



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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Summary

$V_{(BR)DSS}$	$R_{DS(on)}$ (Ω)	I_D (A)
30	0.047 @ $V_{GS}= 10V$	4.6
	0.065 @ $V_{GS}= 4.5V$	4.0



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
- SOT23

Applications

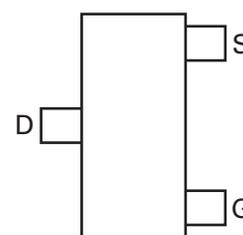
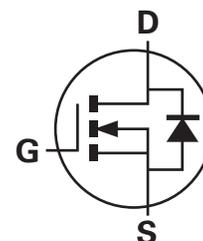
- DC-DC Converters
- Power management functions
- Motor Control

Ordering information

DEVICE	Reel size (inches)	Tape width (mm)	Quantity per reel
NK-ZXMN3F30FHTA	7	8	3000

Device marking

KNA



Top view

Absolute maximum ratings

Parameter	Symbol	Limit	Unit
Drain source voltage	V_{DSS}	30	V
Gate source voltage	V_{GS}	± 20	V
Continuous Drain Current @ $V_{GS}=4.5$; $T_A=25^{\circ}C^{(b)}$ @ $V_{GS}=4.5$; $T_A=70^{\circ}C^{(b)}$ @ $V_{GS}=4.5$; $T_A=25^{\circ}C^{(a)}$	I_D	4.6	A
		3.7	A
		3.8	A
Pulsed drain current ^(c)	I_{DM}	21	A
Continuous source current (body diode) ^(b)	I_S	2.2	A
Pulsed source current (body diode) ^(c)	I_{SM}	21	A
Power dissipation at $T_A = 25^{\circ}C^{(a)}$	P_D	0.95	W
Linear derating factor		7.6	mW/ $^{\circ}C$
Power dissipation at $T_A = 25^{\circ}C^{(b)}$	P_D	1.4	W
Linear derating factor		11.2	mW/ $^{\circ}C$
Operating and storage temperature range	T_{j}, T_{stg}	-55 to 150	$^{\circ}C$

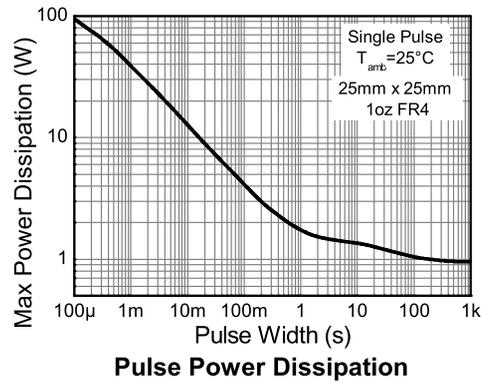
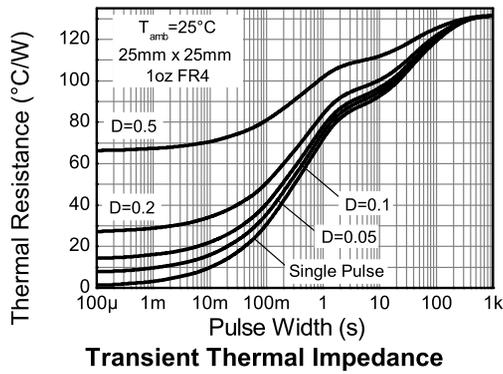
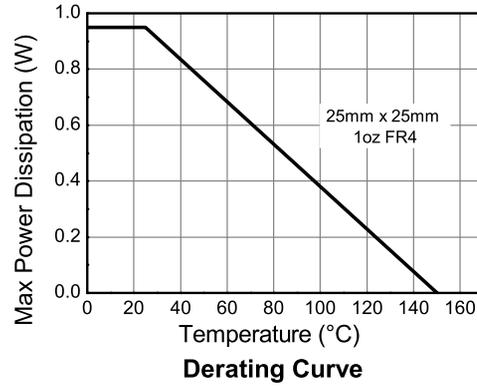
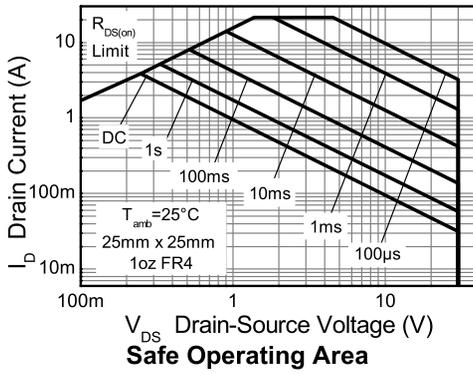
Thermal resistance

