

# ZXMN2A01F

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## 20V N-CHANNEL ENHANCEMENT MODE MOSFET

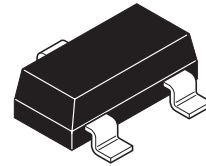
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### SUMMARY

$V_{(BR)DSS} = 20V$ ;  $R_{DS(ON)} = 0.12\Omega$ ;  $I_D = 2.2A$

### 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.



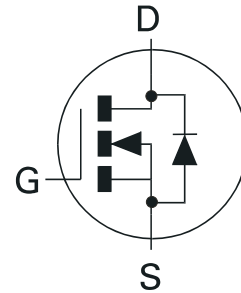
SOT23

### 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

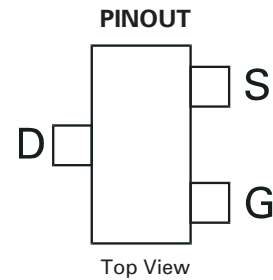


### ORDERING INFORMATION

| DEVICE      | REEL SIZE | TAPE WIDTH | QUANTITY PER REEL |
|-------------|-----------|------------|-------------------|
| ZXMN2A01FTA | 7"        | 8mm        | 3000 units        |
| ZXMN2A01FTC | 13"       | 8mm        | 10000 units       |

### DEVICE MARKING

- 7N2



# ZXMN2A01F

## 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 $V_{GS}=10V$ ; $T_A=25^\circ C$ (b)<br>$V_{GS}=10V$ ; $T_A=70^\circ C$ (b)<br>$V_{GS}=10V$ ; $T_A=25^\circ C$ (a) | $I_D$         | 2.2<br>1.7<br>1.9 | A                    |
| Pulsed Drain Current (c)   | $I_{DM}$      | 8                 | A                    |
| Continuous Source Current (Body Diode) (b)   | $I_S$         | 1.29              | A                    |
| Pulsed Source Current (Body Diode) (c)   | $I_{SM}$      | 8                 | 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

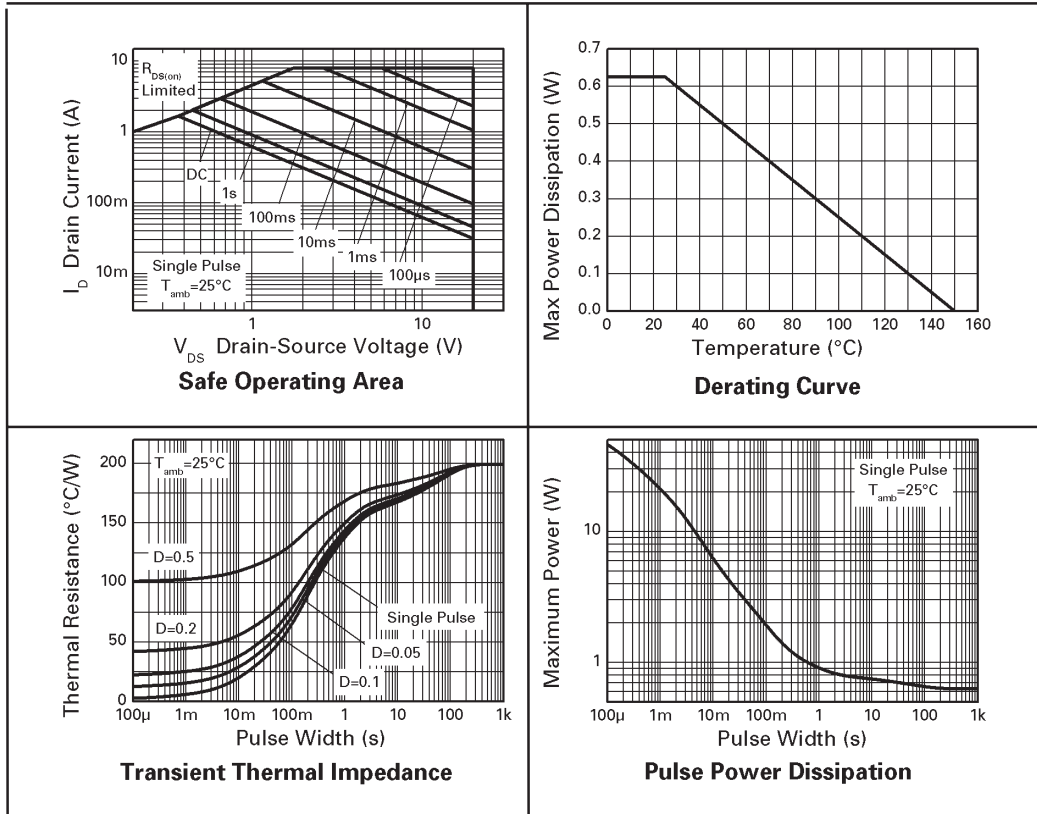
| PARAMETER               | SYMBOL          | VALUE | UNIT         |
|-------------------------|-----------------|-------|--------------|
| Junction to Ambient (a) | $R_{\theta JA}$ | 200   | $^\circ C/W$ |
| Junction to Ambient (b) | $R_{\theta JA}$ | 155   | $^\circ C/W$ |

