



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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企业微信二维码



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Summary

$V_{(BR)DSS} = -40V$; $R_{DS(ON)} = 0.05\Omega$; $I_D = 10.9A$

Description

This new generation of trench MOSFETs from Zetex utilizes a unique structure that combines the benefits of low on-resistance with fast switching speed. This makes them ideal for high efficiency, low voltage, power management applications.

Features

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

Applications

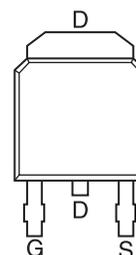
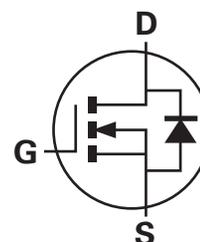
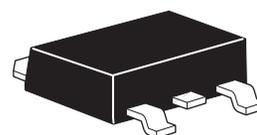
- DC - DC converters
- Audio output stages
- Relay and solenoid driving
- Motor control

Ordering information

Device	Reel size (inches)	Tape width (mm)	Quantity per reel
NK-ZXMN4A06KTC	13	16	2,500

Device marking

NK-ZXMN
4A06



Pinout - Top view

Absolute maximum ratings

Parameter	Symbol	Limit	Unit
Drain-source voltage	V_{DSS}	40	V
Gate-source voltage	V_{GS}	± 20	V
Continuous drain current: $V_{GS}=10V$; $T_A=25^{\circ}C$ ^(b) $V_{GS}=10V$; $T_A=70^{\circ}C$ ^(b) $V_{GS}=10V$; $T_A=25^{\circ}C$ ^(a)	I_D	10.9	A
		8.7	A
		7.2	A
Pulsed drain current ^(c)	I_{DM}	35.3	A
Continuous source current (body diode) ^(b)	I_S	10.8	A
Pulsed source current (body diode) ^(c)	I_{SM}	35.3	A
Power dissipation at $T_A=25^{\circ}C$ ^(a) Linear derating factor	P_D	4.2	W
		33.6	mW/ $^{\circ}C$
Power dissipation at $T_A=25^{\circ}C$ ^(b) Linear derating factor	P_D	9.5	W
		76	mW/ $^{\circ}C$
Power dissipation at $T_A=25^{\circ}C$ ^(d) Linear derating factor	P_D	2.15	W
		17.2	mW/ $^{\circ}C$
Operating and storage temperature range	T_j : T_{stg}	-55 to +150	$^{\circ}C$

