



YOUSHANG SEMICONDUCTOR

设计研发新型功率器件

各类小信号开关

中低压及高压大电流等场效应管

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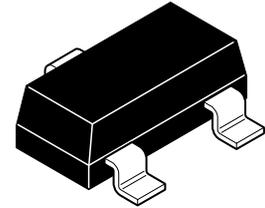
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Summary

$V_{(BR)DSS}$	$R_{DS(on)}$ (Ω)	I_D (A)
20	0.055 @ $V_{GS} = 4.5V$	4.3
	0.075 @ $V_{GS} = 2.5V$	3.7
	0.100 @ $V_{GS} = 1.8V$	3.2



Description

This new generation of trench MOSFETs 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

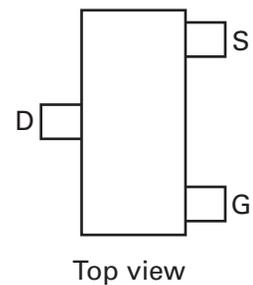
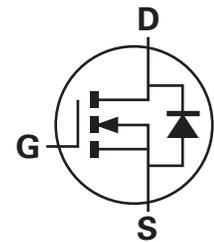
- DC-DC converters
- Power management functions
- Disconnect switches
- Motor control

Ordering information

Device	Reel size (inches)	Tape width (mm)	Quantity per reel
NK-ZXMN2B14FHTA	7	8	3,000

Device marking

2B4



Absolute maximum ratings

Parameter	Symbol	Limit	Unit
Drain-source voltage	V_{DSS}	20	V
Gate-source voltage	V_{GS}	± 8	V
Continuous drain current	I_D	@ $V_{GS} = 4.5V$; $T_{amb} = 25^{\circ}C$ (b)	4.3
		@ $V_{GS} = 4.5V$; $T_{amb} = 70^{\circ}C$ (b)	3.5
		@ $V_{GS} = 4.5V$; $T_{amb} = 25^{\circ}C$ (a)	3.5
Pulsed drain current (c)	I_{DM}	21	A
Continuous source current (body diode) (b)	I_S	2.4	A
Pulsed source current (body diode) (c)	I_{SM}	21	A
Power dissipation at $T_{amb} = 25^{\circ}C$ (a)	P_D	1	W
Linear derating factor		8	mW/ $^{\circ}C$
Power dissipation at $T_{amb} = 25^{\circ}C$ (b)	P_D	1.5	W
Linear derating factor		12	mW/ $^{\circ}C$
Operating and storage temperature range	T_{j}, T_{stg}	-55 to +150	$^{\circ}C$

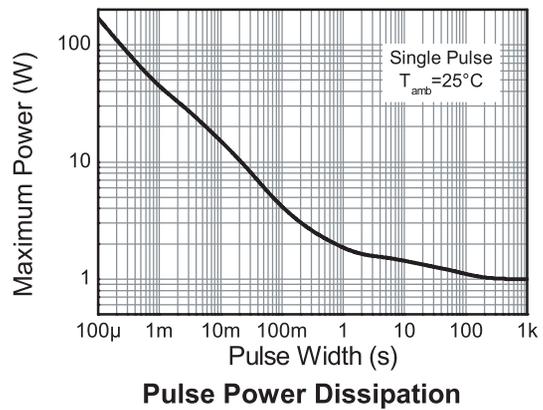
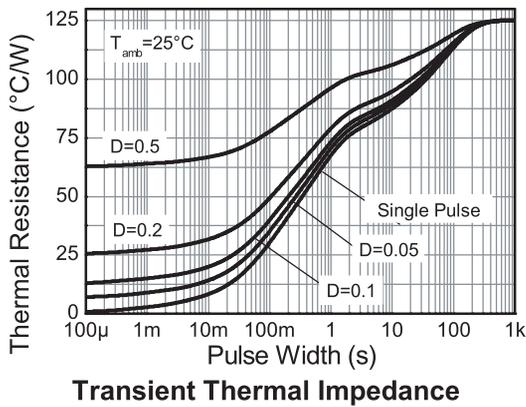
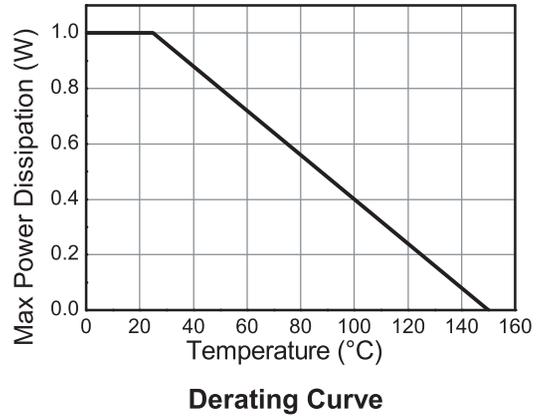
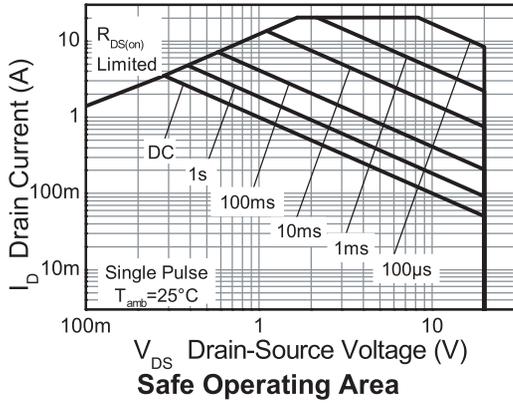
Thermal resistance

