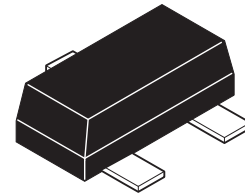


# ZXMP2120FF

## 200V SOT23F P-channel enhancement mode MOSFET

### Summary

| $V_{(BR)DSS}$ | $R_{DS(on)}$ ( $\Omega$ ) | $I_D$ (mA) |
|---------------|---------------------------|------------|
| -200          | 28 @ $V_{GS} = -10V$      | -137       |



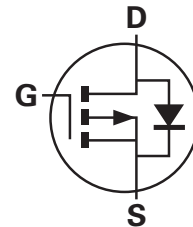
### Description

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

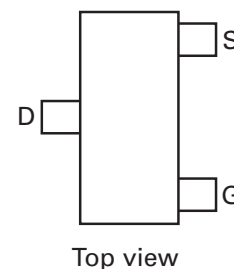


### Applications

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

### Ordering information

| Device       | Reel size (inches) | Tape width (mm) | Quantity per reel |
|--------------|--------------------|-----------------|-------------------|
| ZXMP2120FFTA | 7                  | 8               | 3,000             |



### Device marking

1C4

# ZXMP2120FF

## 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 @ $V_{GS}=10V$ ; $T_{amb}=25^{\circ}C^{(a)}$ | $I_D$          | -137        | mA              |
| Pulsed drain current <sup>(c)</sup>                                   | $I_{DM}$       | -0.8        | A               |
| Pulsed source current (body diode) <sup>(c)</sup>                     | $I_{SM}$       | -0.8        | A               |
| Power dissipation at $T_{amb}=25^{\circ}C^{(a)}$                      | $P_D$          | 1           | W               |
| Linear derating factor  |                | 8           | mW/ $^{\circ}C$ |
| Power dissipation at $T_{amb}=25^{\circ}C^{(b)}$                      | $P_D$          | 1.5         | W               |
| Linear derating factor  |                | 12.3        | mW/ $^{\circ}C$ |
| Operating and storage temperature range                               | $T_j, T_{stg}$ | -55 to +150 | $^{\circ}C$     |

## Thermal resistance

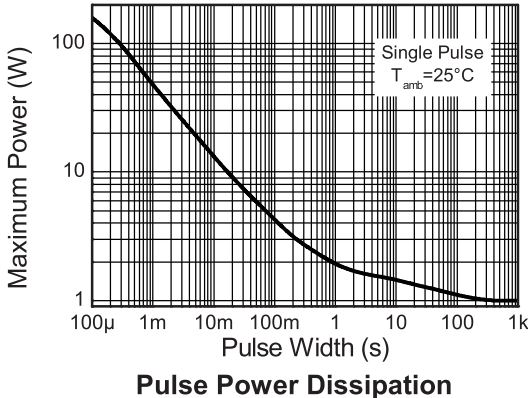
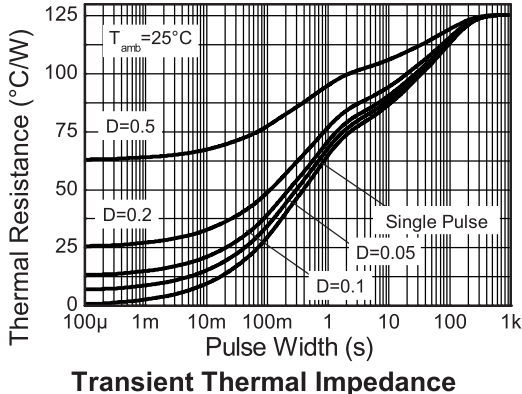
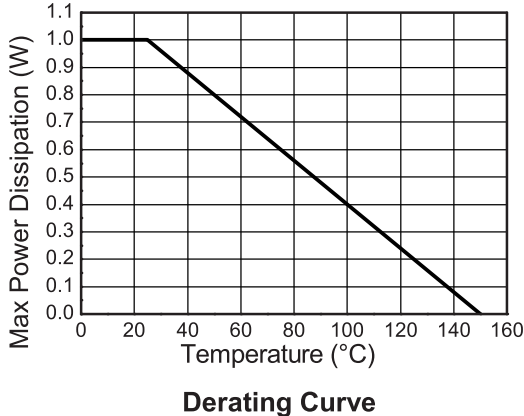
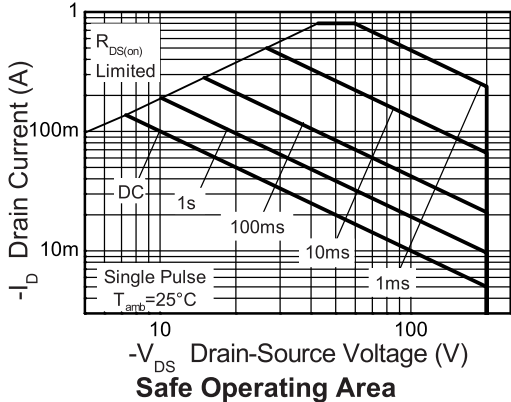
| Parameter                          | Symbol          | Limit | Unit          |
|------------------------------------|-----------------|-------|---------------|
| Junction to ambient <sup>(a)</sup> | $R_{\theta JA}$ | 125   | $^{\circ}C/W$ |
| Junction to ambient <sup>(b)</sup> | $R_{\theta JA}$ | 81    | $^{\circ}C/W$ |

