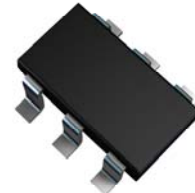


ZXMN2088DE6

20V Dual SOT23-6 N-channel enhancement mode MOSFET with low gate drive capability

Summary

$V_{(BR)DSS}$	$R_{DS(on)}$ (Ω)	I_D (A)
20	0.200 @ $V_{GS}=4.5V$	2.1
	0.240 @ $V_{GS}=2.5V$	1.9
	0.310 @ $V_{GS}=1.8V$	1.7



Description

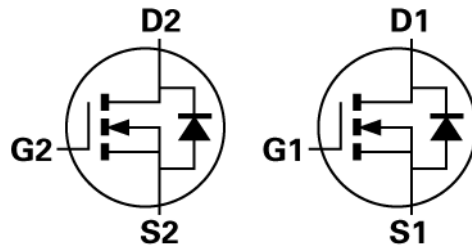
This new generation dual n-channel trench MOSFET from Zetex features low on-resistance achievable with low gate drive.

Features

- Low on-resistance
- Low gate drive capability
- SOT23-6 (dual) package

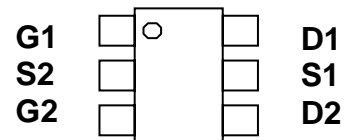
Applications

- Power Management functions
- Disconnect switches
- Relay driving and load switching



Ordering information

Device	Reel size (inches)	Tape width (mm)	Quantity per reel
ZXMN2088DE6TA	7	8	3,000



Pinout – top view

Device marking

2088

Absolute maximum ratings

Parameter	Symbol	Limit	Unit
Drain-Source voltage	V_{DSS}	20	V
Gate-Source voltage	V_{GS}	± 8	V
Continuous Drain current @ $V_{GS}=4.5V$; $T_A=25^\circ C$ ^{(b) (d)} @ $V_{GS}=4.5V$; $T_A=70^\circ C$ ^{(b) (d)} @ $V_{GS}=4.5V$; $T_A=25^\circ C$ ^{(a) (d)}	I_D	2.1 1.7 1.7	A
Pulsed Drain current ^(c)	I_{DM}	8	A
Power dissipation at $T_A=25^\circ C$ ^{(a) (d)} Linear derating factor	P_D	0.9 7.2	W mW/ $^\circ C$
Power dissipation at $T_A=25^\circ C$ ^{(a) (e)} Linear derating factor	P_D	1.1 8.8	W mW/ $^\circ C$
Power dissipation at $T_A=25^\circ C$ ^{(b) (d)} Linear derating factor	P_D	1.3 10.4	W mW/ $^\circ C$
Operating and storage temperature range	T_j, T_{stg}	-55 to +150	$^\circ C$

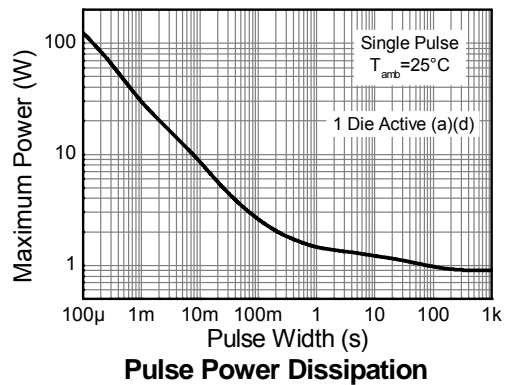
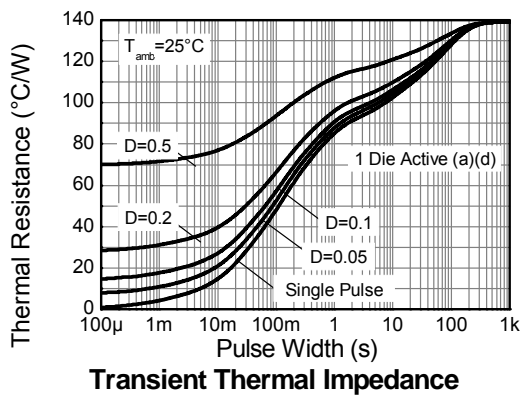
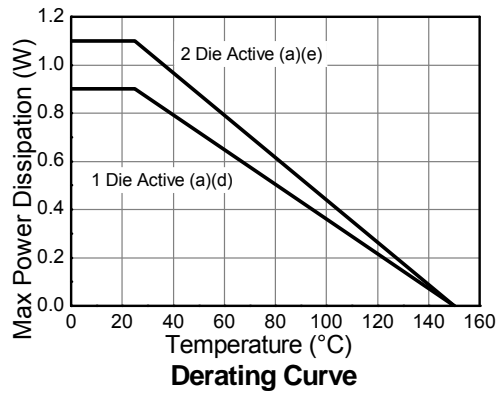
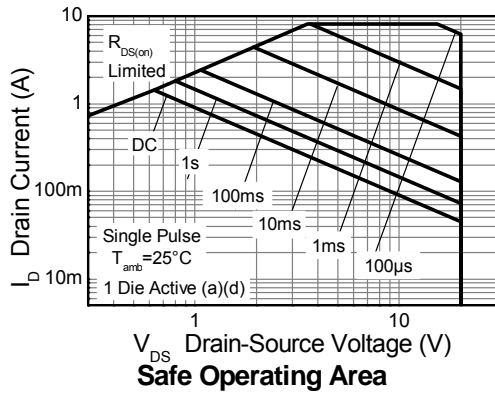
Thermal resistance

