

## ZXMN2A01E6

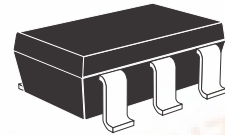
### 20V N-CHANNEL ENHANCEMENT MODE MOSFET

#### SUMMARY

$V_{(BR)DSS} = 20V$ ;  $R_{DS(ON)} = 0.12\Omega$ ;  $I_D = 3.1A$

#### 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.



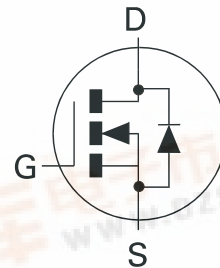
SOT23-6

#### FEATURES

- Low on-resistance
- Fast switching speed
- Low threshold
- Low gate drive
- SOT23-6 package

#### APPLICATIONS

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



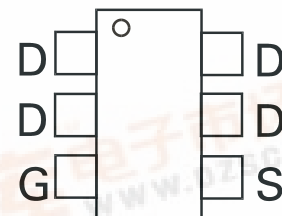
#### ORDERING INFORMATION

| DEVICE       | REEL SIZE | TAPE WIDTH | QUANTITY PER REEL |
|--------------|-----------|------------|-------------------|
| ZXMN2A01E6TA | 7"        | 8mm        | 3000 units        |
| ZXMN2A01E6TC | 13"       | 8mm        | 10000 units       |

#### DEVICE MARKING

- 2A1

#### PINOUT



Top View

# ZXMN2A01E6

## 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) | $I_D$         | 3.1<br>2.5<br>2.5 | A                   |
| Pulsed Drain Current (c)                                                                                                                   | $I_{DM}$      | 11                | A                   |
| Continuous Source Current (Body Diode) (b)                                                                                                 | $I_S$         | 2.4               | A                   |
| Pulsed Source Current (Body Diode) (c)                                                                                                     | $I_{SM}$      | 11                | A                   |
| Power Dissipation at $T_A=25^\circ C$ (a)<br>Linear Derating Factor                                                                        | $P_D$         | 1.1<br>8.8        | W<br>mW/ $^\circ C$ |
| Power Dissipation at $T_A=25^\circ C$ (b)<br>Linear Derating Factor                                                                        | $P_D$         | 1.7<br>13.6       | W<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) | $R_{\theta JA}$ | 113   | $^\circ C/W$ |
| Junction to Ambient (b) | $R_{\theta JA}$ | 70    | $^\circ C/W$ |

### NOTES

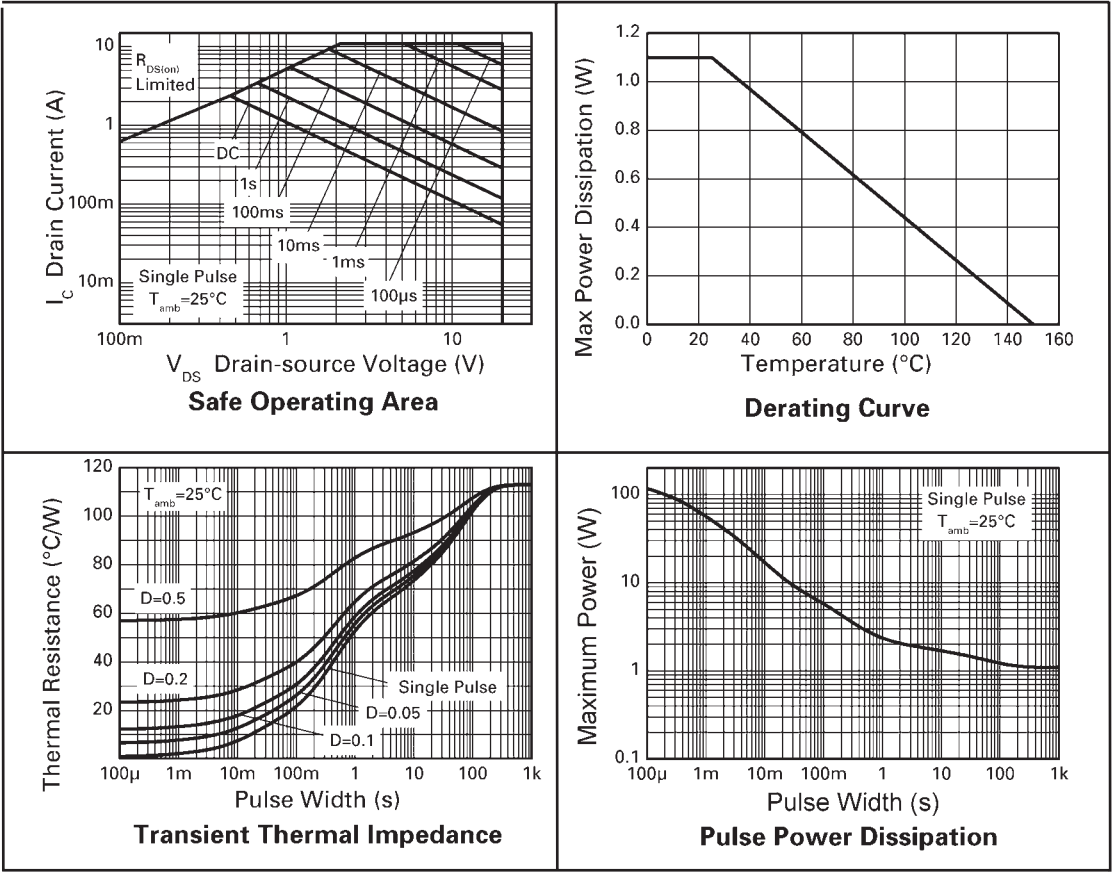
(a) For a device surface mounted on 25mm x 25mm FR4 PCB with high coverage of single sided 1oz copper, in still air conditions