### 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  $t \leq 5$  sec.
- (c) Repetitive rating - 25mm x 25mm FR4 PCB,  $D=0.02$ , pulse width 300 $\mu$ s - pulse width limited by maximum junction temperature.

# ZXMP2120FF

## Thermal characteristics



# ZXMP2120FF

## Electrical characteristics (at $T_{amb} = 25^{\circ}\text{C}$ unless otherwise stated)

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

### NOTES:

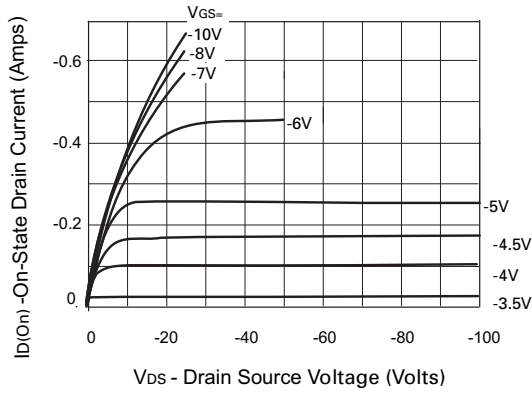
(\*) Measured under pulsed conditions. Pulse width  $\leq 300\mu\text{s}$ ; duty cycle  $\leq 2\%$ .

(\ddagger) Switching characteristics are independent of operating junction temperature.

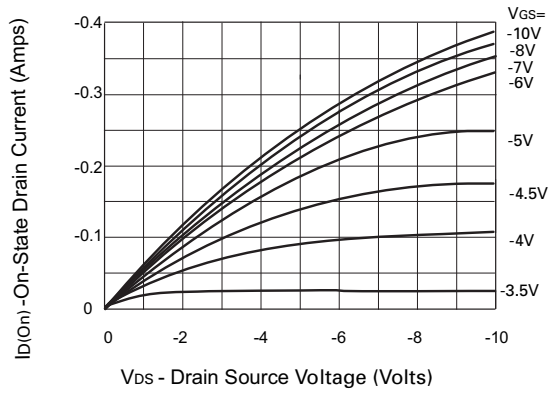
(\ddagger) For design aid only, not subject to production testing.

