

# ZXMP3A13F

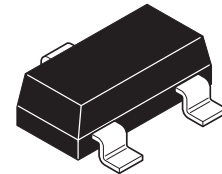
## 30V P-CHANNEL ENHANCEMENT MODE MOSFET

### SUMMARY

$V_{(BR)DSS} = -30V$ ;  $R_{DS(ON)} = 0.21\Omega$ ;  $I_D = -1.6A$

### DESCRIPTION

This new generation of trench MOSFETs from Zetex utilizes a unique structure that combines the benefits of low on-resistance with fast switching speed. This makes them ideal for high efficiency, low voltage, power management applications.



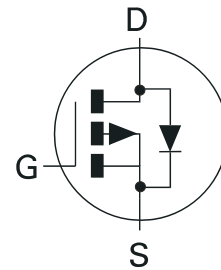
SOT23

### FEATURES

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

### APPLICATIONS

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



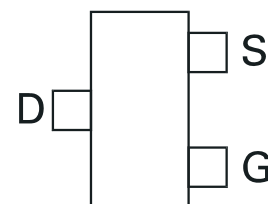
### ORDERING INFORMATION

| DEVICE      | REEL SIZE | TAPE WIDTH | QUANTITY PER REEL |
|-------------|-----------|------------|-------------------|
| ZXMP3A13FTA | 7"        | 8mm        | 3000 units        |
| ZXMP3A13FTC | 13"       | 8mm        | 10000 units       |

### DEVICE MARKING

- 313

### PINOUT



Top View

# ZXMP3A13F

## 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 $V_{GS}=10V$ ; $T_A=25^\circ C$ (b)<br>$V_{GS}=10V$ ; $T_A=70^\circ C$ (b)<br>$V_{GS}=10V$ ; $T_A=25^\circ C$ (a) | $I_D$         | -1.6<br>-1.3<br>-1.4 | A                    |
| Pulsed Drain Current (c)                                                                                                                   | $I_{DM}$      | -6                   | A                    |
| Continuous Source Current (Body Diode) (b)                                                                                                 | $I_S$         | -1.2                 | A                    |
| Pulsed Source Current (Body Diode) (c)                                                                                                     | $I_{SM}$      | -6                   | A                    |
| Power Dissipation at $T_A=25^\circ C$ (a)<br>Linear Derating Factor                                                                        | $P_D$         | 625<br>5             | mW<br>mW/ $^\circ C$ |
| Power Dissipation at $T_A=25^\circ C$ (b)<br>Linear Derating Factor                                                                        | $P_D$         | 806<br>6.4           | mW<br>mW/ $^\circ C$ |
| Operating and Storage Temperature Range                                                                                                    | $T_j:T_{stg}$ | -55 to +150          | $^\circ C$           |

## THERMAL RESISTANCE

| PARAMETER               | SYMBOL          | VALUE | UNIT         |
|-------------------------|-----------------|-------|--------------|
| Junction to ambient (a) | $R_{\theta JA}$ | 200   | $^\circ C/W$ |
| Junction to ambient (b) | $R_{\theta JA}$ | 155   | $^\circ C/W$ |

