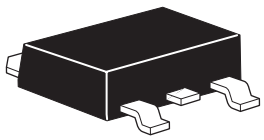
ZXMP4A16K
40V P-channel enhancement mode MOSFET

Summary

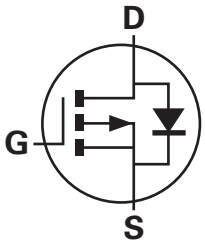


$V_{(BR)DSS}$= -40V; $R_{DS(ON)}$= 0.060Ω I_D= -9.9A

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



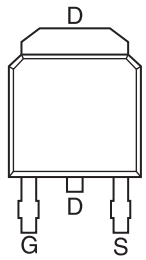
- Low on-resistance
- Fast switching speed
- Low threshold
- Low gate drive
- DPAK package

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

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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°C (b) V_{GS}= -10V; T_A=70°C (b) V_{GS}= -10V; T_A=25°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°C (a) Linear derating factor	P_D	4.2 33.6	W mW/°C
Power dissipation at T_A=25°C (b) Linear derating factor	P_D	9.5 76	W mW/°C
Power dissipation at T_A=25°C (d) 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

Thermal resistance

Parameter	Symbol	Value	Unit
Junction to ambient (a)	$R_{\Theta JA}$	30	°C/W
Junction to ambient (b)	$R_{\Theta JA}$	13.2	°C/W
Junction to ambient (d)	$R_{\Theta JA}$	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.

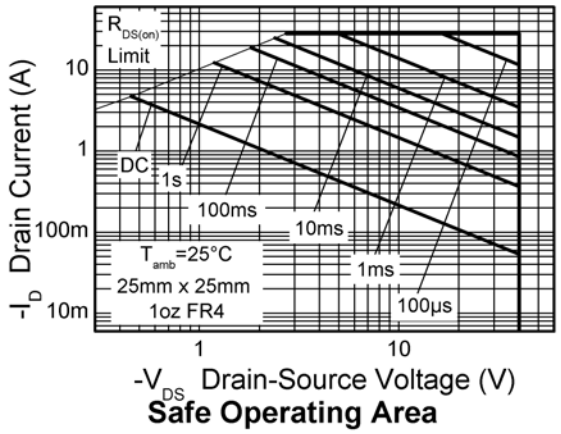
(b) For a device surface mounted on FR4 PCB measured at t ≤10 sec.

(c) Repetitive rating 50mm x 50mm x 1.6mm FR4 PCB, D=0.02 pulse width=300µs - pulse width limited by maximum junction temperature.

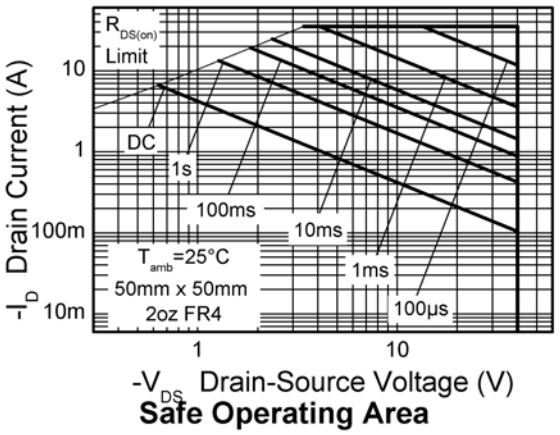
(d) For a device surface mounted on 25mm x 25mm x 1.6mm FR4 PCB with high coverage of single sided 1oz copper, in still air conditions.