# ZXMP2120FF

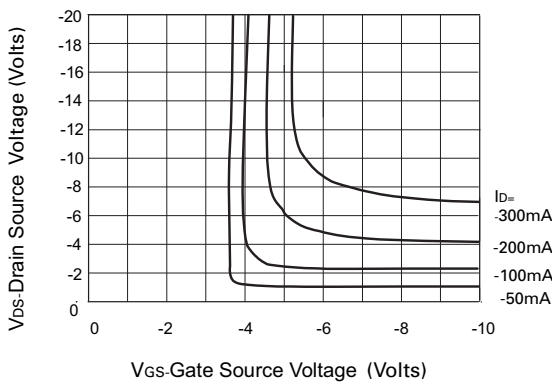
## Typical characteristics



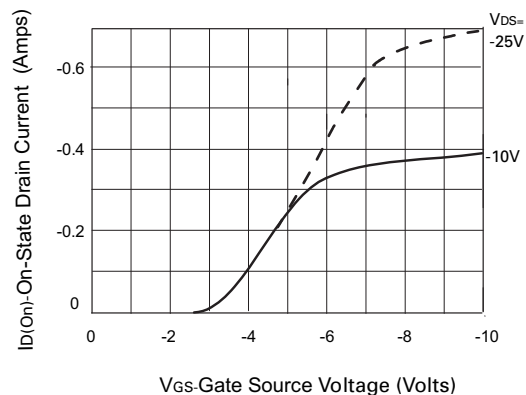
**Output Characteristics**



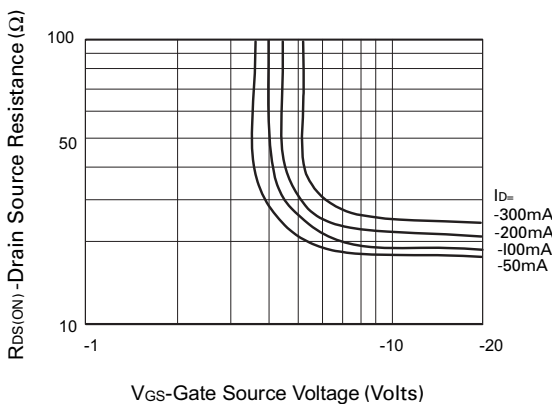
**Saturation Characteristics**



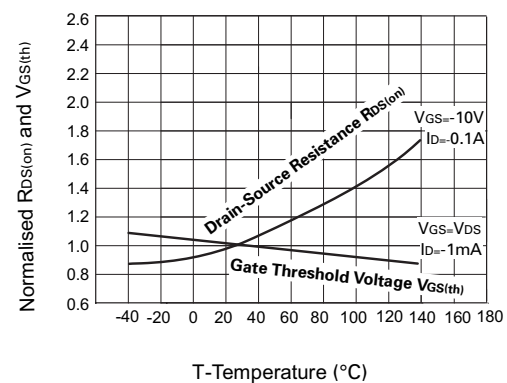
**Voltage Saturation Characteristics**



**Transfer Characteristics**



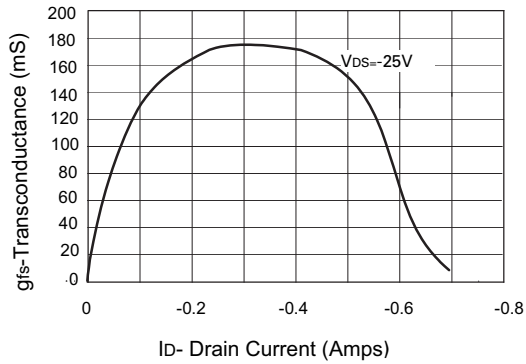
**On-resistance vs gate-source voltage**



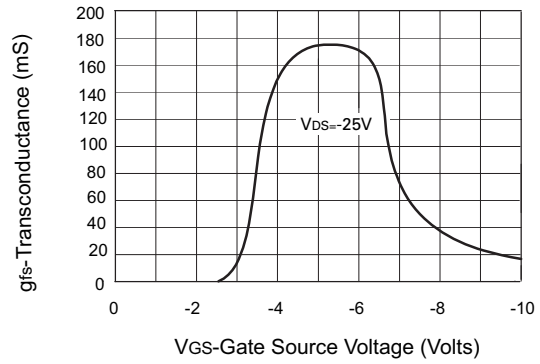
**Normalised  $R_{DS(on)}$  and  $V_{GS(th)}$  vs Temperature**

