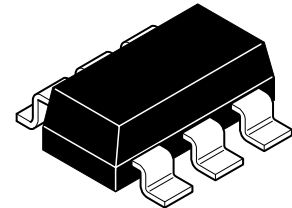


# ZXMN2B03E6

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

### Summary

$V_{(BR)DSS}$	$R_{DS(on)}$ ( $\Omega$ )	$I_D$ (A)
20	0.040 @ $V_{GS} = 4.5V$	5.4
	0.055 @ $V_{GS} = 2.5V$	4.6
	0.075 @ $V_{GS} = 1.8V$	4.0



### Description

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

### Features

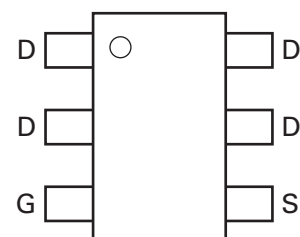
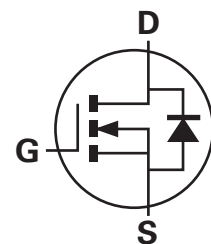
- Low on-resistance
- Fast switching speed
- Low gate drive capability
- SOT23-6 package

### Applications

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

### Ordering information

Device	Reel size (inches)	Tape width (mm)	Quantity per reel
ZXMN2B03E6TA	7	8	3,000



Top view

### Device marking

2B3

# ZXMN2B03E6

## 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 @ $V_{GS} = 4.5V$ ; $T_{amb} = 25^{\circ}C^{(b)}$	$I_D$	5.4	A
@ $V_{GS} = 4.5V$ ; $T_{amb} = 70^{\circ}C^{(b)}$		4.3	
@ $V_{GS} = 4.5V$ ; $T_{amb} = 25^{\circ}C^{(a)}$		4.3	
Pulsed drain current <sup>(c)</sup>	$I_{DM}$	26	A
Continuous source current (body diode) <sup>(b)</sup>	$I_S$	2.8	A
Pulsed source current (body diode) <sup>(c)</sup>	$I_{SM}$	26	A
Power dissipation at $T_{amb} = 25^{\circ}C^{(a)}$	$P_D$	1.1	W
Linear derating factor		8.8	mW/ $^{\circ}C$
Power dissipation at $T_{amb} = 25^{\circ}C^{(b)}$	$P_D$	1.7	W
Linear derating factor		13.7	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 <sup>(a)</sup>	$R_{\theta JA}$	113	$^{\circ}C/W$
Junction to ambient <sup>(b)</sup>	$R_{\theta JA}$	73	$^{\circ}C/W$

### NOTES:

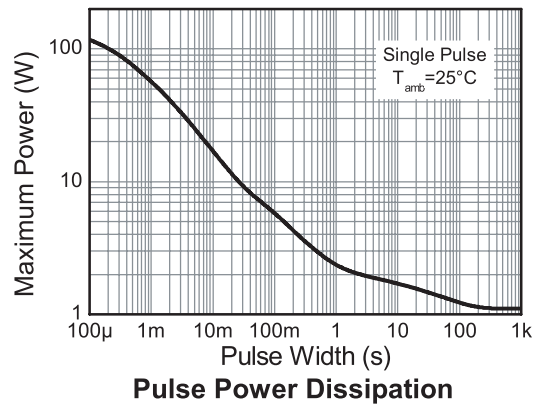
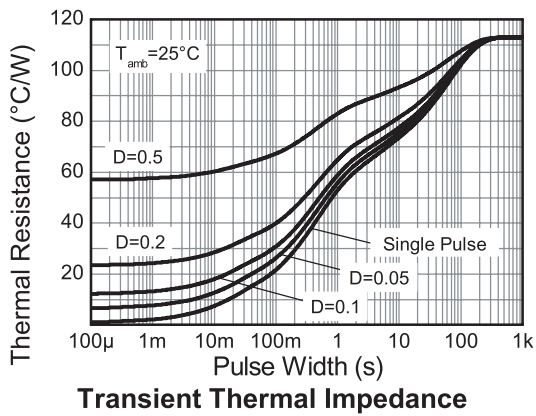
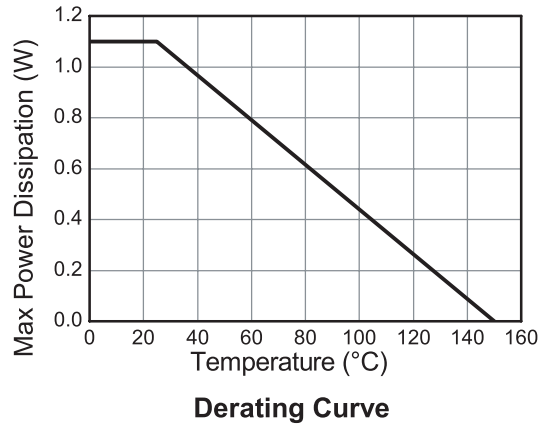
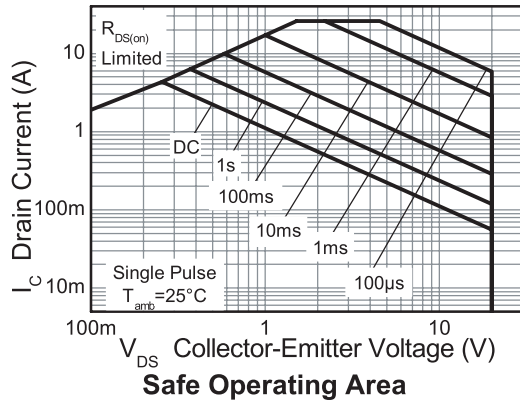
(a) For a device surface mounted on 25mm x 25mm FR4 PCB with high coverage of single sided 1oz copper, in still air conditions.

