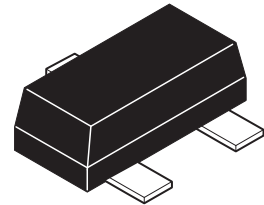


# ZXMP2120FF

## 200V SOT23F P-channel enhancement mode MOSFET

### Summary

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



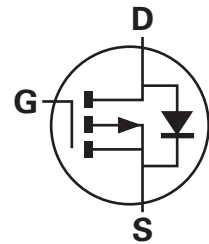
### Description

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

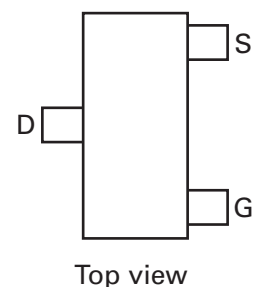


### Applications

- 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:

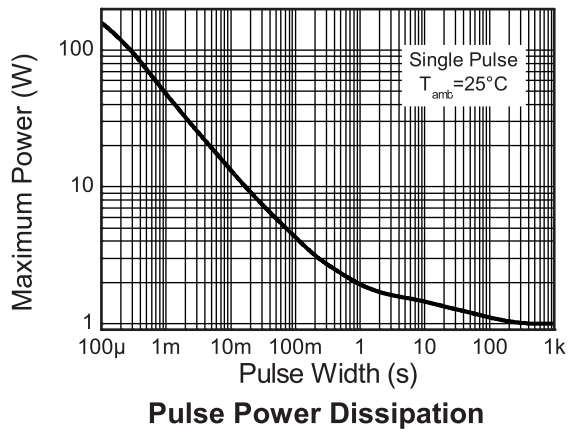
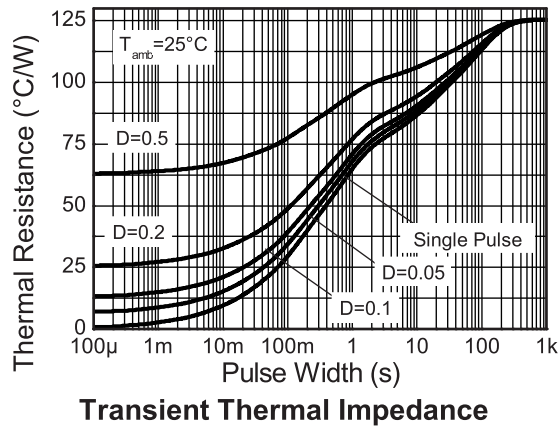
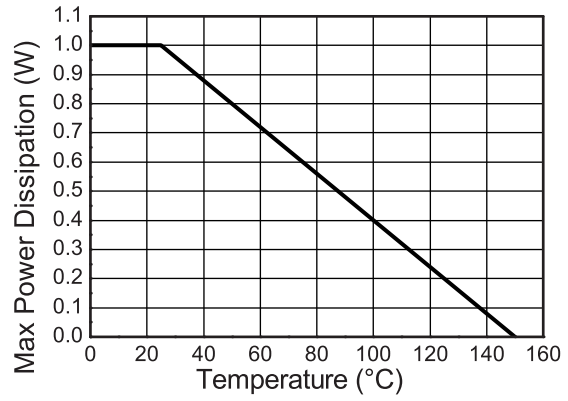
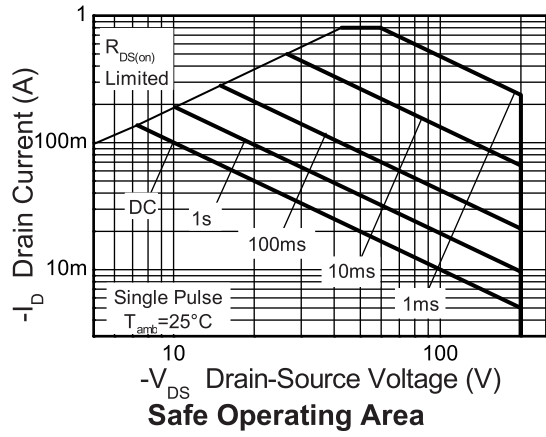
(a) For a device surface mounted on 25mm x 25mm FR4 PCB with high coverage of single sided 1oz copper, in still air conditions.