(b) For a device surface mounted on FR4 PCB measured at  $t \leq 10$  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



# ZXMN2A01E6

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

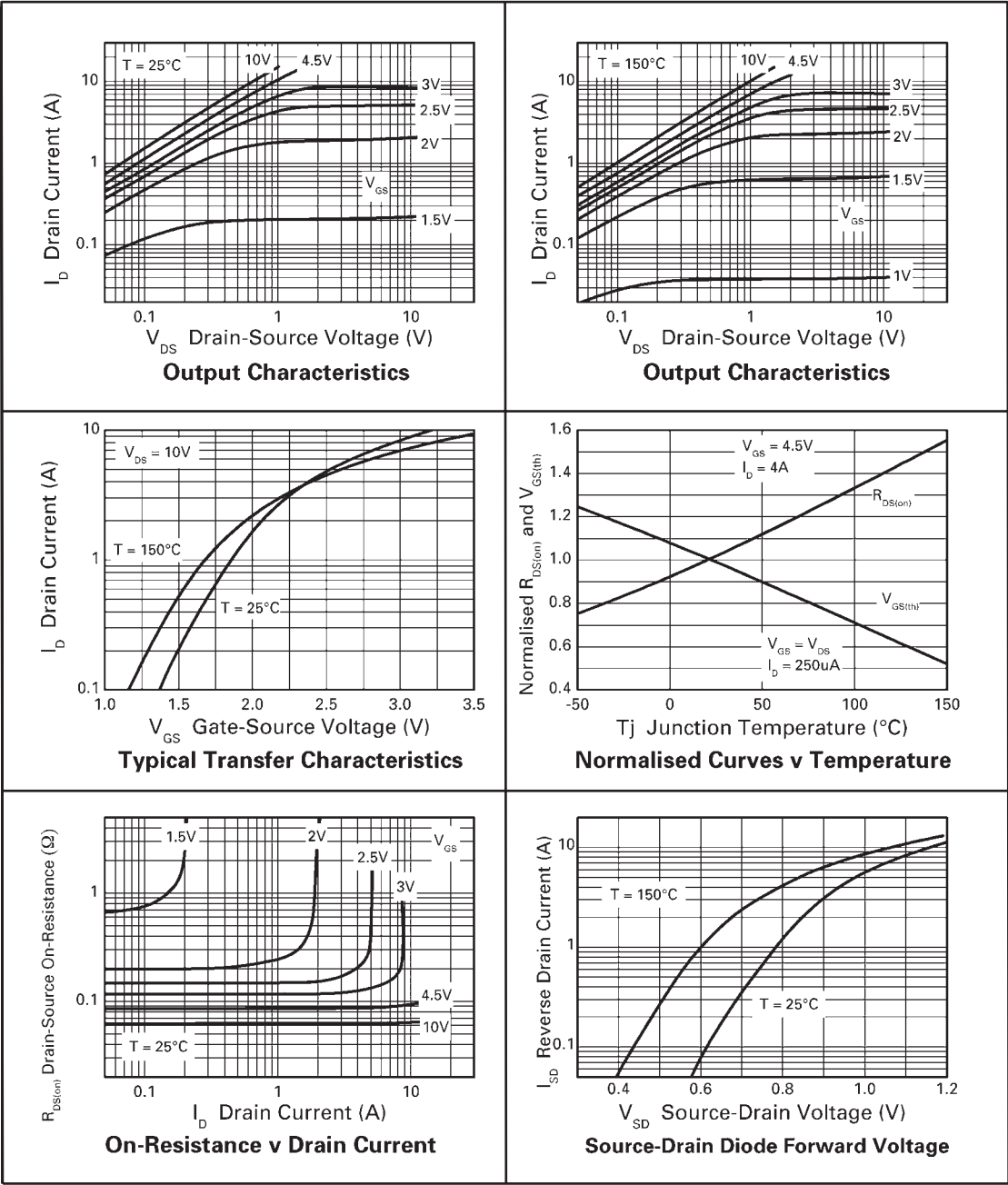
| PARAMETER                                   | SYMBOL               | MIN. | TYP. | MAX.          | UNIT   | CONDITIONS.                                                                              |
|---------------------------------------------|----------------------|------|------|---------------|--------|------------------------------------------------------------------------------------------|
| STATIC                                      |                      |      |      |               |        |                                                                                          |
| Drain-Source Breakdown Voltage              | V <sub>(BR)DSS</sub> | 20   |      |               | V      | I <sub>D</sub> =250μA, V <sub>GS</sub> =0V                                               |
| Zero Gate Voltage Drain Current             | I <sub>DSS</sub>     |      |      | 1             | μA     | V <sub>DS</sub> =20V, V <sub>GS</sub> =0V                                                |
| Gate-Body Leakage                           | I <sub>GSS</sub>     |      |      | 100           | nA     | V <sub>GS</sub> =±12V, V <sub>DS</sub> =0V                                               |
| Gate-Source Threshold Voltage               | V <sub>GS(th)</sub>  | 0.7  |      |               | 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>  |      |      | 0.12<br>0.225 | Ω<br>Ω | V <sub>GS</sub> =4.5V, I <sub>D</sub> =4A<br>V <sub>GS</sub> =2.5V, I <sub>D</sub> =1.5A |
| Forward Transconductance (1)(3)             | g <sub>fs</sub>      |      | 6.1  |               | S      | V <sub>DS</sub> =10V,I <sub>D</sub> =4A                                                  |
| DYNAMIC (3)                                 |                      |      |      |               |        |                                                                                          |
| Input Capacitance                           | C <sub>iss</sub>     |      | 303  |               | pF     | V <sub>DS</sub> =15 V, V <sub>GS</sub> =0V,<br>f=1MHz                                    |
| Output Capacitance                          | C <sub>oss</sub>     |      | 59   |               | pF     |                                                                                          |
