------|-----------|
| 20            | 0.060 @ $V_{GS} = 4.5V$   | 8.5       |
|               | 0.120 @ $V_{GS} = 2.5V$   |           |

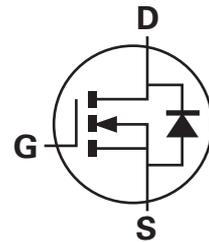


#### Description

This new generation Trench MOSFET from Zetex features low on-resistance achievable with low (2.5V) gate drive. The 2mm x 2mm DFN package provides superior thermal performance versus alternative leaded devices

#### Features

- Low on-resistance
- Superior thermal performance (versus to SOT23)
- 2.5V gate drive capability
- DFN 2x2 package

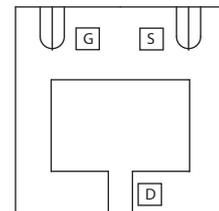


#### Applications

- Buck/Boost DC-DC Converters
- Motor Control
- LED Lighting

#### Ordering information

| DEVICE       | Reel size (inches) | Tape width (mm) | Quantity per reel |
|--------------|--------------------|-----------------|-------------------|
| ZXMN2F34MATA | 7                  | 8               | 3,000             |



#### Device marking

1M4

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## ZXMN2F34MA

### Absolute maximum ratings

| Parameter  | Symbol         | Limit      | Unit  |
|--|----------------|------------|-------|
| Drain source voltage   | $V_{DSS}$      | 20         | V     |
| Gate source voltage  | $V_{GS}$       | $\pm 12$   | V     |
| Continuous Drain Current @ $V_{GS}=4.5$ ; $T_A=25^\circ\text{C}^{(b)}$ | $I_D$          | 5.1        | A     |
| @ $V_{GS}=4.5$ ; $T_A=70^\circ\text{C}^{(b)}$                          |                | 4.1        | A     |
| @ $V_{GS}=4.5$ ; $T_A=25^\circ\text{C}^{(a)}$                          |                | 4.0        | A     |
| @ $V_{GS}=4.5$ ; $T_A=25^\circ\text{C}^{(d)}$                          |                | 8.5        | A     |
| Pulsed drain current <sup>(c)</sup>                                    | $I_{DM}$       | 19         | A     |
| Continuous source current (body diode) <sup>(b)</sup>                  | $I_S$          | 3.1        | A     |
| Pulsed source current (body diode) <sup>(c)</sup>                      | $I_{SM}$       | 19         | A     |
| Power dissipation at $T_A=25^\circ\text{C}^{(a)}$                      | $P_D$          | 1.35       | W     |
| Linear derating factor   |                | 10.8       | mW/°C |
| Power dissipation at $T_A=25^\circ\text{C}^{(b)}$                      | $P_D$          | 2.2        | W     |
| Linear derating factor   |                | 17.8       | mW/°C |
| Power dissipation at $T_A=25^\circ\text{C}^{(d)}$                      | $P_D$          | 6.6        | W     |
| Linear derating factor   |                | 52.9       | 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)</sup> | $R_{\theta JA}$ | 92.5  | °C/W |
| Junction to ambient <sup>(b)</sup> | $R_{\theta JA}$ | 56    | °C/W |
| Junction to lead <sup>(d)</sup>    | $R_{\theta JL}$ | 18.9  | °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  $t \leq 5$  sec.