(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.

# ZXMN2B03E6

## Thermal characteristics



# ZXMN2B03E6

## 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 (*)	$R_{DS(on)}$			0.040	$\Omega$	$V_{GS} = 4.5\text{V}$ , $I_D = 4.3\text{A}$
				0.055	$\Omega$	$V_{GS} = 2.5\text{V}$ , $I_D = 3.7\text{A}$
				0.075	$\Omega$	$V_{GS} = 1.8\text{V}$ , $I_D = 3.2\text{A}$
Forward transconductance(*) (‡)	$g_{fs}$		13.5		S	$V_{DS} = 10\text{V}$ , $I_D = 4.3\text{A}$
<b>Dynamic(‡)</b>						
Input capacitance	$C_{iss}$		1160		pF	$V_{DS} = 10\text{V}$ , $V_{GS} = 0\text{V}$ $f = 1\text{MHz}$
Output capacitance	$C_{oss}$		210		pF	
Reverse transfer capacitance	$C_{rss}$		136		pF	
<b>Switching (†) (‡)</b>						
Turn-on-delay time	$t_{d(on)}$		4.2		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	$t_r$		6.2		ns	
Turn-off delay time	$t_{d(off)}$		33.9		ns	
Fall time	$t_f$		12.4		ns	
Total gate charge	$Q_g$		14.5		nC	$V_{DS} = 10\text{V}$ , $V_{GS} = 4.5\text{V}$ $I_D = 4.3\text{A}$
Gate-source charge	$Q_{gs}$		2		nC	
Gate drain charge	$Q_{gd}$		2.8		nC	
<b>Source-drain diode</b>						
Diode forward voltage(*)	$V_{SD}$		0.67	0.95	V	$T_j = 25^{\circ}\text{C}$ , $I_S = 1.8\text{A}$ , $V_{GS} = 0\text{V}$
Reverse recovery time(‡)	$t_{rr}$		10.8		ns	$T_j = 25^{\circ}\text{C}$ , $I_F = 2.8\text{A}$ , $di/dt = 100\text{A}/\mu\text{s}$
Reverse recovery charge(‡)	$Q_{rr}$		3.4		nC	

