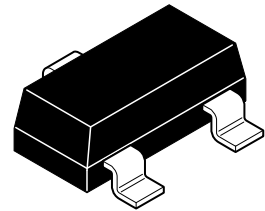


ZXMN2B01F

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

Summary

$V_{(BR)DSS}$	$R_{DS(on)}$ (Ω)	I_D (A)
20	0.100 @ $V_{GS} = 4.5V$	2.4
	0.150 @ $V_{GS} = 2.5V$	2.0
	0.200 @ $V_{GS} = 1.8V$	1.7



Description

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

Features

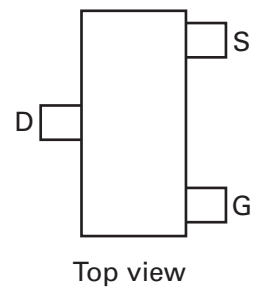
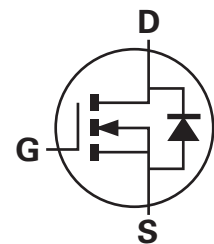
- Low on-resistance
- Fast switching speed
- Low gate drive capability
- SOT23 package

Applications

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

Ordering information

Device	Reel size (inches)	Tape width (mm)	Quantity per reel
ZXMN2B01FTA	7	8	3,000



Device marking

2B1

ZXMN2B01F

Absolute maximum ratings

Parameter	Symbol	Limit	Unit
Drain-source voltage	V_{DSS}	20	V
Gate-source voltage	V_{GS}	± 8	V
Continuous drain current @ $V_{GS} = 4.5V$; $T_{amb} = 25^{\circ}C^{(b)}$ @ $V_{GS} = 4.5V$; $T_{amb} = 70^{\circ}C^{(b)}$ @ $V_{GS} = 4.5V$; $T_{amb} = 25^{\circ}C^{(a)}$	I_D	2.4	A
		1.9	A
		2.1	A
Pulsed drain current ^(c)	I_{DM}	11.8	A
Continuous source current (body diode) ^(b)	I_S	1.4	A
Pulsed source current (body diode) ^(c)	I_{SM}	11.8	A
Power dissipation at $T_{amb} = 25^{\circ}C^{(a)}$	P_D	625	mW
Linear derating factor		5	mW/ $^{\circ}C$
Power dissipation at $T_{amb} = 25^{\circ}C^{(b)}$	P_D	806	mW
Linear derating factor		6.4	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 ^(a)	$R_{\theta JA}$	200	$^{\circ}C/W$
Junction to ambient ^(b)	$R_{\theta JA}$	155	$^{\circ}C/W$

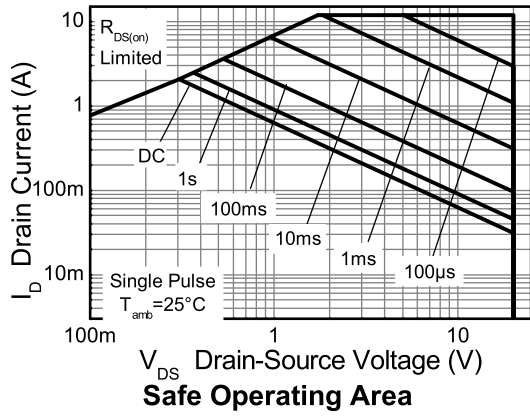
NOTES:

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

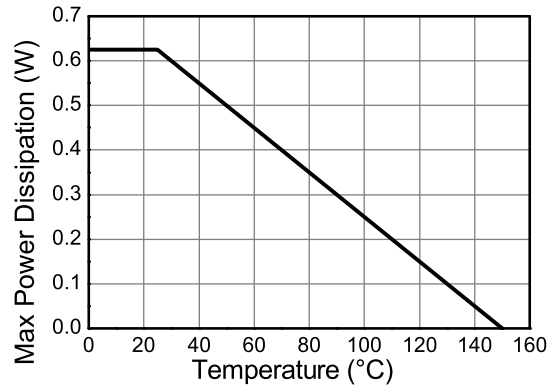
(b) For a device surface mounted on FR4 PCB measured at $t \leq 5$ sec.