| Reverse Transfer Capacitance                | C <sub>rss</sub>     |      | 30   |               | pF     |                                                                                          |
| SWITCHING(2) (3)                            |                      |      |      |               |        |                                                                                          |
| Turn-On Delay Time                          | t <sub>d(on)</sub>   |      | 2.49 |               | ns     | V <sub>DD</sub> =10V, I <sub>D</sub> =4A<br>R <sub>G</sub> =6.0Ω, V <sub>GS</sub> =5V    |
| Rise Time                                   | t <sub>r</sub>       |      | 5.21 |               | ns     |                                                                                          |
| Turn-Off Delay Time                         | t <sub>d(off)</sub>  |      | 7.47 |               | ns     |                                                                                          |
| Fall Time                                   | t <sub>f</sub>       |      | 4.62 |               | ns     |                                                                                          |
| Total Gate Charge                           | Q <sub>g</sub>       |      | 3.0  |               | nC     | V <sub>DS</sub> =10V,V <sub>GS</sub> =4.5V,<br>I <sub>D</sub> =4A                        |
| Gate-Source Charge                          | Q <sub>gs</sub>      |      | 0.8  |               | nC     |                                                                                          |
| Gate-Drain Charge                           | Q <sub>gd</sub>      |      | 1.0  |               | nC     |                                                                                          |
| SOURCE-DRAIN DIODE                          |                      |      |      |               |        |                                                                                          |
| Diode Forward Voltage (1)                   | V <sub>SD</sub>      |      | 0.9  | 0.95          | V      | T <sub>J</sub> =25°C, I <sub>S</sub> =3.2A,<br>V <sub>GS</sub> =0V                       |
| Reverse Recovery Time (3)                   | t <sub>rr</sub>      |      | 23   |               | ns     | T <sub>J</sub> =25°C, I <sub>F</sub> = 4A,<br>di/dt= 100A/μs                             |
| Reverse Recovery Charge (3)                 | Q <sub>rr</sub>      |      | 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.

