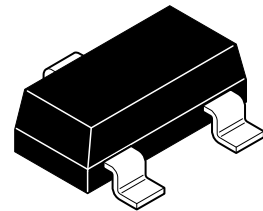


# ZXMN2B14FH

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

### Summary

| $V_{(BR)DSS}$ | $R_{DS(on)}$ ( $\Omega$ ) | $I_D$ (A) |
|---------------|---------------------------|-----------|
| 20            | 0.055 @ $V_{GS} = 4.5V$   | 4.3       |
|               | 0.075 @ $V_{GS} = 2.5V$   | 3.7       |
|               | 0.100 @ $V_{GS} = 1.8V$   | 3.2       |



### Description

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

### Features

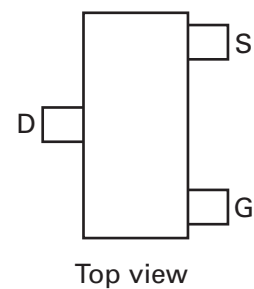
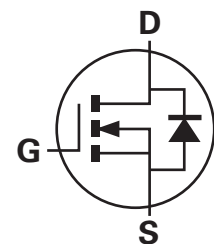
- Low on-resistance
- Fast switching speed
- Low gate drive capability
- SOT23 package

### Applications

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

### Ordering information

| Device       | Reel size (inches) | Tape width (mm) | Quantity per reel |
|--------------|--------------------|-----------------|-------------------|
| ZXMN2B14FHTA | 7                  | 8               | 3,000             |



### Device marking

2B4

# ZXMN2B14FH

## Absolute maximum ratings

| Parameter  | Symbol         | Limit             | Unit            |
|--|----------------|-------------------|-----------------|
| Drain-source voltage   | $V_{DSS}$      | 20                | V               |
| Gate-source voltage  | $V_{GS}$       | $\pm 8$           | V               |
| Continuous drain current @ $V_{GS}=4.5V$ ; $T_{amb}=25^{\circ}C$ (b)<br>@ $V_{GS}=4.5V$ ; $T_{amb}=70^{\circ}C$ (b)<br>@ $V_{GS}=4.5V$ ; $T_{amb}=25^{\circ}C$ (a) | $I_D$          | 4.3<br>3.5<br>3.5 | A               |
| Pulsed drain current (c)   | $I_{DM}$       | 21                | A               |
| Continuous source current (body diode) (b)   | $I_S$          | 2.4               | A               |
| Pulsed source current (body diode) (c)   | $I_{SM}$       | 21                | A               |
| Power dissipation at $T_{amb}=25^{\circ}C$ (a)   | $P_D$          | 1                 | W               |
| Linear derating factor   |                | 8                 | mW/ $^{\circ}C$ |
| Power dissipation at $T_{amb}=25^{\circ}C$ (b)   | $P_D$          | 1.5               | W               |
| Linear derating factor   |                | 12                | mW/ $^{\circ}C$ |
| Operating and storage temperature range  | $T_j, T_{stg}$ | -55 to +150       | $^{\circ}C$     |