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

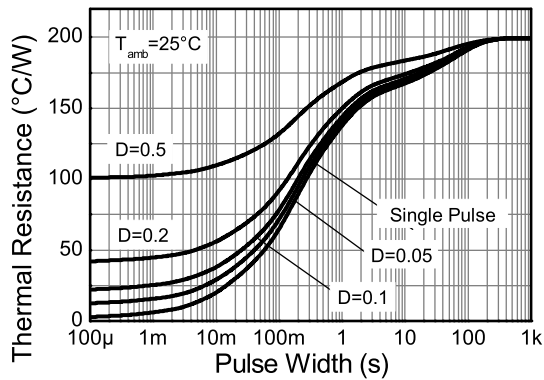
Thermal characteristics



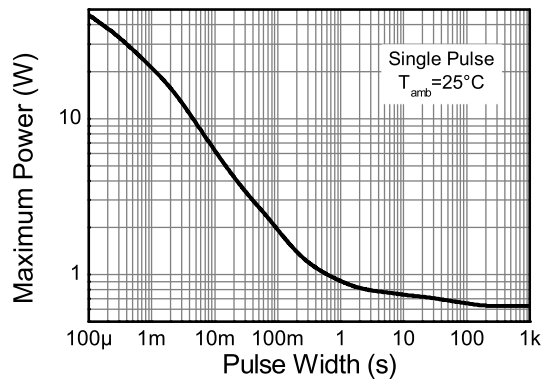
Safe Operating Area



Derating Curve



Transient Thermal Impedance



Pulse Power Dissipation

ZXMN2B01F

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

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Static						
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	μA	$V_{DS} = 20\text{V}$, $V_{GS} = 0\text{V}$
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 ^(*)	$R_{DS(on)}$			0.100	Ω	$V_{GS} = 4.5\text{V}$, $I_D = 2.4\text{A}$
				0.150	Ω	$V_{GS} = 2.5\text{V}$, $I_D = 2.0\text{A}$
				0.200	Ω	$V_{GS} = 1.8\text{V}$, $I_D = 1.7\text{A}$
Forward transconductance ^{(*)(‡)}	g_{fs}		6.1		S	$V_{DS} = 10\text{V}$, $I_D = 2.4\text{A}$

Dynamic^(‡)

Input capacitance	C_{iss}		370		pF	$V_{DS} = 10\text{V}$, $V_{GS} = 0\text{V}$ $f = 1\text{MHz}$
Output capacitance	C_{oss}		81		pF	
Reverse transfer capacitance	C_{rss}		46		pF	

Switching^(†) (‡)

Turn-on-delay time	$t_{d(on)}$		2.2		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		3.6		ns	
Turn-off delay time	$t_{d(off)}$		17.8		ns	
Fall time	t_f		10.5		ns	
Total gate charge	Q_g		4.8		nC	$V_{DS} = 10\text{V}$, $V_{GS} = 4.5\text{V}$ $I_D = 2.4\text{A}$
Gate-source charge	Q_{gs}		0.6		nC	
Gate drain charge	Q_{gd}		1.0		nC	

Source-drain diode

Diode forward voltage ^(*)	V_{SD}		0.73	0.95	V	$T_j = 25^{\circ}\text{C}$, $I_S = 1.2\text{A}$, $V_{GS} = 0\text{V}$
Reverse recovery time ^(‡)	t_{rr}		6.7		ns	$T_j = 25^{\circ}\text{C}$, $I_F = 1.1\text{A}$, $di/dt = 100\text{A/ms}$
Reverse recovery charge ^(‡)	Q_{rr}		1.3		nC	

