



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

$V_{(BR)DSS}$	$R_{DS(on)}$ ( $\Omega$ )	$I_D$ (A)
-60	0.085 @ $V_{GS} = -10V$	8.2
	0.125 @ $V_{GS} = -4.5V$	6.75

## Description

This new generation trench MOSFET from Zetex features a unique structure combining the benefits of low on-resistance and fast switching, making it ideal for high efficiency power management applications.

## Features

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

## Applications

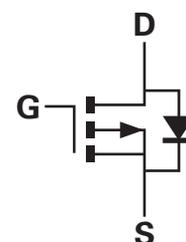
- DC-DC converters
- Power management functions
- Disconnect switches
- Motor control

## Ordering information

Device	Reel size (inches)	Tape width (mm)	Quantity per reel
NK-ZXMP6A16KTC	13	16	2500

## Device marking

NK-ZXMP  
6A16



## Absolute maximum ratings

Parameter	Symbol	Limit	Unit
Drain-source voltage	$V_{DSS}$	-60	V
Gate-source voltage	$V_{GS}$	$\pm 20$	V
Continuous drain current @ $V_{GS}=10V$ ; $T_{amb}=25^{\circ}C^{(b)}$ @ $V_{GS}=10V$ ; $T_{amb}=70^{\circ}C^{(b)}$ @ $V_{GS}=10V$ ; $T_{amb}=25^{\circ}C^{(a)}$	$I_D$	8.2 6.5 5.4	A
Pulsed drain current <sup>(c)</sup>	$I_{DM}$	27.2	A
Continuous source current (body diode) <sup>(b)</sup>	$I_S$	10	A
Pulsed source current (body diode) <sup>(c)</sup>	$I_{SM}$	27.2	A
Power dissipation at $T_{amb}=25^{\circ}C^{(a)}$	$P_D$	4.24	W
Linear derating factor		33.9	mW/ $^{\circ}C$
Power dissipation at $T_{amb}=25^{\circ}C^{(b)}$	$P_D$	9.76	W
Linear derating factor		78	mW/ $^{\circ}C$
Power dissipation at $T_{amb}=25^{\circ}C^{(d)}$	$P_D$	2.11	W
Linear derating factor		16.8	mW/ $^{\circ}C$
Operating and storage temperature range	$T_j, T_{stg}$	-55 to +150	$^{\circ}C$