(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 -100	$\mu\text{A}$ $\mu\text{A}$	$V_{DS} = -200\text{V}$ , $V_{GS} = 0\text{V}$ $V_{DS} = -160\text{V}$ , $V_{GS} = 0\text{V}$ , $T = 125\text{C}^{(\ddagger)}$
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> (‡)	$g_{fs}$	50		mS	$V_{DS} = -25\text{V}$ , $I_D = -150\text{mA}$
<b>Dynamic<sup>(‡)</sup></b>					
Input capacitance	$C_{iss}$		100	pF	$V_{DS} = -25\text{V}$ , $V_{GS} = 0\text{V}$ $f = 1\text{MHz}$
Output capacitance	$C_{oss}$		25	pF	
Reverse transfer capacitance	$C_{rss}$		7	pF	
<b>Switching<sup>(†)</sup> (‡)</b>					
Turn-on-delay time	$t_{d(on)}$		7	ns	$V_{DD} = -25\text{V}$ , $V_{GS} = -10\text{V}$ $I_D = -150\text{mA}$ $R_{SOURCE} \approx 50\Omega$
Rise time	$t_r$		15	ns	
Turn-off delay time	$t_{d(off)}$		12	ns	
Fall time	$t_f$		15	ns	

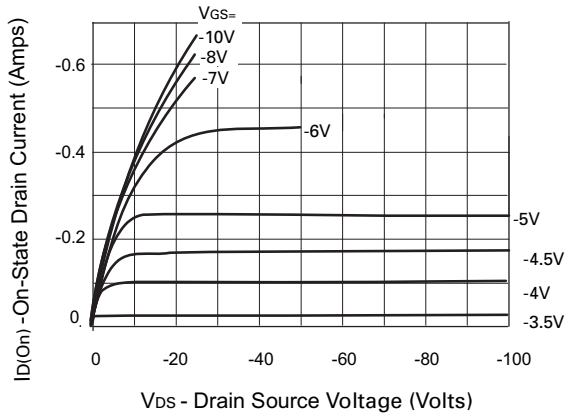
### NOTES:

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

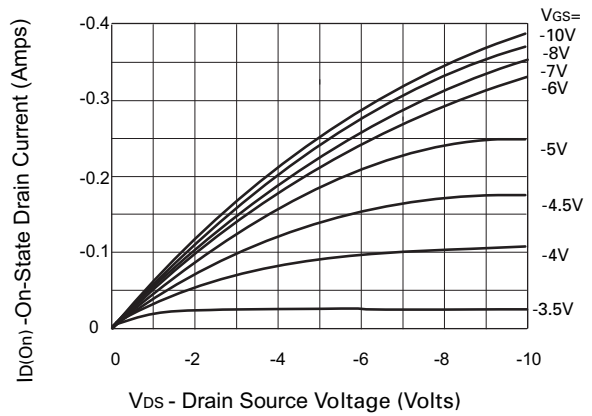
(†) Switching characteristics are independent of operating junction temperature.