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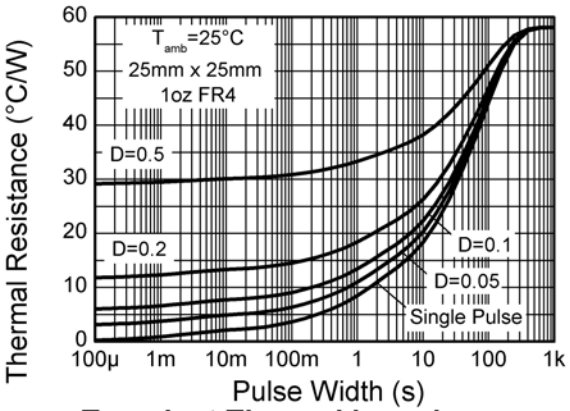
Characteristics



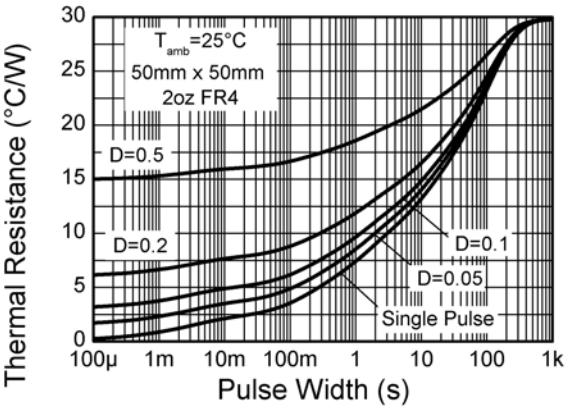
Safe Operating Area



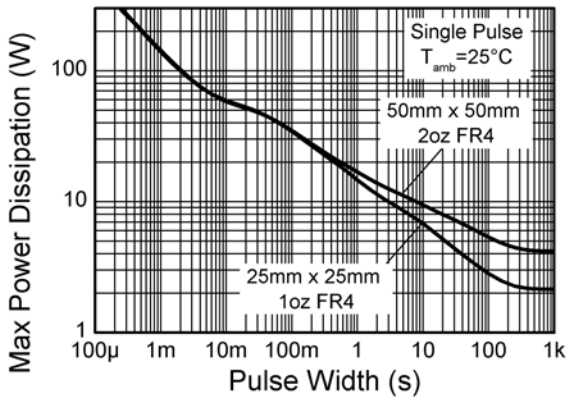
Safe Operating Area



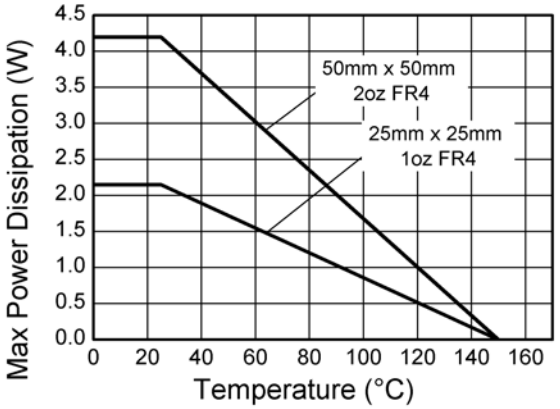
Transient Thermal Impedance



Transient Thermal Impedance



Pulse Power Dissipation



Derating Curve

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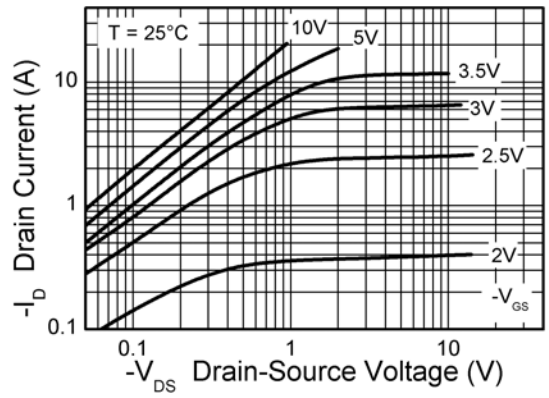
Electrical characteristics (at T_A = 25°C unless otherwise stated)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Static						
Drain-source breakdown voltage	$V_{(BR)DSS}$	-40			V	I_D=-250μA, V_{GS}=0V
Zero gate voltage drain current	I_{DSS}			-1	μA	V_{DS}=-40V, V_{GS}=0V
Gate-body leakage	I_{GSS}			100	nA	V_{GS} =±20V, V_{DS}=0V
Gate-source threshold voltage	$V_{GS(th)}$	-1.0			V	I_D=-250μA, V_{DS}=V_{GS}
Static drain-source on-state resistance (*)	$R_{DS(on)}$			0.060 0.100	Ω Ω	V_{GS}=-10V, I_D=-3.8A V_{GS}=-4.5V, I_D=-2.9A