### NOTES

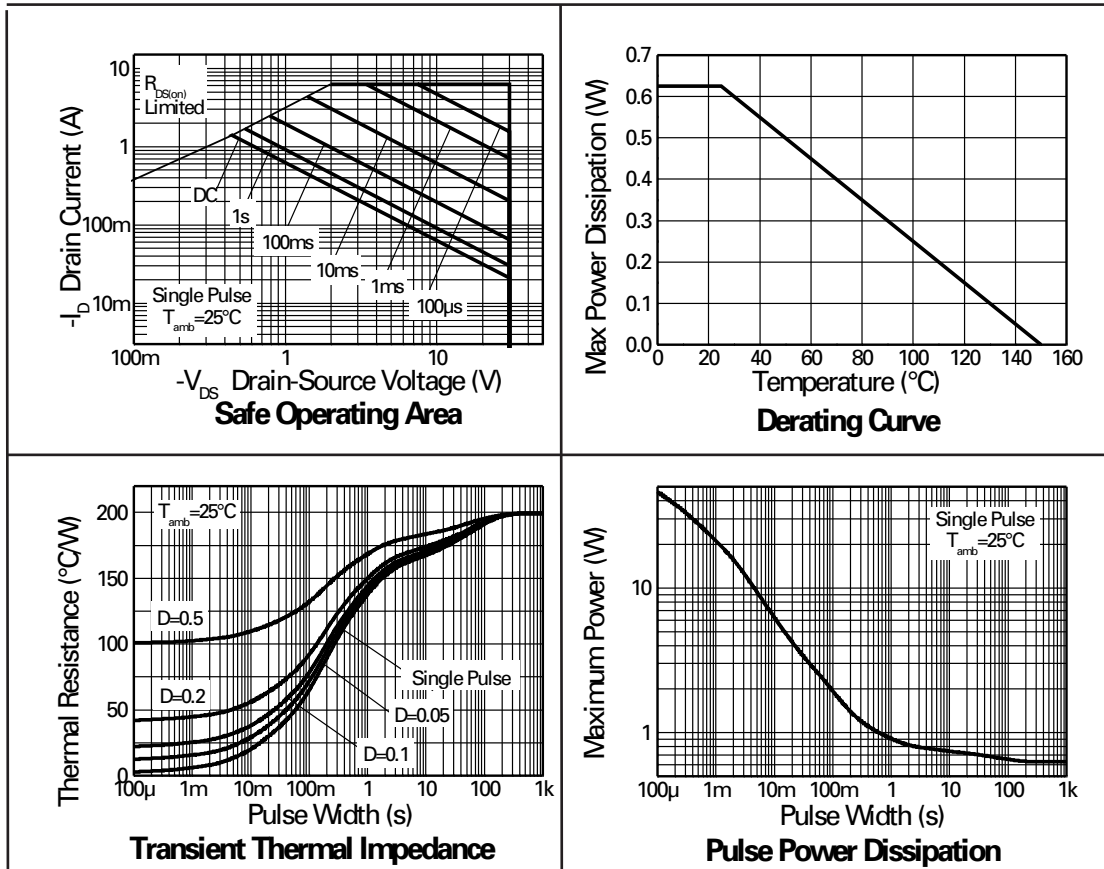
(a) For a device surface mounted on 25mm x 25mm FR4 PCB with high coverage of single sided 1oz copper, in still air conditions

(b) For a device surface mounted on FR4 PCB measured at  $t \leq 5$  secs.

(c) Repetitive rating 25mm x 25mm FR4 PCB,  $D = 0.05$ , pulse width 10  $\mu s$  - pulse width limited by maximum junction temperature. Refer to Transient Thermal Impedance graph.

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## CHARACTERISTICS



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## ELECTRICAL CHARACTERISTICS (at $T_A = 25^\circ\text{C}$ unless otherwise stated)