## Thermal resistance

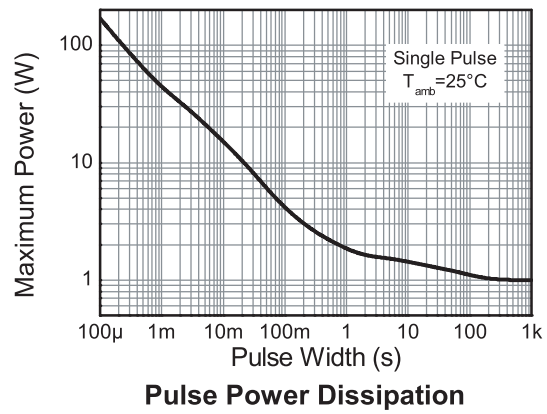
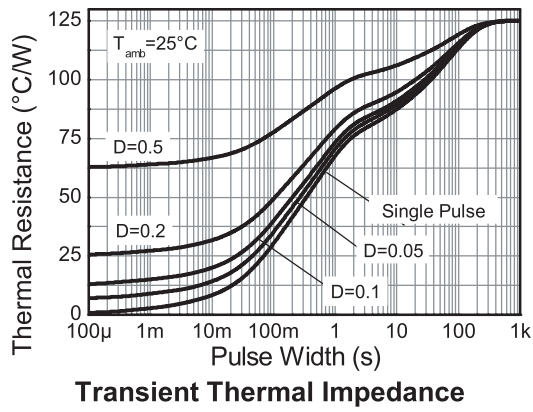
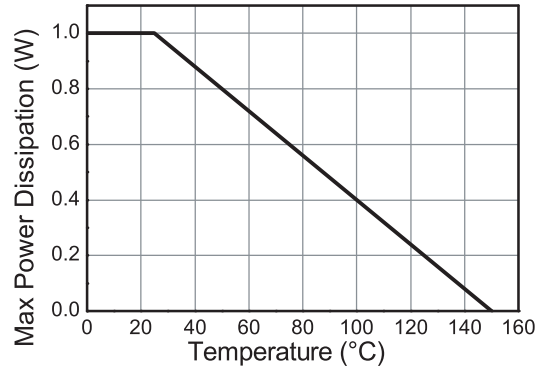
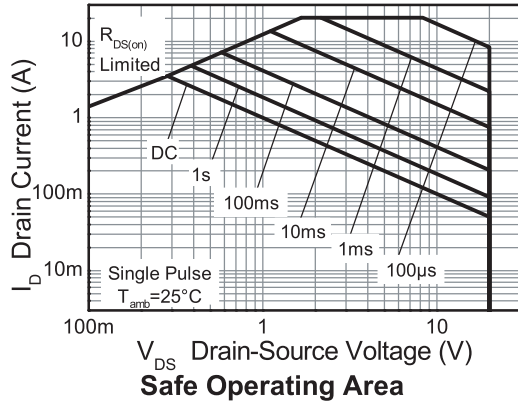
| Parameter           | Symbol          | Limit | Unit          |
|---------------------|-----------------|-------|---------------|
| Junction to ambient | $R_{\theta JA}$ | 125   | $^{\circ}C/W$ |
| Junction to ambient | $R_{\theta JA}$ | 82    | $^{\circ}C/W$ |

### 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 $\mu$ s - pulse width limited by maximum junction temperature.

# ZXMN2B14FH

## Thermal characteristics



# ZXMN2B14FH

## 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            | $V_{GS} = \pm 8\text{V}$ , $V_{DS} = 0\text{V}$  |
| 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 <sup>(*)</sup> | $R_{DS(on)}$  |      |      | 0.055 | $\Omega$      | $V_{GS} = 4.5\text{V}$ , $I_D = 3.5\text{A}$   |
|  |               |      |      | 0.075 | $\Omega$      | $V_{GS} = 2.5\text{V}$ , $I_D = 3\text{A}$   |
|  |               |      |      | 0.100 | $\Omega$      | $V_{GS} = 1.8\text{V}$ , $I_D = 2.6\text{A}$   |
| Forward transconductance <sup>(*)</sup> (‡)            | $g_{fs}$      |      | 11   |       | S             | $V_{DS} = 10\text{V}$ , $I_D = 3.5\text{A}$  |
| <b>Dynamic</b> (‡)                                     |               |      |      |       |               |  |
| Input capacitance                                      | $C_{iss}$     |      | 872  |       | pF            | $V_{DS} = 10\text{V}$ , $V_{GS} = 0\text{V}$<br>$f = 1\text{MHz}$                              |
| Output capacitance                                     | $C_{oss}$     |      | 145  |       | pF            |  |
| Reverse transfer capacitance                           | $C_{rss}$     |      | 90   |       | pF            |  |
| <b>Switching</b> (†) (‡)                               |               |      |      |       |               |  |
| Turn-on-delay time                                     | $t_{d(on)}$   |      | 3.7  |       | 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  | $t_r$         |      | 5.2  |       | ns            |  |
| Turn-off delay time                                    | $t_{d(off)}$  |      | 30   |       | ns            |  |
| Fall time  | $t_f$         |      | 5.5  |       | ns            |  |
| Total gate charge                                      | $Q_g$         |      | 11   |       | nC            | $V_{DS} = 10\text{V}$ , $V_{GS} = 4.5\text{V}$<br>$I_D = 4.0\text{A}$                          |
| Gate-source charge                                     | $Q_{gs}$      |      | 1.4  |       | nC            |  |
| Gate drain charge                                      | $Q_{gd}$      |      | 2.1  |       | nC            |  |
| <b>Source-drain diode</b>                              |               |      |      |       |               |  |
| Diode forward voltage <sup>(*)</sup>                   | $V_{SD}$      |      | 0.69 | 0.95  | V             | $T_j = 25^{\circ}\text{C}$ , $I_S = 1.45\text{A}$ ,<br>$V_{GS} = 0\text{V}$                    |
| Reverse recovery time <sup>(‡)</sup>                   | $t_{rr}$      |      | 9.4  |       | ns            | $T_j = 25^{\circ}\text{C}$ , $I_F = 2.4\text{A}$ ,<br>$di/dt = 100\text{A}/\mu\text{s}$        |
| Reverse recovery charge <sup>(‡)</sup>                 | $Q_{rr}$      |      | 2.8  |       | nC            |  |