Parameter	Symbol	Value	Unit
Junction to Ambient ^{(a) (d)}	$R_{\theta JA}$	139	$^\circ C/W$
Junction to Ambient ^{(a) (e)}	$R_{\theta JA}$	113	$^\circ C/W$
Junction to Ambient ^{(b) (d)}	$R_{\theta JA}$	96	$^\circ C/W$

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) As above measured at $t \leq 5$ sec.
- (c) Repetitive rating - 25mm x 25mm FR4 PCB, $D=0.02$, pulse width 300us – pulse width limited by maximum junction temperature.
- (d) For device with one active die
- (e) For device with two active die running at equal power.

Thermal Characteristics



ZXMN2088DE6

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}			100	nA	$V_{DS} = 3\text{V}$, $V_{GS} = 0\text{V}$
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 ^(*)	$R_{DS(on)}$		112	0.200	Ω	$V_{GS} = 4.5\text{V}$, $I_D = 1.0\text{A}$
			137	0.240	Ω	$V_{GS} = 2.5\text{V}$, $I_D = 0.6\text{A}$
			165	0.310	Ω	$V_{GS} = 1.8\text{V}$, $I_D = 0.3\text{A}$
Forward transconductance ^(*) ^(‡)	g_{fs}		4.6		S	$V_{DS} = 10\text{V}$, $I_D = 1.0\text{A}$
Dynamic ^(‡)						
Input capacitance	C_{iss}		279		pF	$V_{DS} = 10\text{V}$, $V_{GS} = 0\text{V}$ $f = 1\text{MHz}$
Output capacitance	C_{oss}		52		pF	
Reverse transfer capacitance	C_{rss}		29		pF	
Switching ^(†) ^(‡)						
Turn-on-delay time	$t_{d(on)}$		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		3.2		ns	
Turn-off delay time	$t_{d(off)}$		12.7		ns	
Fall time	t_f		6.2		ns	
Gate Charge						
Total Gate charge	Q_g		3.8		nC	$V_{DS} = 10\text{V}$, $V_{GS} = 4.5\text{V}$ $I_D = 2.4\text{A}$
Gate-Source charge	Q_{gs}		0.41		nC	
Gate Drain charge	Q_{gd}		0.56		nC	
Source-drain diode						
Diode forward voltage ^(‡)	V_{SD}		0.75	0.95	V	$T_j = 25^{\circ}\text{C}$, $I_s = 1.0\text{A}$, $V_{GS} = 0\text{V}$
Reverse recovery time	t_{rr}		6.6		ns	$T_j = 25^{\circ}\text{C}$, $I_F = 1.24\text{A}$ $di/dt = 100\text{A}/\mu\text{s}$
Reverse recovery charge	Q_{rr}		1.6		nC	