Parameter	Symbol	Limit	Unit
Junction to ambient	$R_{\theta JA}$	125	$^{\circ}C/W$
Junction to ambient	$R_{\theta JA}$	82	$^{\circ}C/W$

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 μ s - pulse width limited by maximum junction temperature.

Thermal characteristics



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 ^(*)	$R_{DS(on)}$			0.055	Ω	$V_{GS} = 4.5\text{V}, I_D = 3.5\text{A}$
				0.075	Ω	$V_{GS} = 2.5\text{V}, I_D = 3\text{A}$
				0.100	Ω	$V_{GS} = 1.8\text{V}, I_D = 2.6\text{A}$
Forward transconductance ^(*) (‡)	g_{fs}		11		S	$V_{DS} = 10\text{V}, I_D = 3.5\text{A}$
Dynamic^(‡)						
Input capacitance	C_{iss}		872		pF	$V_{DS} = 10\text{V}, V_{GS} = 0\text{V}$ $f = 1\text{MHz}$
Output capacitance	C_{oss}		145		pF	
Reverse transfer capacitance	C_{rss}		90		pF	
Switching^(†) (‡)						
Turn-on-delay time	$t_{d(on)}$		3.7		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		5.2		ns	
Turn-off delay time	$t_{d(off)}$		30		ns	
Fall time	t_f		5.5		ns	
Total gate charge	Q_g		11		nC	$V_{DS} = 10\text{V}, V_{GS} = 4.5\text{V}$ $I_D = 4.0\text{A}$
Gate-source charge	Q_{gs}		1.4		nC	
Gate drain charge	Q_{gd}		2.1		nC	
Source-drain diode						
Diode forward voltage ^(*)	V_{SD}		0.69	0.95	V	$T_j = 25^{\circ}\text{C}, I_S = 1.45\text{A}, V_{GS} = 0\text{V}$
Reverse recovery time ^(‡)	t_{rr}		9.4		ns	$T_j = 25^{\circ}\text{C}, I_F = 2.4\text{A}, di/dt = 100\text{A}/\mu\text{s}$
Reverse recovery charge ^(‡)	Q_{rr}		2.8		nC	