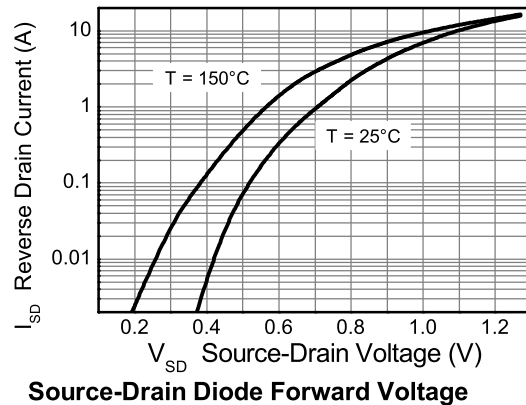
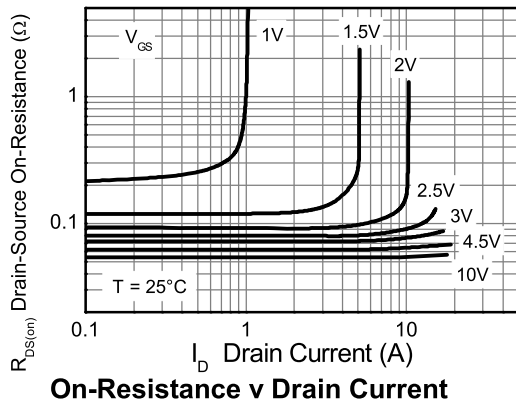
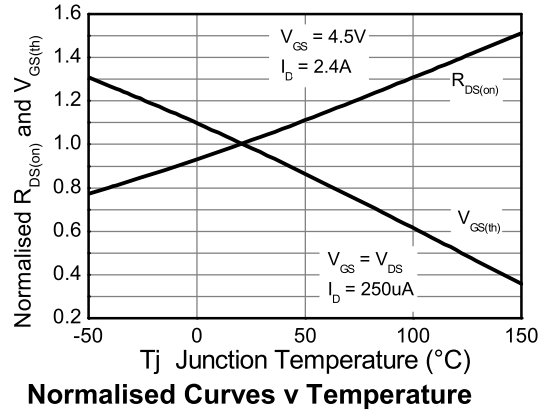
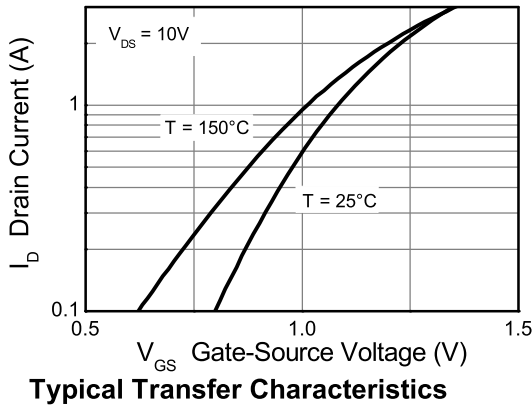
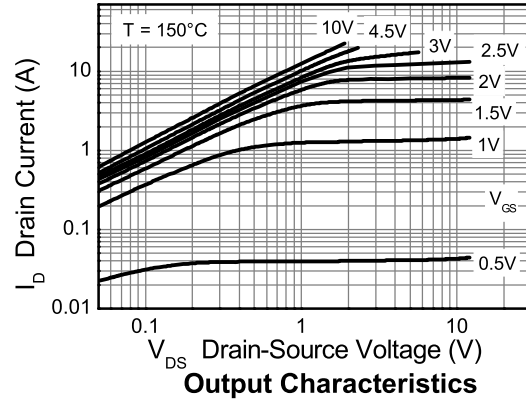
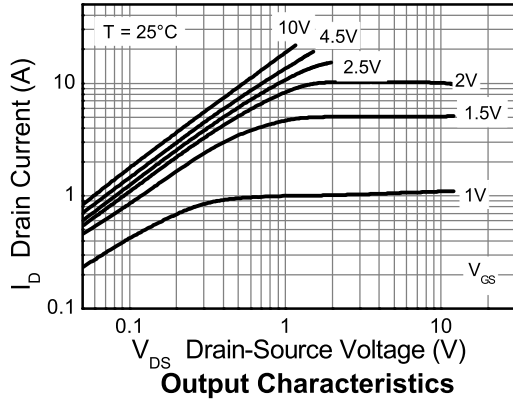
NOTES:

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

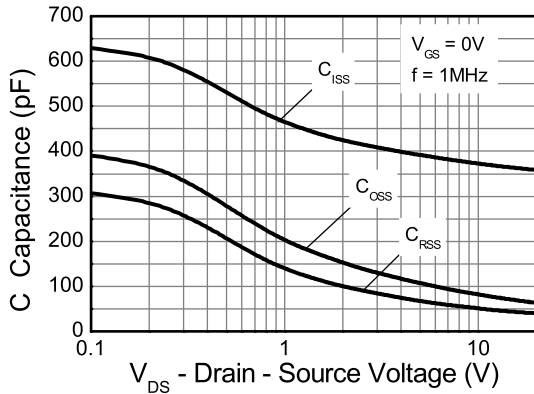
(†) Switching characteristics are independent of operating junction temperature.

