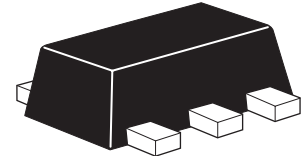


ZXMN6A11Z

60V SOT89 N-channel enhancement mode MOSFET

Summary

$V_{(BR)DSS}$	$R_{DS(on)}$ (Ω)	I_D (A)
60	0.120 @ $V_{GS} = 10V$	3.6
	0.180 @ $V_{GS} = 4.5V$	2.9

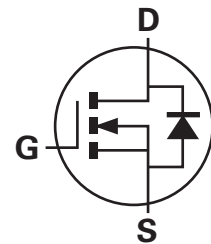


Description

This new generation trench MOSFET from Zetex features a unique structure combining the benefits of low on-resistance and fast switching, making it ideal for high efficiency power management applications.

Features

- Low on-resistance
- Fast switching speed
- Low threshold
- Low gate drive
- SOT89 package

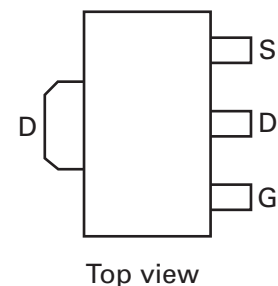


Applications

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

Ordering information

Device	Reel size (inches)	Tape width (mm)	Quantity per reel
ZXMN6A11ZTA	7	12	1,000



Device marking

11N6

ZXMN6A11Z

Absolute maximum ratings

Parameter	Symbol	Limit	Unit
Drain-source voltage	V_{DSS}	60	V
Gate-source voltage	V_{GS}	± 20	V
Continuous drain current @ $V_{GS} = 10V$; $T_{amb} = 25^{\circ}C^{(b)}$	I_D	3.6	A
@ $V_{GS} = 10V$; $T_{amb} = 70^{\circ}C^{(b)}$		2.9	
@ $V_{GS} = 10V$; $T_{amb} = 25^{\circ}C^{(a)}$		2.7	
Pulsed drain current ^(c)	I_{DM}	14.5	A
Continuous source current (body diode) ^(b)	I_S	3.7	A
Pulsed source current (body diode) ^(c)	I_{SM}	14.5	A
Power dissipation at $T_{amb} = 25^{\circ}C^{(a)}$	P_D	1.5	W
Linear derating factor		12	mW/ $^{\circ}C$
Power dissipation at $T_{amb} = 25^{\circ}C^{(b)}$	P_D	2.6	W
Linear derating factor		21	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)	$R_{\theta JA}$	83.3	$^{\circ}C/W$
Junction to ambient ^(b)	$R_{\theta JA}$	47.4	$^{\circ}C/W$

