

# ZXMP2120E5

---

## 200V P-CHANNEL ENHANCEMENT MODE MOSFET

---

### SUMMARY

$V_{(BR)DSS} = -200V$ ;  $R_{DS(ON)} = 28\Omega$ ;  $I_D = -122mA$

### DESCRIPTION

This 200V enhancement mode P-channel MOSFET provides users with a competitive specification offering efficient power handling capability, high impedance and is free from thermal runaway and thermally induced secondary breakdown. Applications benefiting from this device include a variety of Telecom and general high voltage circuits.

A 4 pin SOT223 version is also available (ZXMP2120G4).

### FEATURES

- High voltage
- Low on-resistance
- Fast switching speed
- Low gate drive
- Low threshold
- SOT23-5 package variant engineered to increase spacing between high voltage pins.

### APPLICATIONS

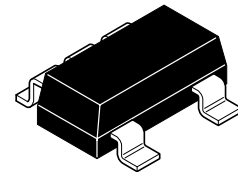
- Active clamping of primary side MOSFETs in 48 volt DC-DC converters

### ORDERING INFORMATION

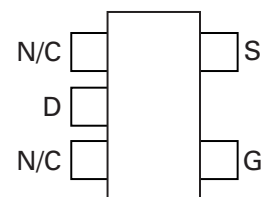
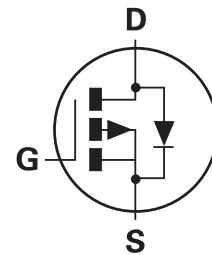
| DEVICE       | REEL SIZE (inches) | TAPE WIDTH (mm) | QUANTITY PER REEL |
|--------------|--------------------|-----------------|-------------------|
| ZXMP2120E5TA | 7                  | 8mm embossed    | 3,000 units       |

### DEVICE MARKING

- P120



SOT23-5



PINOUT - TOP VIEW

# ZXMP2120E5

## ABSOLUTE MAXIMUM RATINGS

| PARAMETER  | SYMBOL         | LIMIT       | UNIT            |
|--|----------------|-------------|-----------------|
| Drain-Source Voltage   | $V_{DSS}$      | -200        | V               |
| Gate Source Voltage  | $V_{GS}$       | $\pm 20$    | V               |
| Continuous Drain Current ( $V_{GS}=10V$ ; $T_{amb}=25^{\circ}C$ ) <sup>(a)</sup> | $I_D$          | -122        | mA              |
| Pulsed Drain Current (c)   | $I_{DM}$       | -0.7        | A               |
| Pulsed Source Current (Body Diode) <sup>(c)</sup>                                | $I_{SM}$       | -0.7        | A               |
| Power Dissipation at $T_{amb}=25^{\circ}C$ <sup>(a)</sup>                        | $P_D$          | 0.75        | W               |
| Linear Derating Factor   |                | 6           | 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 <sup>(a)</sup> | $R_{\theta JA}$ | 167   | $^{\circ}C/W$ |

### 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 - pulse width limited by maximum junction temperature. Refer to Transient Thermal Impedance graph.

# ZXMP2120E5

## 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                         | $V_{(BR)DSS}$ | -200 |      |             | V                              | $I_D = -1\text{mA}$ , $V_{GS} = 0\text{V}$  |
| Gate-Source Threshold Voltage                          | $V_{GS(th)}$  | -1.5 |      | -3.5        | V                              | $I_D = -1\text{mA}$ , $V_{DS} = V_{GS}$   |
| Gate-Body Leakage                                      | $I_{GSS}$     |      |      | 20          | nA                             | $V_{GS} = \pm 20\text{V}$ , $V_{DS} = 0\text{V}$  |
| Zero Gate Voltage Drain Current                        | $I_{DSS}$     |      |      | -10<br>-100 | $\mu\text{A}$<br>$\mu\text{A}$ | $V_{DS} = -200\text{V}$ , $V_{GS} = 0$<br>$V_{DS} = -160\text{V}$ , $V_{GS} = 0\text{V}$ ,<br>$T = 125^{\circ}\text{C}$ (2) |
| On-State Drain Current <sup>(1)</sup>                  | $I_{D(on)}$   | -300 |      |             | mA                             | $V_{DS} = -25\text{V}$ , $V_{GS} = -10\text{V}$   |
| Static Drain-Source On-State Resistance <sup>(1)</sup> | $R_{DS(on)}$  |      |      | 28          | $\Omega$                       | $V_{GS} = -10\text{V}$ , $I_D = -150\text{mA}$  |
| Forward Transconductance <sup>(1)(2)</sup>             | $g_{fs}$      | 50   |      |             | mS                             | $V_{DS} = -25\text{V}$ , $I_D = -150\text{mA}$  |
| <b>DYNAMIC</b>   |               |      |      |             |                                |   |
| Input Capacitance <sup>(2)</sup>                       | $C_{iss}$     |      |      | 100         | pF                             | $V_{DS} = -25\text{V}$ , $V_{GS} = 0\text{V}$ ,<br>$f = 1\text{MHz}$  |
| Output Capacitance <sup>(2)</sup>                      | $C_{oss}$     |      |      | 25          | pF                             |   |
| Reverse Transfer Capacitance <sup>(2)</sup>            | $C_{rss}$     |      |      | 7           | pF                             |   |
| <b>SWITCHING</b>                                       |               |      |      |             |                                |   |
| Turn-On Delay Time <sup>(2)(3)</sup>                   | $t_{d(on)}$   |      |      | 7           | ns                             | $V_{DD} = -25\text{V}$ , $I_D = -150\text{mA}$  |
| Rise Time <sup>(2)(3)</sup>                            | $t_r$         |      |      | 15          | ns                             |   |
| Turn-Off Delay Time <sup>(2)(3)</sup>                  | $t_{d(off)}$  |      |      | 12          | ns                             |   |
| Fall Time <sup>(2)(3)</sup>                            | $t_f$         |      |      | 15          | ns                             |   |

