



ZXMN6A09K

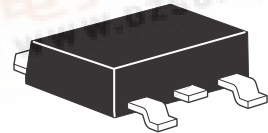
60V N-channel enhancement mode MOSFET in DPAK

Summary

$V_{(BR)DSS}=60V$; $R_{DS(on)}=0.040\Omega$; $I_D=12.2A$

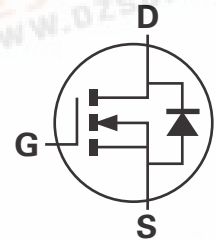
Description

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.



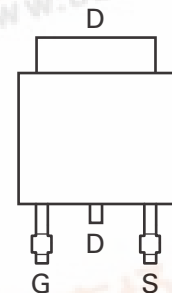
Features

- Low on-resistance
- Fast switching speed
- Low threshold
- Low gate drive
- DPAK (T0-252) package



Applications

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



Pinout - top view

Ordering information

Device	Reel size (inches)	Tape width (mm)	Quantity per reel
ZXMN6A09KTC	13	16	2500

Device marking

ZXMN
6A09K

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Absolute maximum ratings

Parameter	Symbol	Limit	Unit
Drain-source voltage	V_{DSS}	60	V
Gate-source voltage	V_{GS}	± 20	V
Continuous drain current @ $V_{GS}=10V$; $T_{amb}=25^{\circ}C^{(b)}$	I_D	12.2	A
@ $V_{GS}=10V$; $T_{amb}=70^{\circ}C^{(b)}$		9.8	
@ $V_{GS}=10V$; $T_{amb}=25^{\circ}C^{(a)}$		7.9	
Pulsed drain current ^(c)	I_{DM}	43	A
Continuous source current (body diode) ^(b)	I_S	10.8	A
Pulsed source current (body diode) ^(c)	I_{SM}	43	A
Power dissipation at $T_{amb}=25^{\circ}C^{(a)}$	P_D	4.3	W
Linear derating factor		34.4	mW/ $^{\circ}C$
Power dissipation at $T_{amb}=25^{\circ}C^{(a)}$	P_D	10.1	W
Linear derating factor		80.8	mW/ $^{\circ}C$
Power dissipation at $T_{amb}=25^{\circ}C^{(a)}$	P_D	2.15	W
Linear derating factor		17.2	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 ^(a)	$R_{\theta JA}$	29	$^{\circ}C/W$
Junction to ambient ^(b)	$R_{\theta JA}$	12.3	$^{\circ}C/W$
Junction to ambient ^(d)	$R_{\theta JA}$	58.1	$^{\circ}C/W$

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.