### 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,  $D = 0.02$ , pulse width 300 $\mu s$  - pulse width limited by maximum junction temperature.

# ZXMN2A01F

## CHARACTERISTICS



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## ELECTRICAL CHARACTERISTICS (at $T_A = 25^\circ\text{C}$ 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               | $V_{GS(th)}$  | 0.7  |      |               | V                    | $I_D=250\mu\text{A}$ , $V_{DS}=V_{GS}$   |
| Static Drain-Source On-State Resistance (1) | $R_{DS(on)}$  |      |      | 0.12<br>0.225 | $\Omega$<br>$\Omega$ | $V_{GS}=4.5\text{V}$ , $I_D=4\text{A}$<br>$V_{GS}=2.5\text{V}$ , $I_D=1.5\text{A}$ |
| Forward Transconductance (1)(3)             | $g_{fs}$      |      | 6.1  |               | S                    | $V_{DS}=10\text{V}$ , $I_D=4\text{A}$  |
| <b>DYNAMIC (3)</b>                          |               |      |      |               |                      |  |
| Input Capacitance                           | $C_{iss}$     |      | 303  |               | pF                   | $V_{DS}=15\text{V}$ , $V_{GS}=0\text{V}$ ,<br>$f=1\text{MHz}$                      |
| Output Capacitance                          | $C_{oss}$     |      | 59   |               | pF                   |  |
| Reverse Transfer Capacitance                | $C_{rss}$     |      | 30   |               | pF                   |  |
| <b>SWITCHING(2) (3)</b>                     |               |      |      |               |                      |  |
| Turn-On Delay Time                          | $t_{d(on)}$   |      | 2.49 |               | ns                   | $V_{DD}=10\text{V}$ , $I_D=4\text{A}$<br>$R_G=6.0\Omega$ , $V_{GS}=5\text{V}$      |
| Rise Time                                   | $t_r$         |      | 5.21 |               | ns                   |  |
| Turn-Off Delay Time                         | $t_{d(off)}$  |      | 7.47 |               | ns                   |  |
| Fall Time                                   | $t_f$         |      | 4.62 |               | ns                   |  |
| Total Gate Charge                           | $Q_g$         |      | 3.0  |               | nC                   | $V_{DS}=10\text{V}$ , $V_{GS}=4.5\text{V}$ ,<br>$I_D=4\text{A}$                    |
| Gate-Source Charge                          | $Q_{gs}$      |      | 0.8  |               | nC                   |  |
| Gate-Drain Charge                           | $Q_{gd}$      |      | 1.0  |               | nC                   |  |
| <b>SOURCE-DRAIN DIODE</b>                   |               |      |      |               |                      |  |
| Diode Forward Voltage (1)                   | $V_{SD}$      |      | 0.85 | 0.95          | V                    | $T_J=25^\circ\text{C}$ , $I_S=3.2\text{A}$ ,<br>$V_{GS}=0\text{V}$                 |
| Reverse Recovery Time (3)                   | $t_{rr}$      |      | 23   |               | ns                   | $T_J=25^\circ\text{C}$ , $I_F=4\text{A}$ ,<br>$di/dt=100\text{A}/\mu\text{s}$      |
| Reverse Recovery Charge (3)                 | $Q_{rr}$      |      | 5.65 |               | nC                   |  |

