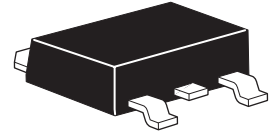


ZXMP4A16K

40V P-channel enhancement mode MOSFET

Summary

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

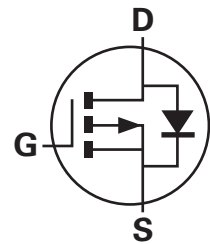


Description

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

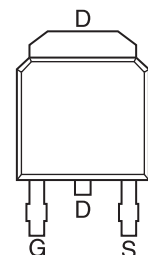


Applications

- 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

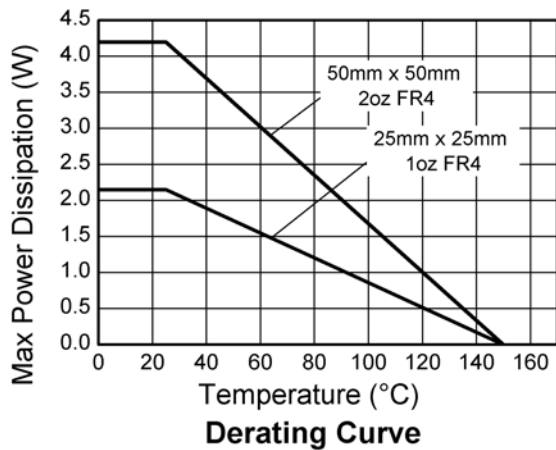
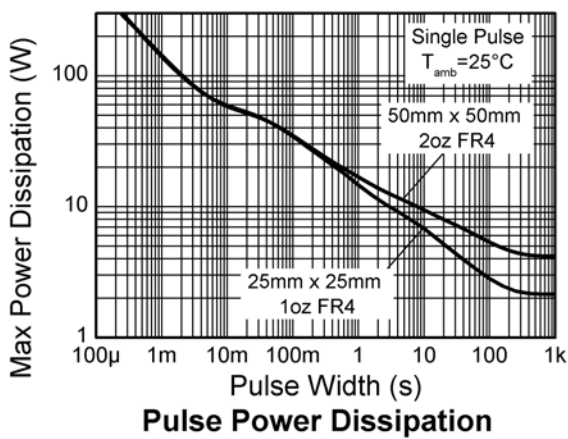
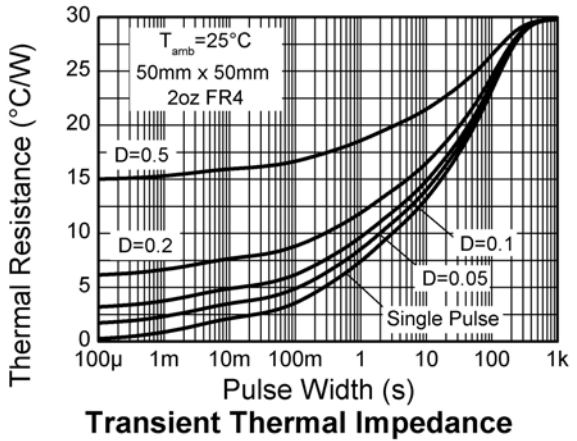
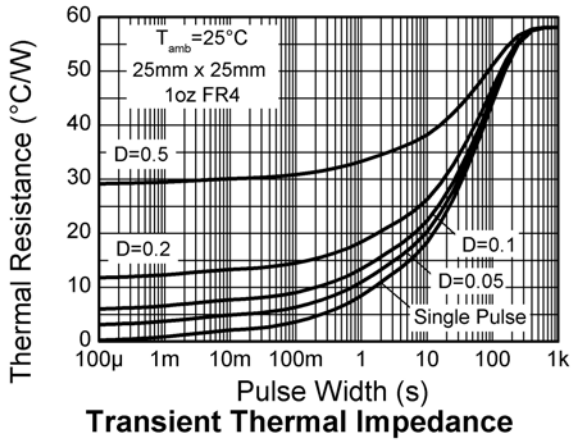
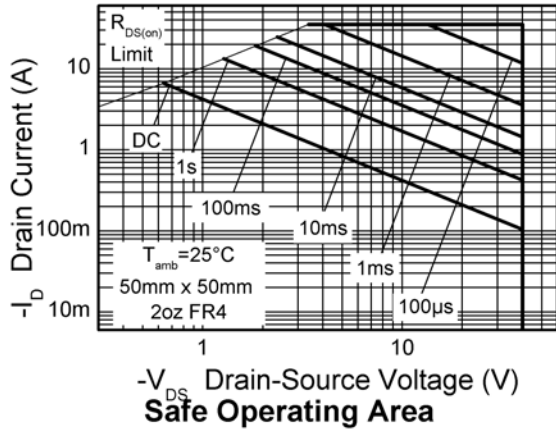
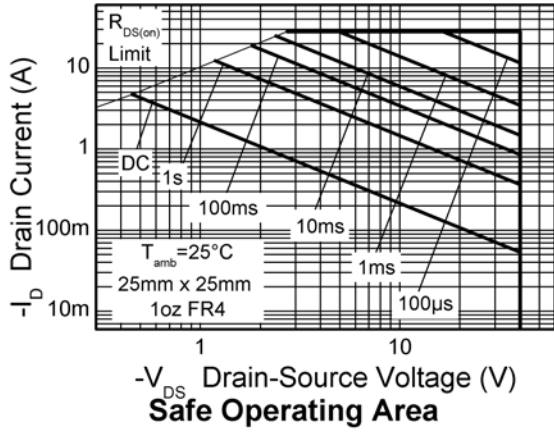
Absolute maximum rating