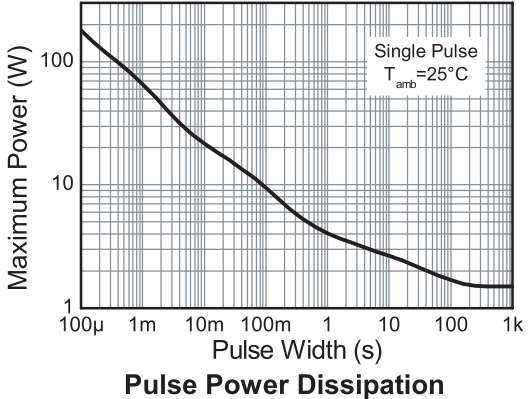
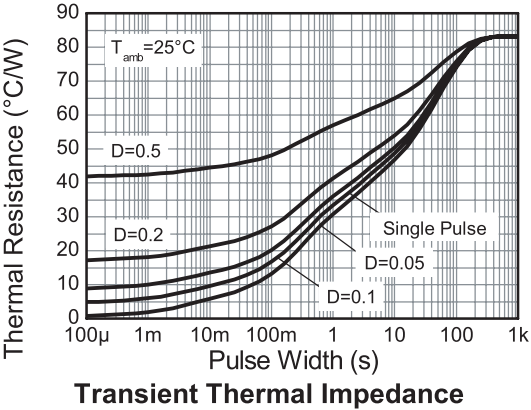
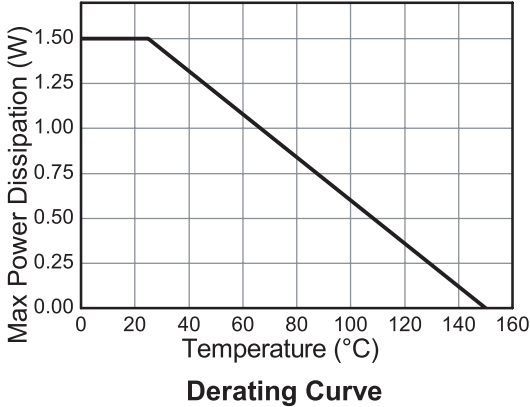
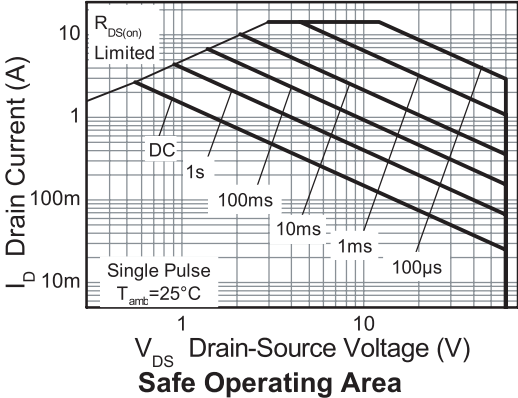
NOTES:

(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 $t = 10$ sec.

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

Typical characteristics



ZXMN6A11Z

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

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Static						
Drain-source breakdown voltage	$V_{(BR)DSS}$	60			V	$I_D = 250\mu\text{A}$, $V_{GS} = 0\text{V}$
Zero gate voltage drain current	I_{DSS}			1.0	μA	$V_{DS} = 60\text{V}$, $V_{GS} = 0\text{V}$
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			V	$I_D = 250\mu\text{A}$, $V_{DS} = V_{GS}$
Static drain-source on-state resistance (*)	$R_{DS(on)}$			0.120	Ω	$V_{GS} = 10\text{V}$, $I_D = 2.5\text{A}$
				0.180	Ω	$V_{GS} = 4.5\text{V}$, $I_D = 2\text{A}$
Forward transconductance(*) (‡)	g_{fs}		4.9		S	$V_{DS} = 15\text{V}$, $I_D = 2.5\text{A}$
Dynamic (‡)						
Input capacitance	C_{iss}		330		pF	$V_{DS} = 40\text{V}$, $V_{GS} = 0\text{V}$ $f = 1\text{MHz}$
Output capacitance	C_{oss}		35.2		pF	
Reverse transfer capacitance	C_{rss}		17.1		pF	
Switching (†) (‡)						
Turn-on-delay time	$t_{d(on)}$		1.95		ns	$V_{DD} = 30\text{V}$, $I_D = 2.5\text{A}$ $R_G = 6.0\Omega$, $V_{GS} = 10\text{V}$
Rise time	t_r		3.5		ns	
Turn-off delay time	$t_{d(off)}$		8.2		ns	
Fall time	t_f		4.6		ns	
Gate charge	Q_g		3.0		nC	$V_{DS} = 15\text{V}$, $V_{GS} = 5\text{V}$ $I_D = 2.5\text{A}$
Total gate charge	Q_g		5.7		nC	$V_{DS} = 15\text{V}$, $V_{GS} = 10\text{V}$ $I_D = 2.5\text{A}$
Gate-source charge	Q_{gs}		1.25		nC	
Gate drain charge	Q_{gd}		0.86		nC	
Source-drain diode						
Diode forward voltage(*)	V_{SD}		0.85	0.95	V	$T_j = 25^{\circ}\text{C}$, $I_S = 2.8\text{A}$, $V_{GS} = 0\text{V}$
Reverse recovery time(‡)	t_{rr}		21.5		ns	$T_j = 25^{\circ}\text{C}$, $I_S = 2.5\text{A}$, $di/dt = 100\text{A}/\mu\text{s}$
Reverse recovery charge(‡)	Q_{rr}		20.5		nC	