### NOTES:

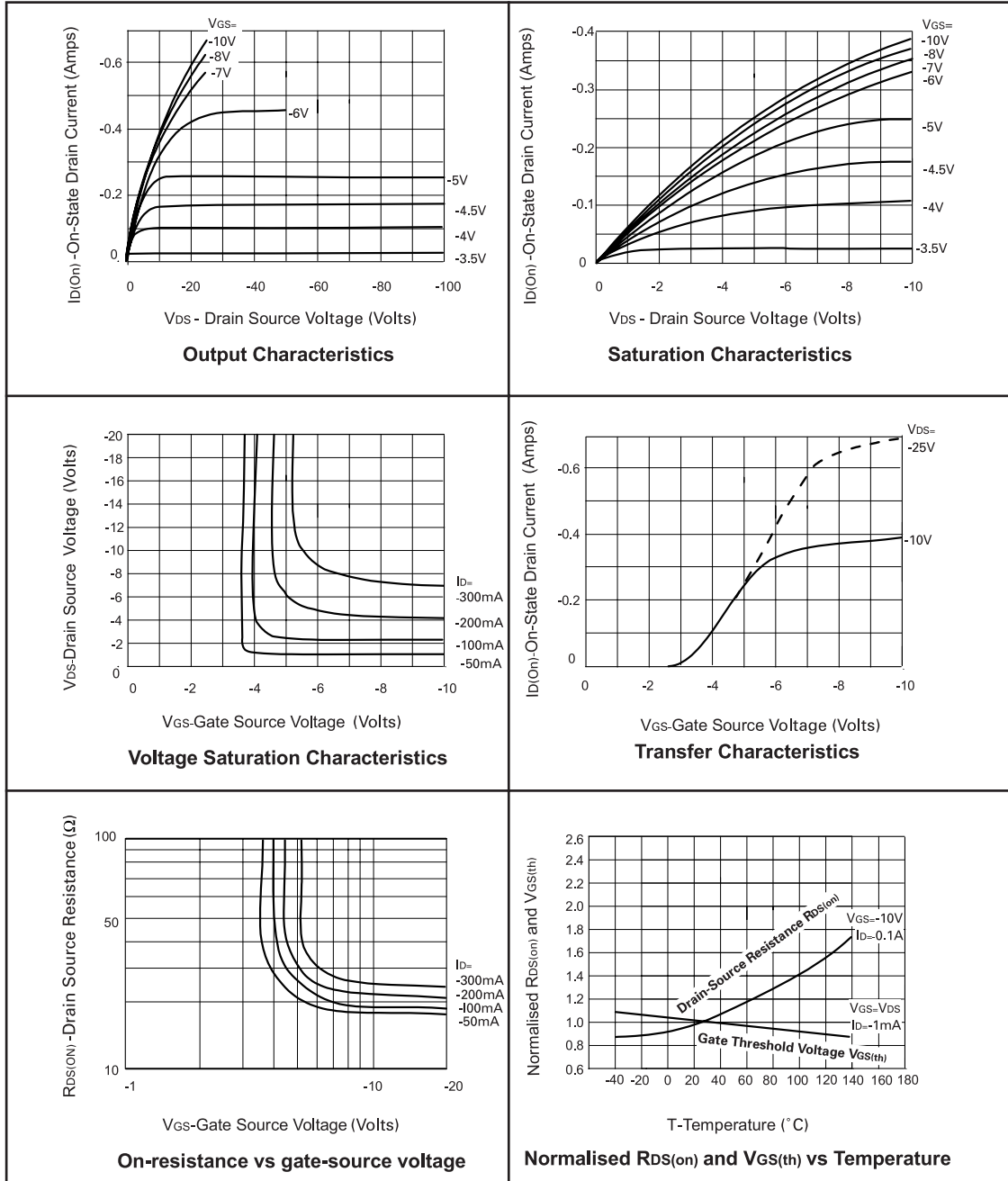
(1) Measured under pulsed conditions. Width=300 $\mu\text{s}$ . Duty cycle  $\leq 2\%$ .

