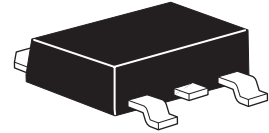


# ZXMP4A16K

## 40V P-channel enhancement mode MOSFET

### Summary

$V_{(BR)DSS} = -40V$ ;  $R_{DS(ON)} = 0.060\Omega$   $I_D = -9.9A$

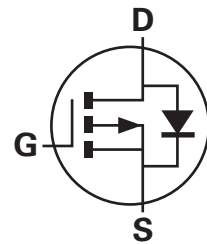


### Description

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

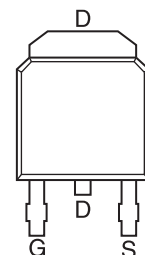


### Applications

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

### Ordering information

Device	Reel size (inches)	Tape width	Quantity per reel
ZXMP4A16KTC	13	16mm	2500 units



Pinout - Top view

### Device marking

ZXMP  
4A16

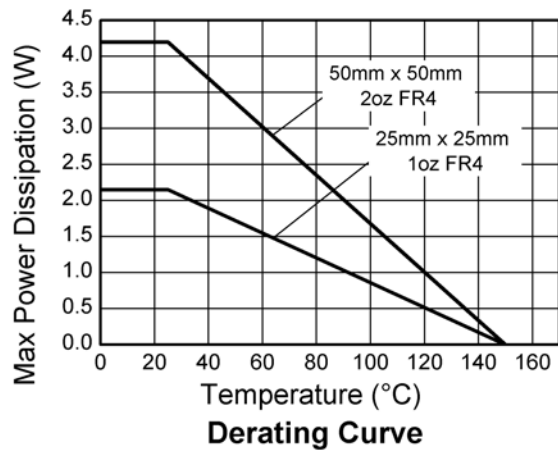
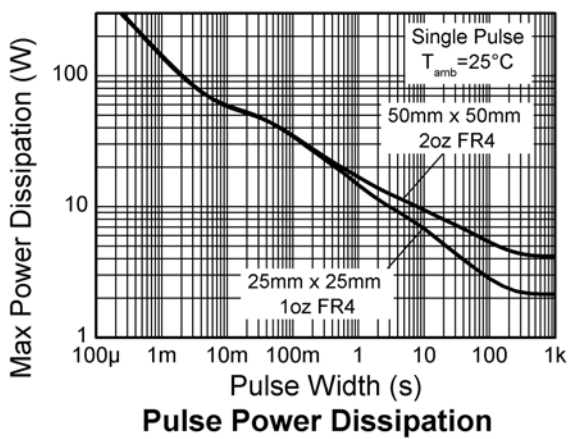
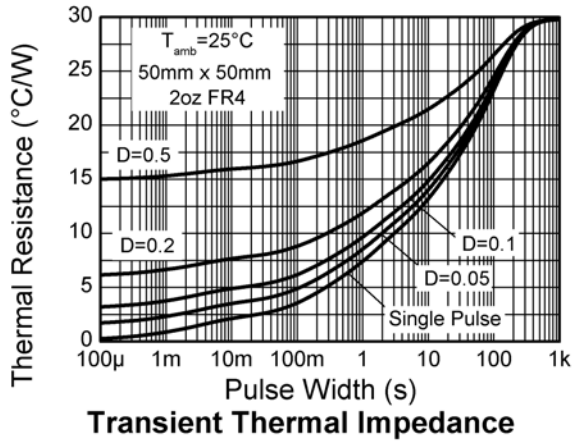
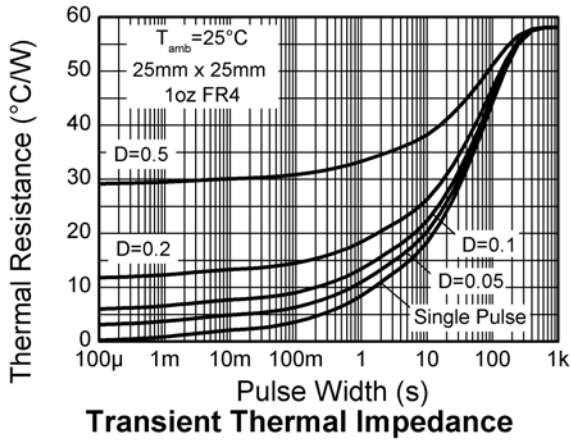
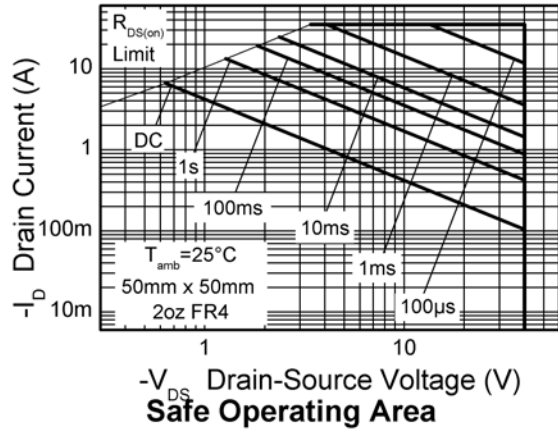
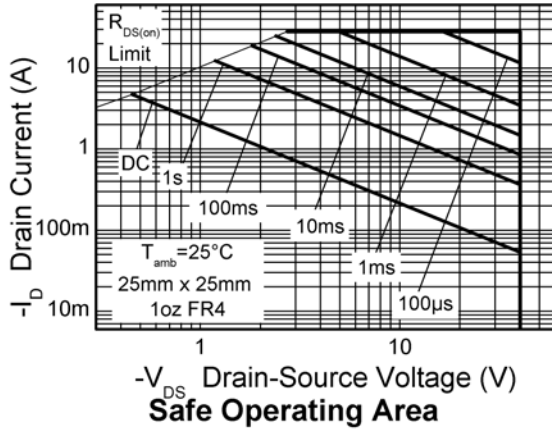
## Absolute maximum rating