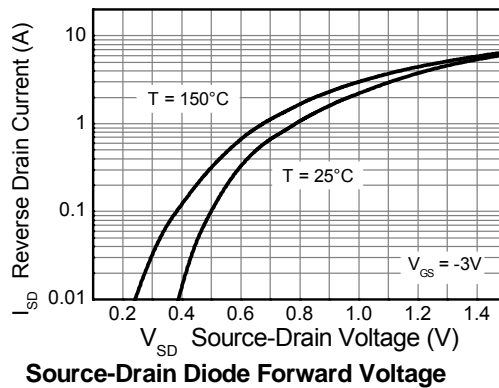
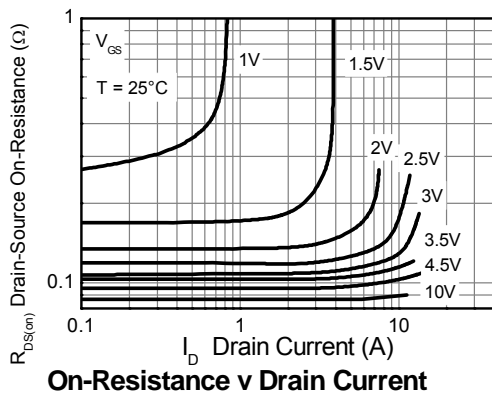
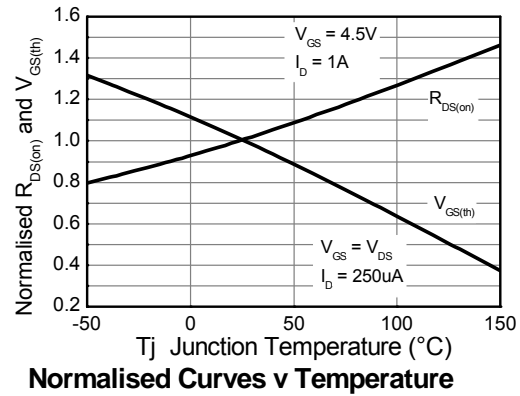
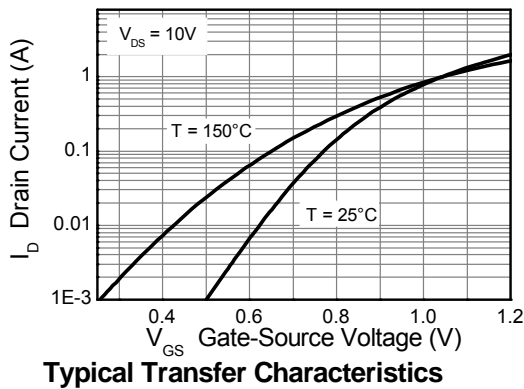
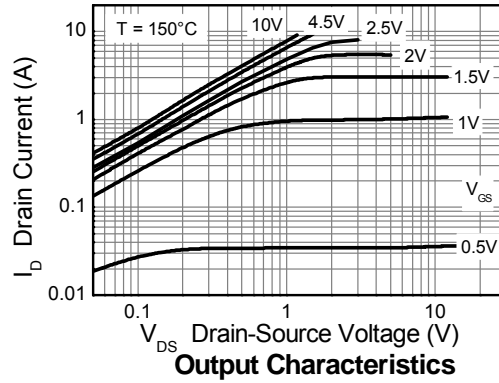
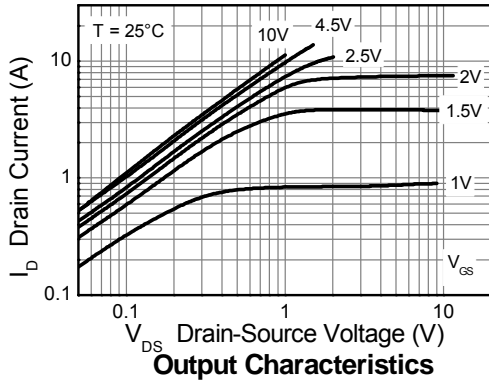
NOTES:

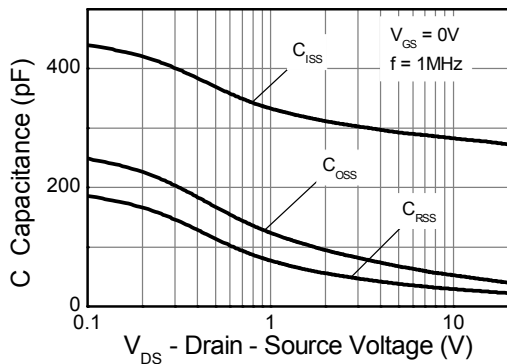
^(*) Measured under pulsed conditions. Pulse width $\leq 300\mu\text{s}$; duty cycle $\leq 2\%$.

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

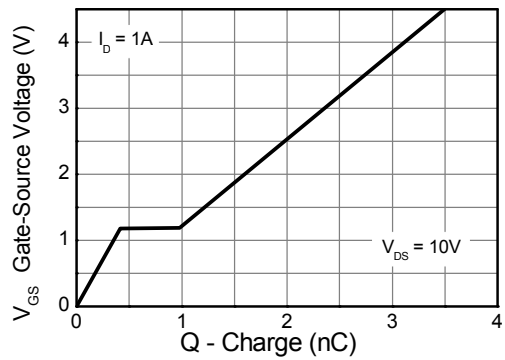
^(‡) For design aid only, not subject to production testing.