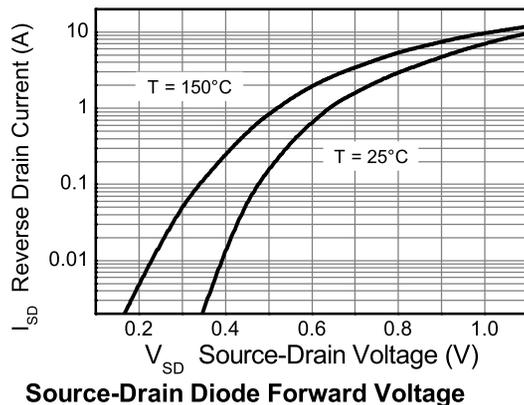
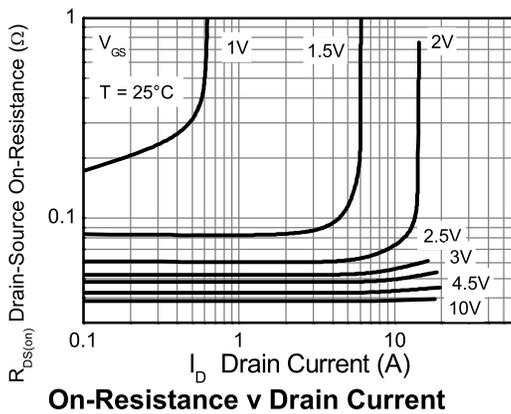
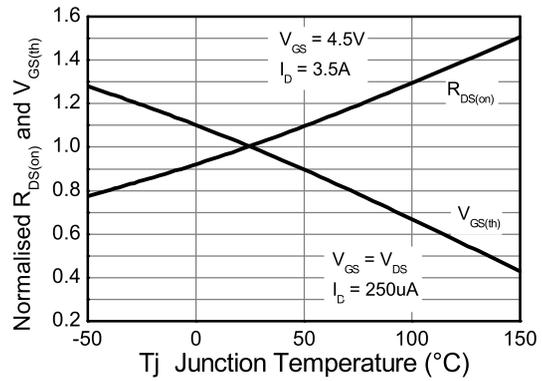
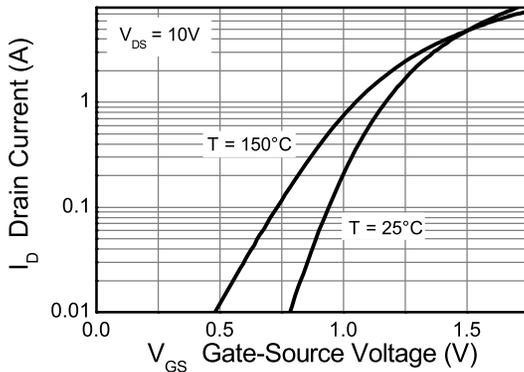
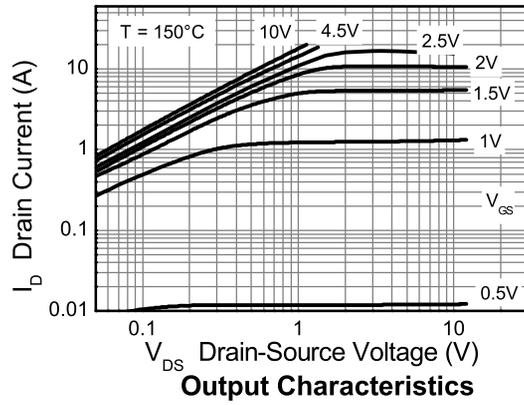
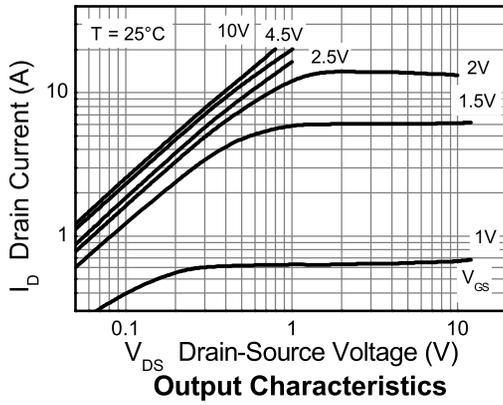
NOTES:

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

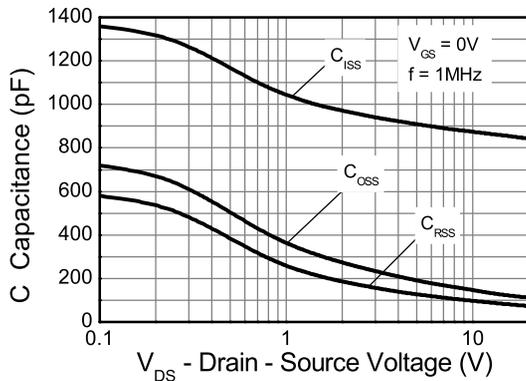
(†) Switching characteristics are independent of operating junction temperature.