Parameter	Symbol	Limit	Unit
Drain-source voltage	$V_{DSS}$	-40	V
Gate-source voltage	$V_{GS}$	$\pm 20$	V
Continuous drain current $V_{GS} = -10V; T_A = 25^\circ C$ <sup>(b)</sup> $V_{GS} = -10V; T_A = 70^\circ C$ <sup>(b)</sup> $V_{GS} = -10V; T_A = 25^\circ C$ <sup>(a)</sup>	$I_D$	-9.9 -8.0 -6.6	A A A
Pulsed drain current <sup>(c)</sup>	$I_{DM}$	-35	A
Continuous source current (body diode) <sup>(b)</sup>	$I_S$	-10.1	A
Pulsed source current (body diode) <sup>(c)</sup>	$I_{SM}$	-35	A
Power dissipation at $T_A = 25^\circ C$ <sup>(a)</sup> Linear derating factor	$P_D$	4.2 33.6	W mW/°C
Power dissipation at $T_A = 25^\circ C$ <sup>(b)</sup> Linear derating factor	$P_D$	9.5 76	W mW/°C
Power dissipation at $T_A = 25^\circ C$ <sup>(d)</sup> Linear derating factor	$P_D$	2.15 17.2	W mW/°C
Operating and storage temperature range	$T_j; T_{stg}$	-55 to +150	°C
<b>Thermal resistance</b>			
Parameter	Symbol	Value	Unit
Junction to ambient <sup>(a)</sup>	$R_{\theta JA}$	30	°C/W
Junction to ambient <sup>(b)</sup>	$R_{\theta JA}$	13.2	°C/W
Junction to ambient <sup>(d)</sup>	$R_{\theta JA}$	58	°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.