Forward transconductance (*)(‡)	g_{fs}		7.4		S	V_{DS}=-15V,I_D=-3.8A
Dynamic (‡)						
Input capacitance	C_{iss}		965		pF	V_{DS}=-20V, V_{GS}=0V, f=1MHz
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} =-20V, I_D=-1A R_G=6.0Ω,V_{GS}=-10V
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}=-20V,V_{GS}=-5V, I_D=-3.8A
Total gate charge	Q_g		29.6		nC	V_{DS}=-20V,V_{GS}=-10V, I_D=-3.8A
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°C, I_S=-3.8A, V_{GS}=0V
Reverse recovery time (‡)	t_{rr}		29.8		ns	T_J=25°C, I_F=-3.8A, di/dt= 100A/μs
Reverse recovery charge (‡)	Q_{rr}		37.2		nC	

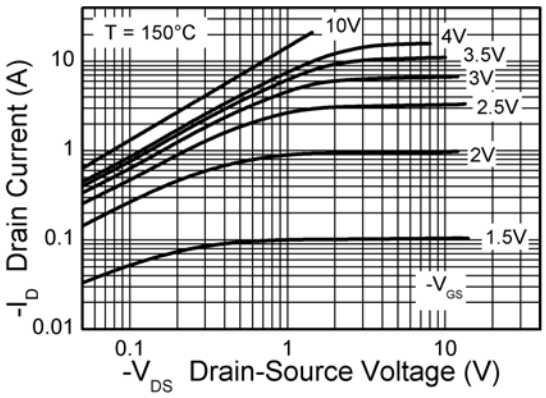
NOTES:
(*) Measured under pulsed conditions. Width ≤ 300μs. Duty cycle ≤ 2%.
(†) Switching characteristics are independent of operating junction temperature.
(‡) For design aid only, not subject to production testing.

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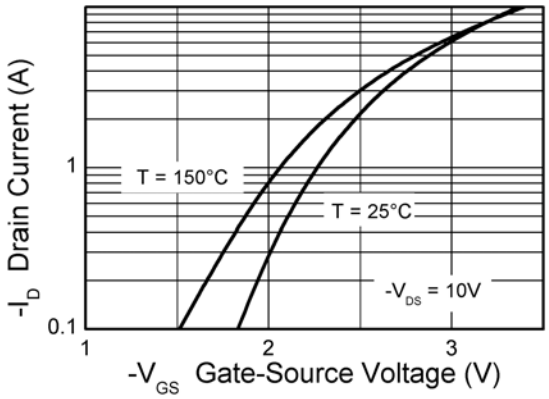
Typical characteristics