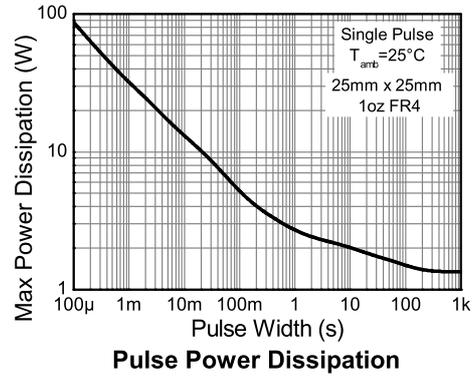
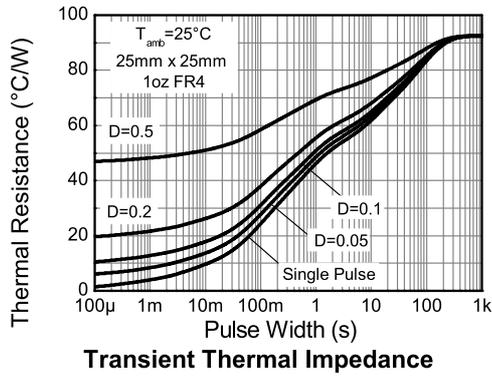
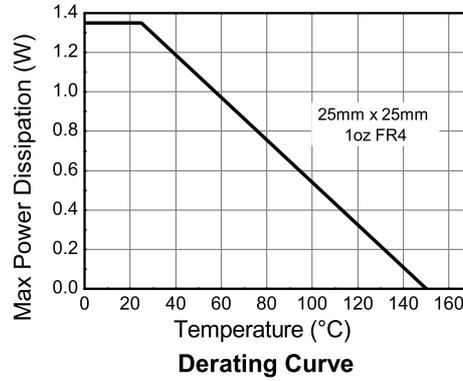
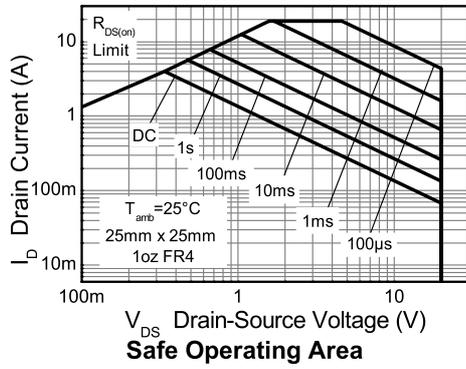
(c) Repetitive rating - 25mm x 25mm FR4 PCB,  $D=0.02$ , pulse width 300 $\mu\text{s}$  - pulse width limited by maximum junction temperature.

(d) Thermal resistance from junction to solder-point (at end of drain lead).