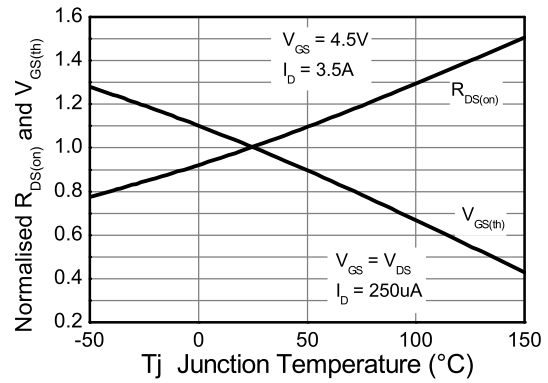
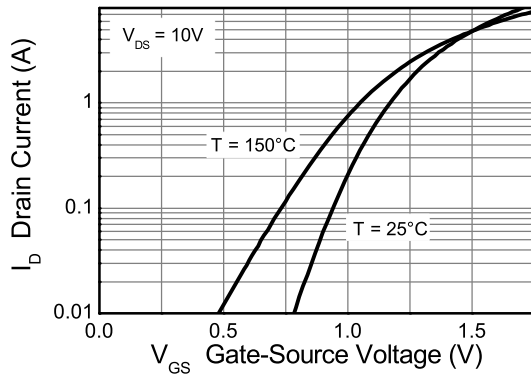
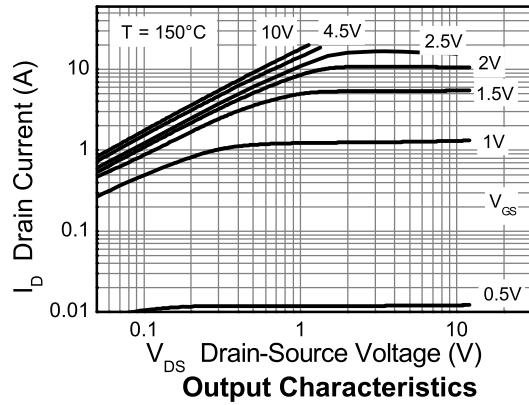
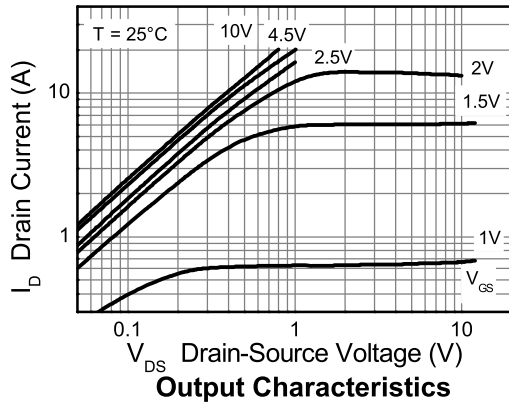
### NOTES:

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

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

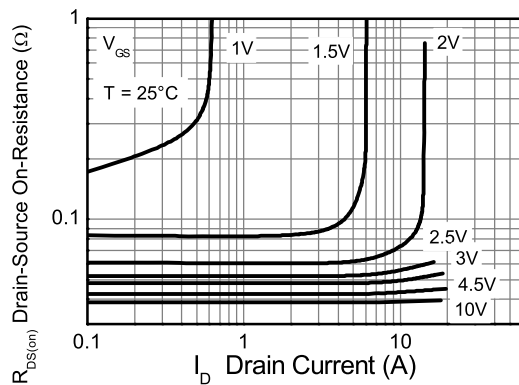
(‡) For design aid only, not subject to production testing.

## Typical characteristics

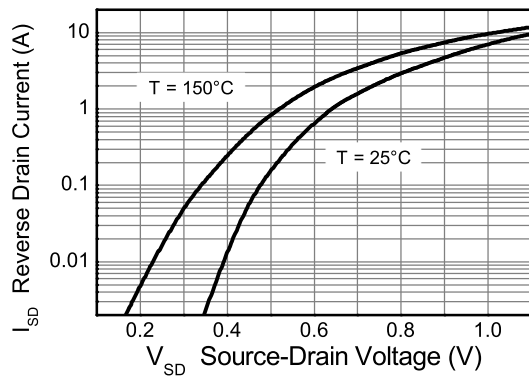


**Typical Transfer Characteristics**

**Normalised Curves v Temperature**

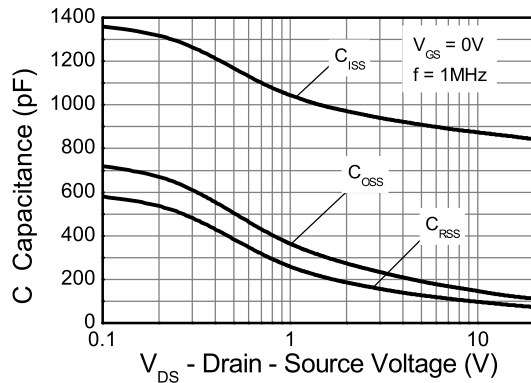


**On-Resistance v Drain Current**

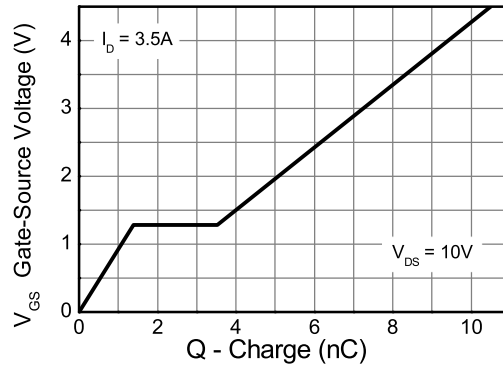


**Source-Drain Diode Forward Voltage**

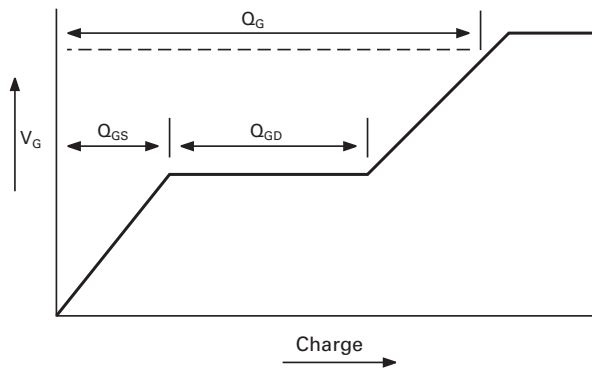
## Typical characteristics



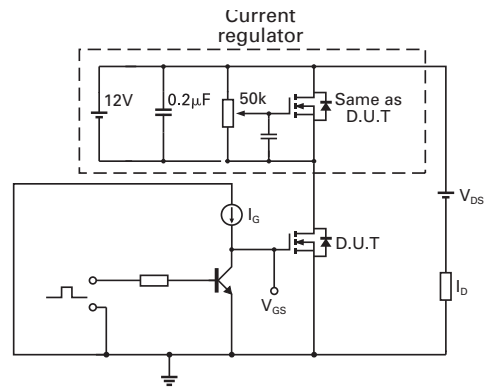
Capacitance v Drain-Source Voltage



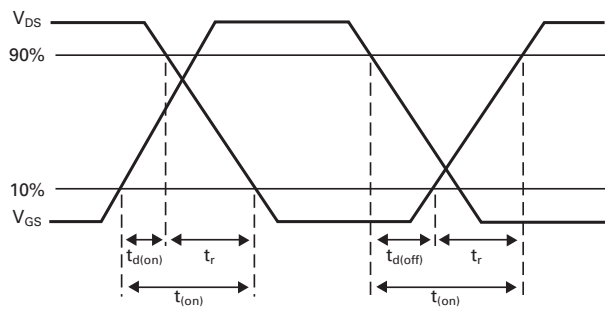
Gate-Source Voltage v Gate Charge