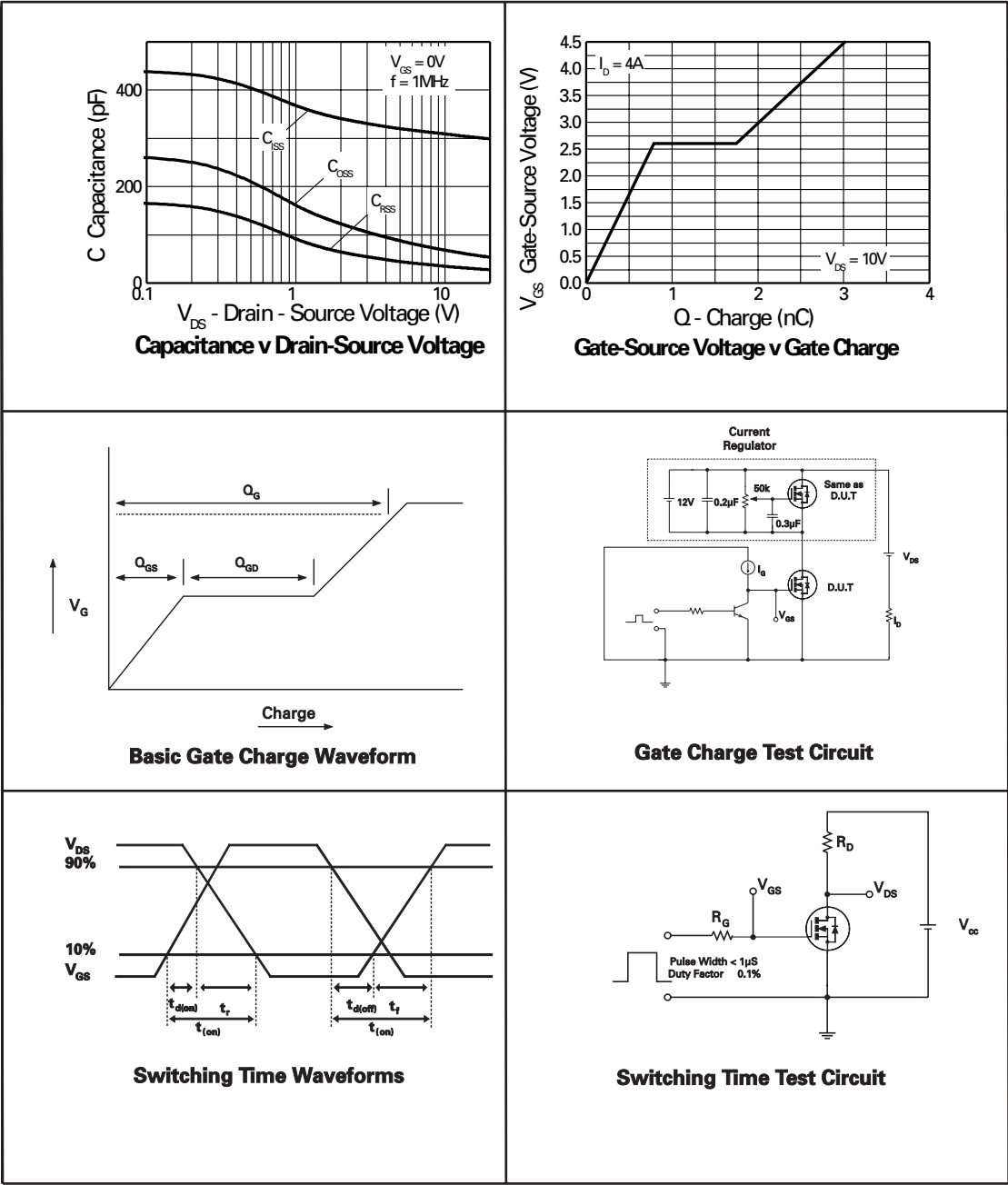
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TYPICAL CHARACTERISTICS