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## ZXMN2F34MA

### Thermal characteristics



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## ZXMN2F34MA

### 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              | $V_{(BR)DSS}$ | 20   |      |                | V                    | $I_D = 250\mu\text{A}$ , $V_{GS} = 0\text{V}$  |
| Zero gate voltage drain current             | $I_{DSS}$     |      |      | 1              | $\mu\text{A}$        | $V_{DS} = 20\text{V}$ , $V_{GS} = 0\text{V}$   |
| Gate-Body leakage                           | $I_{GSS}$     |      |      | 100            | nA                   | $V_{GS} = \pm 12\text{V}$ , $V_{DS} = 0\text{V}$   |
| Gate-Source threshold voltage               | $V_{GS(th)}$  | 0.5  | 0.8  | 1.5            | V                    | $I_D = 250\mu\text{A}$ , $V_{DS} = V_{GS}$   |
| Static Drain-Source on-state resistance (*) | $R_{DS(on)}$  |      |      | 0.060<br>0.120 | $\Omega$<br>$\Omega$ | $V_{GS} = 4.5\text{V}$ , $I_D = 2.5\text{A}$<br>$V_{GS} = 2.5\text{V}$ , $I_D = 1.0\text{A}$   |
| Forward transconductance(*)†                | $g_{fs}$      |      | 7.5  |                | S                    | $V_{DS} = 10\text{V}$ , $I_D = 2.5\text{A}$  |
| <b>Dynamic †</b>                            |               |      |      |                |                      |  |
| Input capacitance                           | $C_{iss}$     |      | 277  |                | pF                   | $V_{DS} = 10\text{V}$ , $V_{GS} = 0\text{V}$<br>$f = 1\text{MHz}$                              |
| Output capacitance                          | $C_{oss}$     |      | 65   |                | pF                   |  |
| Reverse transfer capacitance                | $C_{rss}$     |      | 35   |                | pF                   |  |
| <b>Switching ‡†</b>                         |               |      |      |                |                      |  |