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

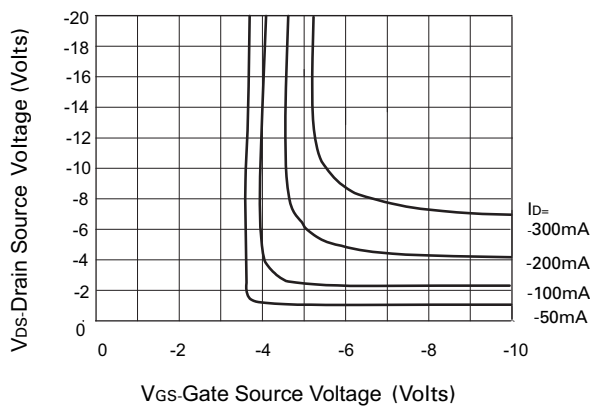
## Typical characteristics



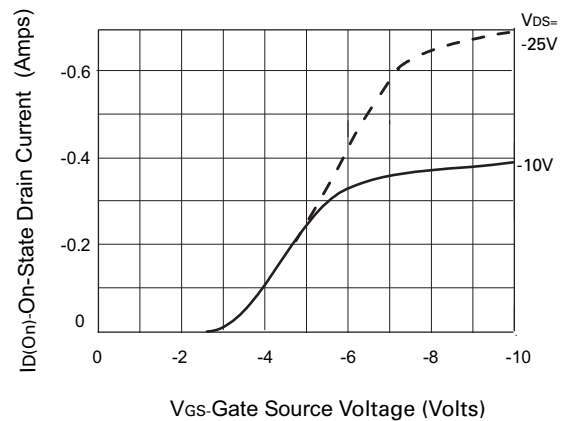
**Output Characteristics**



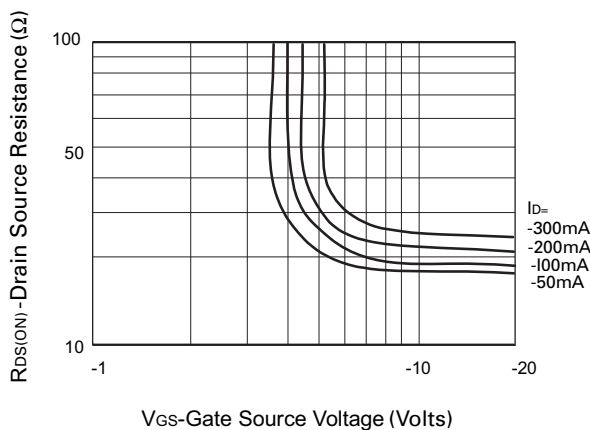
**Saturation Characteristics**



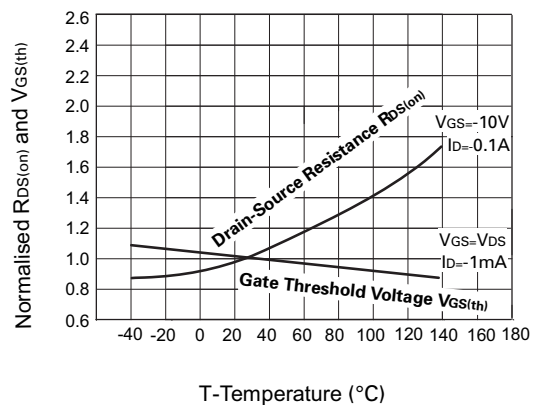
**Voltage Saturation Characteristics**



**Transfer Characteristics**



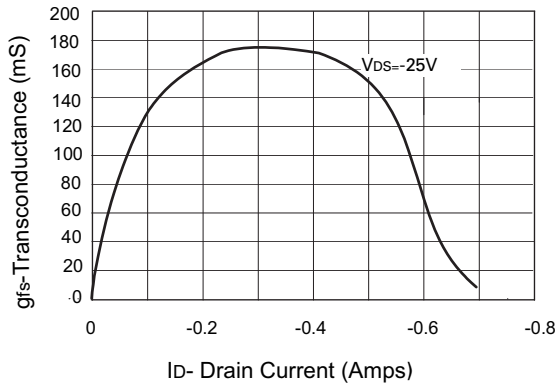
**On-resistance vs gate-source voltage**



