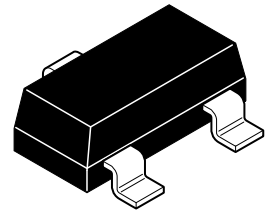


ZXMN2B01F

20V SOT23 N-channel enhancement mode MOSFET with low gate drive capability

Summary

| $V_{(BR)DSS}$ | $R_{DS(on)}$ (Ω) | I_D (A) |
|---------------|---------------------------|-----------|
| 20 | 0.100 @ $V_{GS} = 4.5V$ | 2.4 |
| | 0.150 @ $V_{GS} = 2.5V$ | 2.0 |
| | 0.200 @ $V_{GS} = 1.8V$ | 1.7 |



Description

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

Features

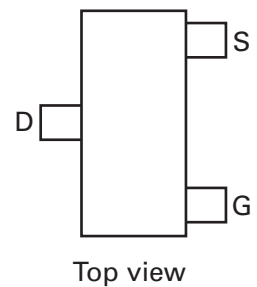
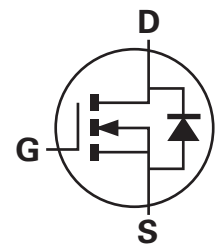
- Low on-resistance
- Fast switching speed
- Low gate drive capability
- SOT23 package

Applications

- DC-DC converters
- Power management functions
- Disconnect switches
- Motor control

Ordering information

| Device | Reel size (inches) | Tape width (mm) | Quantity per reel |
|-------------|--------------------|-----------------|-------------------|
| ZXMN2B01FTA | 7 | 8 | 3,000 |



Device marking

2B1

ZXMN2B01F

Absolute maximum ratings

| Parameter | Symbol | Limit | Unit |
|--|----------------|-------------|-----------------|
| Drain-source voltage | V_{DSS} | 20 | V |
| Gate-source voltage | V_{GS} | ± 8 | V |
| Continuous drain current @ $V_{GS} = 4.5V$; $T_{amb} = 25^{\circ}C^{(b)}$ @ $V_{GS} = 4.5V$; $T_{amb} = 70^{\circ}C^{(b)}$ @ $V_{GS} = 4.5V$; $T_{amb} = 25^{\circ}C^{(a)}$ | I_D | 2.4 | A |
| | | 1.9 | A |
| | | 2.1 | A |
| Pulsed drain current ^(c) | I_{DM} | 11.8 | A |
| Continuous source current (body diode) ^(b) | I_S | 1.4 | A |
| Pulsed source current (body diode) ^(c) | I_{SM} | 11.8 | A |
| Power dissipation at $T_{amb} = 25^{\circ}C^{(a)}$ | P_D | 625 | mW |
| Linear derating factor | | 5 | mW/ $^{\circ}C$ |
| Power dissipation at $T_{amb} = 25^{\circ}C^{(b)}$ | P_D | 806 | mW |
| Linear derating factor | | 6.4 | mW/ $^{\circ}C$ |
| Operating and storage temperature range | T_j, T_{stg} | -55 to +150 | $^{\circ}C$ |

Thermal resistance

| Parameter | Symbol | Limit | Unit |
|------------------------------------|-----------------|-------|---------------|
| Junction to ambient ^(a) | $R_{\theta JA}$ | 200 | $^{\circ}C/W$ |
| Junction to ambient ^(b) | $R_{\theta JA}$ | 155 | $^{\circ}C/W$ |