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

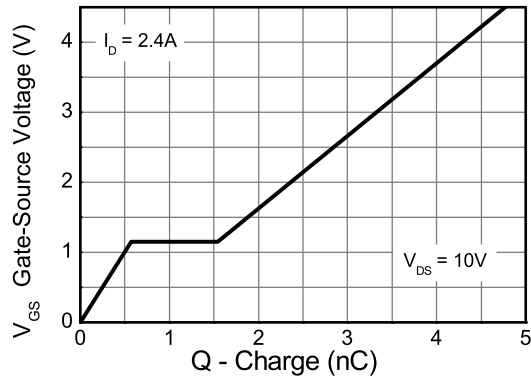
Typical characteristics



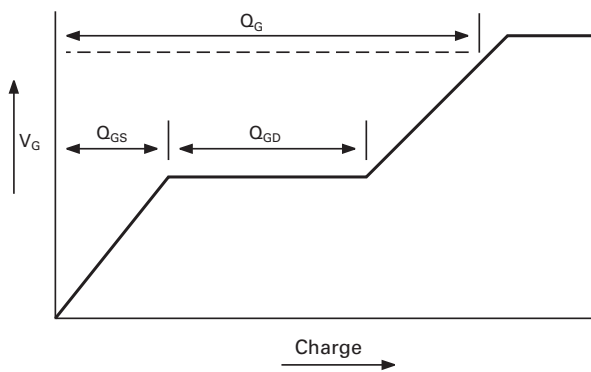
Typical characteristics



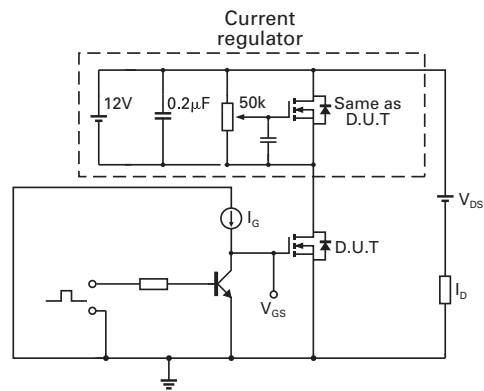
Capacitance v Drain-Source Voltage



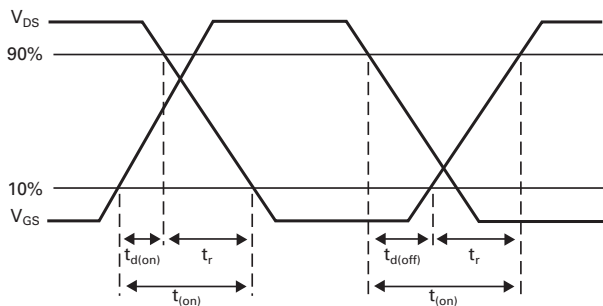
Gate-Source Voltage v Gate Charge



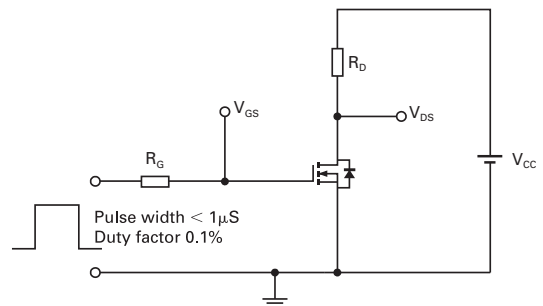
Basic gate charge waveform



Gate charge test circuit



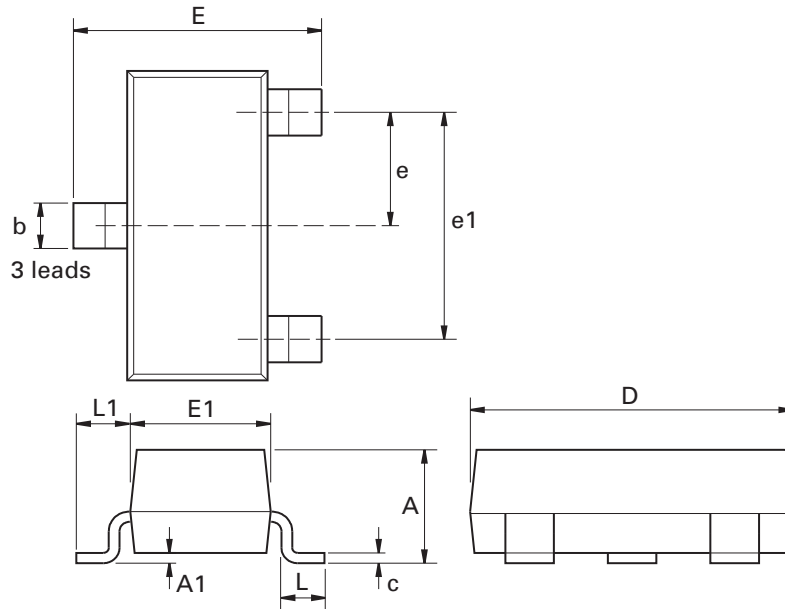
Switching time waveforms



Switching time test circuit

ZXMN2B01F

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

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Zetex sales offices

Europe	Americas	Asia Pacific	Corporate Headquarters
Zetex GmbH Kustermann-park Balanstraße 59 D-81541 München Germany Telephone: (49) 89 45 49 49 0 Fax: (49) 89 45 49 49 49 europe.sales@zetex.com	Zetex Inc 700 Veterans Memorial Highway Hauppauge, NY 11788 USA Telephone: (1) 631 360 2222 Fax: (1) 631 360 8222 usa.sales@zetex.com	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	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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