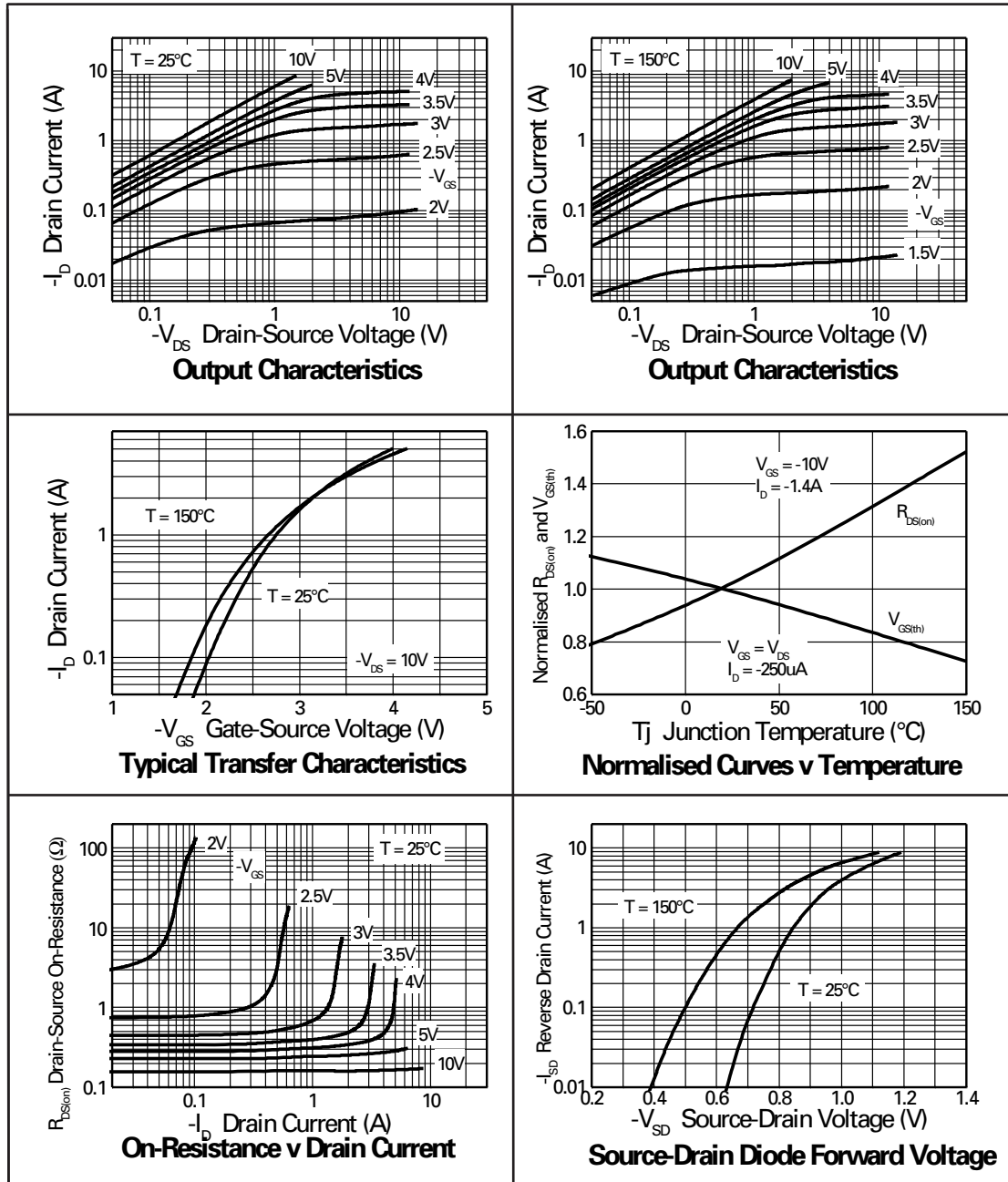
| PARAMETER                                   | SYMBOL               | MIN. | TYP.  | MAX.           | UNIT   | CONDITIONS                                                                                    |
|---------------------------------------------|----------------------|------|-------|----------------|--------|-----------------------------------------------------------------------------------------------|
| 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 |       |                | V      | I <sub>D</sub> =-250μA, V <sub>DS</sub> = V <sub>GS</sub>                                     |
| Static Drain-Source On-State Resistance (1) | R <sub>DS(on)</sub>  |      |       | 0.210<br>0.330 | Ω<br>Ω | V <sub>GS</sub> =-10V, I <sub>D</sub> =-1.4A<br>V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-1.1A |
| Forward Transconductance (1)(3)             | g <sub>fs</sub>      |      | 2.4   |                | S      | V <sub>DS</sub> =-15V,I <sub>D</sub> =-1.4A                                                   |
| DYNAMIC (3)                                 |                      |      |       |                |        |                                                                                               |
| Input Capacitance                           | C <sub>iss</sub>     |      | 206   |                | pF     | V <sub>DS</sub> =-15V, V <sub>GS</sub> =0V,<br>f=1MHz                                         |
| Output Capacitance                          | C <sub>oss</sub>     |      | 59.3  |                | pF     |                                                                                               |
| Reverse Transfer Capacitance                | C <sub>rss</sub>     |      | 49.2  |                | pF     |                                                                                               |
| SWITCHING(2) (3)                            |                      |      |       |                |        |                                                                                               |