| Turn-on-delay time                          | $t_{d(on)}$   |      | 2.65 |                | ns                   | $V_{DD} = 10\text{V}$ , $V_{GS} = 4.5\text{V}$<br>$I_D = 1\text{A}$<br>$R_G \approx 6.0\Omega$ |
| Rise time                                   | $t_r$         |      | 4.2  |                | ns                   |  |
| Turn-off delay time                         | $t_{d(off)}$  |      | 9.9  |                | ns                   |  |
| Fall time                                   | $t_f$         |      | 5.1  |                | ns                   |  |
| Total gate charge                           | $Q_g$         |      | 2.8  |                | nC                   | $V_{DS} = 10\text{V}$ , $V_{GS} = 4.5\text{V}$<br>$I_D = 2.5\text{A}$                          |
| Gate-Source charge                          | $Q_{gs}$      |      | 0.61 |                | nC                   |  |
| Gate Drain charge                           | $Q_{gd}$      |      | 0.63 |                | nC                   |  |
| <b>Source-drain diode</b>                   |               |      |      |                |                      |  |
| Diode forward voltage(*)                    | $V_{SD}$      |      | 0.73 | 1.2            | V                    | $I_S = 1.25\text{A}$ , $V_{GS} = 0\text{V}$  |
| Reverse recovery time†                      | $t_{rr}$      |      | 6.5  |                | ns                   | $T_j = 25^{\circ}\text{C}$ , $I_F = 1.65\text{A}$<br>$di/dt = 100\text{A}/\mu\text{s}$         |
| Reverse recovery charge†                    | $Q_{rr}$      |      | 1.4  |                | nC                   |  |

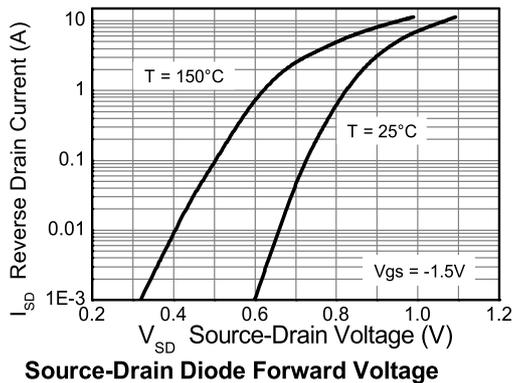
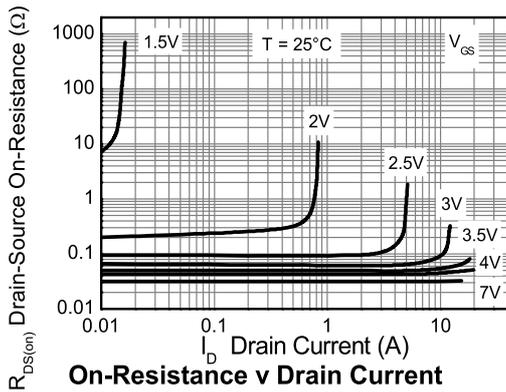
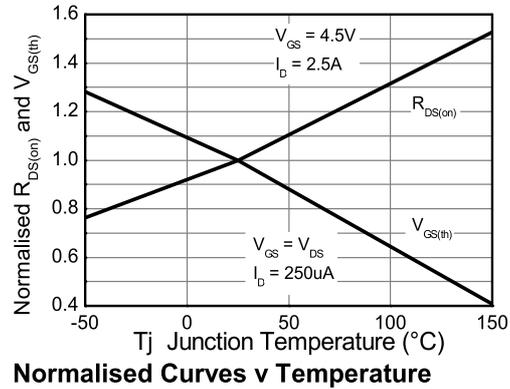
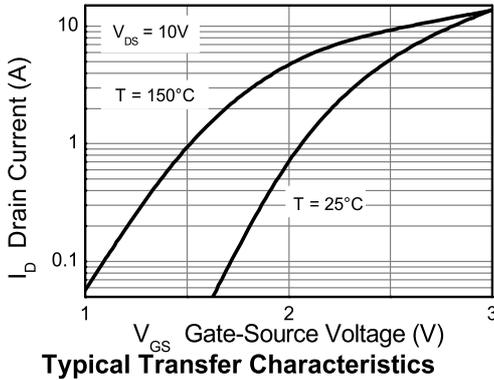
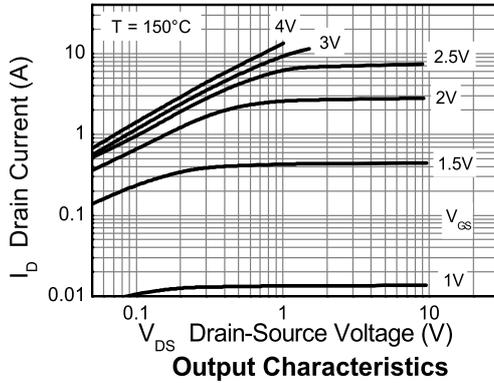
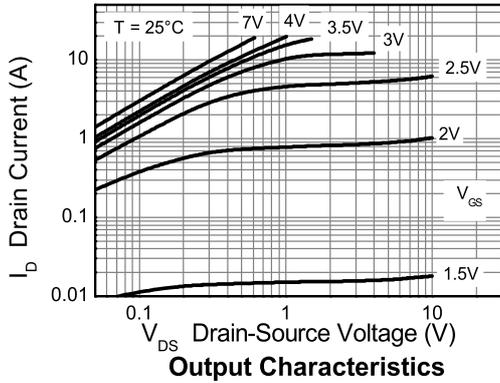
**NOTES:**