# ZXMP2120FF

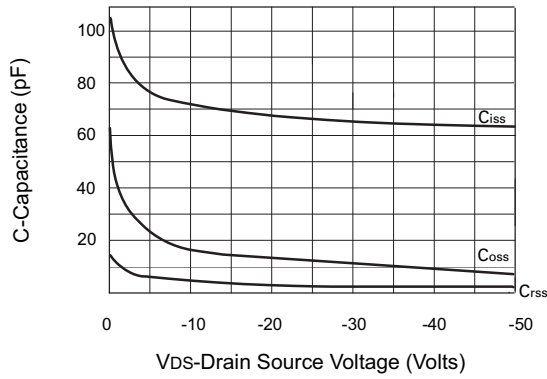
## Typical characteristics



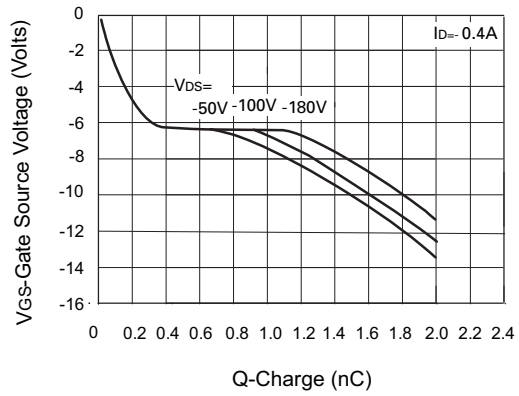
**Transconductance v drain current**



**Transconductance v gate-source voltage**



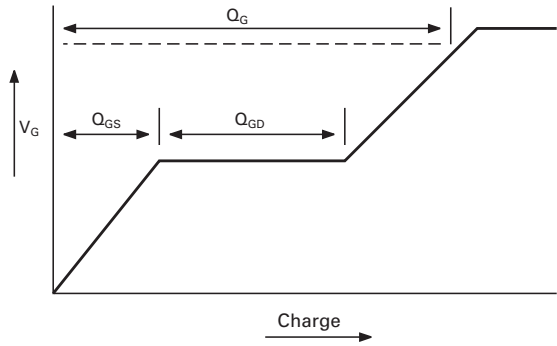
**Capacitance v drain-source voltage**



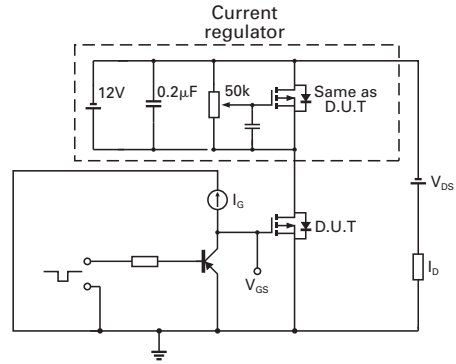
**Gate charge v gate-source voltage**

# ZXMP2120FF

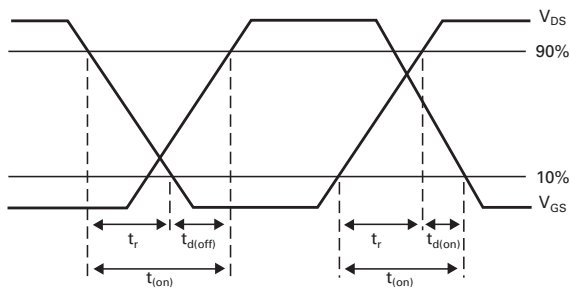
## Typical characteristics



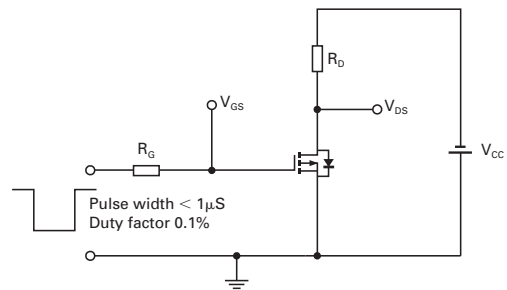
**Basic gate charge waveform**



**Gate charge test circuit**



**Switching time waveforms**



**Switching time test circuit**

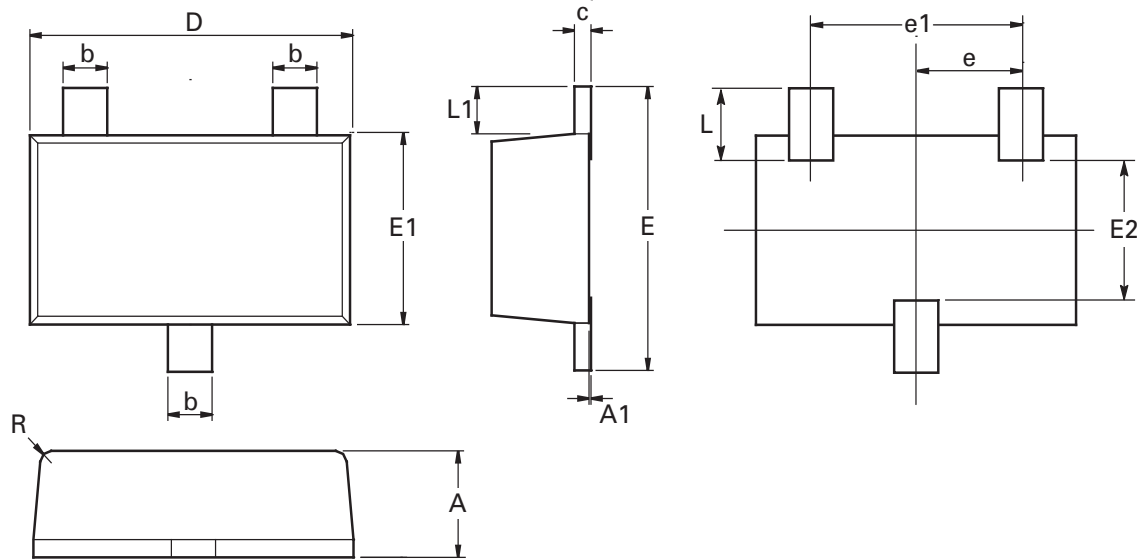
# ZXMP2120FF

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# ZXMP2120FF

## Package outline - SOT23F



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

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

# ZXMP2120FF

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10

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