| Turn-On Delay Time                          | t <sub>d(on)</sub>   |      | 1.5   |                | 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>       |      | 3.0   |                | ns     |                                                                                               |
| Turn-Off Delay Time                         | t <sub>d(off)</sub>  |      | 11.1  |                | ns     |                                                                                               |
| Fall Time                                   | t <sub>f</sub>       |      | 7.6   |                | ns     |                                                                                               |
| Gate Charge                                 | Q <sub>g</sub>       |      | 3.8   |                | nC     | V <sub>DS</sub> =-15V,V <sub>GS</sub> =-5V,<br>I <sub>D</sub> =-1.4A                          |
| Total Gate Charge                           | Q <sub>g</sub>       |      | 6.4   |                | nC     | V <sub>DS</sub> =-15V,V <sub>GS</sub> =-10V,<br>I <sub>D</sub> =-1.4A                         |
| Gate-Source Charge                          | Q <sub>gs</sub>      |      | 0.69  |                | nC     |                                                                                               |
| Gate-Drain Charge                           | Q <sub>gd</sub>      |      | 2.0   |                | nC     |                                                                                               |
| SOURCE-DRAIN DIODE                          |                      |      |       |                |        |                                                                                               |
| Diode Forward Voltage (1)                   | V <sub>SD</sub>      |      | -0.85 | -0.95          | V      | T <sub>J</sub> =25°C, I <sub>S</sub> =-1.1A,<br>V <sub>GS</sub> =0V                           |
| Reverse Recovery Time (3)                   | t <sub>rr</sub>      |      | 15.6  |                | ns     | T <sub>J</sub> =25°C, I <sub>F</sub> =-0.95A,<br>di/dt= 100A/μs                               |
| Reverse Recovery Charge (3)                 | Q <sub>rr</sub>      |      | 9.6   |                | nC     |                                                                                               |