### NOTES:

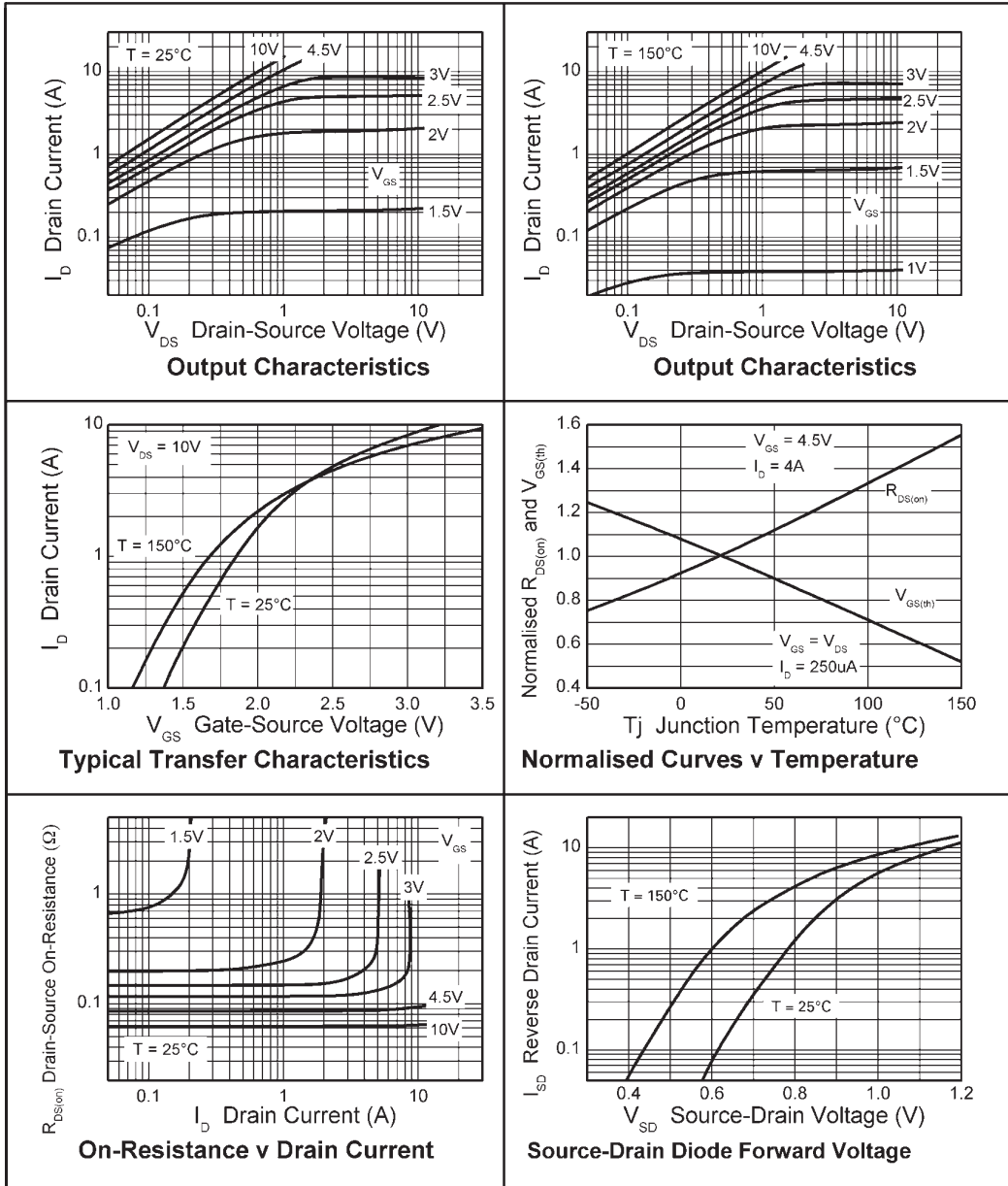
- (1) Measured under pulsed conditions. Width=300 $\mu\text{s}$ . Duty cycle  $\leq 2\%$ .
- (2) Switching characteristics are independent of operating junction temperature.
- (3) For design aid only, not subject to production testing.