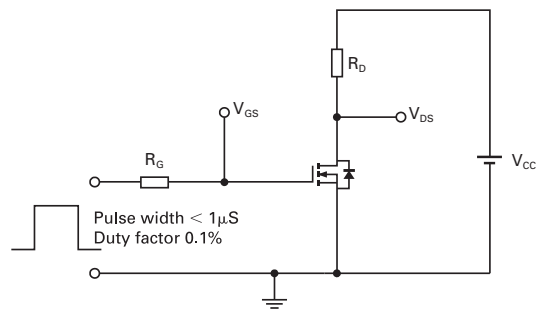
Basic gate charge waveform



Gate charge test circuit



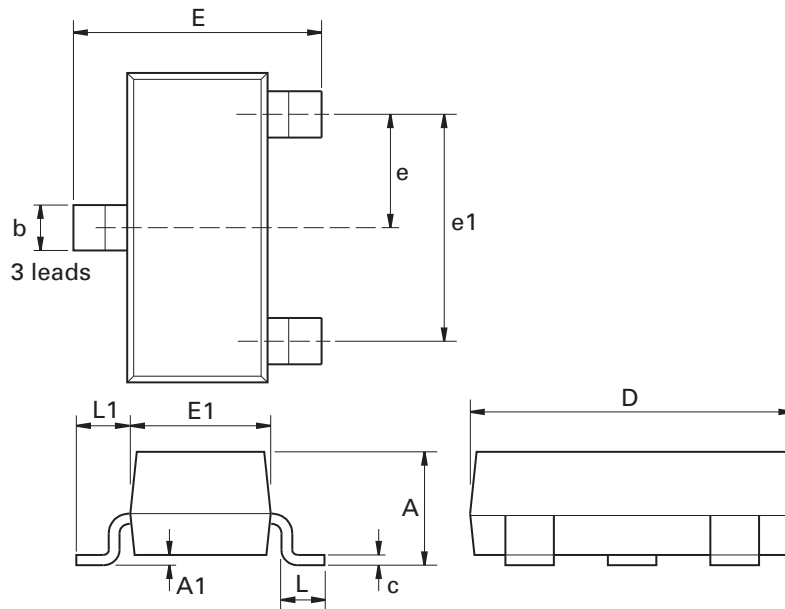
Switching time waveforms



Switching time test circuit

# ZXMN2B14FH

## 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

# ZXMN2B14FH

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|-----------------------------------|--|
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|                       |   |
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#### Как с нами связаться

**Телефон:** 8 (812) 309 58 32 (многоканальный)

**Факс:** 8 (812) 320-02-42

**Электронная почта:** [org@eplast1.ru](mailto:org@eplast1.ru)

**Адрес:** 198099, г. Санкт-Петербург, ул. Калинина, дом 2, корпус 4, литера А.