(\*) 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.

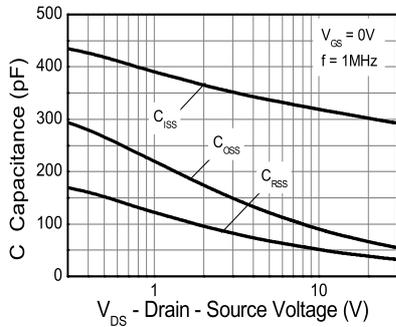
### Typical characteristics



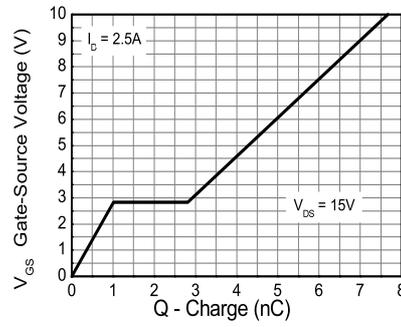
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## ZXMN2F34MA

### Typical characteristics

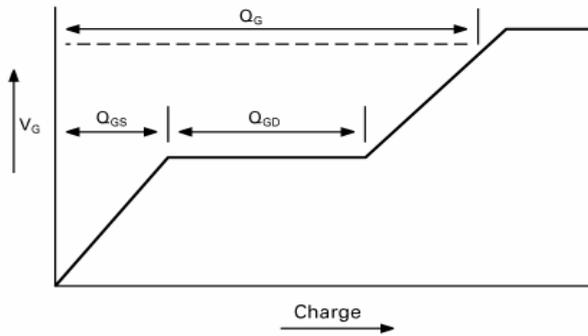


Capacitance v Drain-Source Voltage

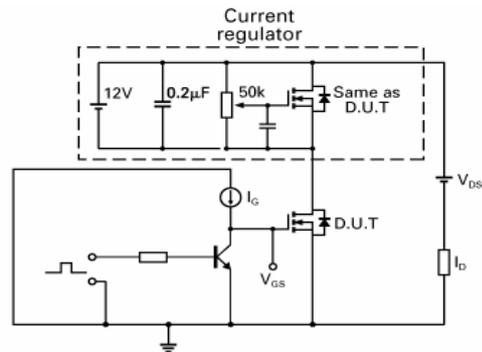


Gate-Source Voltage v Gate Charge

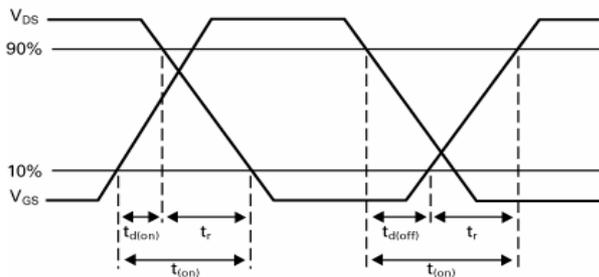
### Test circuits



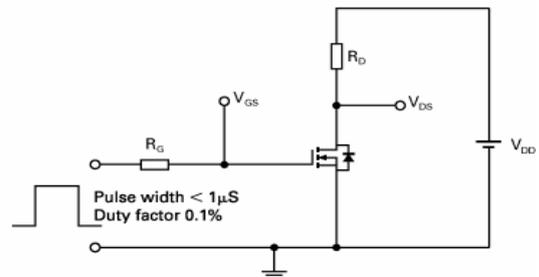
Basic gate charge waveform



Gate charge test circuit



Switching time waveforms

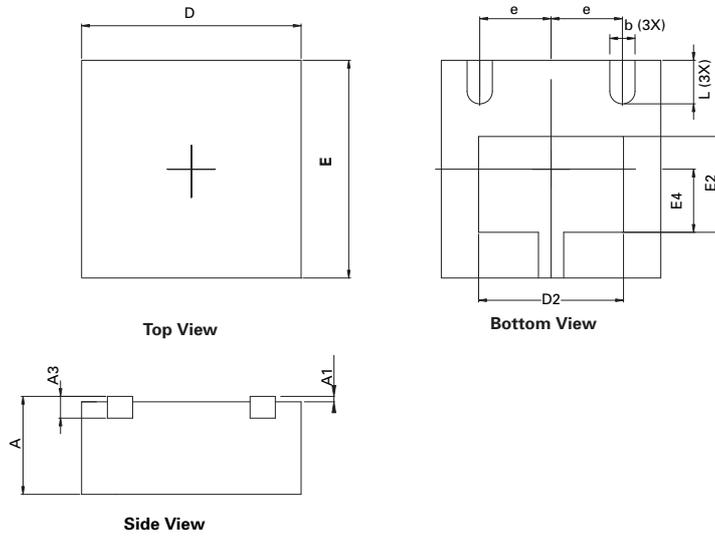


Switching time test circuit

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## ZXMN2F34MA

### Package outline - DFN322



| DIM | Millimeters |       | Inches |        | DIM | Millimeters |       | Inches      |        |
|-----|-------------|-------|--------|--------|-----|-------------|-------|-------------|--------|
|     | Min.        | Max.  | Min.   | Max.   |     | Min.        | Max.  | Min.        | Max.   |
| A   | 0.80        | 1.00  | 0.0315 | 0.0393 | D2  | 1.22        | 1.42  | 0.0480      | 0.0559 |
| A1  |             | 0.05  |        | 0.002  | e   | 0.65 BSC.   |       | 0.02559 BSC |        |
| A3  | 0.153       | 0.253 | 0.0060 | 0.0099 | E   | 1.900       | 2.100 | 0.0748      | 0.0826 |
| b   | 0.180       | 0.300 | 0.0071 | 0.0118 | E2  | 0.780       | 0.990 | 0.0307      | 0.0389 |
| D   | 1.900       | 2.100 | 0.0748 | 0.0826 | E4  | 0.480       | 0.680 | 0.0189      | 0.0267 |
|     |             |       |        |        | L   | 0.300       | 0.500 | 0.0118      | 0.0196 |

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

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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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