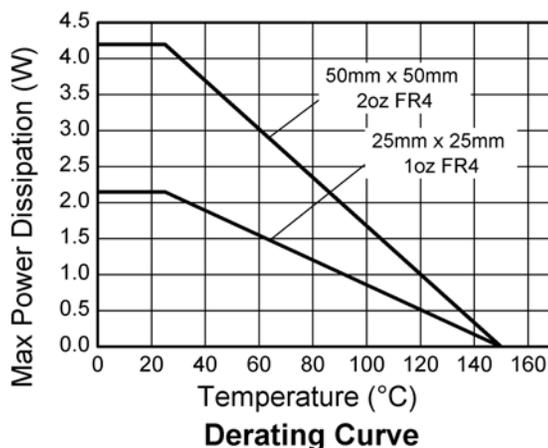
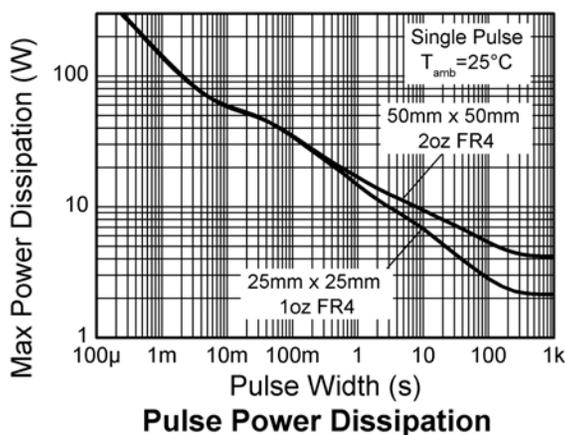
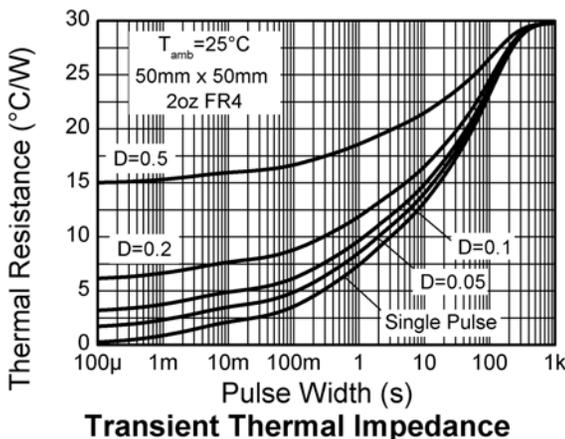
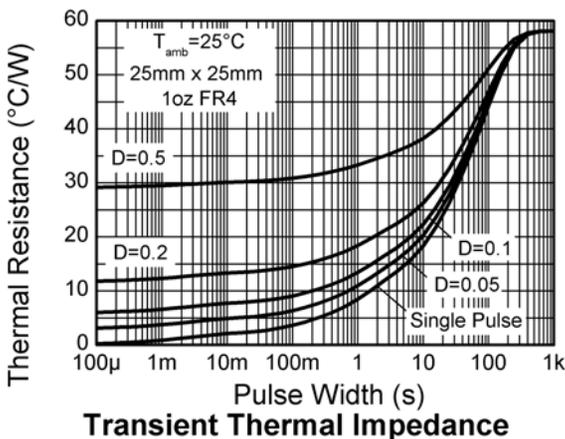
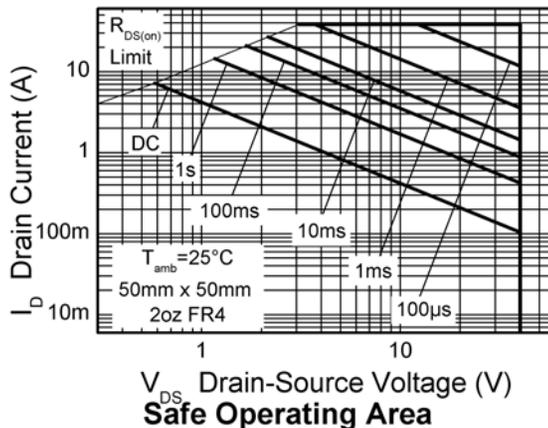
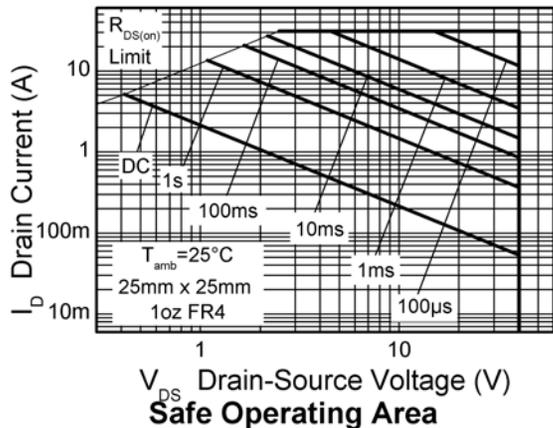
Thermal resistance

Parameter	Symbol	Value	Unit
Junction to ambient ^(a)	$R_{\theta JA}$	30	$^{\circ}C/W$
Junction to ambient ^(b)	$R_{\theta JA}$	13.2	$^{\circ}C/W$
Junction to ambient ^(d)	$R_{\theta JA}$	58	$^{\circ}C/W$

NOTES:

- (a) For a device surface mounted on 50mm x 50mm x 1.6mm FR4 PCB with high coverage of single sided 2oz copper, in still air conditions.
- (b) For a device surface mounted on FR4 PCB measured at $t = 10$ sec.
- (c) Repetitive rating 50mm x 50mm x 1.6mm FR4 PCB, $D=0.02$ pulse width=300 s - pulse width limited by maximum junction temperature.
- (d) For a device surface mounted on 25mm x 25mm x 1.6mm FR4 PCB with high coverage of single sided 1oz copper, in still air conditions.

