ZXMP2120FF
200V SOT23F P-channel enhancement mode MOSFET

Summary

<table>
<thead>
<tr>
<th>$V_{(BR)DSS}$</th>
<th>$R_{DS(on)}$ (Ω)</th>
<th>$I_D$ (mA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>-200</td>
<td>28 @ $V_{GS}$ = -10V</td>
<td>-137</td>
</tr>
</tbody>
</table>

Description

This 200V enhancement mode P-channel MOSFET provides users with a competitive specification offering efficient power handling capability, high impedance and freedom from thermal runaway and thermally induced secondary breakdown.

Applications benefiting from this device include a variety of telecom and general high voltage circuits.

Features

• High voltage
• Low on-resistance
• Fast switching speed
• Low gate drive
• Low threshold
• SOT23 FLAT package

Applications

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

Ordering information

<table>
<thead>
<tr>
<th>Device</th>
<th>Reel size (inches)</th>
<th>Tape width (mm)</th>
<th>Quantity per reel</th>
</tr>
</thead>
<tbody>
<tr>
<td>ZXMP2120FFTA</td>
<td>7</td>
<td>8</td>
<td>3,000</td>
</tr>
</tbody>
</table>

Device marking

1C4
Absolute maximum ratings

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Limit</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drain-source voltage</td>
<td>V_{DSS}</td>
<td>-200</td>
<td>V</td>
</tr>
<tr>
<td>Gate-source voltage</td>
<td>V_{GS}</td>
<td>± 20</td>
<td>V</td>
</tr>
<tr>
<td>Continuous drain current @ V_{GS}= 10V; T_{amb}=25°C(a)</td>
<td>I_{D}</td>
<td>-137</td>
<td>mA</td>
</tr>
<tr>
<td>Pulsed drain current(c)</td>
<td>I_{DM}</td>
<td>-0.8</td>
<td>A</td>
</tr>
<tr>
<td>Pulsed source current (body diode)(c)</td>
<td>I_{SM}</td>
<td>-0.8</td>
<td>A</td>
</tr>
<tr>
<td>Power dissipation at T_{amb}=25°C(a)</td>
<td>P_{D}</td>
<td>1</td>
<td>W</td>
</tr>
<tr>
<td>Linear derating factor</td>
<td></td>
<td>8</td>
<td>mW/°C</td>
</tr>
<tr>
<td>Power dissipation at T_{amb}=25°C(b)</td>
<td>P_{D}</td>
<td>1.5</td>
<td>W</td>
</tr>
<tr>
<td>Linear derating factor</td>
<td></td>
<td>12.3</td>
<td>mW/°C</td>
</tr>
<tr>
<td>Operating and storage temperature range</td>
<td>T_{j}, T_{stg}</td>
<td>-55 to +150</td>
<td>°C</td>
</tr>
</tbody>
</table>

Thermal resistance

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Limit</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Junction to ambient(a)</td>
<td>R_{OJA}</td>
<td>125</td>
<td>°C/W</td>
</tr>
<tr>
<td>Junction to ambient(b)</td>
<td>R_{OJA}</td>
<td>81</td>
<td>°C/W</td>
</tr>
</tbody>
</table>

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 ≤ 5 sec.
(c) Repetitive rating - 25mm x 25mm FR4 PCB, D=0.02, pulse width 300μs - pulse width limited by maximum junction temperature.
Thermal characteristics

- Drain Current (A)
- Drain-Source Voltage (V)

Safe Operating Area

Derating Curve

- Max Power Dissipation (W)
- Temperature (°C)

Transient Thermal Impedance

- Thermal Resistance (°C/W)
- Pulse Width (s)

Maximum Power (W)