Parameter	Symbol	Limit	Unit
Junction to ambient ^(a)	$R_{\theta JA}$	131	$^{\circ}C/W$
Junction to ambient ^(b)	$R_{\theta JA}$	89	$^{\circ}C/W$
Junction to lead ^(d)	$R_{\theta JL}$	68	$^{\circ}C/W$

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 μs - pulse width limited by maximum junction temperature.
- (d) Thermal resistance from junction to solder-point (at the end of the drain lead).

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	$V_{(BR)DSS}$	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 ^(*)	$R_{DS(on)}$			0.047 0.065	Ω Ω	$V_{GS} = 10\text{V}, I_D = 3.2\text{A}$ $V_{GS} = 4.5\text{V}, I_D = 2.8\text{A}$
Forward transconductance ^{(*)(†)}	g_{fs}		5.2		S	$V_{DS} = 15\text{V}, I_D = 2.5\text{A}$
Dynamic^(†)						
Input capacitance	C_{iss}		318		pF	$V_{DS} = 15\text{V}, V_{GS} = 0\text{V}$ $f = 1\text{MHz}$
Output capacitance	C_{oss}		75		pF	
Reverse transfer capacitance	C_{rss}		45		pF	
Switching^(†) (‡)						
Turn-on-delay time	$t_{d(on)}$		1.6		ns	$V_{DD} = 15\text{V}, V_{GS} = 10\text{V}$ $I_D = 1\text{A}$ $R_G \approx 6.0\Omega$
Rise time	t_r		2.6		ns	
Turn-off delay time	$t_{d(off)}$		17		ns	
Fall time	t_f		9.3		ns	
Total gatecharge	Q_g		7.7		nC	$V_{DS} = 15\text{V}, V_{GS} = 10\text{V}$ $I_D = 2.5\text{A}$
Gate-Source charge	Q_{gs}		1		nC	
Gate-Drain charge	Q_{gd}		1.8		nC	
Source-drain diode						
Diode forward voltage ^(*)	V_{SD}		0.73	1.2	V	$I_S = 1.25\text{A}, V_{GS} = 0\text{V}$
Reverse recovery time ^(†)	t_{rr}		12		ns	$T_j = 25^{\circ}\text{C}, I_F = 1.6\text{A}$ $di/dt = 100\text{A}/\mu\text{s}$
Reverse recovery charge ^(†)	Q_{rr}		4.8		nC	

