

# ZXMN3A01E6

## 30V N-CANNEL ENHANCEMENT MODE MOSFET

### SUMMARY

$V_{(BR)DSS}=30V$ ;  $R_{DS(ON)}=0.12\Omega$   $I_D=3.0A$

### 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.

### FEATURES

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

### APPLICATIONS

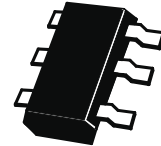
- DC - DC Converters
- Power Management Functions
- Disconnect switches
- Motor control

### ORDERING INFORMATION

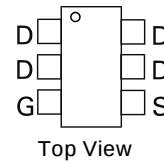
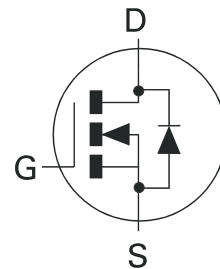
| DEVICE       | REEL SIZE | TAPE WIDTH | QUANTITY PER REEL |
|--------------|-----------|------------|-------------------|
| ZXMN3A01E6TA | 7"        | 8mm        | 3000 units        |
| ZXMN3A01E6TC | 13"       | 8mm        | 10000 units       |

### DEVICE MARKING

- 3A1



SOT23-6



# ZXMN3A01E6

## ABSOLUTE MAXIMUM RATINGS.

| PARAMETER                                                                                                                                           | SYMBOL         | LIMIT             | UNIT                 |
|-----------------------------------------------------------------------------------------------------------------------------------------------------|----------------|-------------------|----------------------|
| Drain-Source Voltage                                                                                                                                | $V_{DSS}$      | 30                | V                    |
| Gate Source Voltage                                                                                                                                 | $V_{GS}$       | 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) | $I_D$          | 3.0<br>2.4<br>2.4 | A                    |
| Pulsed Drain Current (c)                                                                                                                            | $I_{DM}$       | 10                | A                    |
| Continuous Source Current (Body Diode) (b)                                                                                                          | $I_S$          | 2.4               | A                    |
| Pulsed Source Current (Body Diode)(c)                                                                                                               | $I_{SM}$       | 10                | 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) | $R_{\theta JA}$ | 73    | $^{\circ}C/W$ |

### 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.

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## ELECTRICAL CHARACTERISTICS (at T<sub>A</sub> = 25°C unless otherwise stated).