## Characteristics



# ZXMP4A16K

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

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
<b>Static</b>						
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	$\mu\text{A}$	$V_{DS} = -40\text{V}$ , $V_{GS} = 0\text{V}$
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 (*)	$R_{DS(on)}$			0.060	$\Omega$	$V_{GS} = -10\text{V}$ , $I_D = -3.8\text{A}$
				0.100	$\Omega$	$V_{GS} = -4.5\text{V}$ , $I_D = -2.9\text{A}$
Forward transconductance (*)(‡)	$g_{fs}$		7.4		S	$V_{DS} = -15\text{V}$ , $I_D = -3.8\text{A}$
<b>Dynamic</b> (‡)						
Input capacitance	$C_{iss}$		965		pF	$V_{DS} = -20\text{V}$ , $V_{GS} = 0\text{V}$ , $f = 1\text{MHz}$
Output capacitance	$C_{oss}$		180		pF	
Reverse transfer capacitance	$C_{rss}$		158		pF	
<b>Switching</b> (†) (‡)						
Turn-on delay time	$t_{d(on)}$		4.0		ns	$V_{DD} = -20\text{V}$ , $I_D = -1\text{A}$ $R_G = 6.0\Omega$ , $V_{GS} = -10\text{V}$
Rise time	$t_r$		6.0		ns	
Turn-off delay time	$t_{d(off)}$		36.8		ns	
Fall time	$t_f$		17.1		ns	
Gate charge	$Q_g$		16.5		nC	$V_{DS} = -20\text{V}$ , $V_{GS} = -5\text{V}$ , $I_D = -3.8\text{A}$
Total gate charge	$Q_g$		29.6		nC	$V_{DS} = -20\text{V}$ , $V_{GS} = -10\text{V}$ , $I_D = -3.8\text{A}$
Gate-source charge	$Q_{gs}$		2.8		nC	
Gate-drain charge	$Q_{gd}$		8.1		nC	
<b>Source-drain diode</b>						
Diode forward voltage (*)	$V_{SD}$		-0.89	-1.2	V	$T_J = 25^\circ\text{C}$ , $I_S = -3.8\text{A}$ , $V_{GS} = 0\text{V}$
Reverse recovery time (‡)	$t_{rr}$		29.8		ns	$T_J = 25^\circ\text{C}$ , $I_F = -3.8\text{A}$ , $di/dt = 100\text{A}/\mu\text{s}$
Reverse recovery charge (‡)	$Q_{rr}$		37.2		nC	

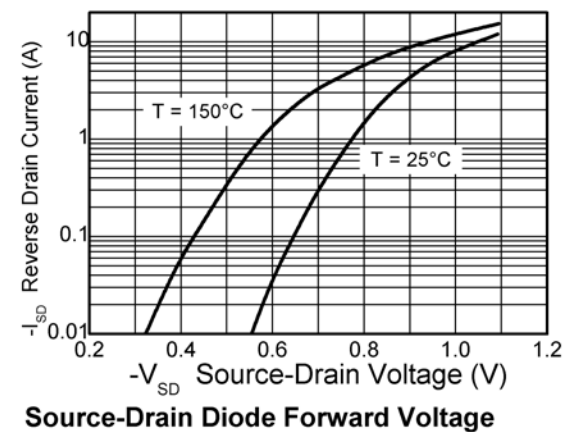
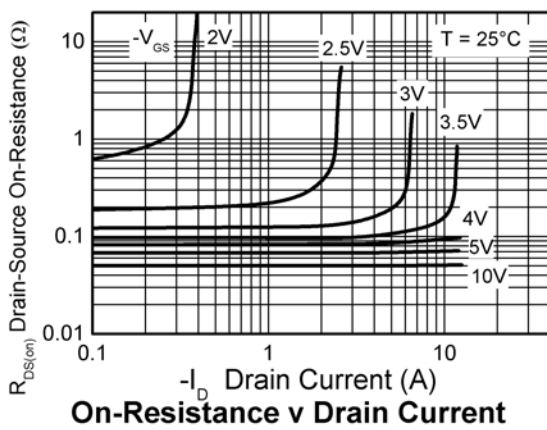
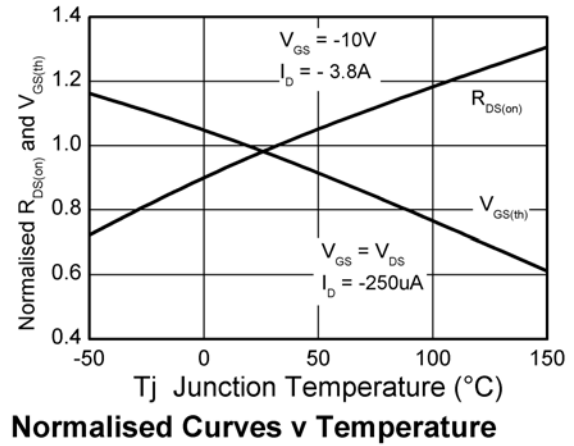
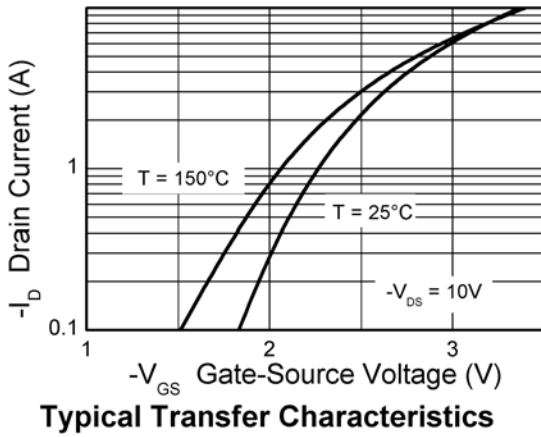
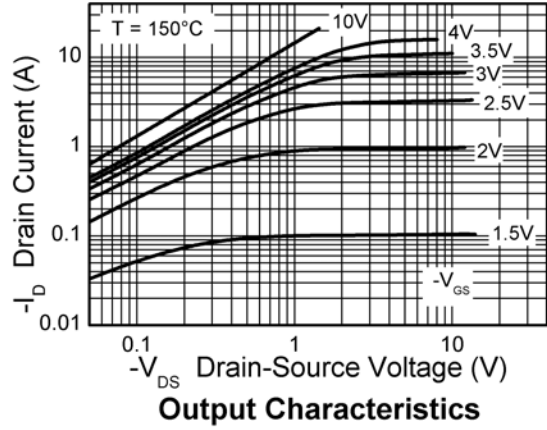
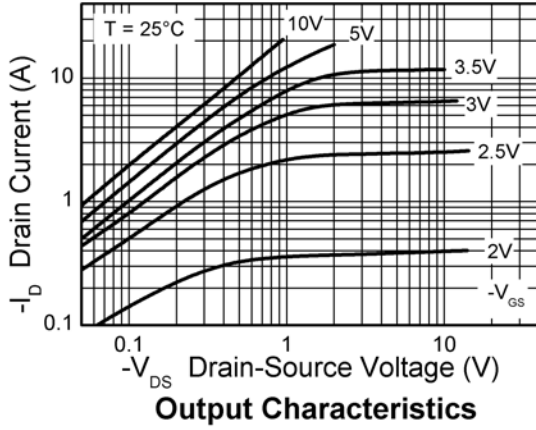
### NOTES:

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

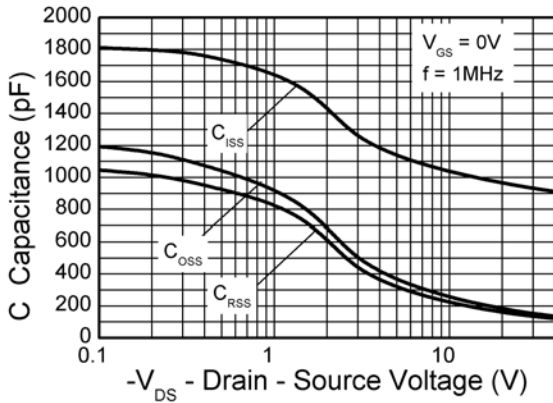
(†) Switching characteristics are independent of operating junction temperature.

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

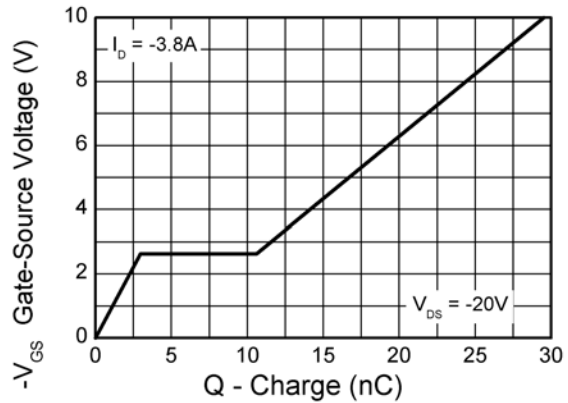
## Typical characteristics



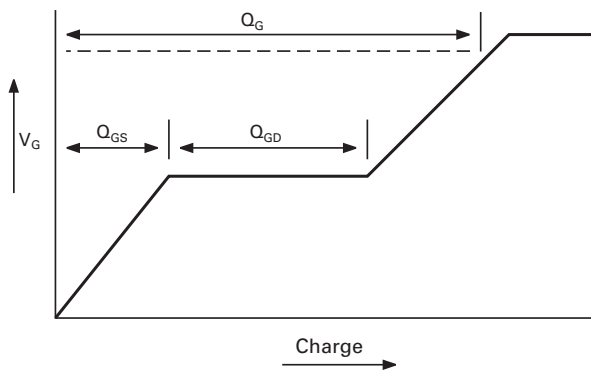
## Typical characteristics



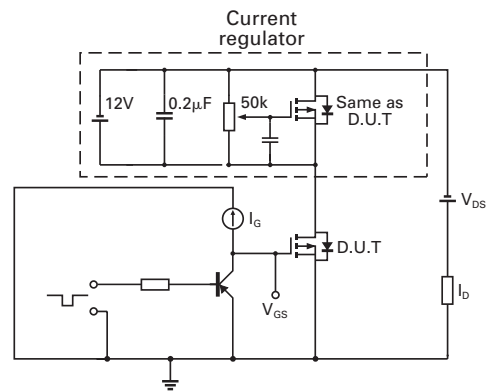
**Capacitance v Drain-Source Voltage**



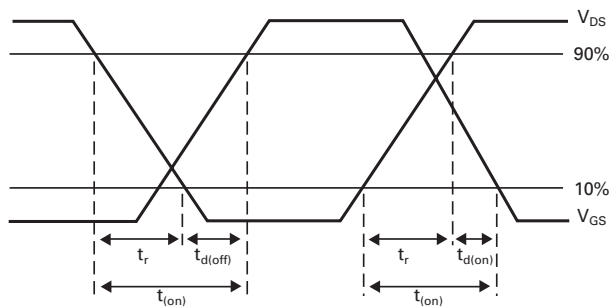
**Gate-Source Voltage v Gate Charge**



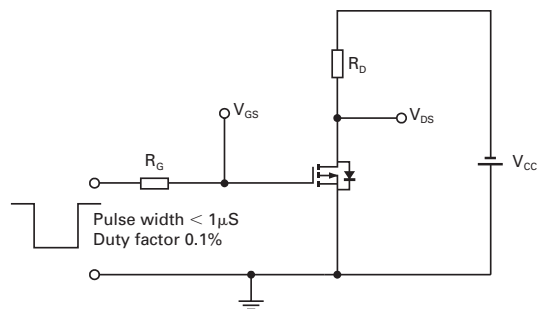
**Basic gate charge waveform**



**Gate charge test circuit**



**Switching time waveforms**



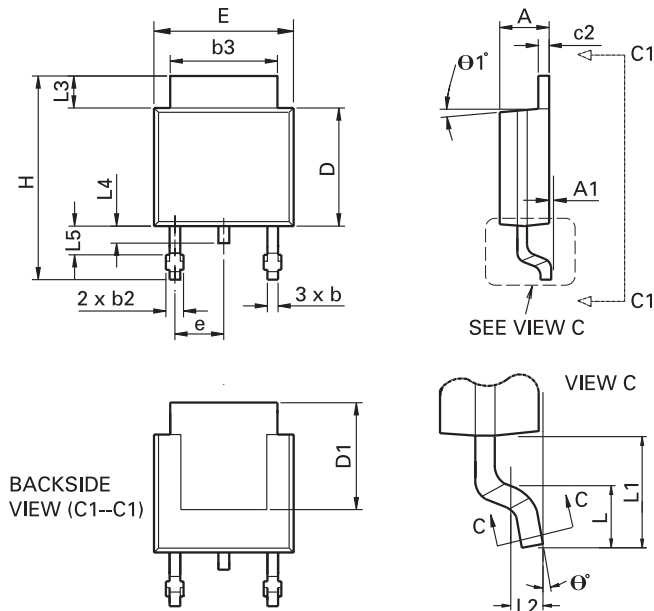
**Switching time test circuit**

# ZXMP4A16K

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# ZXMP4A16K

## 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°	0°	10°	0°	10°
E	0.250	0.265	6.35	6.73	theta °	0°	15°	0°	15°
E1	0.170	-	4.32	-	-	-	-	-	-

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

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