Parameter	Symbol	Limit	Unit
Drain-source voltage	V_{DSS}	-40	V
Gate-source voltage	V_{GS}	± 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	-9.9 -8.0 -6.6	A A A
Pulsed drain current ^(c)	I_{DM}	-35	A
Continuous source current (body diode) ^(b)	I_S	-10.1	A
Pulsed source current (body diode) ^(c)	I_{SM}	-35	A
Power dissipation at $T_A = 25^\circ C$ ^(a) Linear derating factor	P_D	4.2 33.6	W mW/ $^\circ C$
Power dissipation at $T_A = 25^\circ C$ ^(b) Linear derating factor	P_D	9.5 76	W mW/ $^\circ C$
Power dissipation at $T_A = 25^\circ C$ ^(d) Linear derating factor	P_D	2.15 17.2	W 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 $t \leq 10$ sec.
- (c) Repetitive rating 50mm x 50mm x 1.6mm FR4 PCB, $D=0.02$ pulse width=300 μs - 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
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 (*)	$R_{DS(on)}$			0.060	Ω	$V_{GS} = -10\text{V}$, $I_D = -3.8\text{A}$
				0.100	Ω	$V_{GS} = -4.5\text{V}$, $I_D = -2.9\text{A}$
Forward transconductance (*)(‡)	g_{fs}		7.4		S	$V_{DS} = -15\text{V}$, $I_D = -3.8\text{A}$
Dynamic (‡)						
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	
Switching (†) (‡)						
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	
Source-drain diode						
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	