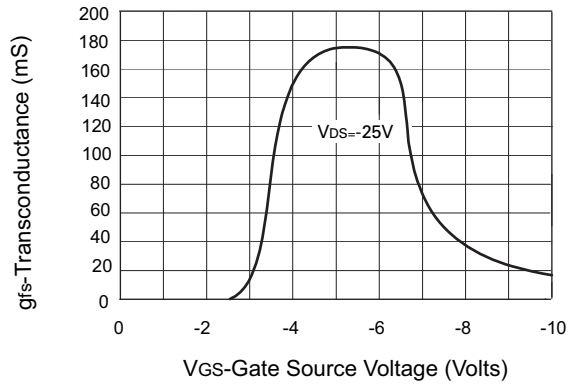
**Normalised  $R_{DS(on)}$  and  $V_{GS(th)}$  vs Temperature**

# ZXMP2120FF

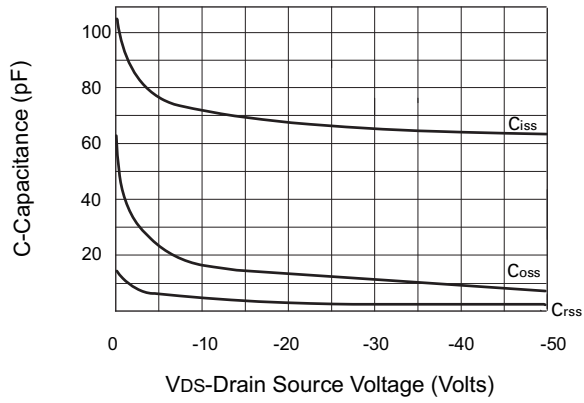
## Typical characteristics



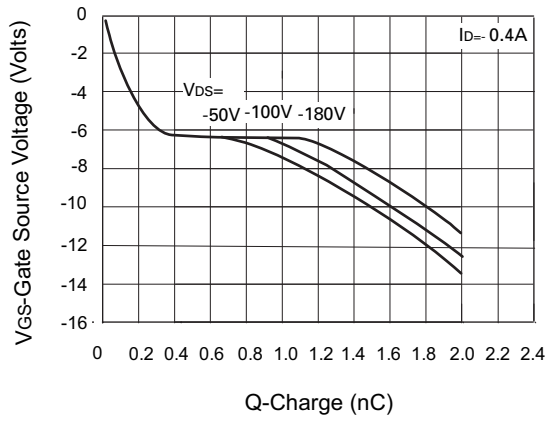
**Transconductance v drain current**



**Transconductance v gate-source voltage**



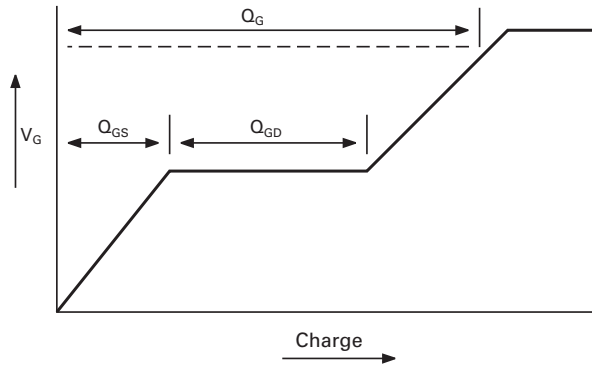
**Capacitance v drain-source voltage**



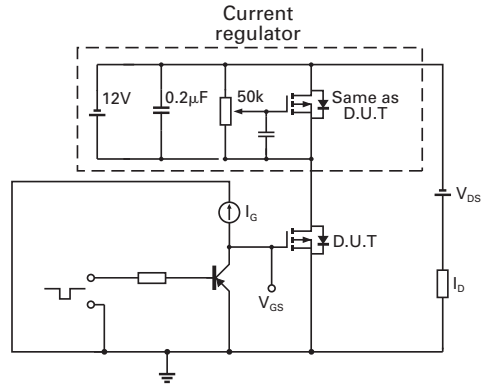