Characteristics



Electrical characteristics (at $T_A = 25^\circ\text{C}$ unless otherwise stated)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Static						
Drain-source breakdown voltage	$V_{(BR)DSS}$	40			V	$I_D=250\mu\text{A}, V_{GS}=0\text{V}$
Zero gate voltage drain current	I_{DSS}			1	μA	$V_{DS}=40\text{V}, V_{GS}=0\text{V}$
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 ^(*)	$R_{DS(on)}$			0.050	Ω	$V_{GS}=10\text{V}, I_D=4.5\text{A}$
				0.075	Ω	$V_{GS}=4.5\text{V}, I_D=3.2\text{A}$
Forward transconductance ^(‡)	g_{fs}		11.5		S	$V_{DS}=15\text{V}, I_D=4.5\text{A}$
Dynamic^(‡)						
Input capacitance	C_{iss}		827		pF	$V_{DS}=20\text{V}, V_{GS}=0\text{V}, f=1\text{MHz}$
Output capacitance	C_{oss}		133		pF	
Reverse transfer capacitance	C_{rss}		84		pF	
Switching^{(†) (‡)}						
Turn-on delay time	$t_{d(on)}$		3.2		ns	$V_{DD}=20\text{V}, I_D=1\text{A}$ $R_G=6.0\Omega, V_{GS}=10\text{V}$ (refer to test circuit)
Rise time	t_r		3.8		ns	
Turn-off delay time	$t_{d(off)}$		23.3		ns	
Fall time	t_f		10.9		ns	
Total gate charge	Q_g		17.1		nC	$V_{DS}=20\text{V}, V_{GS}=10\text{V}, I_D=4.5\text{A}$ (refer to test circuit)
Gate-source charge	Q_{gs}		2.41		nC	
Gate-drain charge	Q_{gd}		3.4		nC	
Source-drain diode						
Diode forward voltage ^(*)	V_{SD}		0.83	0.95	V	$T_J=25^\circ\text{C}, I_S=4.5\text{A}, V_{GS}=0\text{V}$
Reverse recovery time ^(†)	t_{rr}		16		ns	$T_J=25^\circ\text{C}, I_F=4\text{A}, di/dt=100\text{A}/\mu\text{s}$
Reverse recovery charge ^(‡)	Q_{rr}		9		nC	

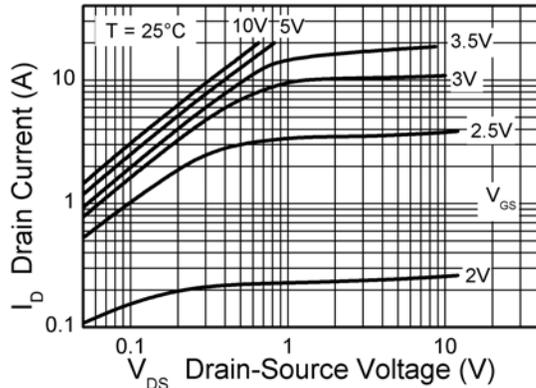
NOTES:

 (*) Measured under pulsed conditions. Width $\leq 300\mu\text{s}$. Duty cycle $\leq 2\%$.

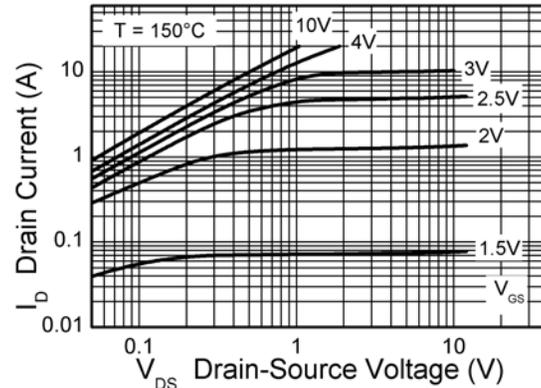
(†) Switching characteristics are independent of operating junction temperature.