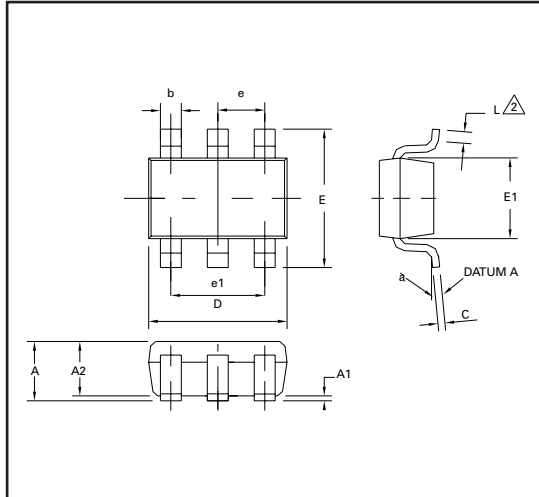
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## TYPICAL CHARACTERISTICS

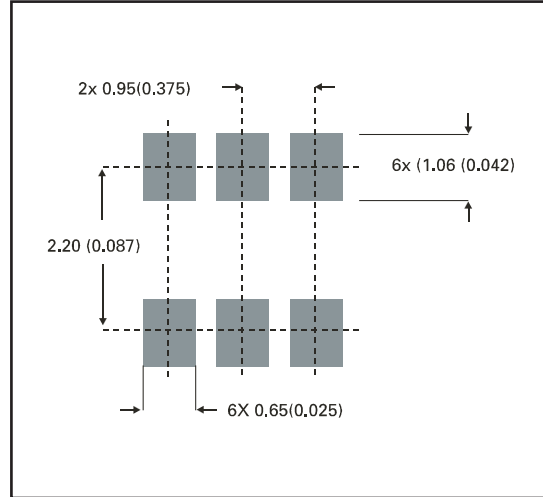


# ZXMN2A01E6

## PACKAGE OUTLINE



## PAD LAYOUT DETAILS



CONTROLLING DIMENSIONS IN MILLIMETERS APPROX CONVERSIONS INCHES

## PACKAGE DIMENSIONS

| DIM | Millimeters |      | Inches |       | DIM | Millimeters |      | Inches    |       |
|-----|-------------|------|--------|-------|-----|-------------|------|-----------|-------|
|     | Min         | Max  | Min    | Max   |     | Min         | Max  | Min       | Max   |
| A   | 0.90        | 1.45 | 0.35   | 0.057 | E   | 2.60        | 3.00 | 0.102     | 0.118 |
| A1  | 0.00        | 0.15 | 0      | 0.006 | E1  | 1.50        | 1.75 | 0.059     | 0.069 |
| A2  | 0.90        | 1.30 | 0.035  | 0.051 | L   | 0.10        | 0.60 | 0.004     | 0.002 |
| b   | 0.35        | 0.50 | 0.014  | 0.019 | e   | 0.95 REF    |      | 0.037 REF |       |
| C   | 0.09        | 0.20 | 0.0035 | 0.008 | e1  | 1.90 REF    |      | 0.074 REF |       |
| D   | 2.80        | 3.00 | 0.110  | 0.118 | L   | 0°          | 10°  | 0°        | 10°   |

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