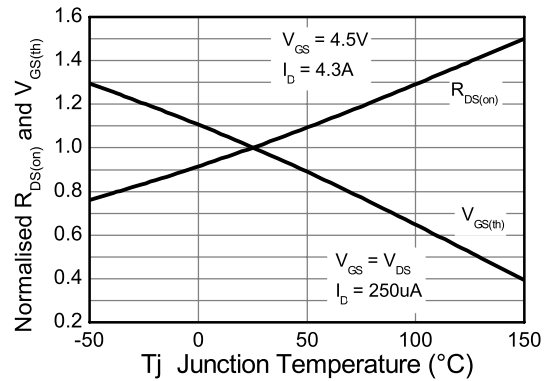
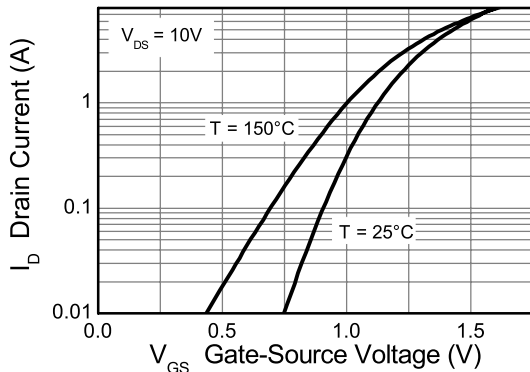
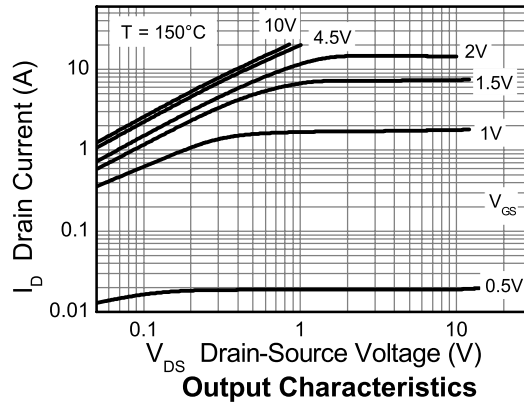
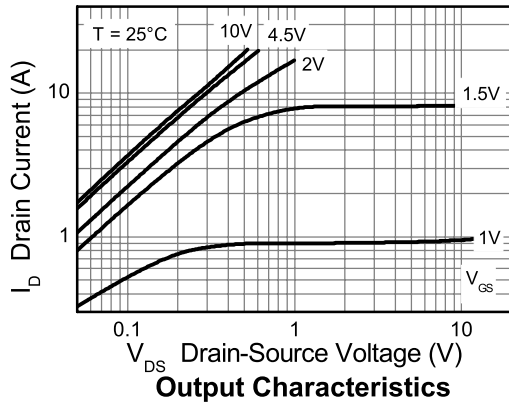
### NOTES:

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

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

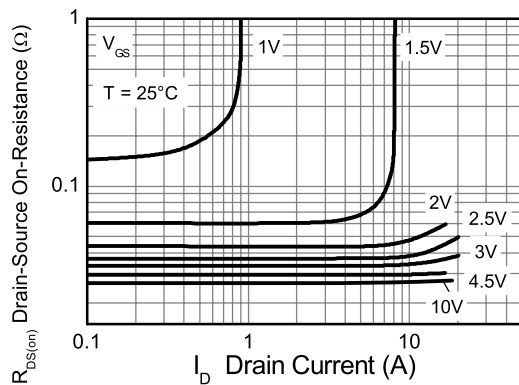
(‡) For design aid only, not subject to production testing.