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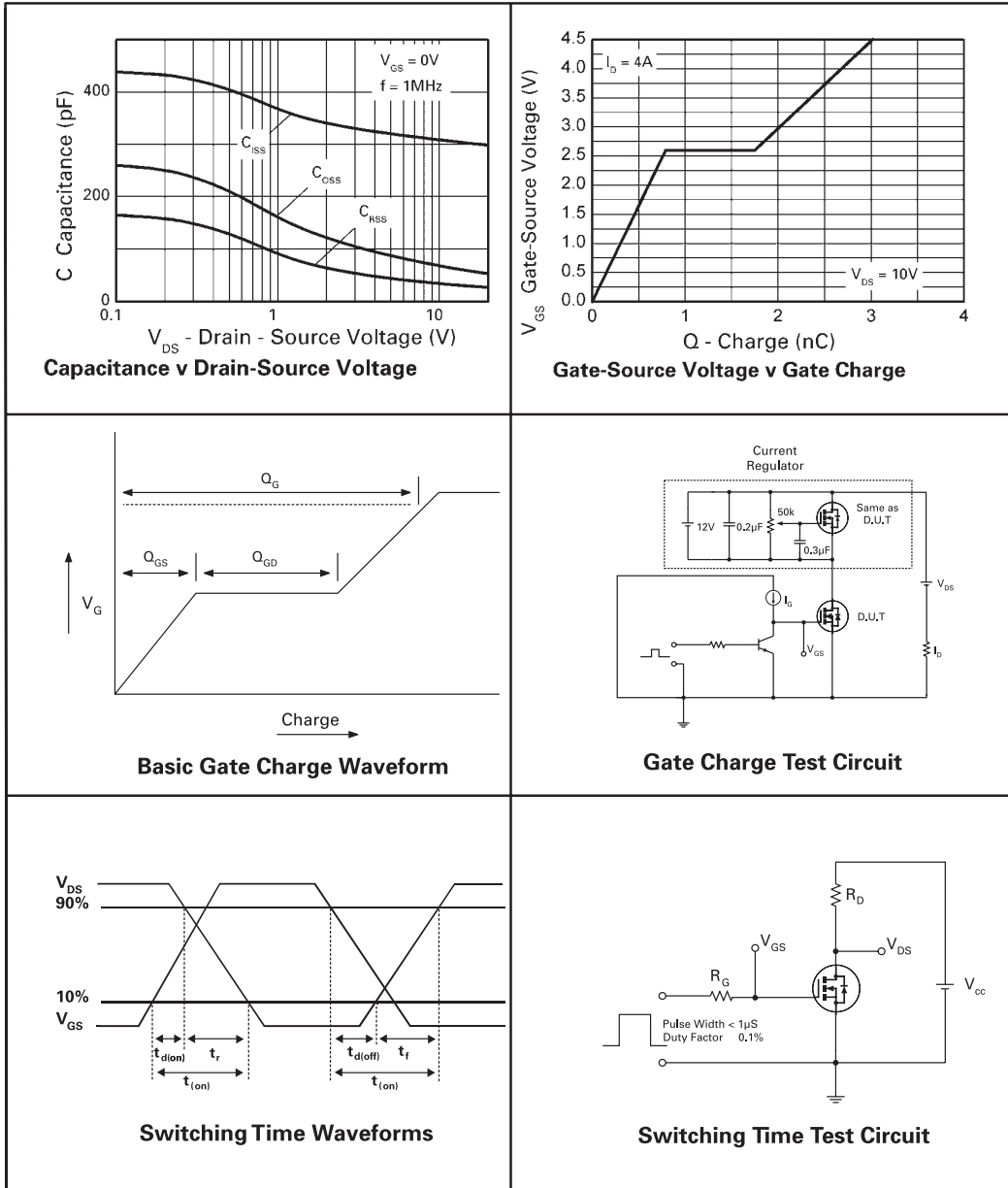
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## TYPICAL CHARACTERISTICS