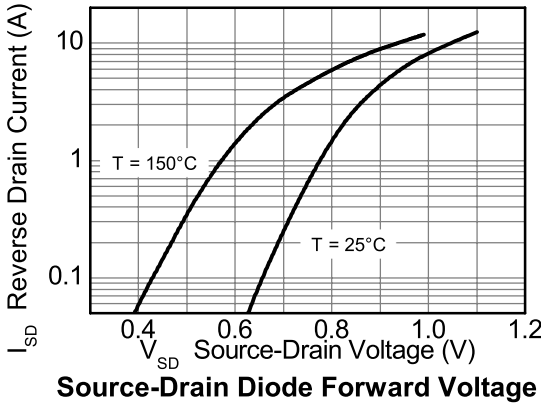
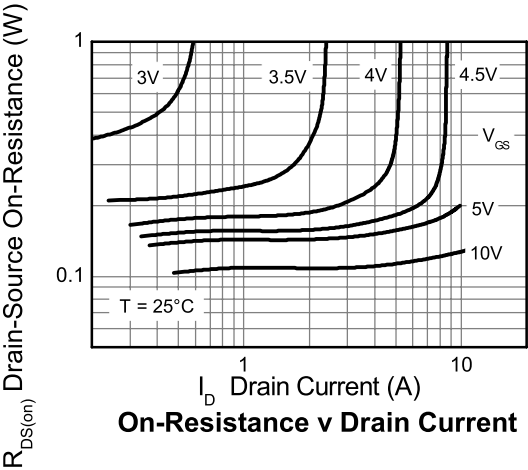
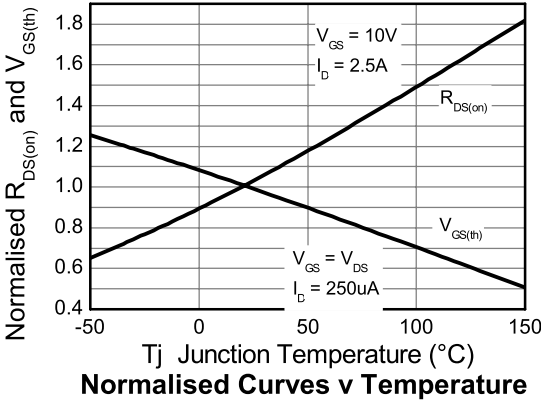
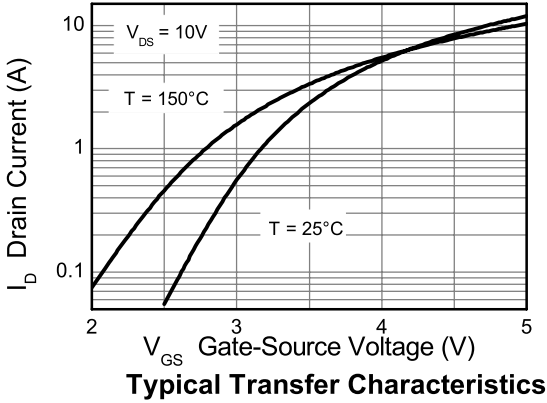
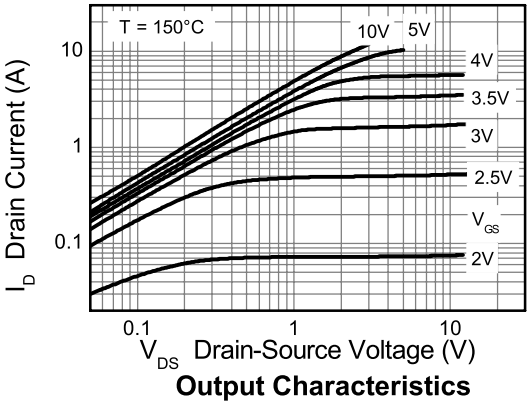
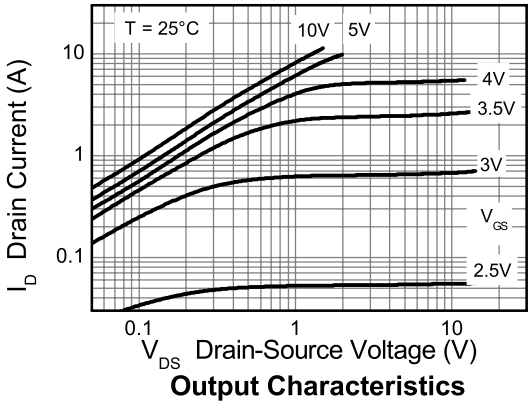
NOTES:

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

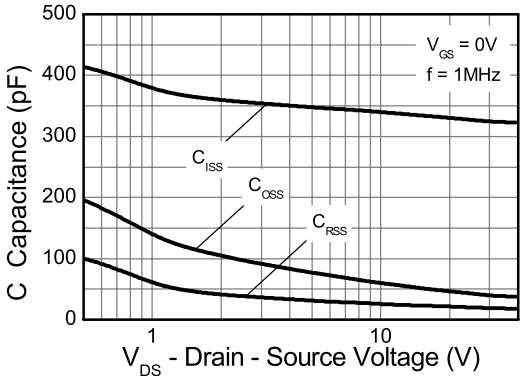
(†) Switching characteristics are independent of operating junction temperature.

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

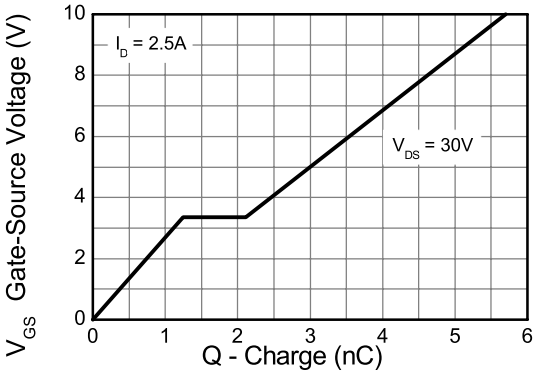
Typical characteristics



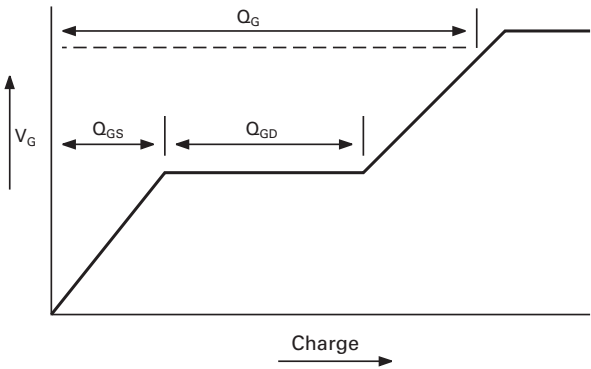
Typical characteristics



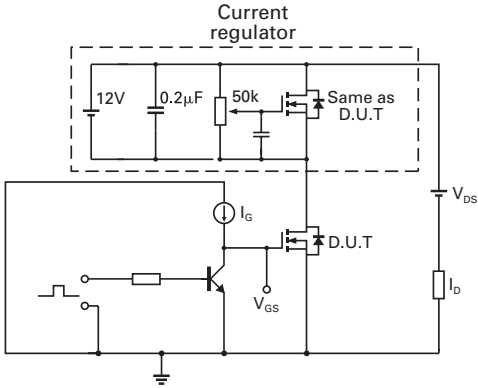
Capacitance v Drain-Source Voltage



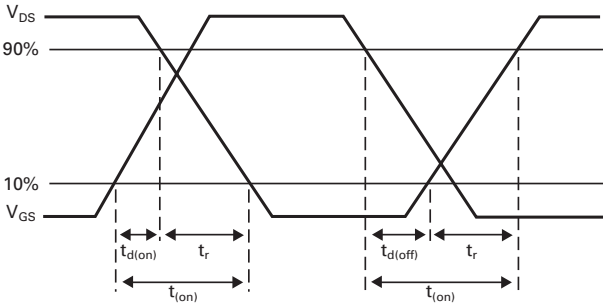
Gate-Source Voltage v Gate Charge



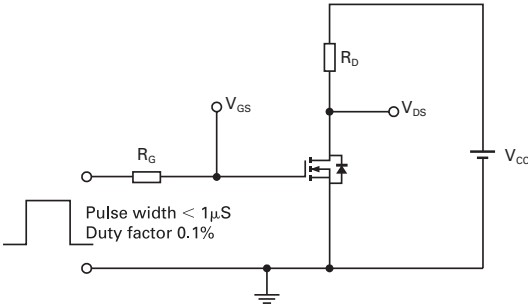
Basic gate charge waveform



Gate charge test circuit



Switching time waveforms



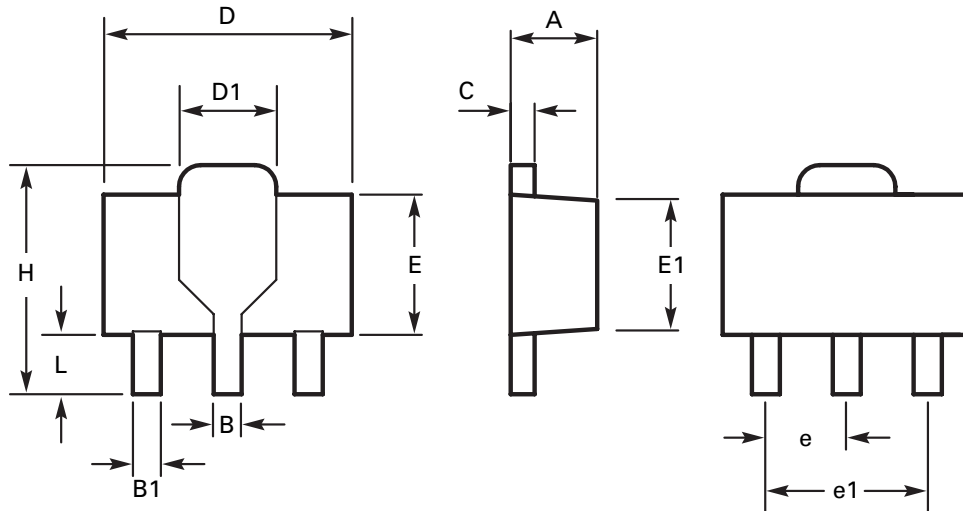
Switching time test circuit

ZXMN6A11Z

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ZXMN6A11Z

Package outline - SOT89



DIM	Millimeters		Inches		DIM	Millimeters		Inches	
	Min	Max	Min	Max		Min	Max	Min	Max
A	1.40	1.60	0.550	0.630	E	2.29	2.60	0.090	0.102
B	0.44	0.56	0.017	0.022	E1	2.13	2.29	0.084	0.090
B1	0.36	0.48	0.014	0.019	e	1.50 BSC		0.059 BSC	
C	0.35	0.44	0.014	0.017	e1	3.00 BSC		0.118 BSC	
D	4.40	4.60	0.173	0.181	H	3.94	4.25	0.155	0.167
D1	1.52	1.83	0.064	0.072	L	0.89	1.20	0.035	0.047

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

Europe

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

Americas

Zetex Inc
700 Veterans Memorial Highway
Hauppauge, NY 11788
USA
Telephone: (1) 631 360 2222
Fax: (1) 631 360 8222
usa.sales@zetex.com

Asia Pacific

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

Corporate Headquarters

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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