

ZXMN3F31DN8

30V SO8 dual N-channel enhancement mode MOSFET

Summary

$V_{(BR)DSS}$	$R_{DS(on)}$ (Ω)	I_D (A)
30	0.024 @ $V_{GS}= 10V$	7.3
	0.039 @ $V_{GS}= 4.5V$	5.7



Description

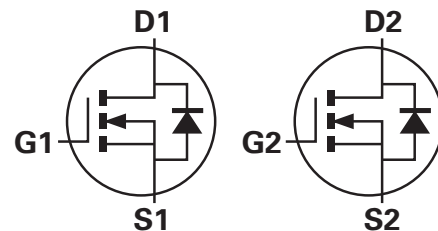
This new generation Trench MOSFET from Zetex features low on-resistance achievable with 4.5V gate drive.

Features

- Low on-resistance
- 4.5V gate drive capability

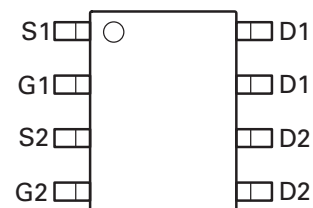
Applications

- DC-DC Converters
- Power management functions
- Load switching
- Motor control
- Back lighting



Ordering information

DEVICE	Reel size (inches)	Tape width (mm)	Quantity per reel
ZXMN3F31DN8TA	7	12	500



Device marking

ZXMN

3F31D

ZXMN3F31DN8

Absolute maximum ratings

Parameter	Symbol	Limit	Unit
Drain source voltage	V_{DSS}	30	V
Gate source voltage	V_{GS}	± 20	V
Continuous Drain Current @ $V_{GS}=10$; $T_A=25^\circ\text{C}^{(b)}$	I_D	7.3	A
@ $V_{GS}=10$; $T_A=70^\circ\text{C}^{(b)}$		5.9	A
@ $V_{GS}=10$; $T_A=25^\circ\text{C}^{(a)}$		5.7	A
Pulsed drain current ^(c)	I_{DM}	33	A
Continuous source current (body diode) ^(b)	I_S	3.5	A
Pulsed source current (body diode) ^(c)	I_{SM}	33	A
Power dissipation at $T_A = 25^\circ\text{C}^{(a)(d)}$	P_D	1.25	W
Linear derating factor		10	mW/°C
Power dissipation at $T_A = 25^\circ\text{C}^{(a)(e)}$	P_D	1.8	W
Linear derating factor		14	mW/°C
Power dissipation at $T_A = 25^\circ\text{C}^{(b)(d)}$	P_D	2.1	W
Linear derating factor		17	mW/°C
Operating and storage temperature range	T_j, T_{stg}	-55 to 150	°C

Thermal resistance

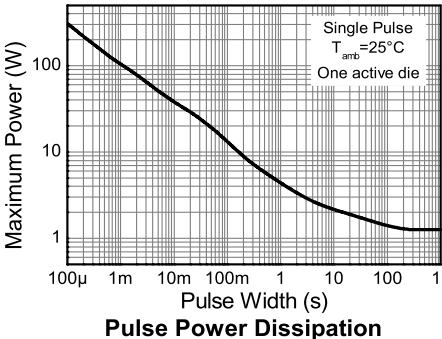
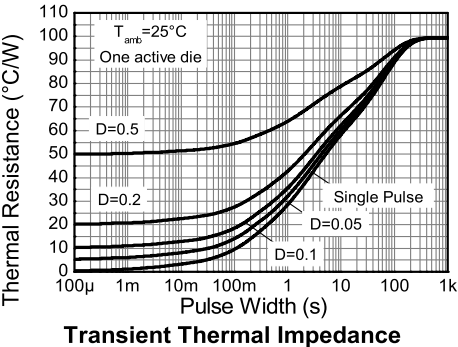
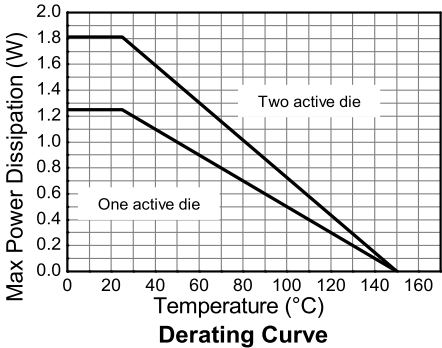
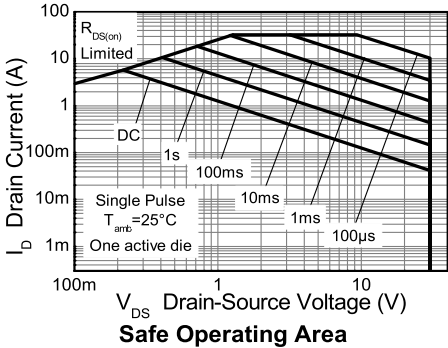
Parameter	Symbol	Limit	Unit
Junction to ambient ^{(a)(d)}	$R_{\theta JA}$	100	°C/W
Junction to ambient ^{(a)(e)}	$R_{\theta JA}$	70	°C/W
Junction to ambient ^{(b)(d)}	$R_{\theta JA}$	60	°C/W
Junction to lead ^(f)	$R_{\theta JL}$	53	°C/W