## Typical characteristics

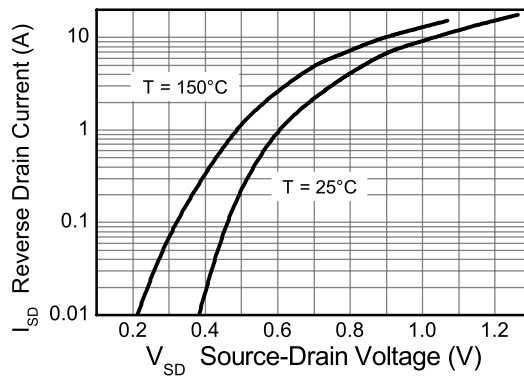


**Typical Transfer Characteristics**

**Normalised Curves v Temperature**

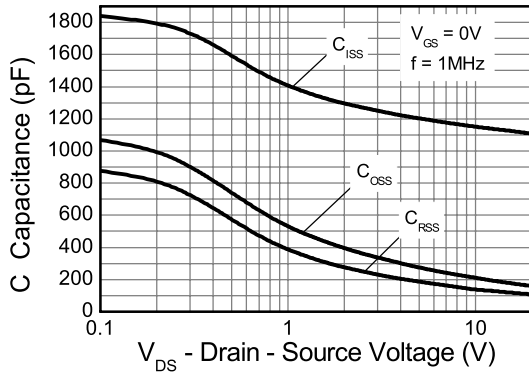


**On-Resistance v Drain Current**

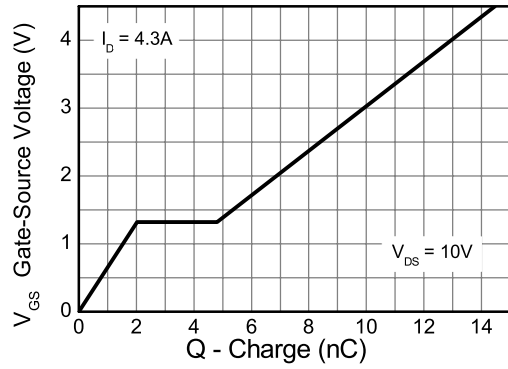


**Source-Drain Diode Forward Voltage**

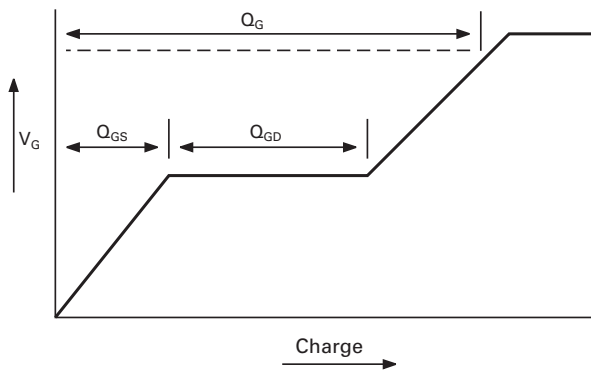
## Typical characteristics



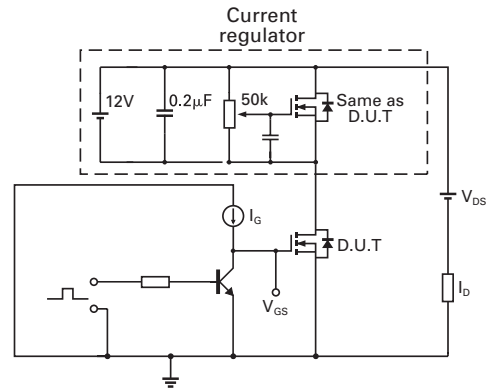
Capacitance v Drain-Source Voltage



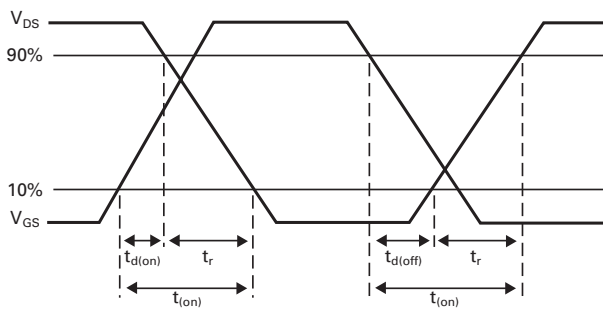
Gate-Source Voltage v Gate Charge



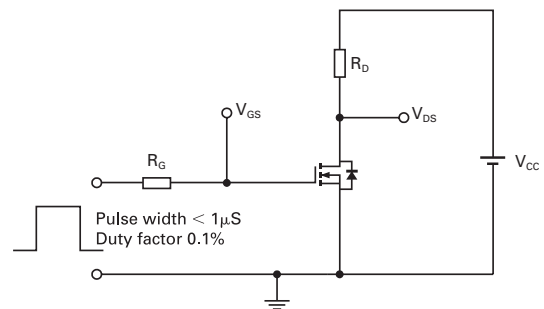
Basic gate charge waveform



Gate charge test circuit



Switching time waveforms



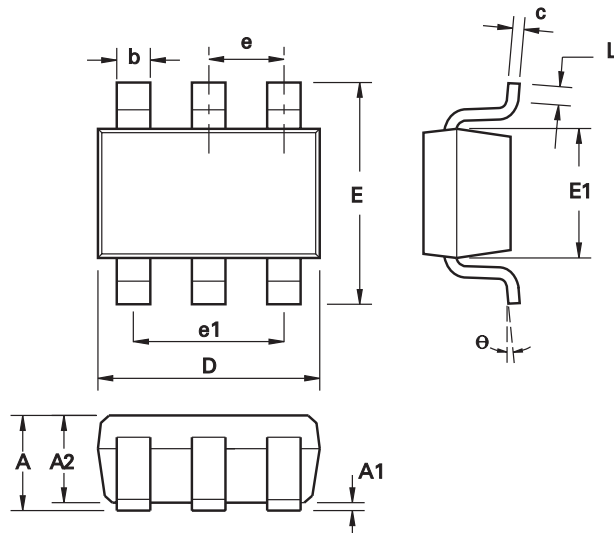
Switching time test circuit

# ZXMN2B03E6

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# ZXMN2B03E6

## Package outline - SOT23-6



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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