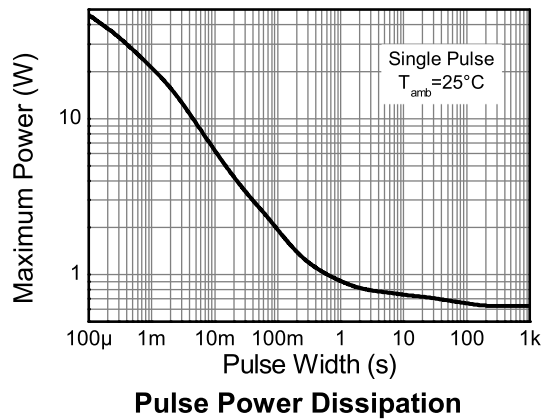
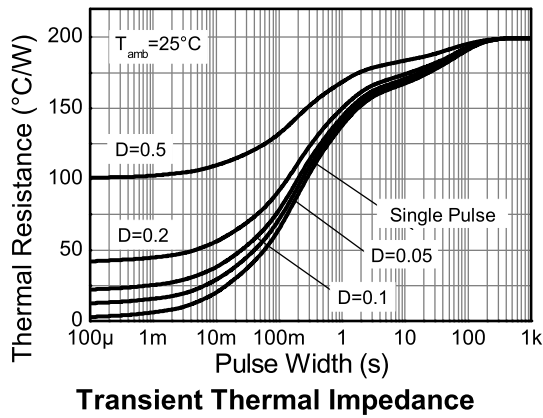
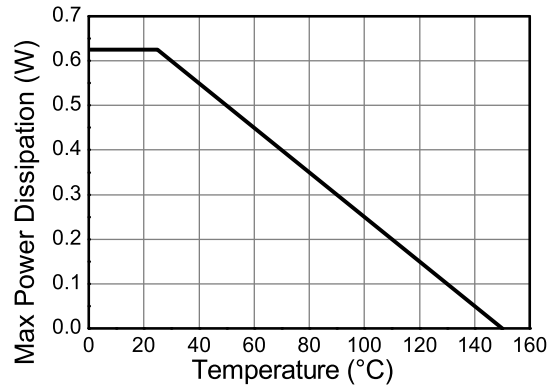
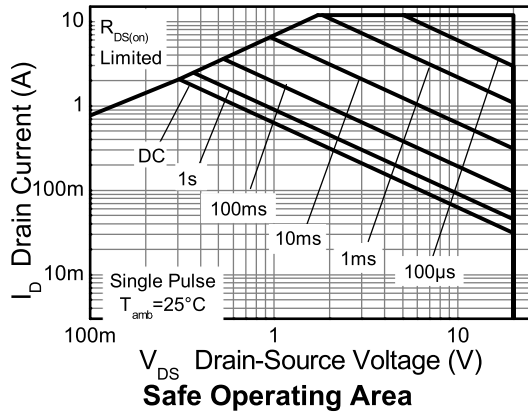
NOTES:

(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 $t \leq 5$ sec.

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

Thermal characteristics



ZXMN2B01F

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

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Conditions |
|---|---------------|------|------|-------|---------------|--|
| Static | | | | | | |
| Drain-source breakdown voltage | $V_{(BR)DSS}$ | 20 | | | V | $I_D = 250\mu\text{A}$, $V_{GS} = 0\text{V}$ |
| Zero gate voltage drain current | I_{DSS} | | | 1 | μA | $V_{DS} = 20\text{V}$, $V_{GS} = 0\text{V}$ |
| Gate-body leakage | I_{GSS} | | | 100 | nA | $V_{GS} = \pm 8\text{V}$, $V_{DS} = 0\text{V}$ |
| Gate-source threshold voltage | $V_{GS(th)}$ | 0.4 | | 1.0 | V | $I_D = 250\mu\text{A}$, $V_{DS} = V_{GS}$ |
| Static drain-source on-state resistance (*) | $R_{DS(on)}$ | | | 0.100 | Ω | $V_{GS} = 4.5\text{V}$, $I_D = 2.4\text{A}$ |
| | | | | 0.150 | Ω | $V_{GS} = 2.5\text{V}$, $I_D = 2.0\text{A}$ |
| | | | | 0.200 | Ω | $V_{GS} = 1.8\text{V}$, $I_D = 1.7\text{A}$ |
| Forward transconductance (*) (‡) | g_{fs} | | 6.1 | | S | $V_{DS} = 10\text{V}$, $I_D = 2.4\text{A}$ |
| Dynamic (‡) | | | | | | |
| Input capacitance | C_{iss} | | 370 | | pF | $V_{DS} = 10\text{V}$, $V_{GS} = 0\text{V}$ $f = 1\text{MHz}$ |
| Output capacitance | C_{oss} | | 81 | | pF | |
| Reverse transfer capacitance | C_{rss} | | 46 | | pF | |
| Switching (†) (‡) | | | | | | |
| Turn-on-delay time | $t_{d(on)}$ | | 2.2 | | ns | $V_{DD} = 10\text{V}$, $V_{GS} = 4.5\text{V}$ $I_D = 1\text{A}$ $R_G \approx 6.0\Omega$ |
| Rise time | t_r | | 3.6 | | ns | |
| Turn-off delay time | $t_{d(off)}$ | | 17.8 | | ns | |
| Fall time | t_f | | 10.5 | | ns | |
| Total gate charge | Q_g | | 4.8 | | nC | $V_{DS} = 10\text{V}$, $V_{GS} = 4.5\text{V}$ $I_D = 2.4\text{A}$ |
| Gate-source charge | Q_{gs} | | 0.6 | | nC | |
| Gate drain charge | Q_{gd} | | 1.0 | | nC | |
| Source-drain diode | | | | | | |
| Diode forward voltage (*) | V_{SD} | | 0.73 | 0.95 | V | $T_j = 25^{\circ}\text{C}$, $I_S = 1.2\text{A}$, $V_{GS} = 0\text{V}$ |
| Reverse recovery time (‡) | t_{rr} | | 6.7 | | ns | $T_j = 25^{\circ}\text{C}$, $I_F = 1.1\text{A}$, $di/dt = 100\text{A/ms}$ |
| Reverse recovery charge (‡) | Q_{rr} | | 1.3 | | nC | |