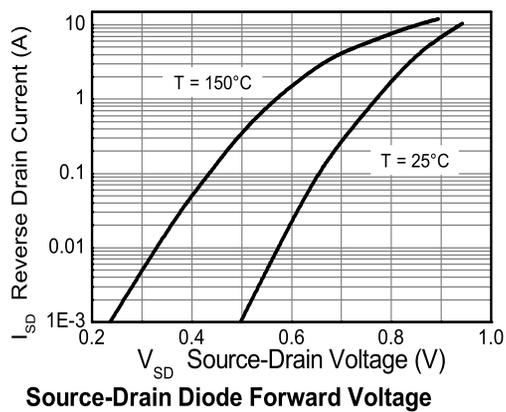
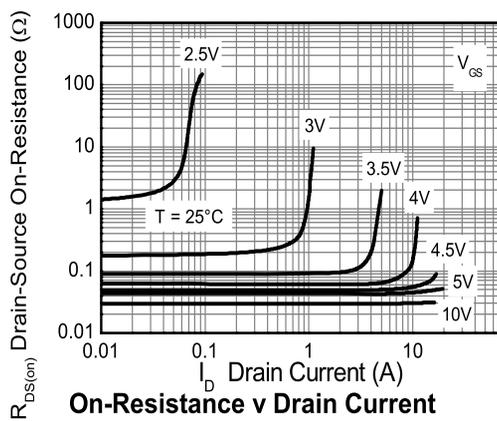
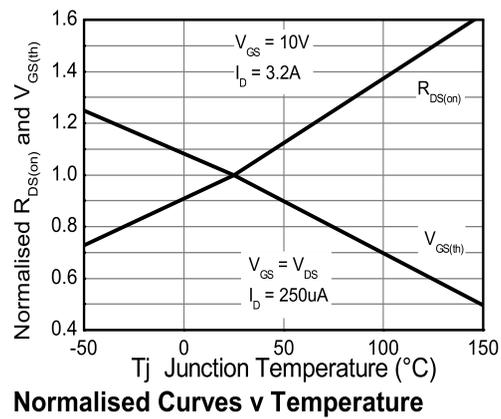
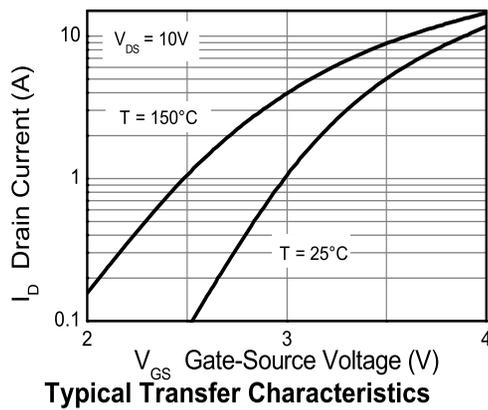
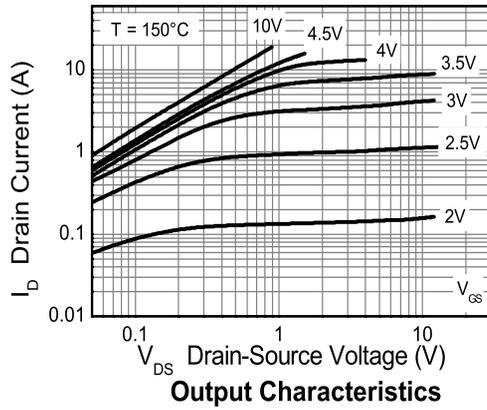
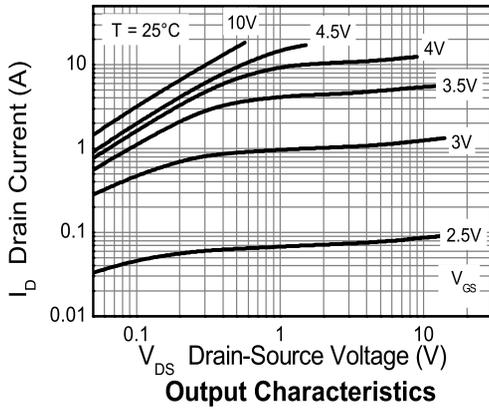
NOTES:

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

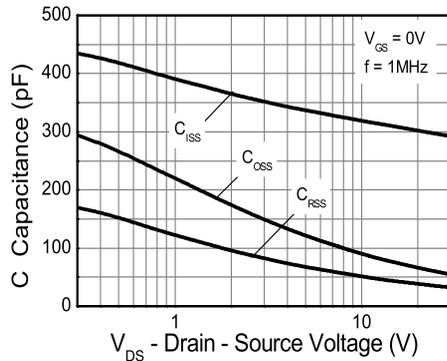
(†) For design aid only, not subject to production testing.