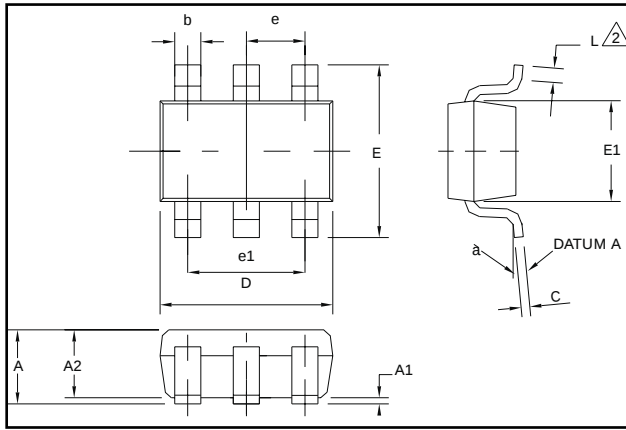
| PARAMETER                                   | SYMBOL               | MIN. | TYP.  | MAX.         | UNIT   | CONDITIONS.                                                                               |
|---------------------------------------------|----------------------|------|-------|--------------|--------|-------------------------------------------------------------------------------------------|
| 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    |       |              | 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>  |      | 0.106 | 0.12<br>0.18 | Ω<br>Ω | V <sub>GS</sub> =10V, I <sub>D</sub> =2.5A<br>V <sub>GS</sub> =4.5V, I <sub>D</sub> =2.0A |
| Forward Transconductance (1)(3)             | g <sub>fs</sub>      |      | 3.5   |              | S      | V <sub>DS</sub> =4.5V,I <sub>D</sub> =2.5A                                                |
| DYNAMIC (3)                                 |                      |      |       |              |        |                                                                                           |
| Input Capacitance                           | C <sub>iss</sub>     |      | 190   |              | pF     | V <sub>DS</sub> =25 V, V <sub>GS</sub> =0V,<br>f=1MHz                                     |
| Output Capacitance                          | C <sub>oss</sub>     |      | 38    |              | pF     |                                                                                           |
| Reverse Transfer Capacitance                | C <sub>rss</sub>     |      | 20    |              | pF     |                                                                                           |
| SWITCHING(2) (3)                            |                      |      |       |              |        |                                                                                           |
| Turn-On Delay Time                          | t <sub>d(on)</sub>   |      | 1.7   |              | ns     | V <sub>DD</sub> =15V, I <sub>D</sub> =2.5A<br>R <sub>G</sub> =6.0Ω, V <sub>GS</sub> =10V  |
| Rise Time                                   | t <sub>r</sub>       |      | 2.3   |              | ns     |                                                                                           |
| Turn-Off Delay Time                         | t <sub>d(off)</sub>  |      | 6.6   |              | ns     |                                                                                           |
| Fall Time                                   | t <sub>f</sub>       |      | 2.9   |              | ns     |                                                                                           |
| Total Gate Charge                           | Q <sub>g</sub>       |      | 2.3   |              | nC     | V <sub>DS</sub> =15V,V <sub>GS</sub> =5V,<br>I <sub>D</sub> =2.5A                         |
| Total Gate Charge                           | Q <sub>g</sub>       |      | 3.9   |              | nC     | V <sub>DS</sub> =15V,V <sub>GS</sub> =10V,<br>I <sub>D</sub> =2.5A                        |
| Gate-Source Charge                          | Q <sub>gs</sub>      |      | 0.6   |              | nC     |                                                                                           |
| Gate-Drain Charge                           | Q <sub>gd</sub>      |      | 0.9   |              | nC     |                                                                                           |
| SOURCE-DRAIN DIODE                          |                      |      |       |              |        |                                                                                           |
| Diode Forward Voltage (1)                   | V <sub>SD</sub>      |      | 0.84  | 0.95         | V      | T <sub>J</sub> =25°C, I <sub>S</sub> =1.7A,<br>V <sub>GS</sub> =0V                        |
| Reverse Recovery Time (3)                   | t <sub>rr</sub>      |      | 17.7  |              | ns     | T <sub>J</sub> =25°C, I <sub>F</sub> =2.5A,<br>di/dt= 100A/μs                             |
| Reverse Recovery Charge (3)                 | Q <sub>rr</sub>      |      | 13.0  |              | nC     |                                                                                           |

### NOTES

- (1) Measured under pulsed conditions. Width ≤300μs. Duty cycle ≤ 2% .
- (2) Switching characteristics are independent of operating junction temperature.
- (3) For design aid only, not subject to production testing.

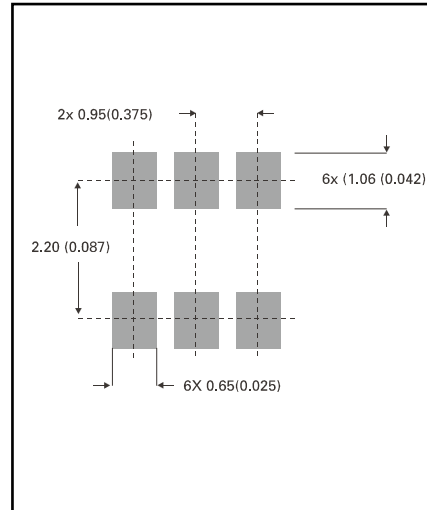
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## PACKAGE DIMENSIONS



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

## PAD LAYOUT DETAILS



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