- Pulse Power Dissipation
- Temperature (°C)
- Pulse Width (s)
## Electrical characteristics (at $T_{amb} = 25°C$ unless otherwise stated)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Min.</th>
<th>Max.</th>
<th>Unit</th>
<th>Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Static</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drain-source breakdown voltage</td>
<td>$V_{(BR)DSS}$</td>
<td>-200</td>
<td></td>
<td>V</td>
<td>$I_D = 1,mA, ; V_{GS}=0,V$</td>
</tr>
<tr>
<td>Zero gate voltage drain current</td>
<td>$I_{DSS}$</td>
<td>-10</td>
<td>-100</td>
<td>$\mu,A$</td>
<td>$V_{DS} = -200,V, ; V_{GS}=0,V$</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$V_{DS} = -160,V, ; V_{GS}=0,V, ; T=125°C(‡)$</td>
</tr>
<tr>
<td>Gate-body leakage</td>
<td>$I_{GSS}$</td>
<td>20</td>
<td></td>
<td>nA</td>
<td>$V_{GS}=\pm20,V, ; V_{DS}=0,V$</td>
</tr>
<tr>
<td>Gate-source threshold voltage</td>
<td>$V_{GS(th)}$</td>
<td>-1.5</td>
<td>-3.5</td>
<td>V</td>
<td>$I_D = 250,\mu,A, ; V_{DS}=V_{GS}$</td>
</tr>
<tr>
<td>Static drain-source on-state resistance</td>
<td>$R_{DS(on)}$</td>
<td>28</td>
<td></td>
<td>$\Omega$</td>
<td>$V_{GS} = -10,V, ; I_D = -150,mA$</td>
</tr>
<tr>
<td>On-state drain current</td>
<td>$I_{D(on)}$</td>
<td>-300</td>
<td></td>
<td>mA</td>
<td>$V_{DS} = -25,V, ; V_{GS}=-10,V$</td>
</tr>
<tr>
<td>Forward transconductance</td>
<td>$g_{fs}$</td>
<td>50</td>
<td></td>
<td>mS</td>
<td>$V_{DS} = -25,V, ; I_D = -150,mA$</td>
</tr>
<tr>
<td><strong>Dynamic(‡)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Input capacitance</td>
<td>$C_{iss}$</td>
<td>100</td>
<td></td>
<td>pF</td>
<td>$V_{DS} = -25,V, ; V_{GS}=0,V$</td>
</tr>
<tr>
<td>Output capacitance</td>
<td>$C_{oss}$</td>
<td>25</td>
<td></td>
<td>pF</td>
<td>$f=1,MHz$</td>
</tr>
<tr>
<td>Reverse transfer capacitance</td>
<td>$C_{rss}$</td>
<td>7</td>
<td></td>
<td>pF</td>
<td></td>
</tr>
<tr>
<td><strong>Switching (†) (‡)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Turn-on-delay time</td>
<td>$t_{d(on)}$</td>
<td>7</td>
<td></td>
<td>ns</td>
<td>$V_{DD} = -25,V, ; V_{GS}=-10,V$</td>
</tr>
<tr>
<td>Rise time</td>
<td>$t_r$</td>
<td>15</td>
<td></td>
<td>ns</td>
<td>$I_D = -150,mA$</td>
</tr>
<tr>
<td>Turn-off delay time</td>
<td>$t_{d(off)}$</td>
<td>12</td>
<td></td>
<td>ns</td>
<td>$R_{SOURCE} \approx 50,\Omega$</td>
</tr>
<tr>
<td>Fall time</td>
<td>$t_f$</td>
<td>15</td>
<td></td>
<td>ns</td>
<td></td>
</tr>
</tbody>
</table>

**NOTES:**

(†) Measured under pulsed conditions. Pulse width $\leq 300\,\mu\,s$; duty cycle $\leq 2\%$.

(‡) Switching characteristics are independent of operating junction temperature.

(‡) For design aid only, not subject to production testing.
Typical characteristics

Output Characteristics

Saturation Characteristics

Voltage Saturation Characteristics

Transfer Characteristics

On-resistance vs gate-source voltage

Normalized RDS(on) and VGS(th) vs Temperature
Typical characteristics

Transconductance v drain current

Transconductance v gate-source voltage

Capacitance v drain-source voltage

Gate charge v gate-source voltage
Typical characteristics

Basic gate charge waveform

Gate charge test circuit

Switching time waveforms

Switching time test circuit

Current regulator

D.U.T

Same as D.U.T

Vgs

Vcc

Ig

Vgs

Vs

RD

RG

Pulse width < 1μs
Duty factor 0.1%
Intentionally left blank
## Package outline - SOT23F

<table>
<thead>
<tr>
<th>Dim.</th>
<th>Millimeters</th>
<th>Inches</th>
<th>Dim.</th>
<th>Millimeters</th>
<th>Inches</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>0.80 1.00</td>
<td>0.0315 0.0394</td>
<td>E</td>
<td>2.30 2.50</td>
<td>0.0906 0.0984</td>
</tr>
<tr>
<td>A1</td>
<td>0.00 0.10</td>
<td>0.00 0.0043</td>
<td>E1</td>
<td>1.50 1.70</td>
<td>0.0590 0.0669</td>
</tr>
<tr>
<td>b</td>
<td>0.35 0.45</td>
<td>0.0153 0.0161</td>
<td>E2</td>
<td>1.10 1.26</td>
<td>0.0433 0.0496</td>
</tr>
<tr>
<td>c</td>
<td>0.10 0.20</td>
<td>0.0043 0.0079</td>
<td>L</td>
<td>0.48 0.68</td>
<td>0.0189 0.0268</td>
</tr>
<tr>
<td>D</td>
<td>2.80 3.00</td>
<td>0.1102 0.1181</td>
<td>L1</td>
<td>0.30 0.50</td>
<td>0.0153 0.0161</td>
</tr>
<tr>
<td>e</td>
<td>0.95 ref</td>
<td>0.0374 ref</td>
<td>R</td>
<td>0.05 0.15</td>
<td>0.0019 0.0059</td>
</tr>
<tr>
<td>e1</td>
<td>1.80 2.00</td>
<td>0.0709 0.0787</td>
<td>O</td>
<td>0° 12°</td>
<td>0° 12°</td>
</tr>
</tbody>
</table>

**Note:** Controlling dimensions are in millimeters. Approximate dimensions are provided in inches.
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Zetex sales offices

Europe
Zetex GmbH
Kustermann-park
Balanstraße 59
D-81541 München
Germany
Telephone: (49) 89 45 49 49 0
Fax: (49) 89 45 49 49 49

Americas
Zetex Inc
700 Veterans Memorial Highway
Hauppauge, NY 11788
USA
Telephone: (1) 631 360 2222
Fax: (1) 631 360 8222

europe.sales@zetex.com

Asia Pacific
Zetex (Asia Ltd)
3791-04 MetroPlaza Tower 1
Hing Fong Road, Kwai Fong
Hong Kong
Telephone: (852) 26100 611
Fax: (852) 24250 494

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

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