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 $t \leq 10$ sec.
- (c) Repetitive rating - 25mm x 25mm FR4 PCB, $D=0.02$, pulse width 300 μs - pulse width limited by maximum junction temperature.
- (d) For a dual device with one active die.
- (e) For a device with two active die running at equal power.
- (f) Thermal resistance from junction to solder-point (at end of drain lead).

ZXMN3F31DN8

Thermal characteristics



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

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Static						
Drain-Source breakdown voltage	$V_{(BR)DSS}$	30			V	$I_D = 250\mu\text{A}$, $V_{GS} = 0\text{V}$
Zero Gate voltage drain current	I_{DSS}			0.5	μA	$V_{DS} = 30\text{V}$, $V_{GS} = 0\text{V}$
Gate-Body leakage	I_{GSS}			100	nA	$V_{GS} = \pm 20\text{V}$, $V_{DS} = 0\text{V}$
Gate-Source threshold voltage	$V_{GS(th)}$	1.0		3.0	V	$I_D = 250\mu\text{A}$, $V_{DS} = V_{GS}$
Static Drain-Source on-state resistance (*)	$R_{DS(on)}$			0.024 0.039	Ω Ω	$V_{GS} = 10\text{V}$, $I_D = 7.0\text{A}$ $V_{GS} = 4.5\text{V}$, $I_D = 6.0\text{A}$
Forward transconductance(*) ^(†)	g_{fs}		16.5		S	$V_{DS} = 15\text{V}$, $I_D = 7\text{A}$
Dynamic ^(†)						
Input capacitance	C_{iss}		608		pF	$V_{DS} = 15\text{V}$, $V_{GS} = 0\text{V}$ $f = 1\text{MHz}$
Output capacitance	C_{oss}		132		pF	
Reverse transfer capacitance	C_{rss}		71		pF	
Switching ^(‡)^(†)						
Turn-on-delay time	$t_{d(on)}$		2.9		ns	$V_{DD} = 15\text{V}$, $I_D = 1\text{A}$ $R_G \approx 6.0\Omega$, $V_{GS} = 10\text{V}$
Rise time	t_r		3.3		ns	
Turn-off delay time	$t_{d(off)}$		16		ns	
Fall time	t_f		8		ns	
Total gate charge	Q_g		12.9		nC	$V_{DS} = 15\text{V}$, $V_{GS} = 10\text{V}$ $I_D = 7\text{A}$
Gate-source charge	Q_{gs}		2.5		nC	
Gate drain charge	Q_{gd}		2.52		nC	
Source-drain diode						
Diode Forward Voltage ^(*)	V_{SD}		0.82	1.2	V	$T_J = 25^{\circ}\text{C}$, $I_S = 1.7\text{A}$, $V_{GS} = 0\text{V}$
Reverse recovery time ^(†)	t_{rr}		12		ns	$T_J = 25^{\circ}\text{C}$, $I_S = 2.2\text{A}$
Reverse recovery charge ^(†)	Q_{rr}		4.8		nC	$di/dt = 100\text{A}/\mu\text{s}$

NOTES:

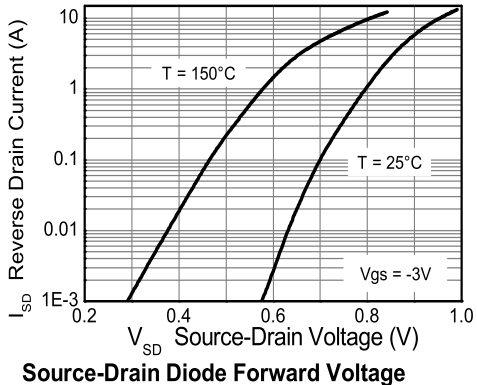
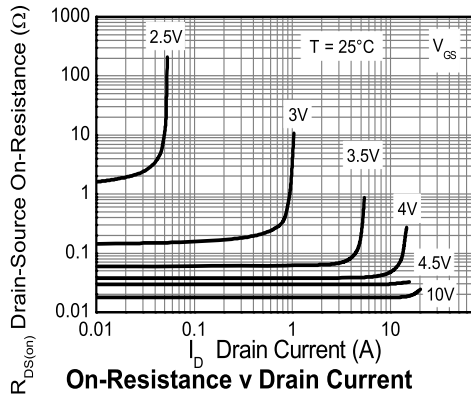
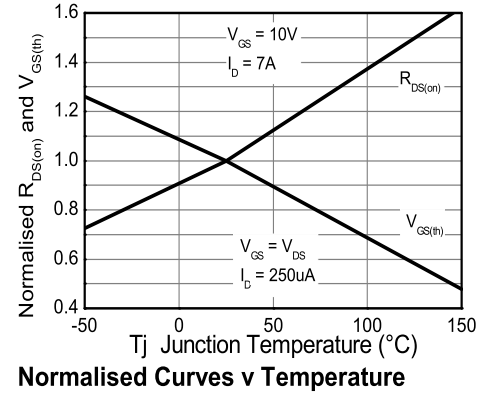
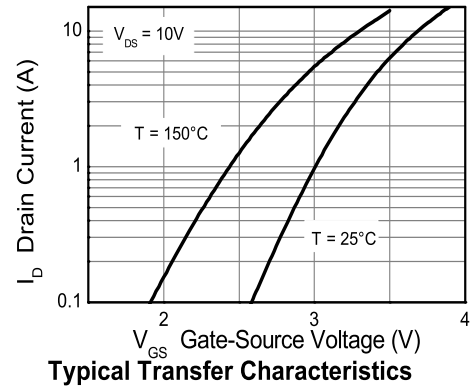
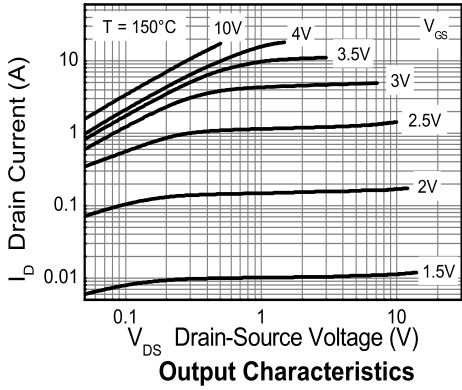
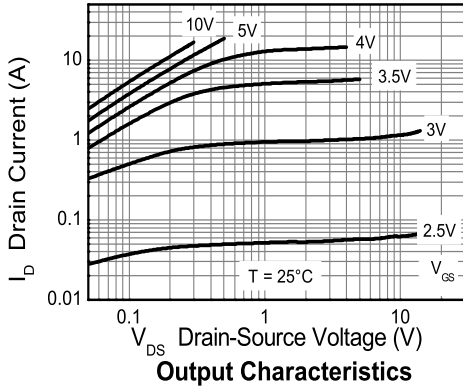
(*) Measured under pulsed conditions. Pulse width $\leq 300\mu\text{s}$; duty cycle $\leq 2\%$.

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

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

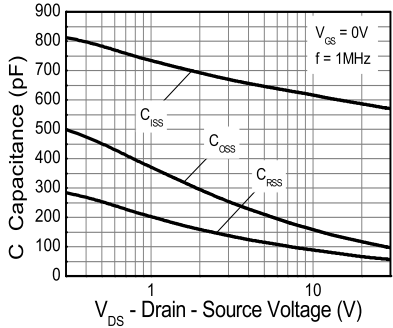
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Typical characteristics