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

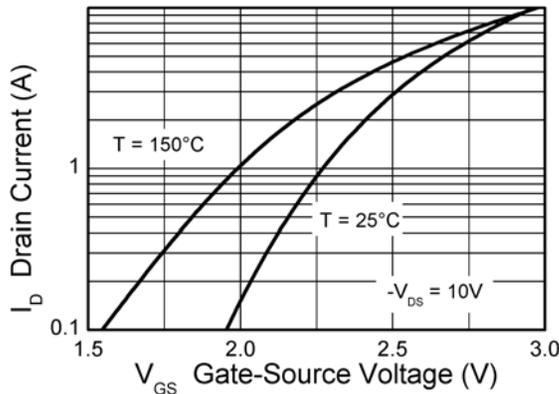
Typical characteristics



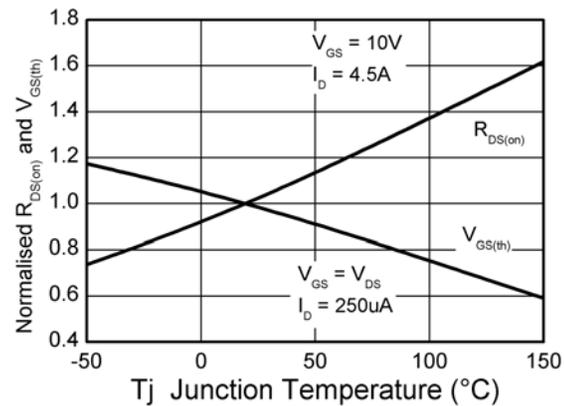
Output Characteristics



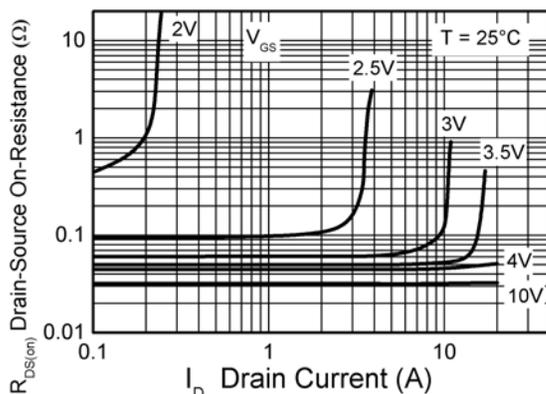
Output Characteristics



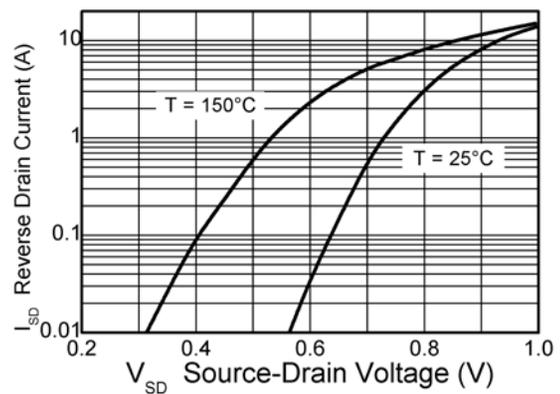
Typical Transfer Characteristics



Normalised Curves v Temperature

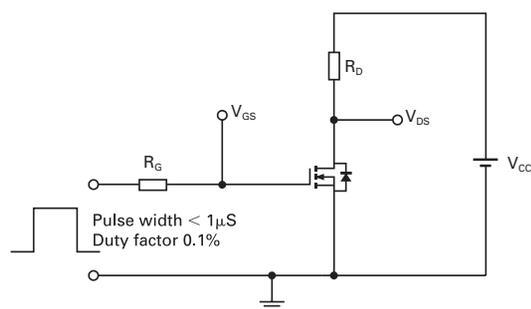
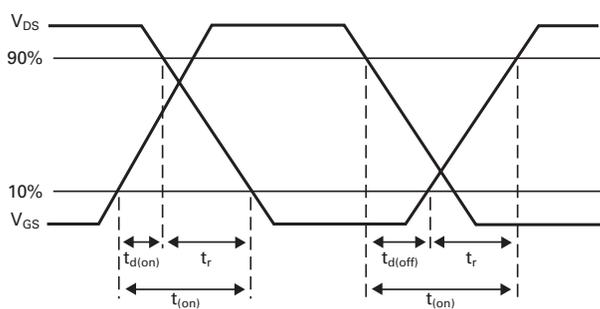
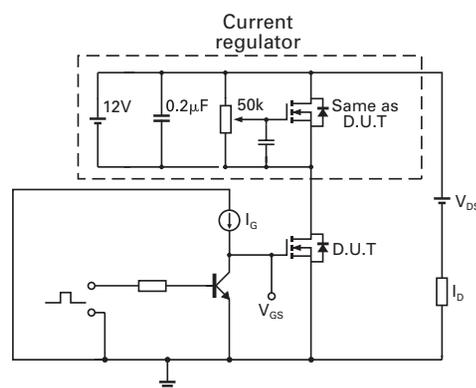
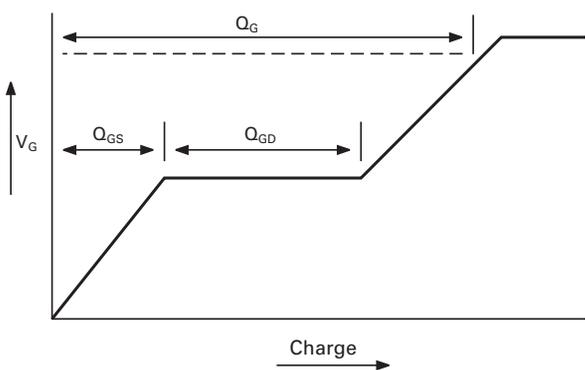
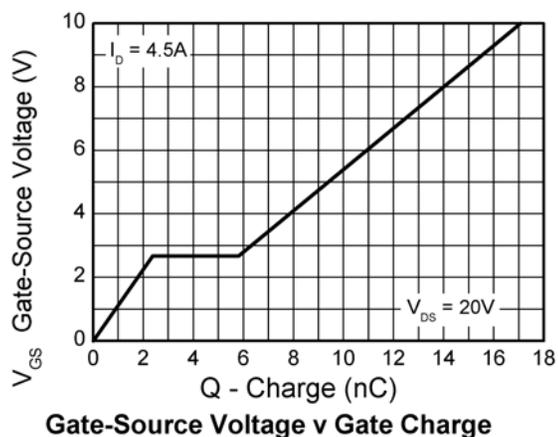
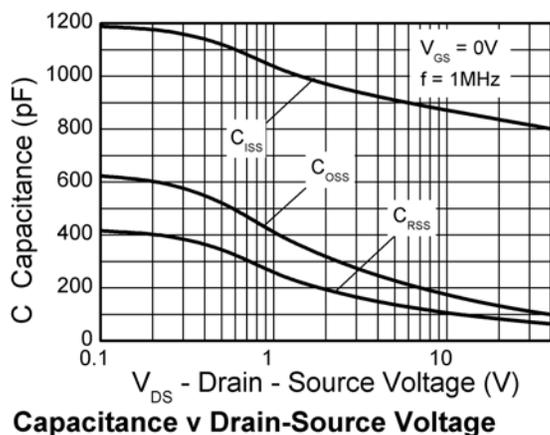