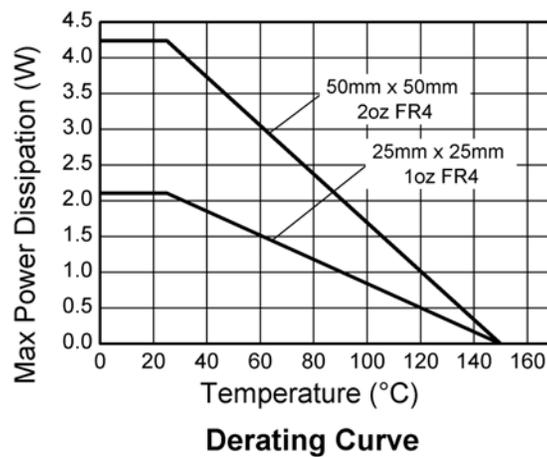
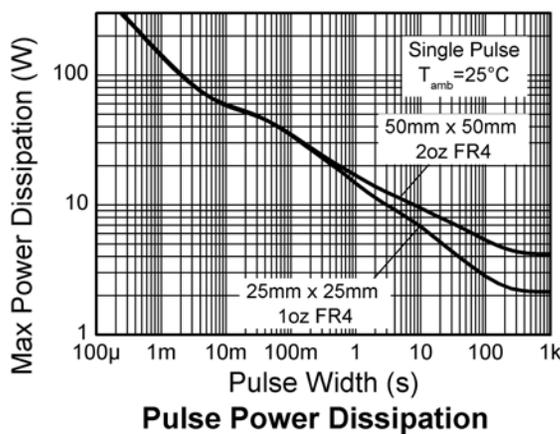
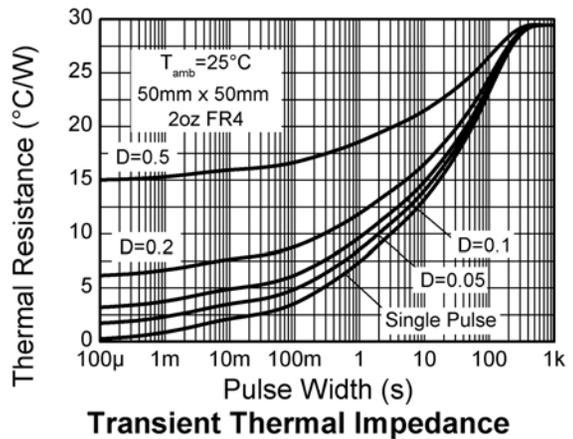
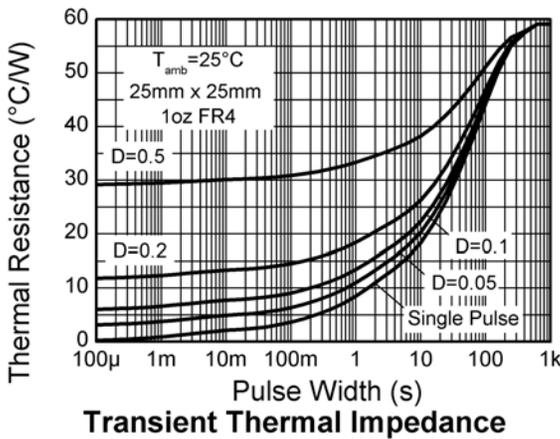
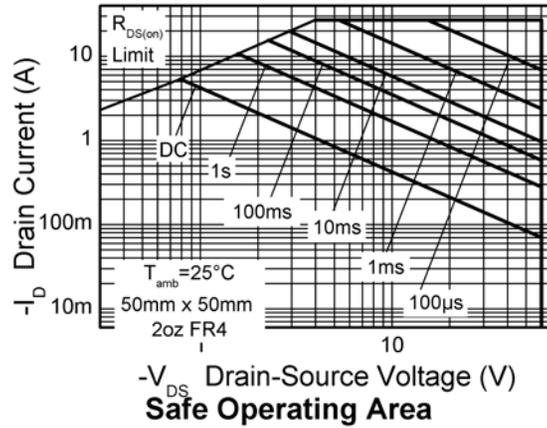
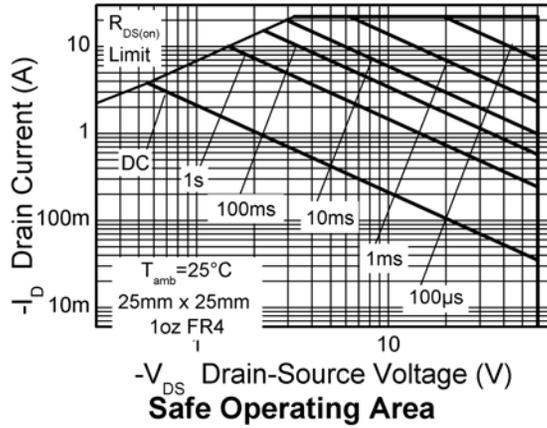
## Thermal resistance

Parameter	Symbol	Limit	Unit
Junction to ambient <sup>(a)</sup>	$R_{\theta JA}$	29.45	$^{\circ}C/W$
Junction to ambient <sup>(b)</sup>	$R_{\theta JA}$	12.8	$^{\circ}C/W$
Junction to ambient <sup>(d)</sup>	$R_{\theta JA}$	59.1	$^{\circ}C/W$

### 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  $t \leq 10$  sec.
- (c) Repetitive rating 50mm x 50mm x 1.6mm FR4 PCB,  $D=0.02$  pulse width=300 $\mu$ 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.