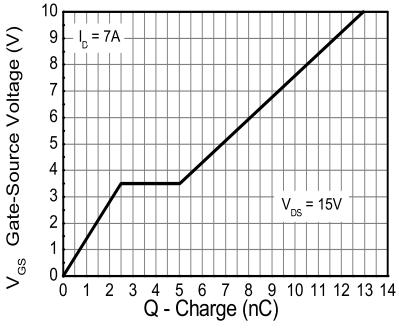


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Typical characteristics

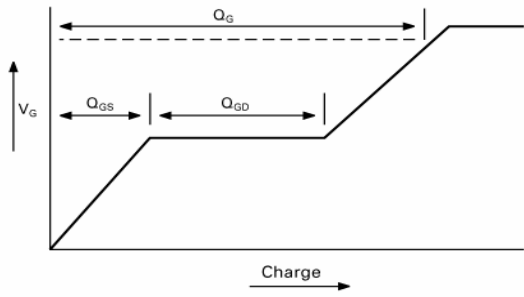


Capacitance v Drain-Source Voltage

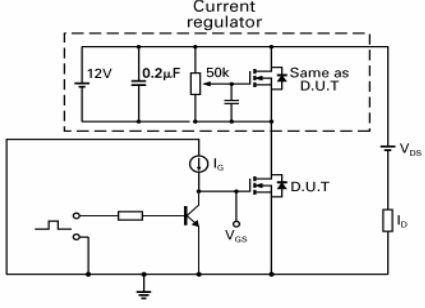


Gate-Source Voltage v Gate Charge

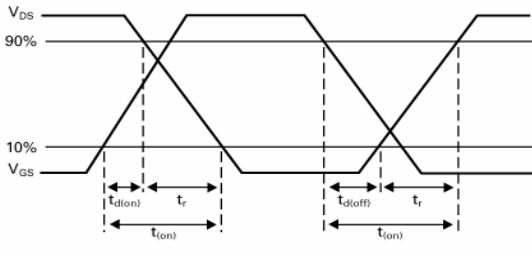
Test circuits



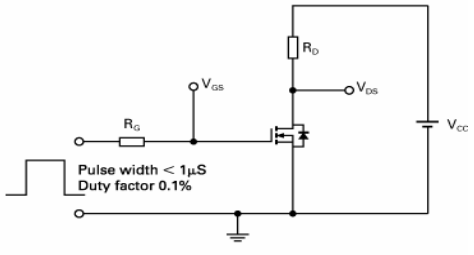
Basic gate charge waveform



Gate charge test circuit



Switching time waveforms

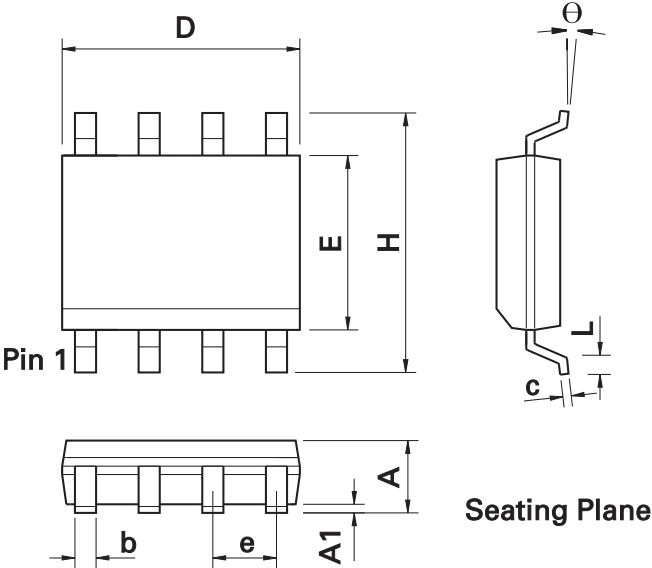


Switching time test circuit

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Package outline - SO8



DIM	Inches		Millimeters		DIM	Inches		Millimeters	
	Min.	Max.	Min.	Max.		Min.	Max.	Min.	Max.
A	0.053	0.069	1.35	1.75	e	0.050 BSC		1.27 BSC	
A1	0.004	0.010	0.10	0.25	b	0.013	0.020	0.33	0.51
D	0.189	0.197	4.80	5.00	c	0.008	0.010	0.19	0.25
H	0.228	0.244	5.80	6.20	Θ	0°	8°	0°	8°
E	0.150	0.157	3.80	4.00	h	0.010	0.020	0.25	0.50
L	0.016	0.050	0.40	1.27	-	-	-	-	-

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

ZXMN3F31DN8

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Zetex sales offices

Europe	Americas	Asia Pacific	Corporate Headquarters
Zetex GmbH Kustermann-park Balanstraße 59 D-81541 München Germany Telefon: (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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8

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