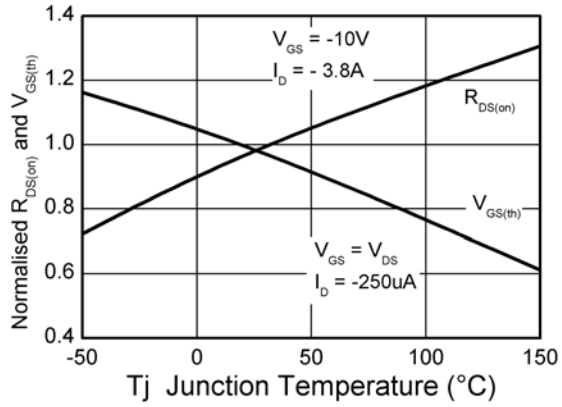
Output Characteristics



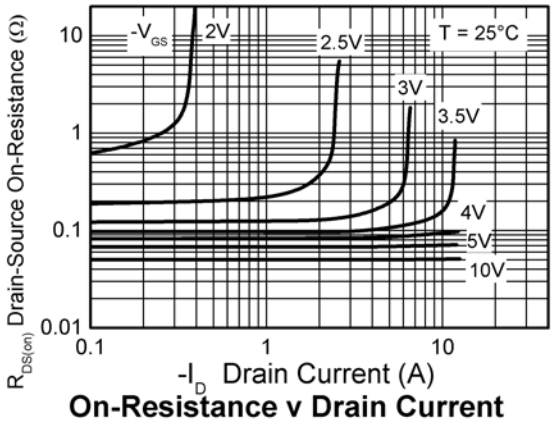
Output Characteristics



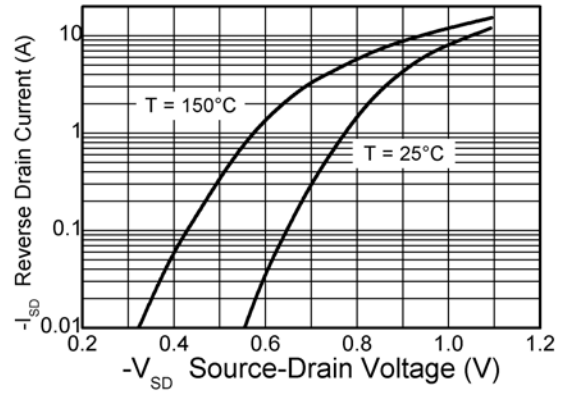
Typical Transfer Characteristics



Normalised Curves v Temperature



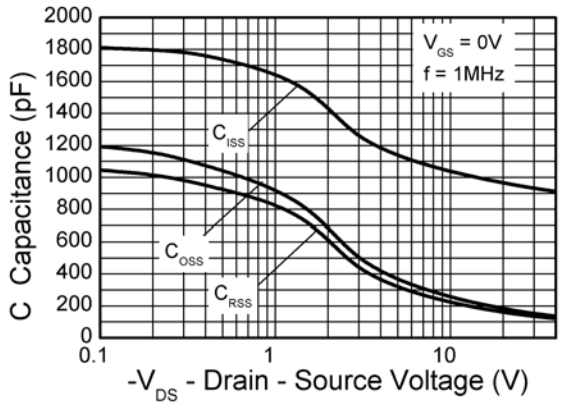
On-Resistance v Drain Current



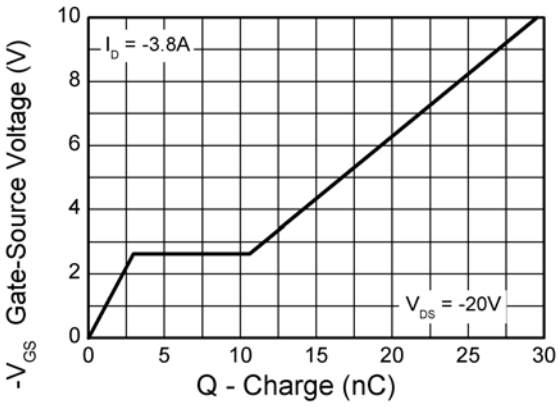
Source-Drain Diode Forward Voltage

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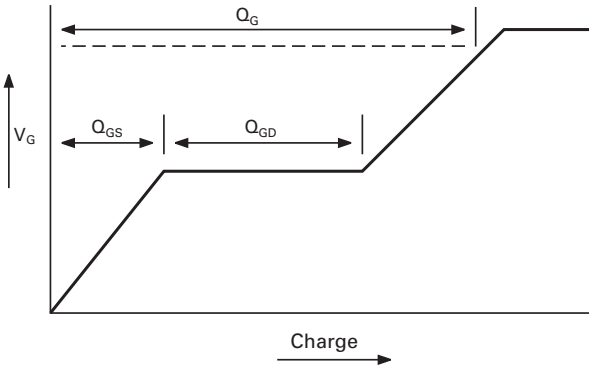
Typical characteristics



