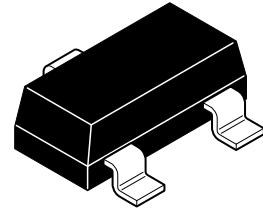


# ZXMN2B14FH

## 20V SOT23 N-channel enhancement mode MOSFET with low gate drive capability

### Summary

$V_{(BR)DSS}$	$R_{DS(on)}$ ( $\Omega$ )	$I_D$ (A)
20	0.055 @ $V_{GS} = 4.5V$	4.3
	0.075 @ $V_{GS} = 2.5V$	3.7
	0.100 @ $V_{GS} = 1.8V$	3.2



### Description

This new generation of trench MOSFETs from Zetex features low on-resistance achievable with low gate drive.

### Features

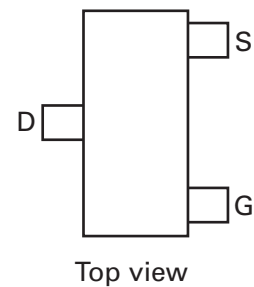
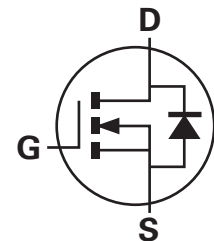
- Low on-resistance
- Fast switching speed
- Low gate drive capability
- SOT23 package

### Applications

- DC-DC converters
- Power management functions
- Disconnect switches
- Motor control

### Ordering information

Device	Reel size (inches)	Tape width (mm)	Quantity per reel
ZXMN2B14FHTA	7	8	3,000



### Device marking

2B4

# ZXMN2B14FH

## Absolute maximum ratings

Parameter	Symbol	Limit	Unit	
Drain-source voltage	$V_{DSS}$	20	V	
Gate-source voltage	$V_{GS}$	$\pm 8$	V	
Continuous drain current	$I_D$	@ $V_{GS}= 4.5V$ ; $T_{amb}=25^{\circ}C$ (b)	4.3	A
		@ $V_{GS}= 4.5V$ ; $T_{amb}=70^{\circ}C$ (b)	3.5	
		@ $V_{GS}= 4.5V$ ; $T_{amb}=25^{\circ}C$ (a)	3.5	
Pulsed drain current (c)	$I_{DM}$	21	A	
Continuous source current (body diode) (b)	$I_S$	2.4	A	
Pulsed source current (body diode) (c)	$I_{SM}$	21	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	mW/ $^{\circ}C$	
Operating and storage temperature range	$T_j, T_{stg}$	-55 to +150	$^{\circ}C$	

## Thermal resistance

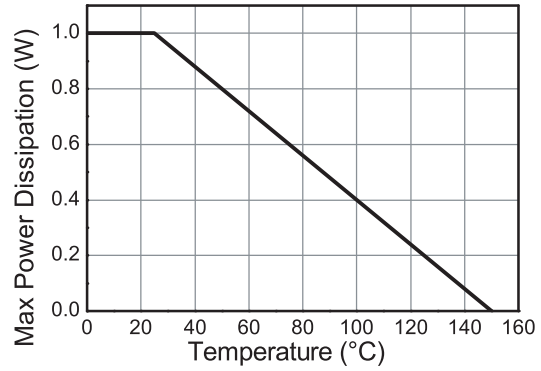
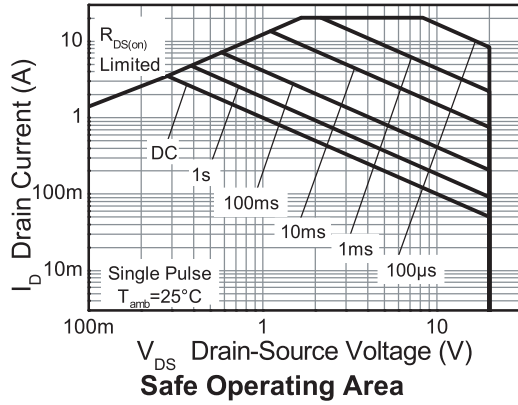
Parameter	Symbol	Limit	Unit
Junction to ambient	$R_{\theta JA}$	125	$^{\circ}C/W$
Junction to ambient	$R_{\theta JA}$	82	$^{\circ}C/W$