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

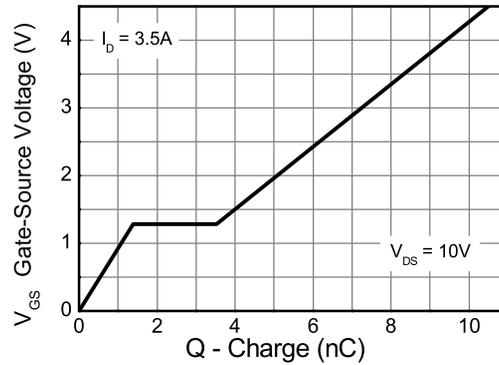
Typical characteristics



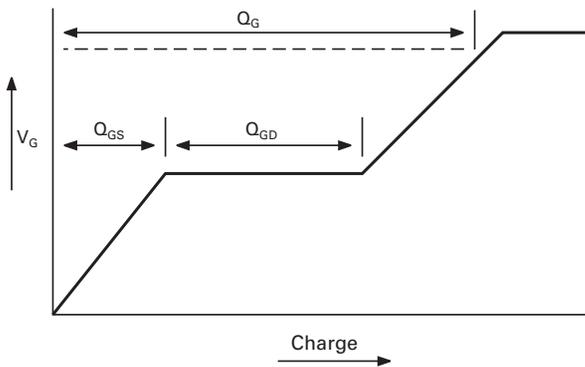
Typical characteristics



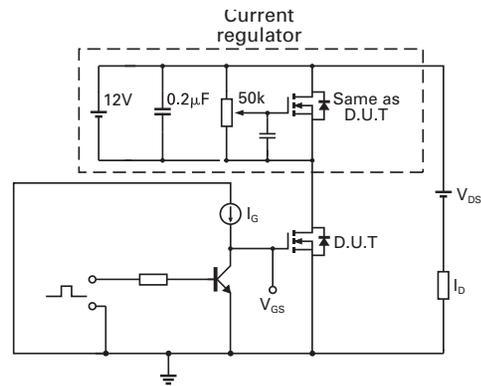
Capacitance v Drain-Source Voltage



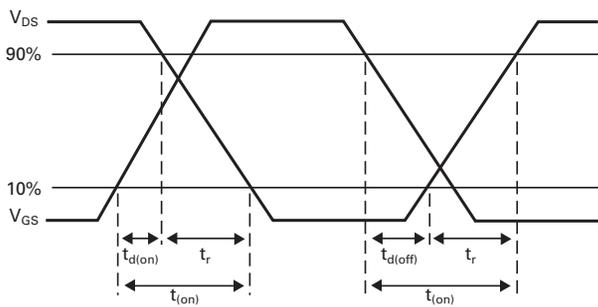
Gate-Source Voltage v Gate Charge



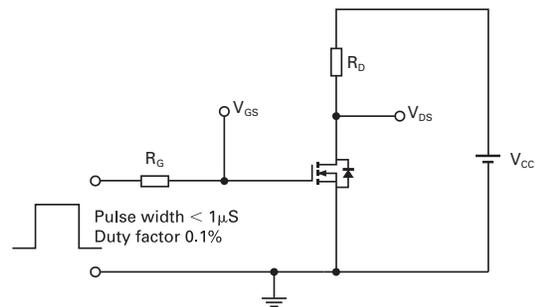
Basic gate charge waveform



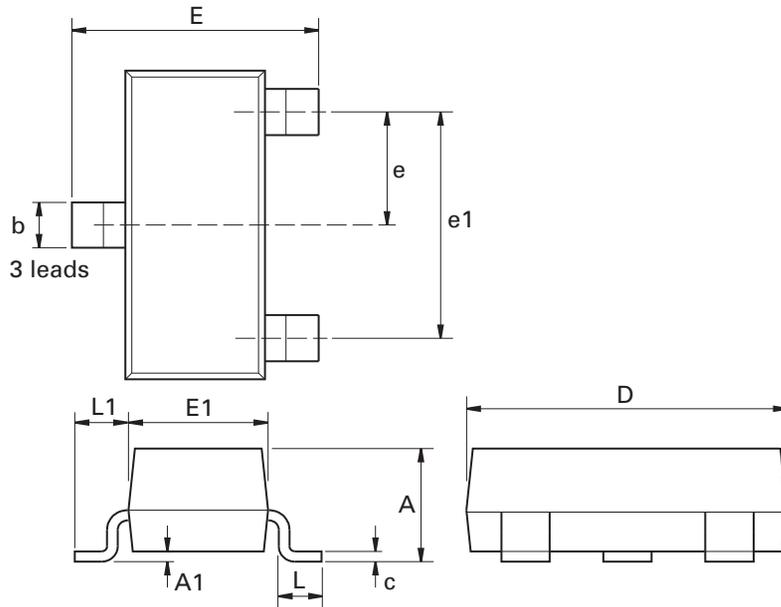
Gate charge test circuit



Switching time waveforms



Switching time test circuit

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