(2) Sample test.

(3) Switching times measured with 50 $\Omega$  source impedance and <5ns rise time on a pulse generator.

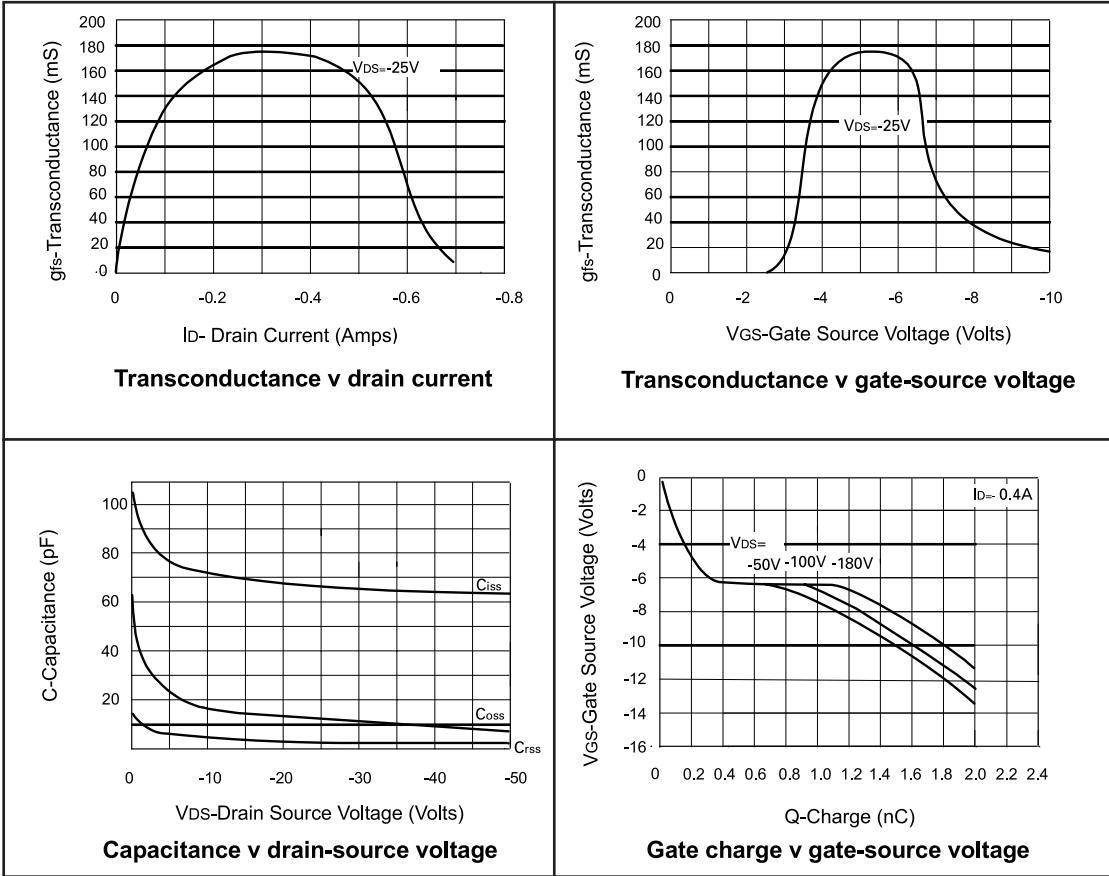
# ZXMP2120E5

## TYPICAL CHARACTERISTICS



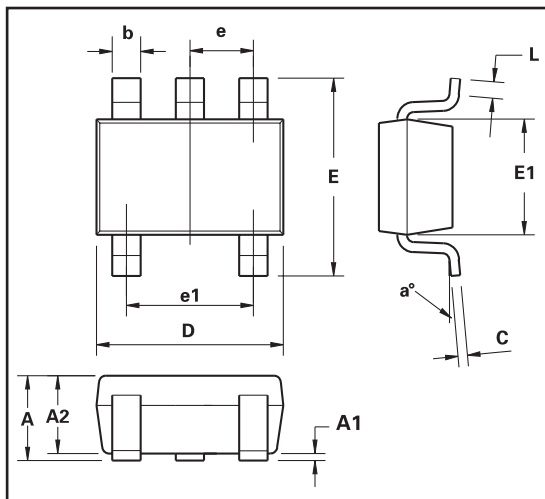
# ZXMP2120E5

## CHARACTERISTICS

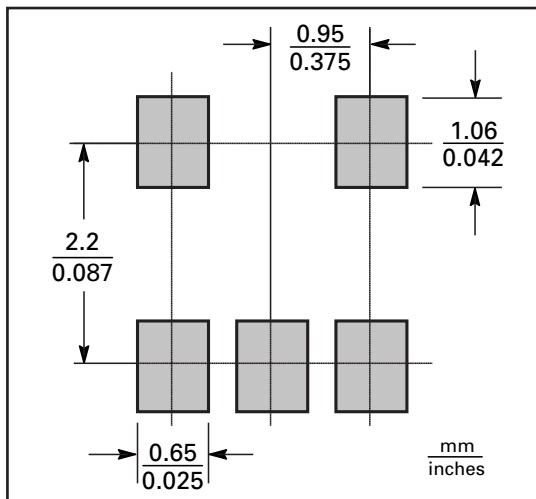


# ZXMP2120E5

## PACKAGE OUTLINE



## PAD LAYOUT DETAILS



Controlling dimensions are in millimeters. Approximate conversions are given in inches

## PACKAGE DIMENSIONS

| DIM | Millimeters |      | Inches |        |
|-----|-------------|------|--------|--------|
|     | MIN.        | MAX. | MIN.   | MAX.   |
| A   | 0.90        | 1.45 | 0.0354 | 0.0570 |
| A1  | -           | 0.15 | -      | 0.0059 |
| A2  | 0.90        | 1.30 | 0.0354 | 0.0511 |
| b   | 0.20        | 0.50 | 0.0078 | 0.0196 |
| C   | 0.09        | 0.26 | 0.0035 | 0.0102 |
| D   | 2.70        | 3.10 | 0.1062 | 0.1220 |

| DIM | Millimeters |      | Inches     |        |
|-----|-------------|------|------------|--------|
|     | MIN.        | MAX. | MIN.       | MAX.   |
| E   | 2.20        | 3.20 | 0.0866     | 0.1181 |
| E1  | 1.30        | 1.80 | 0.0511     | 0.0708 |
| e   | 0.95 REF    |      | 0.0374 REF |        |
| e1  | 1.90 REF    |      | 0.0748 REF |        |
| L   | 0.10        | 0.60 | 0.0039     | 0.0236 |
| a   | 0°          | 30°  | 0°         | 30°    |

© Zetex Semiconductors plc 2006

### Europe

Zetex GmbH  