**Gate charge v gate-source voltage**

# ZXMP2120FF

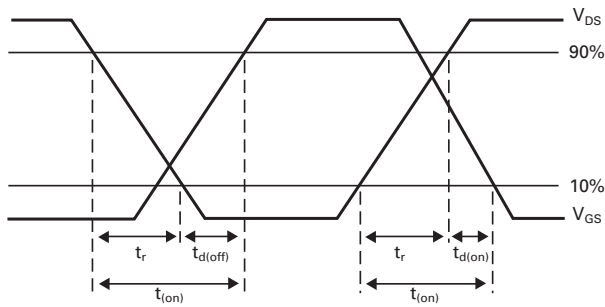
## Typical characteristics



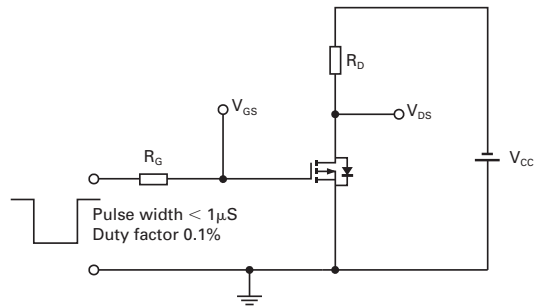
**Basic gate charge waveform**



**Gate charge test circuit**



**Switching time waveforms**



**Switching time test circuit**

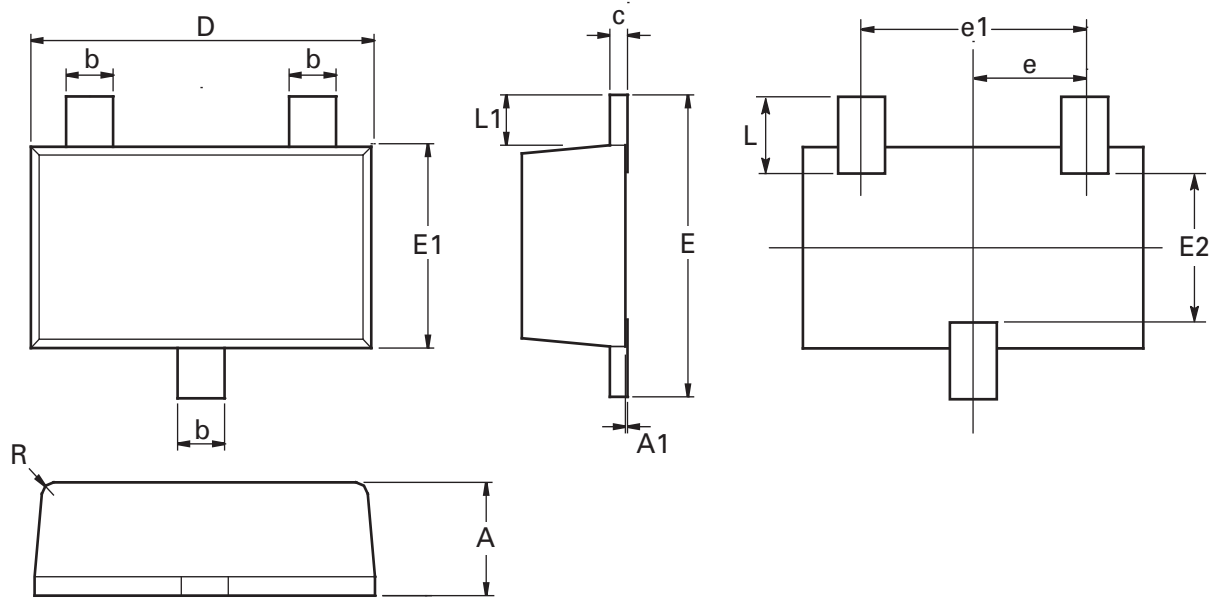
# ZXMP2120FF

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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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