### NOTES:

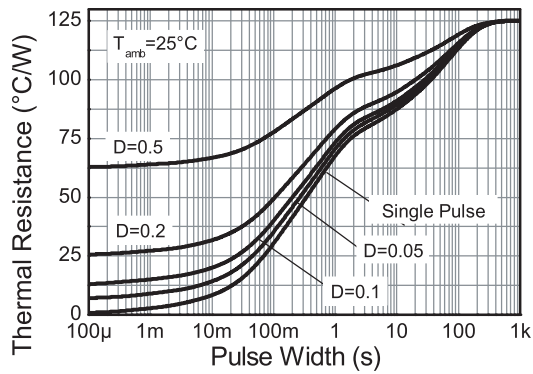
- (a) For a device surface mounted on 25mm x 25mm FR4 PCB with high coverage of single sided 1oz copper, in still air conditions.
- (b) For a device surface mounted on FR4 PCB measured at  $t \leq 5$  sec.
- (c) Repetitive rating - 25mm x 25mm FR4 PCB,  $D=0.02$ , pulse width 300 $\mu s$  - pulse width limited by maximum junction temperature.

# ZXMN2B14FH

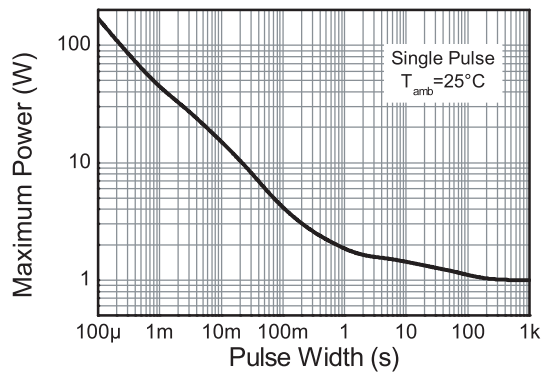
## Thermal characteristics



Derating Curve



Transient Thermal Impedance



Pulse Power Dissipation

# ZXMN2B14FH

## 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	$V_{(BR)DSS}$	20			V	$I_D = 250\mu\text{A}$ , $V_{GS} = 0\text{V}$
Zero gate voltage drain current	$I_{DSS}$			1	$\mu\text{A}$	$V_{DS} = 20\text{V}$ , $V_{GS} = 0\text{V}$
Gate-body leakage	$I_{GSS}$			100	nA	$V_{GS} = \pm 8\text{V}$ , $V_{DS} = 0\text{V}$
Gate-source threshold voltage	$V_{GS(th)}$	0.4		1.0	V	$I_D = 250\mu\text{A}$ , $V_{DS} = V_{GS}$
Static drain-source on-state resistance <sup>(*)</sup>	$R_{DS(on)}$			0.055	$\Omega$	$V_{GS} = 4.5\text{V}$ , $I_D = 3.5\text{A}$
				0.075	$\Omega$	$V_{GS} = 2.5\text{V}$ , $I_D = 3\text{A}$
				0.100	$\Omega$	$V_{GS} = 1.8\text{V}$ , $I_D = 2.6\text{A}$
Forward transconductance <sup>(*)</sup> (‡)	$g_{fs}$		11		S	$V_{DS} = 10\text{V}$ , $I_D = 3.5\text{A}$
<b>Dynamic</b> (‡)						
Input capacitance	$C_{iss}$		872		pF	$V_{DS} = 10\text{V}$ , $V_{GS} = 0\text{V}$ $f = 1\text{MHz}$
Output capacitance	$C_{oss}$		145		pF	
Reverse transfer capacitance	$C_{rss}$		90		pF	
<b>Switching</b> (†) (‡)						
Turn-on-delay time	$t_{d(on)}$		3.7		ns	$V_{DD} = 10\text{V}$ , $V_{GS} = 4.5\text{V}$ $I_D = 1\text{A}$ $R_G \approx 6.0\Omega$
Rise time	$t_r$		5.2		ns	
Turn-off delay time	$t_{d(off)}$		30		ns	
Fall time	$t_f$		5.5		ns	
Total gate charge	$Q_g$		11		nC	$V_{DS} = 10\text{V}$ , $V_{GS} = 4.5\text{V}$ $I_D = 4.0\text{A}$
Gate-source charge	$Q_{gs}$		1.4		nC	
Gate drain charge	$Q_{gd}$		2.1		nC	
<b>Source-drain diode</b>						
Diode forward voltage <sup>(*)</sup>	$V_{SD}$		0.69	0.95	V	$T_j = 25^{\circ}\text{C}$ , $I_S = 1.45\text{A}$ , $V_{GS} = 0\text{V}$
Reverse recovery time <sup>(‡)</sup>	$t_{rr}$		9.4		ns	$T_j = 25^{\circ}\text{C}$ , $I_F = 2.4\text{A}$ , $di/dt = 100\text{A}/\mu\text{s}$
Reverse recovery charge <sup>(‡)</sup>	$Q_{rr}$		2.8		nC	