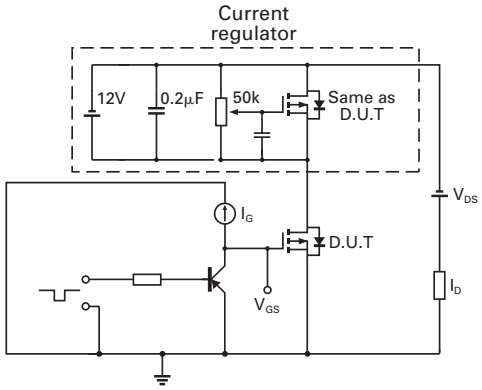
Capacitance v Drain-Source Voltage



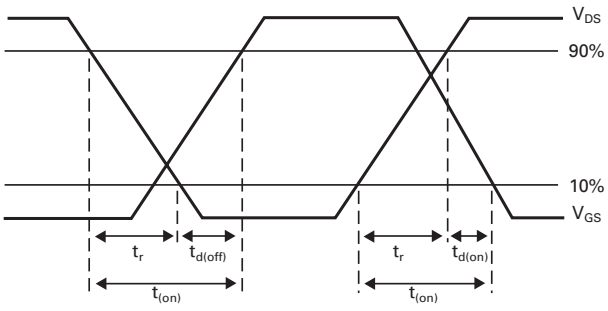
Gate-Source Voltage v Gate Charge



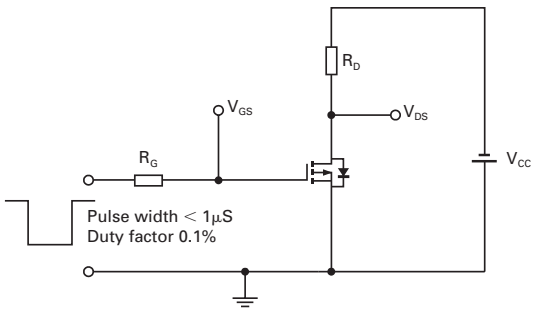
Basic gate charge waveform



Gate charge test circuit



Switching time waveforms



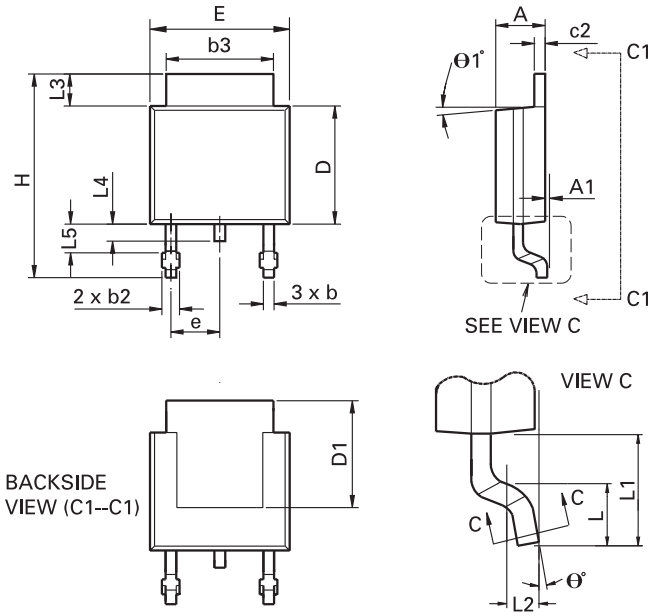
Switching time test circuit

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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	-	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

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