**Thermal characteristics**



**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	$V_{(BR)DSS}$	-60			V	$I_D = -250\mu\text{A}$ , $V_{GS} = 0\text{V}$
Zero gate voltage drain current	$I_{DSS}$			-1.0	$\mu\text{A}$	$V_{DS} = -60\text{V}$ , $V_{GS} = 0\text{V}$
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 <sup>(*)</sup>	$R_{DS(on)}$			0.085	$\Omega$	$V_{GS} = -10\text{V}$ , $I_D = -2.9\text{A}$
				0.125	$\Omega$	$V_{GS} = -4.5\text{V}$ , $I_D = -2.4\text{A}$
Forward transconductance <sup>(*)</sup> (‡)	$g_{fs}$		7.2		S	$V_{DS} = -15\text{V}$ , $I_D = -2.9\text{A}$
<b>Dynamic<sup>(‡)</sup></b>						
Input capacitance	$C_{iss}$		1021		pF	$V_{DS} = -30\text{V}$ , $V_{GS} = 0\text{V}$ $f = 1\text{MHz}$
Output capacitance	$C_{oss}$		83		pF	
Reverse transfer capacitance	$C_{rss}$		56		pF	
<b>Switching<sup>(†)</sup> (‡)</b>						
Turn-on-delay time	$t_{d(on)}$		3.5		ns	$V_{DD} = -30\text{V}$ , $I_D = -1\text{A}$ $R_G = 6.0\Omega$ , $V_{GS} = -10\text{V}$
Rise time	$t_r$		4.1		ns	
Turn-off delay time	$t_{d(off)}$		35		ns	
Fall time	$t_f$		10		ns	
Gate charge	$Q_g$		12.1		nC	$V_{DS} = -30\text{V}$ , $V_{GS} = -5\text{V}$ $I_D = -2.9\text{A}$
Total gate charge	$Q_g$		24.2		nC	$V_{DS} = -30\text{V}$ , $V_{GS} = -10\text{V}$ $I_D = -2.9\text{A}$
Gate-source charge	$Q_{gs}$		2.5		nC	
Gate drain charge	$Q_{gd}$		3.7		nC	
<b>Source-drain diode</b>						
Diode forward voltage <sup>(*)</sup>	$V_{SD}$		-0.85	-0.95	V	$T_j = 25^{\circ}\text{C}$ , $I_S = -3.4\text{A}$ , $V_{GS} = 0\text{V}$
Reverse recovery time <sup>(‡)</sup>	$t_{rr}$		29.2		ns	$T_j = 25^{\circ}\text{C}$ , $I_S = -2\text{A}$ , $di/dt = 100\text{A}/\mu\text{s}$
Reverse recovery charge <sup>(‡)</sup>	$Q_{rr}$		39.6		nC	

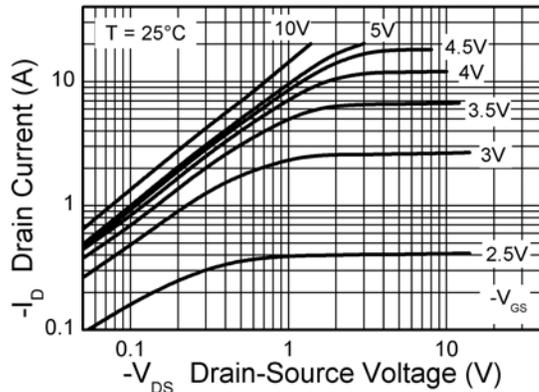
**NOTES:**

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

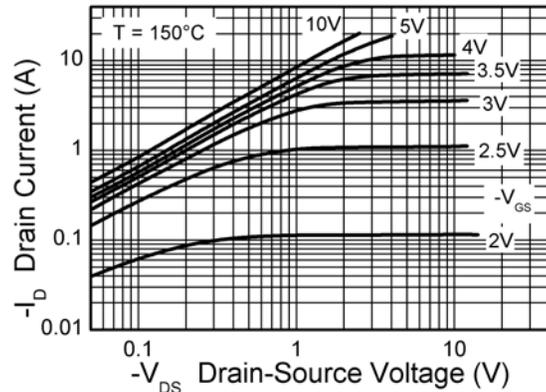
(†) Switching characteristics are independent of operating junction temperature.