Kustermann-park  
Balanstraße 59  
D-81541 München  
Germany  
Telefon: (49) 89 45 49 49 0  
Fax: (49) 89 45 49 49 49  
[europe.sales@zetex.com](mailto:europe.sales@zetex.com)

### Americas

Zetex Inc  
700 Veterans Memorial Hwy  
Hauppauge, NY 11788  
USA  
Telephone: (1) 631 360 2222  
Fax: (1) 631 360 8222  
[usa.sales@zetex.com](mailto:usa.sales@zetex.com)

### Asia Pacific

Zetex (Asia) Ltd  
3701-04 Metroplaza Tower 1  
Hing Fong Road, Kwai Fong  
Hong Kong  
Telephone: (852) 26100 611  
Fax: (852) 24250 494  
[asia.sales@zetex.com](mailto:asia.sales@zetex.com)

### Corporate Headquarters

Zetex Semiconductors plc  
Zetex Technology Park  
Chadderton, Oldham, OL9 9LL  
United Kingdom  
Telephone (44) 161 622 4444  
Fax: (44) 161 622 4446  
[hq@zetex.com](mailto:hq@zetex.com)

These offices are supported by agents and distributors in major countries world-wide.

This publication is issued to provide outline information only which (unless agreed by the Company in writing) may not be used, applied or reproduced for any purpose or form part of any order or contract or be regarded as a representation relating to the products or services concerned. The Company reserves the right to alter without notice the specification, design, price or conditions of supply of any product or service.

For the latest product information, log on to [www.zetex.com](http://www.zetex.com)



ISSUE 2 - SEPTEMBER 2006