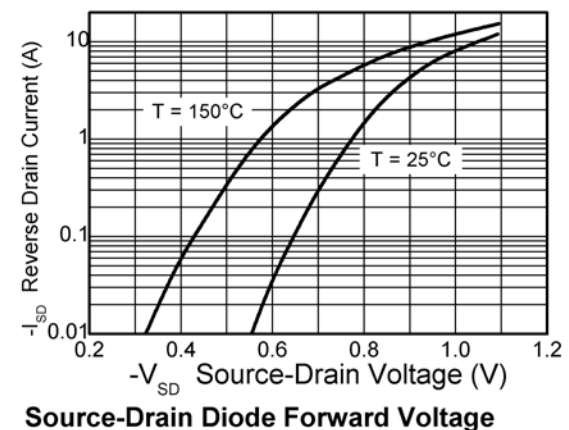
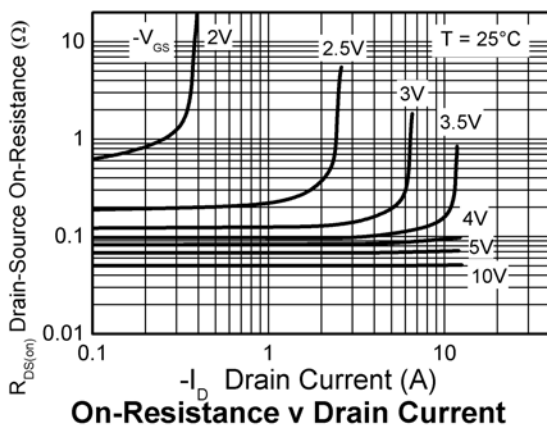
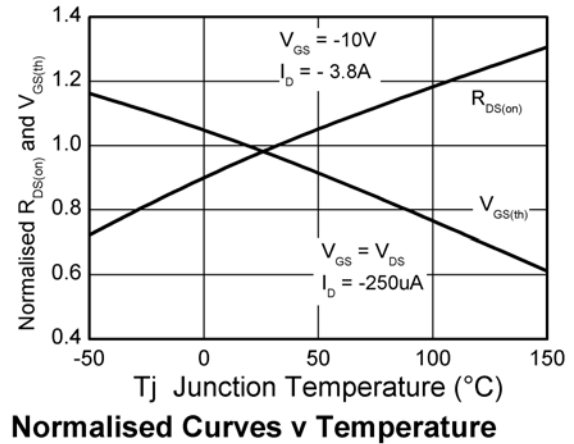
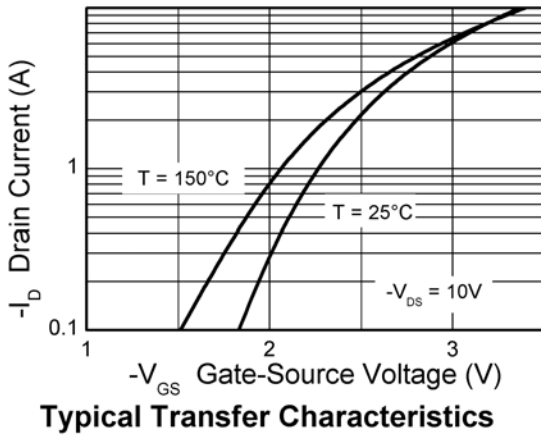
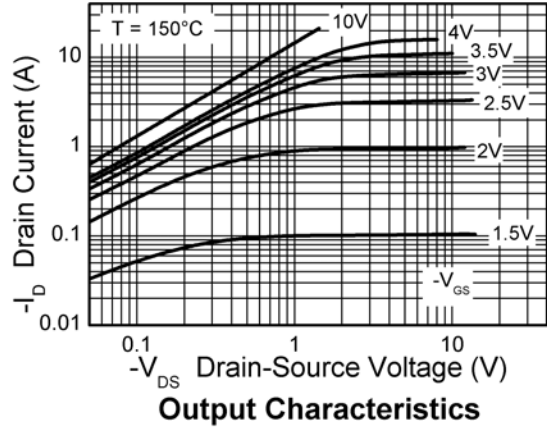
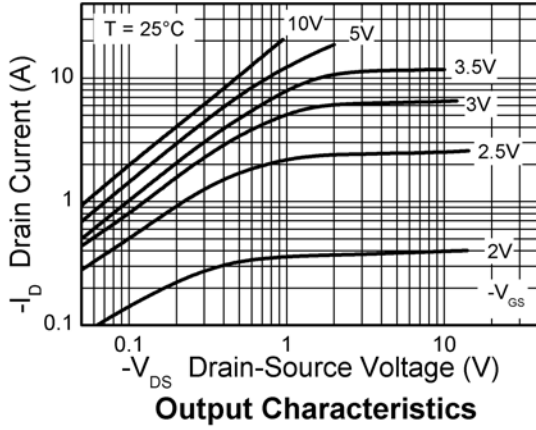
NOTES:

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

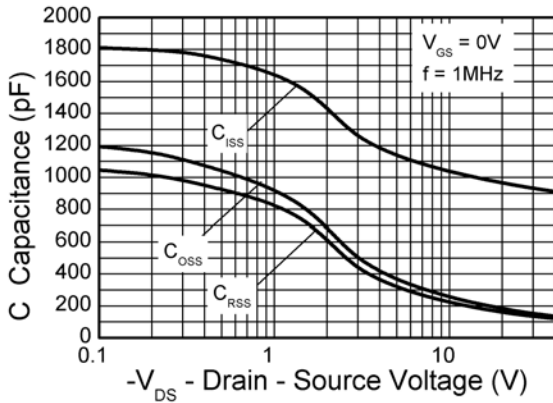
(†) Switching characteristics are independent of operating junction temperature.