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

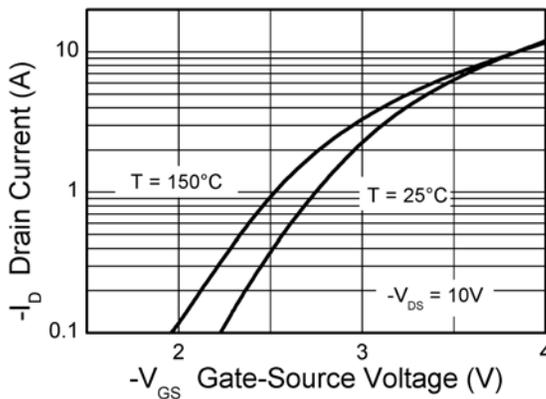
Typical characteristics



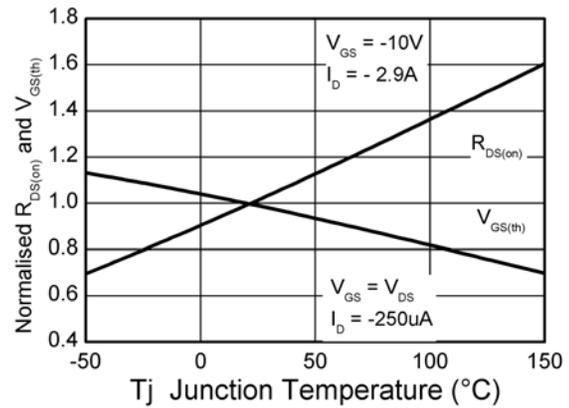
Output Characteristics



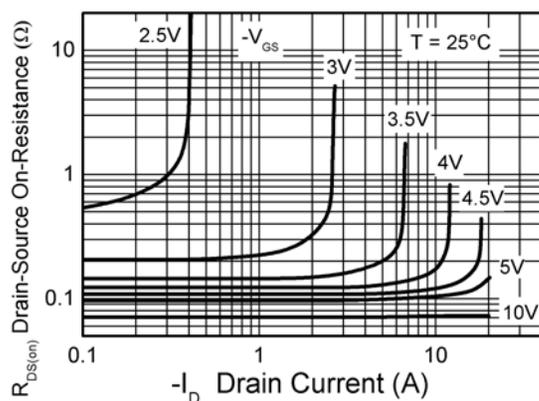
Output Characteristics



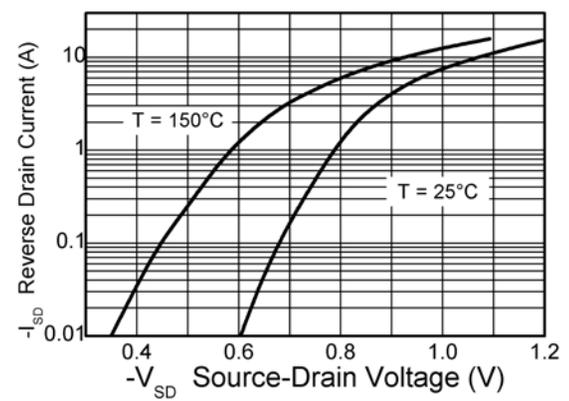
Typical Transfer Characteristics



Normalised Curves v Temperature

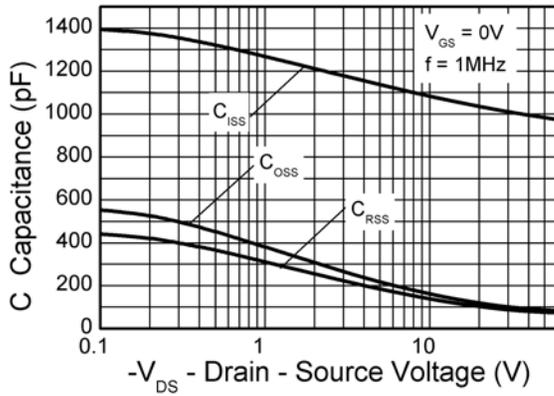


On-Resistance v Drain Current

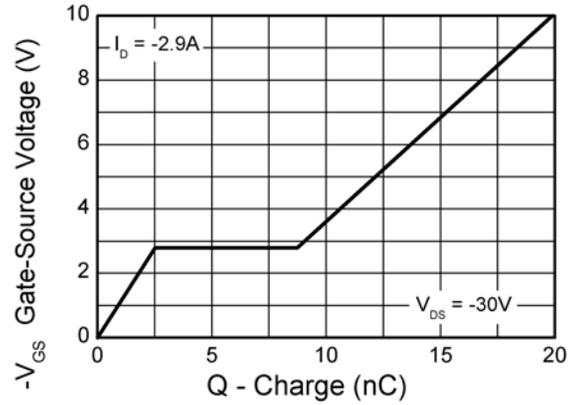


Source-Drain Diode Forward Voltage