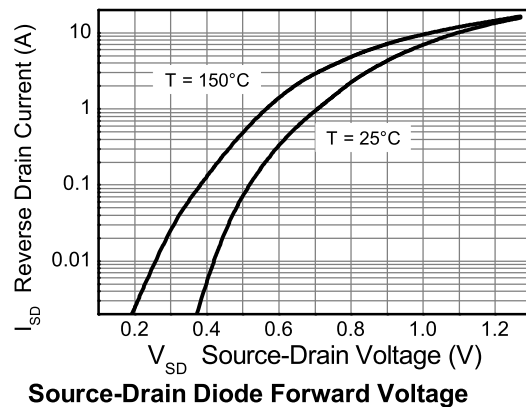
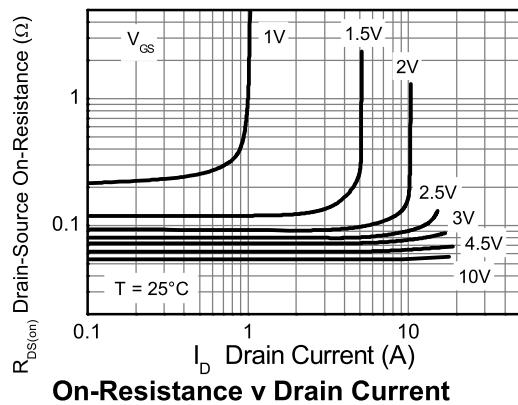
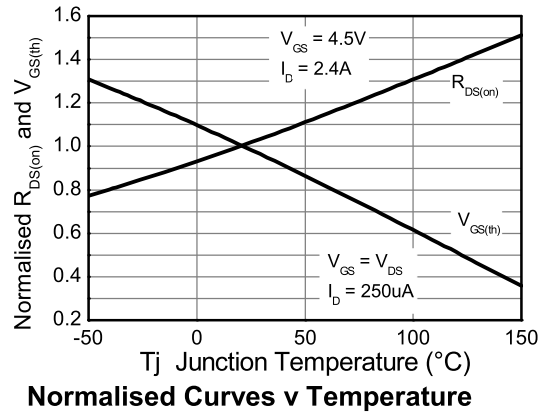
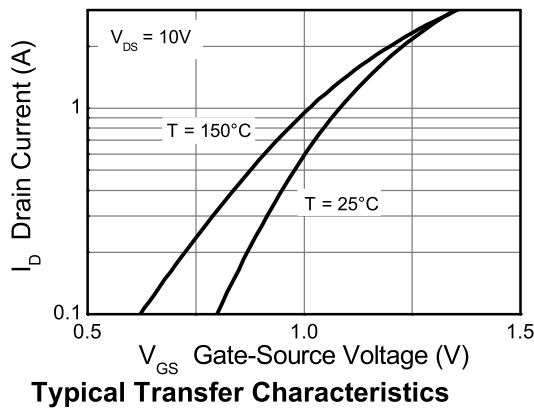
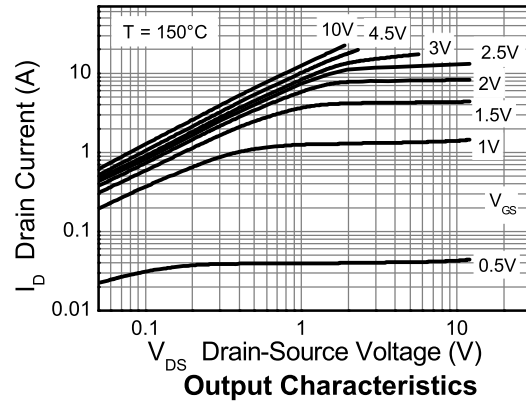
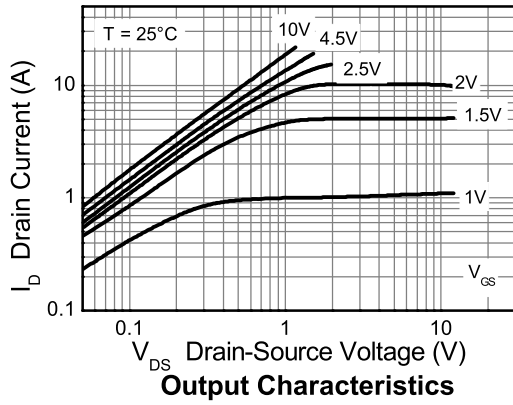
NOTES:

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

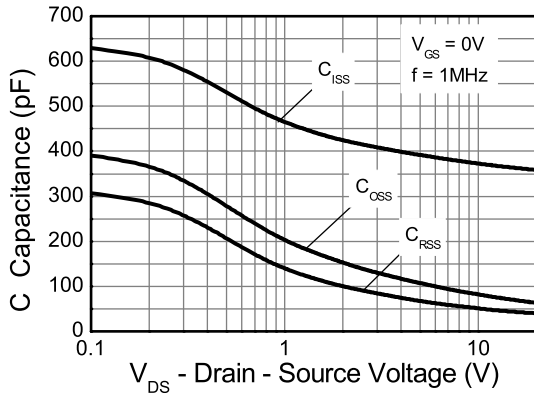
(†) Switching characteristics are independent of operating junction temperature.

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

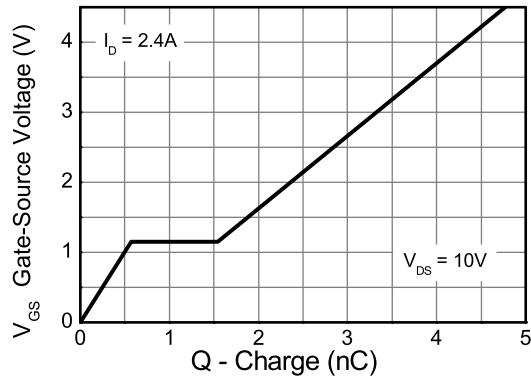
Typical characteristics



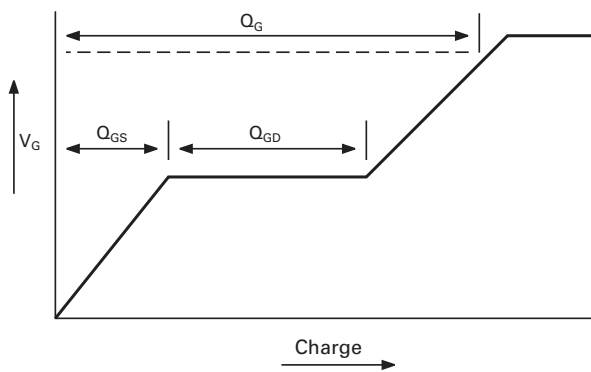
Typical characteristics



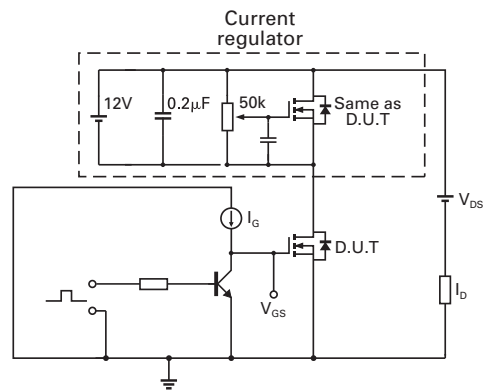
Capacitance v Drain-Source Voltage



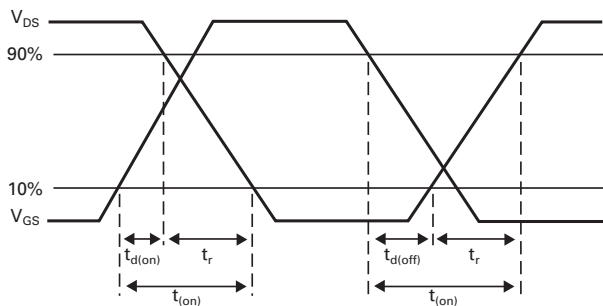
Gate-Source Voltage v Gate Charge



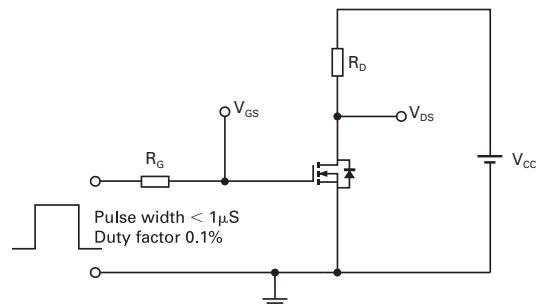
Basic gate charge waveform



Gate charge test circuit



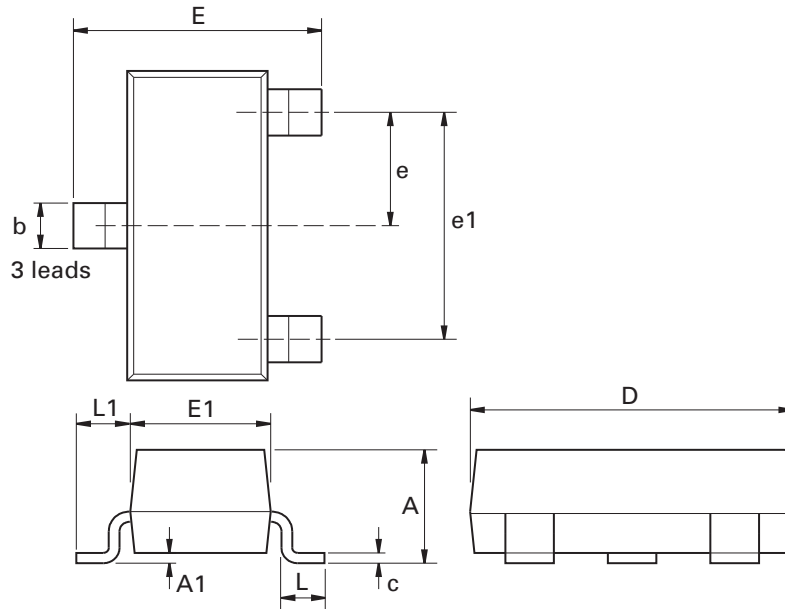
Switching time waveforms



Switching time test circuit

ZXMN2B01F

Package outline - SOT23



| Dim. | Millimeters | | Inches | | Dim. | Millimeters | | Inches | |
|------|-------------|-------|------------|-------|------|-------------|------|-----------|-------|
| | Min. | Max. | Min. | Max. | | Min. | Max. | Max. | Max. |
| A | - | 1.12 | - | 0.044 | e1 | 1.90 NOM | | 0.075 NOM | |
| A1 | 0.01 | 0.10 | 0.0004 | 0.004 | E | 2.10 | 2.64 | 0.083 | 0.104 |
| b | 0.30 | 0.50 | 0.012 | 0.020 | E1 | 1.20 | 1.40 | 0.047 | 0.055 |
| C | 0.085 | 0.120 | 0.003 | 0.008 | L | 0.25 | 0.62 | 0.018 | 0.024 |
| D | 2.80 | 3.04 | 0.110 | 0.120 | L1 | 0.45 | 0.62 | 0.018 | 0.024 |
| e | 0.95 NOM | | 0.0375 NOM | | - | - | - | - | - |

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

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| "Not recommended for new designs" | Device is still in production to support existing designs and production |
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| | |
|-----------------------|---|
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