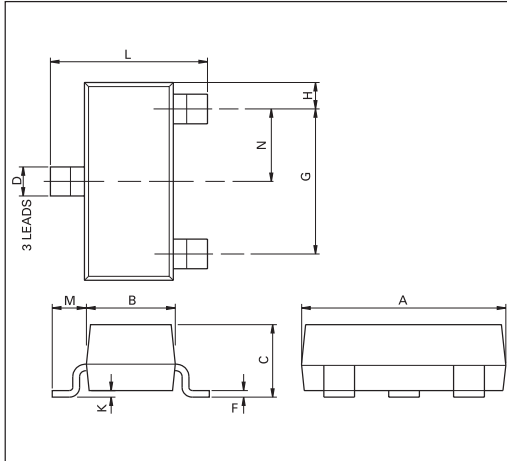
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## TYPICAL CHARACTERISTICS

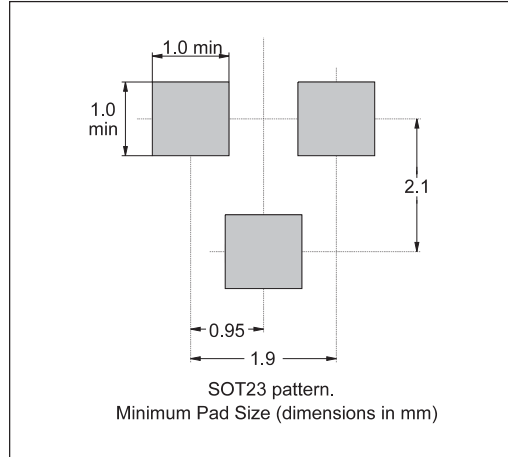


# ZXMN2A01F

## PACKAGE OUTLINE



## PAD LAYOUT



CONTROLLING DIMENSIONS IN MILLIMETERS APPROX CONVERSIONS INCHES

## PACKAGE DIMENSIONS

| DIM | Millimeters |      | Inches    |        | DIM | Millimeters |      | Inches     |        |
|-----|-------------|------|-----------|--------|-----|-------------|------|------------|--------|
|     | Min         | Max  | Min       | Max    |     | Min         | Max  | Max        | Max    |
| A   | 2.67        | 3.05 | 0.105     | 0.120  | H   | 0.33        | 0.51 | 0.013      | 0.020  |
| B   | 1.20        | 1.40 | 0.047     | 0.055  | K   | 0.01        | 0.10 | 0.0004     | 0.004  |
| C   | —           | 1.10 | —         | 0.043  | L   | 2.10        | 2.50 | 0.083      | 0.0985 |
| D   | 0.37        | 0.53 | 0.015     | 0.021  | M   | 0.45        | 0.64 | 0.018      | 0.025  |
| F   | 0.085       | 0.15 | 0.0034    | 0.0059 | N   | 0.95 NOM    |      | 0.0375 NOM |        |
| G   | 1.90 NOM    |      | 0.075 NOM |        | —   | —           |      | —          |        |

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