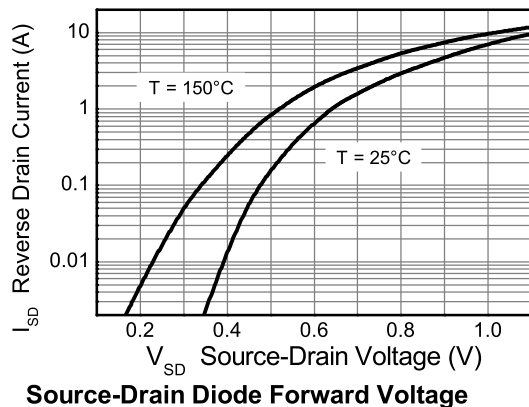
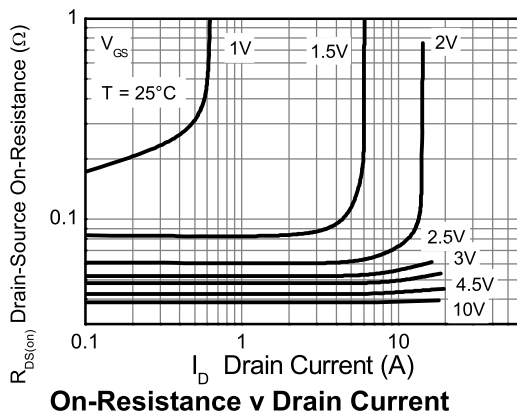
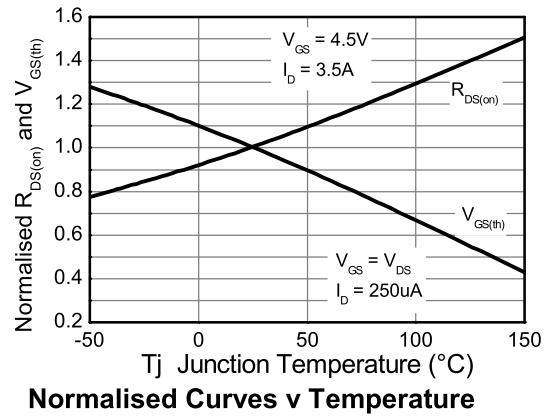
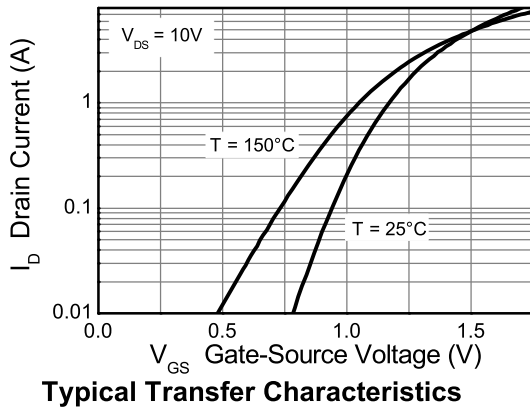
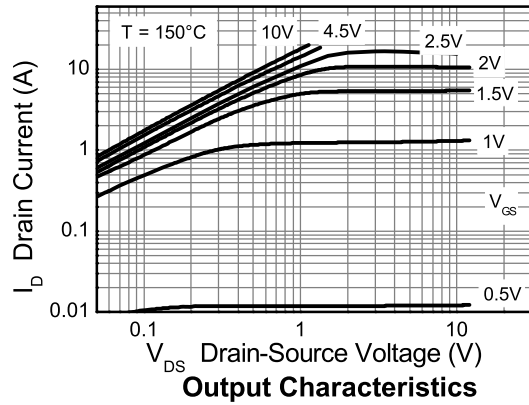
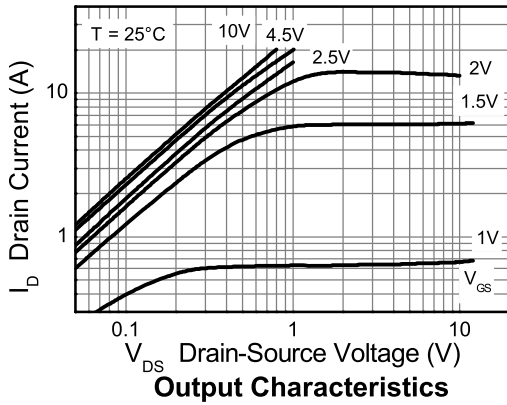
### NOTES:

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

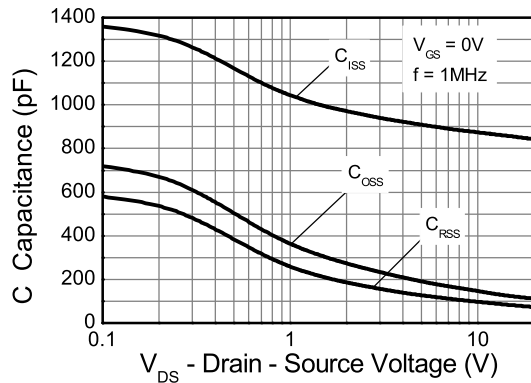
(†) Switching characteristics are independent of operating junction temperature.

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

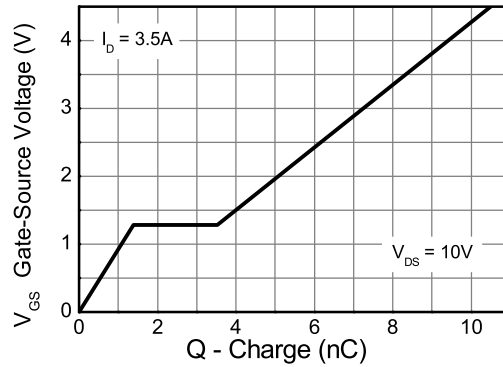
## Typical characteristics



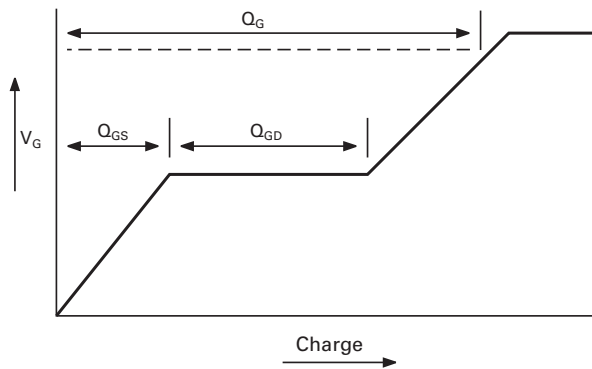
## Typical characteristics



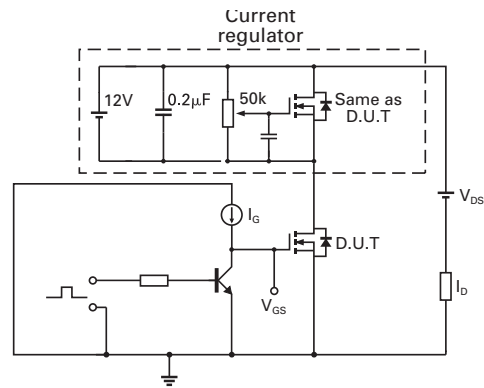
Capacitance v Drain-Source Voltage



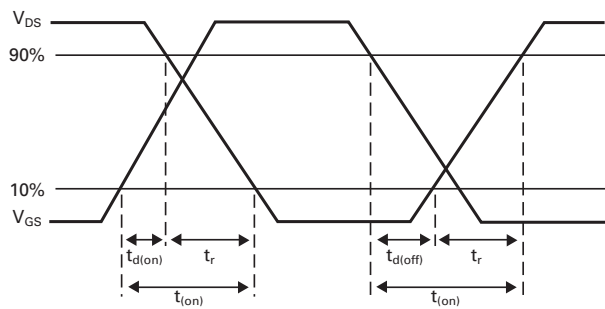
Gate-Source Voltage v Gate Charge



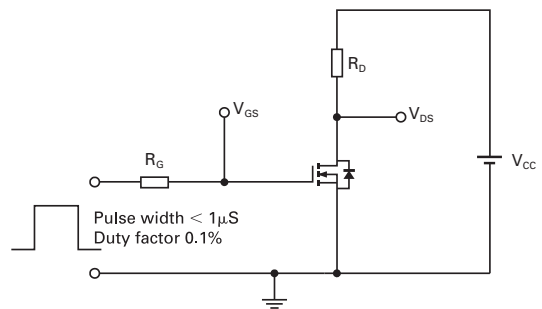
Basic gate charge waveform



Gate charge test circuit