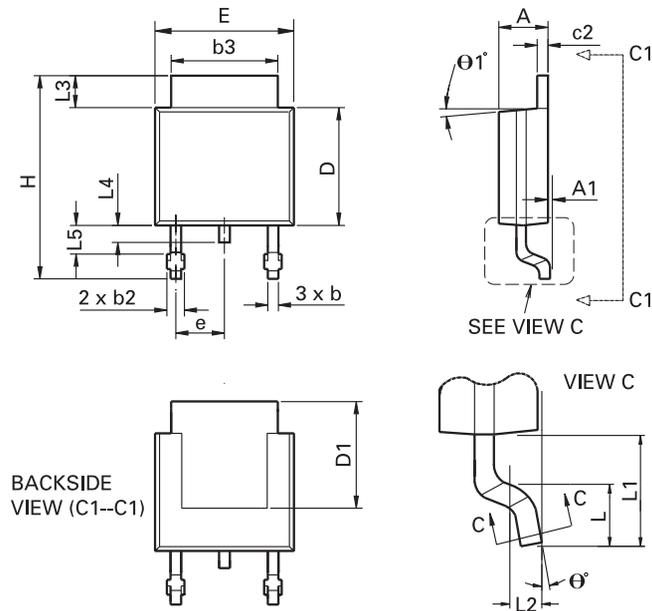
On-Resistance v Drain Current



Source-Drain Diode Forward Voltage

Typical characteristics



Package details - DPAK

Package dimensions

Dim.	Inches		Millimeters		Dim.	Inches		Millimeters	
	Min.	Max.	Min.	Max.		Min.	Max.	Min.	Max.
A	0.086	0.094	2.18	2.39	e	0.090 BSC		2.29 BSC	
A1	-	0.005	-	0.127	H	0.370	0.410	9.40	10.41
b	0.020	0.035	0.508	0.89	L	0.055	0.070	1.40	1.78
b2	0.030	0.045	0.762	1.14	L1	0.108 REF		2.74 REF	
b3	0.205	0.215	5.21	5.46	L2	0.020 BSC		0.508 BSC	
c	0.018	0.024	0.457	0.61	L3	0.035	0.065	0.89	1.65
c2	0.018	0.023	0.457	0.584	L4	0.025	0.040	0.635	1.016
D	0.213	0.245	5.41	6.22	L5	0.045	0.060	1.14	1.52
D1	0.205	-	5.21	-	$\theta 1^\circ$	0°	10°	0°	10°
E	0.250	0.265	6.35	6.73	θ°	0°	15°	0°	15°
E1	0.170	-	4.32	-	-	-	-	-	-

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