Typical Characteristics



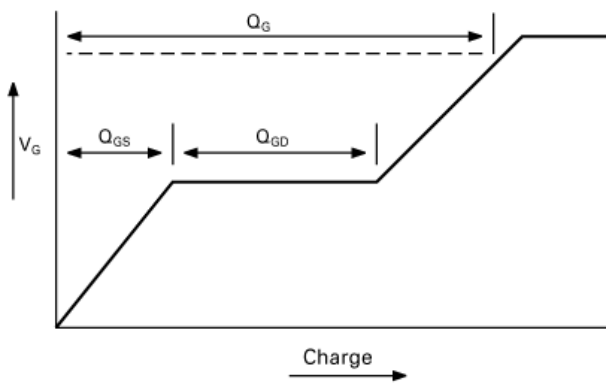


Capacitance v Drain-Source Voltage

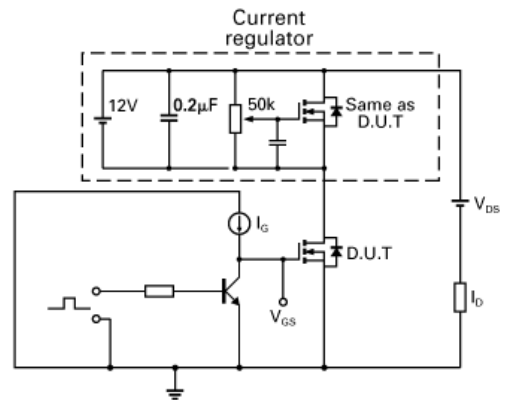


Gate-Source Voltage v Gate Charge

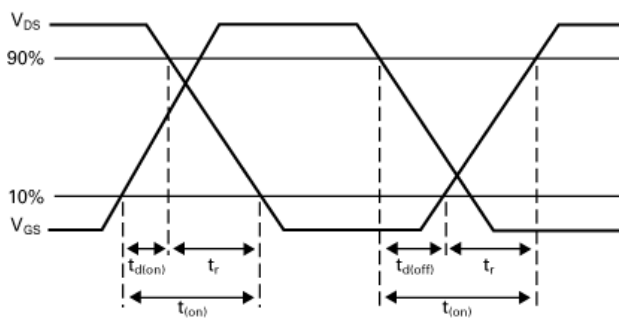
Test Circuits



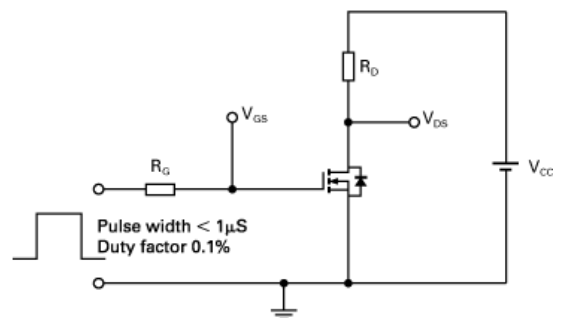
Basic gate charge waveform



Gate charge test circuit



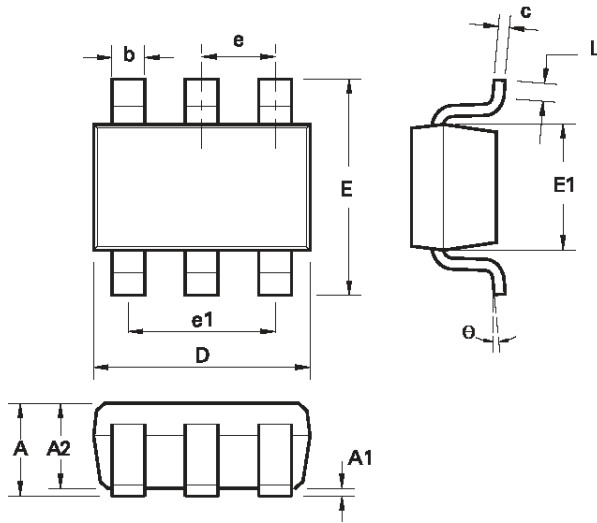
Switching time waveforms



Switching time test circuit

Packaging details – SOT236

Package outline



DIM	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	0.90	1.45	0.354	0.0570
A1	0.00	0.15	0.00	0.0059
A2	0.90	1.30	0.0354	0.0511
b	0.35	0.50	0.0078	0.0196
C	0.09	0.26	0.0035	0.0102
D	2.70	3.10	0.1062	0.1220
E	2.20	3.20	0.0866	0.1181
E1	1.30	1.80	0.0511	0.0708
L	0.10	0.60	0.0039	0.0236
e	0.95 REF		0.0374 REF	
e1	1.90 REF		0.0748 REF	
L	0°	30°	0°	30°

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

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