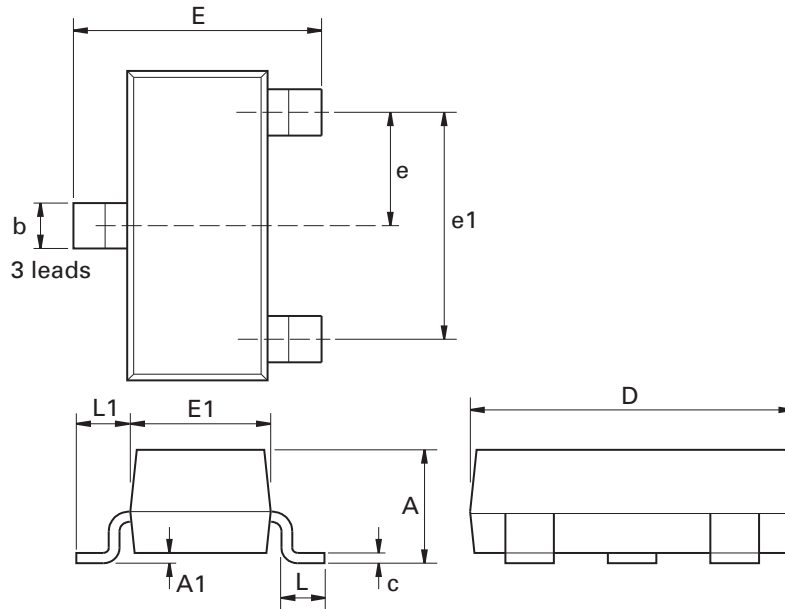
Switching time waveforms



Switching time test circuit

# ZXMN2B14FH

## Package outline - SOT23



Dim.	Millimeters		Inches		Dim.	Millimeters		Inches	
	Min.	Max.	Min.	Max.		Min.	Max.	Max.	Max.
A	-	1.12	-	0.044	e1	1.90 NOM		0.075 NOM	
A1	0.01	0.10	0.0004	0.004	E	2.10	2.64	0.083	0.104
b	0.30	0.50	0.012	0.020	E1	1.20	1.40	0.047	0.055
C	0.085	0.120	0.003	0.008	L	0.25	0.62	0.018	0.024
D	2.80	3.04	0.110	0.120	L1	0.45	0.62	0.018	0.024
e	0.95 NOM		0.0375 NOM		-	-	-	-	-

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

# ZXMN2B14FH

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