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

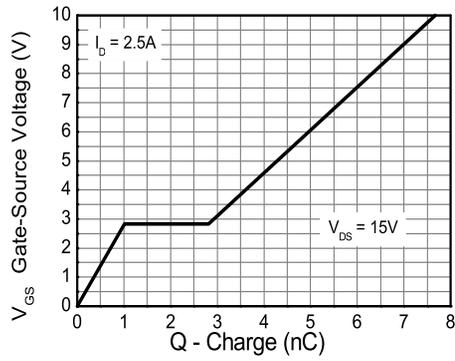
Typical characteristics



Typical characteristics

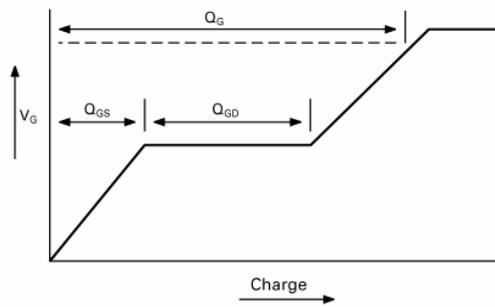


Capacitance v Drain-Source Voltage

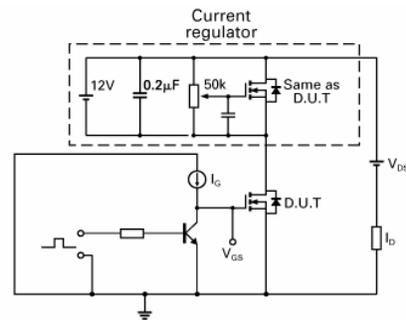


Gate-Source Voltage v Gate Charge

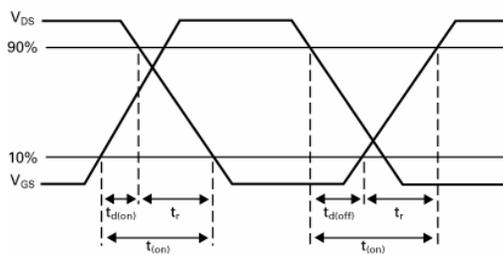
Test circuits



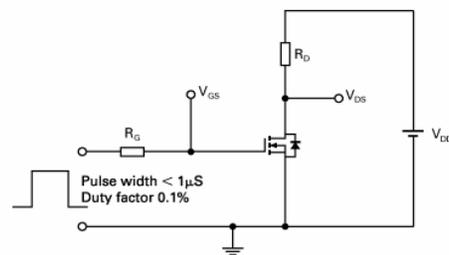
Basic gate charge waveform



Gate charge test circuit

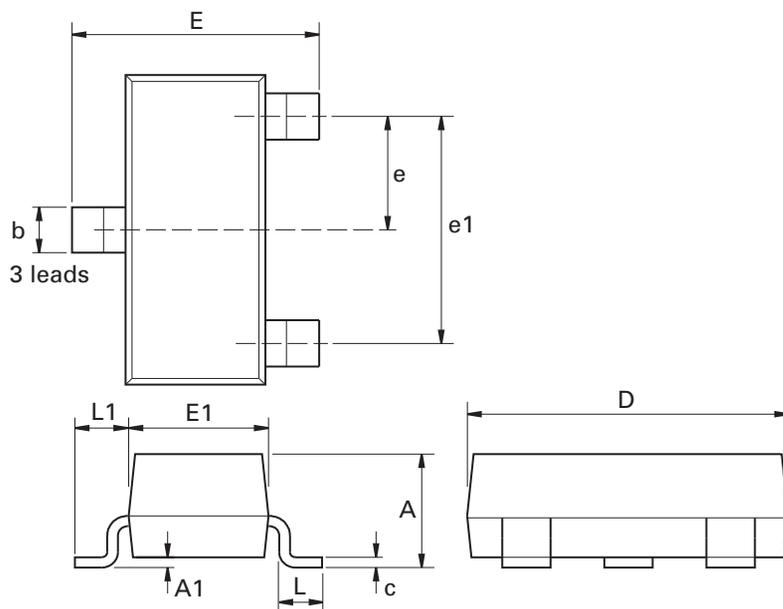


Switching time waveforms



Switching time test circuit

Package outline - SOT23



Dim.	Millimeters		Inches		Dim.	Millimeters		Inches	
	Min.	Max.	Min.	Max.		Min.	Max.	Min.	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	0.20	0.003	0.008	L	0.25	0.60	0.0098	0.0236
D	2.80	3.04	0.110	0.120	L1	0.45	0.62	0.018	0.024
e	0.95 NOM		0.037 NOM		-	-	-	-	-

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