### NOTES:

- (1) Measured under pulsed conditions. Width=300 $\mu\text{s}$ . Duty cycle  $\leq 2\%$ .
- (2) Switching characteristics are independent of operating junction temperature.
- (3) For design aid only, not subject to production testing.

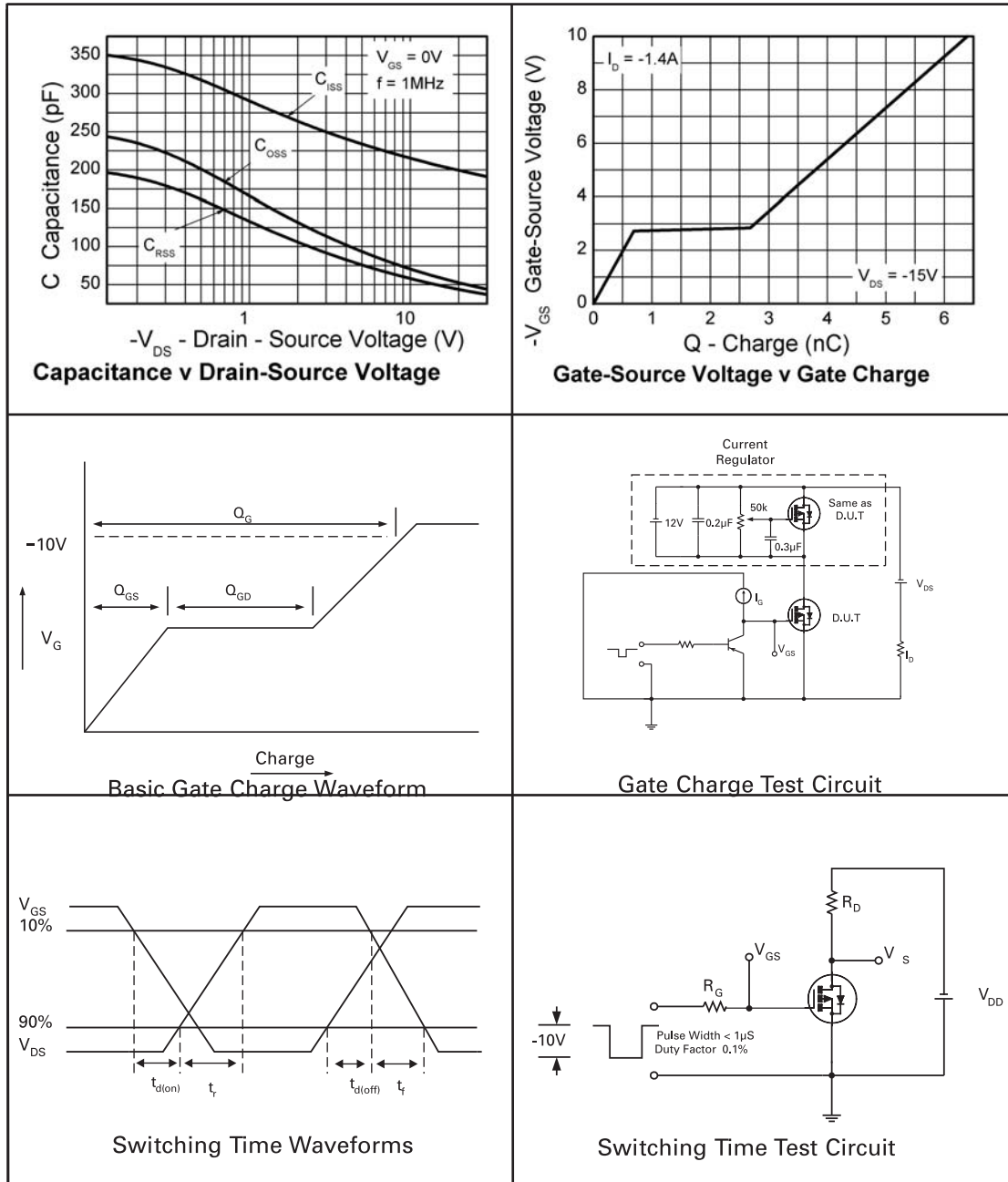
# ZXMP3A13F

## TYPICAL CHARACTERISTICS



# ZXMP3A13F

## TYPICAL CHARACTERISTICS



# ZXMP3A13F

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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:

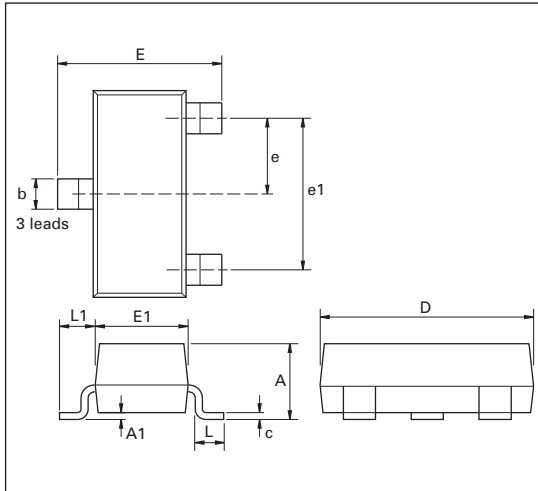
"Draft version"This term denotes a very early datasheet version and contains highly provisional information, which may change in any manner without notice.

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"Issue"This term denotes an issued datasheet containing finalized specifications. However, changes to specifications may occur, at any time and without notice.

# ZXMP3A13F

## PACKAGE OUTLINE



## PACKAGE DIMENSIONS

| DIM | Millimeters |       | Inches    |       | DIM | Millimeters |      | Inches    |        |
|-----|-------------|-------|-----------|-------|-----|-------------|------|-----------|--------|
|     | Min         | Max   | Min       | Max   |     | Min         | Max  | Min       | 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       | 0.020 | 0.003     | 0.008 | L   | 0.25        | 0.60 | 0.0098    | 0.0236 |
| D   | 2.80        | 3.04  | 0.110     | 0.120 | L1  | 0.45        | 0.62 | 0.018     | 0.024  |
| e   | 0.95 NOM    |       | 0.037 NOM |       | —   | —           | —    | —         | —      |

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