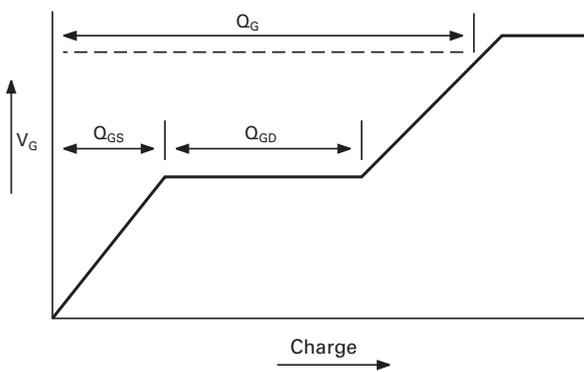
Typical characteristics



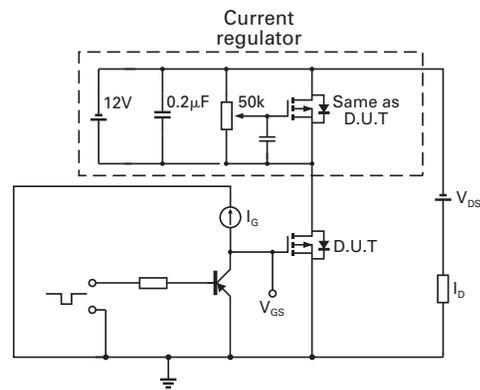
Capacitance v Drain-Source Voltage



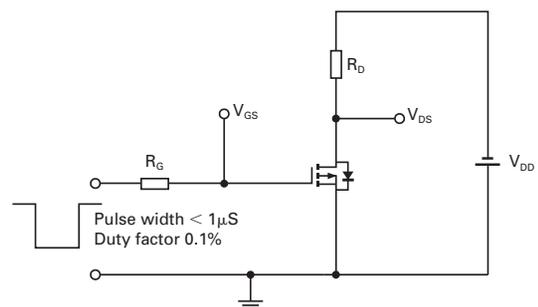
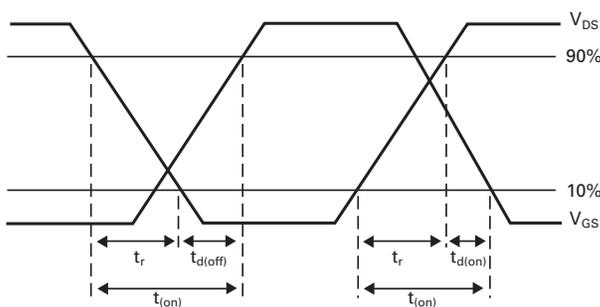
Gate-Source Voltage v Gate Charge



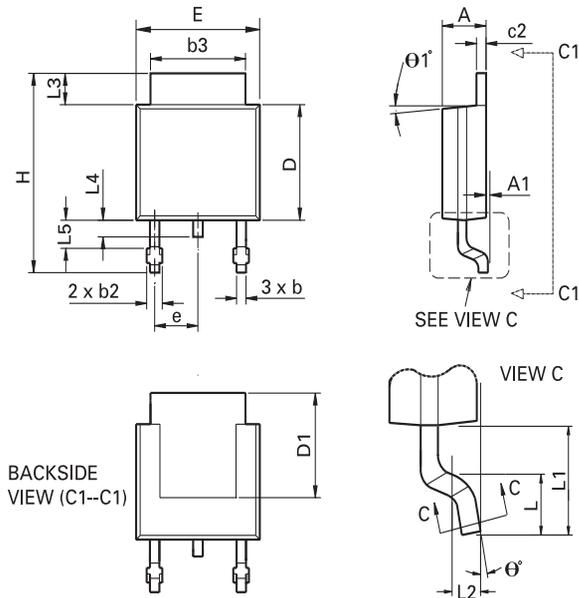
Basic gate charge waveform



Gate charge test circuit



Package outline - DPAK



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	-	θ1°	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