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

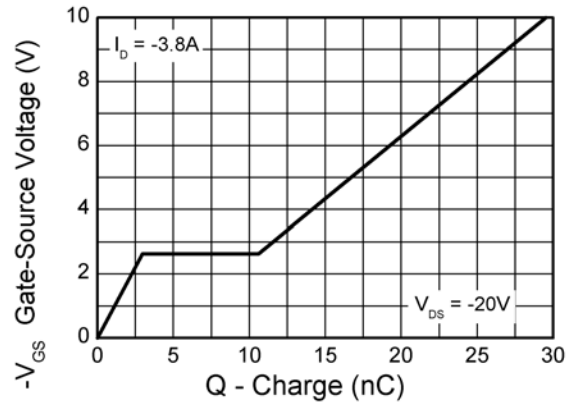
Typical characteristics



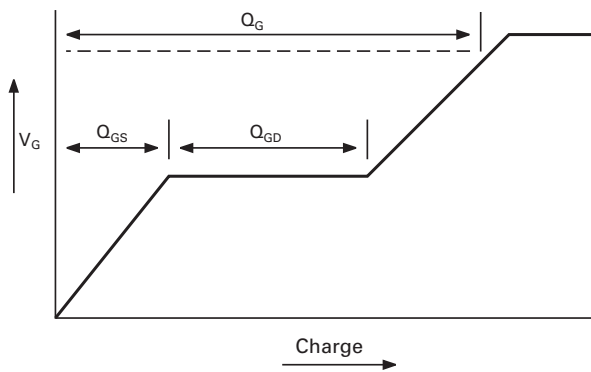
Typical characteristics



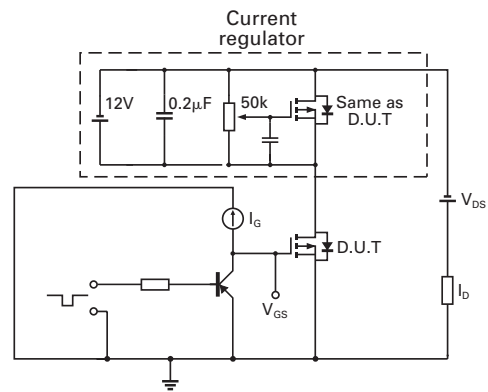
Capacitance v Drain-Source Voltage



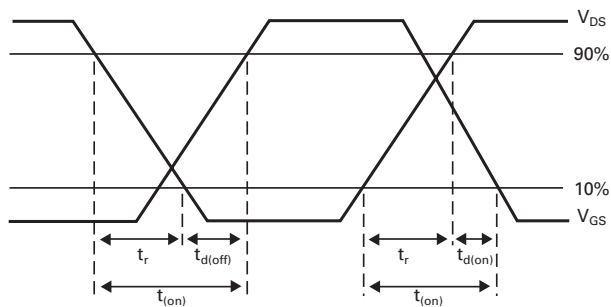
Gate-Source Voltage v Gate Charge



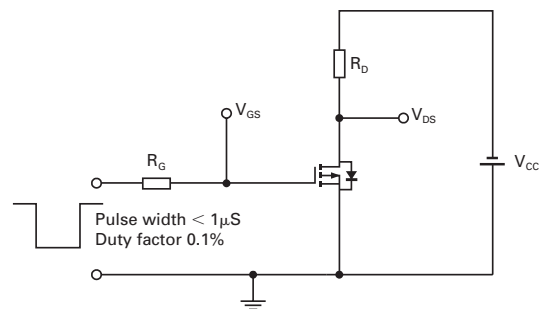
Basic gate charge waveform



Gate charge test circuit



Switching time waveforms



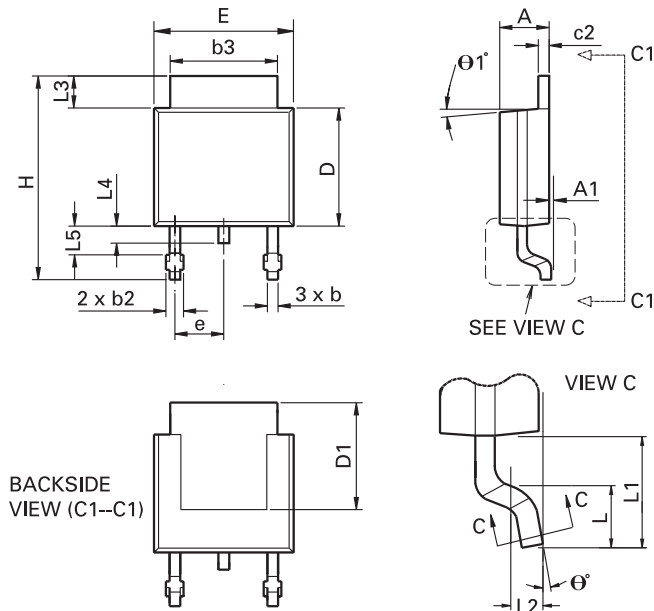
Switching time test circuit

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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