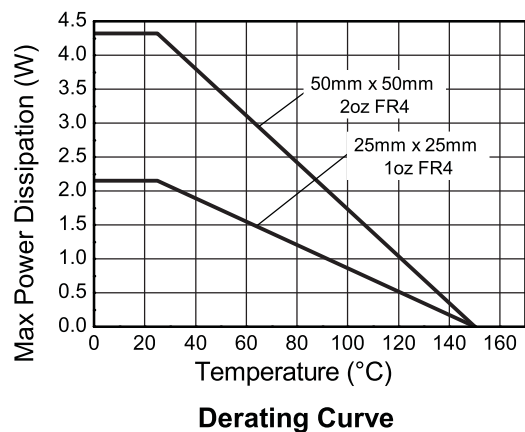
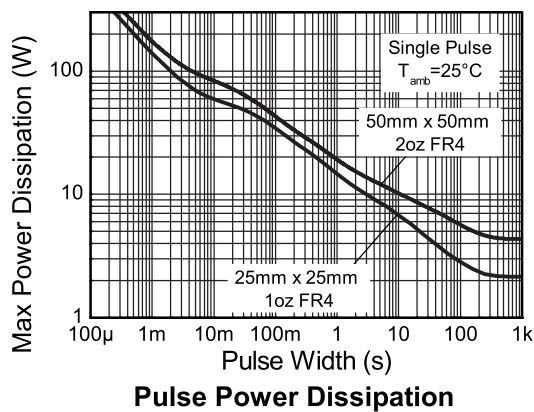
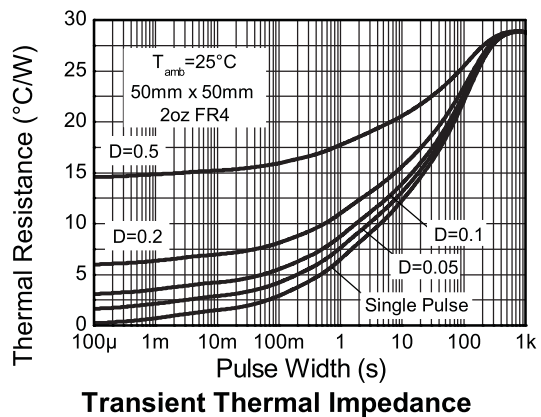
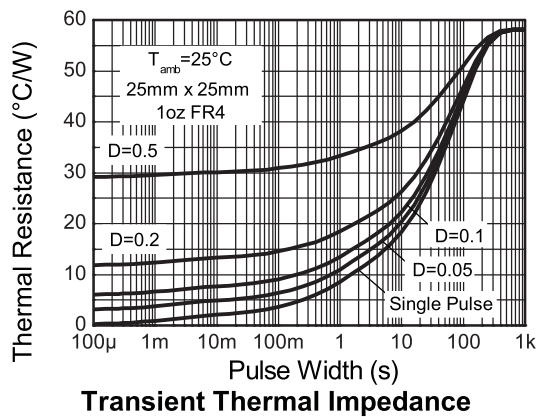
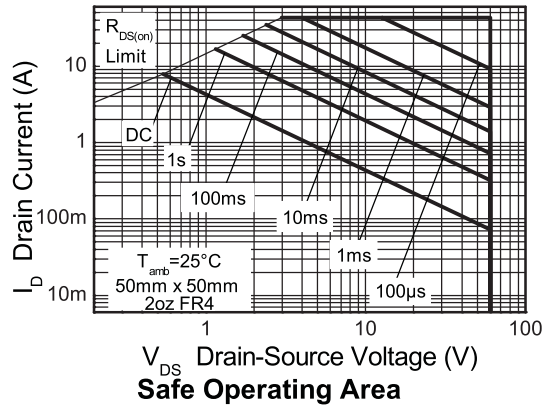
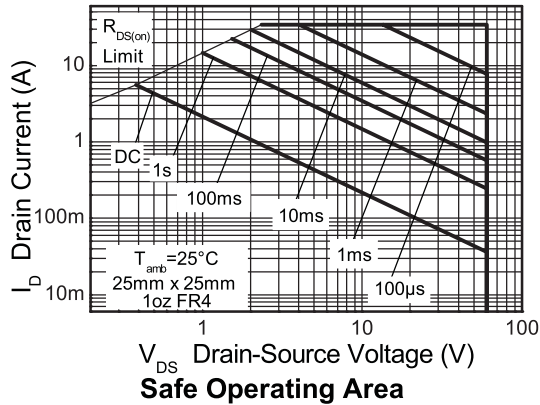
(b) For a device surface mounted on FR4 PCB measured at $t \leq 10$ sec.

(c) Repetitive rating 50mm x 50mm x 1.6mm FR4 PCB, $D=0.02$ pulse width=300 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.

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Characteristics



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

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Static						
Drain-source breakdown voltage	V _{(BR)DSS}	60			V	I _D = 250μA, V _{GS} =0V
Zero gate voltage drain current	I _{DSS}			1	μA	V _{DS} = 60V, 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		3.0	V	I _D = 250μA, V _{DS} =V _{GS}
Static drain-source on-state resistance ^(*)	R _{DS(on)}			0.040	Ω	V _{GS} = 10V, I _D = 7.3A
				0.060	Ω	V _{GS} = 4.5V, I _D = 5.6A
Forward transconductance ^{(*)(‡)}	g _{fs}		15		S	V _{DS} = 15V, I _D = 7.3A
Dynamic ^(‡)						
Input capacitance	C _{iss}		1426		pF	V _{DS} = 30V, V _{GS} =0V f=1MHz
Output capacitance	C _{oss}		134		pF	
Reverse transfer capacitance	C _{rss}		64		pF	
Switching ^(†) ^(‡)						
Turn-on-delay time	t _{d(on)}		4.8		ns	V _{DD} = 30V, I _D = 1A R _G ≐6.0Ω, V _{GS} = 10V (refer to test circuit)
Rise time	t _r		4.6		ns	
Turn-off delay time	t _{d(off)}		32.5		ns	
Fall time	t _f		14.5		ns	
Total gate charge	Q _g		15		nC	V _{DS} = 30V, V _{GS} = 4.5V I _D = 5.6A
Total gate charge	Q _g		29		nC	V _{DS} = 30V, V _{GS} = 10V I _D = 7.3A
Gate-source charge	Q _{gs}		7.0		nC	
Gate drain charge	Q _{gd}		4.7		nC	
Source-drain diode						
Diode forward voltage ^(*)	V _{SD}		0.85	0.95	V	T _j =25°C, I _S = 6.6A, V _{GS} =0V
Reverse recovery time ^(‡)	t _{rr}		25.6		ns	T _j =25°C, I _S = 3A, di/dt=100A/μs
Reverse Recovery charge ^(‡)	Q _{rr}		26.0		nC	

NOTES:

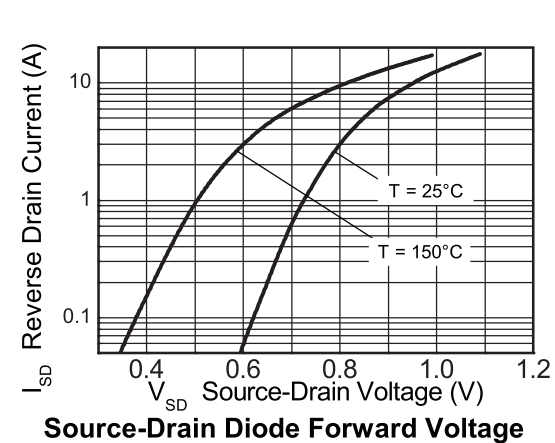
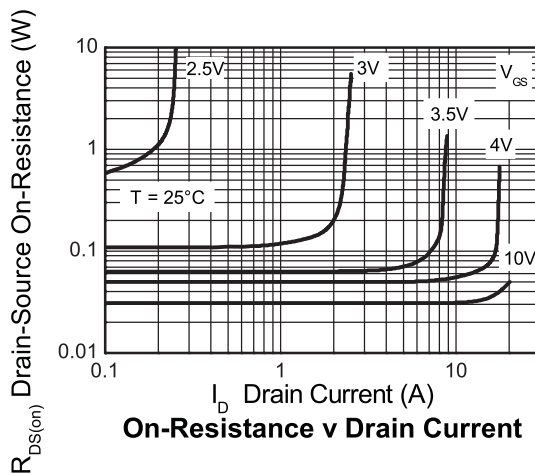
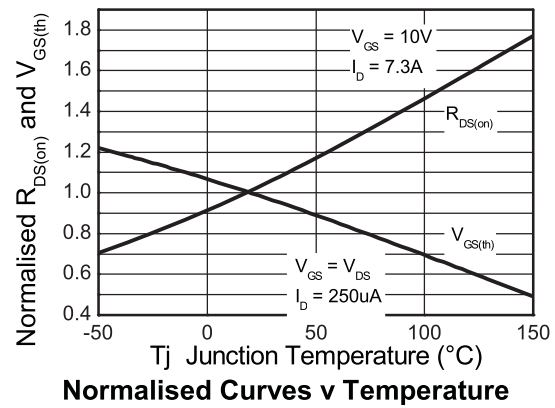
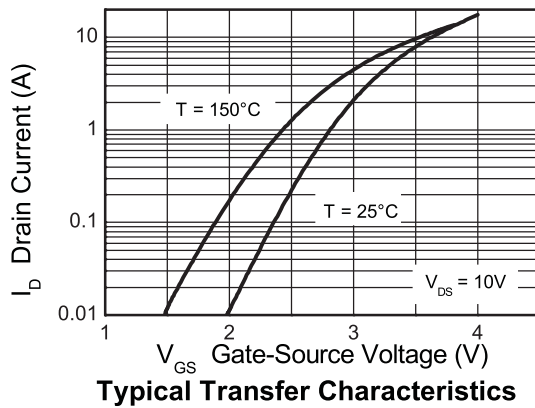
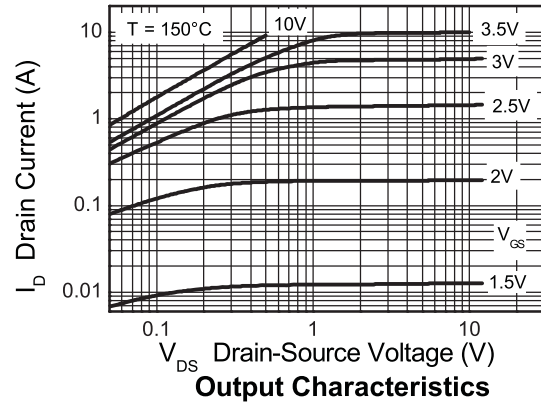
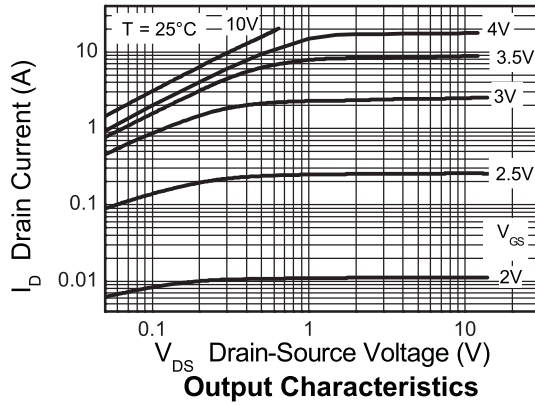
(*) Measured under pulsed conditions. Pulse width $\leq 300\text{ s}$; duty cycle $\leq 2\%$.

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

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

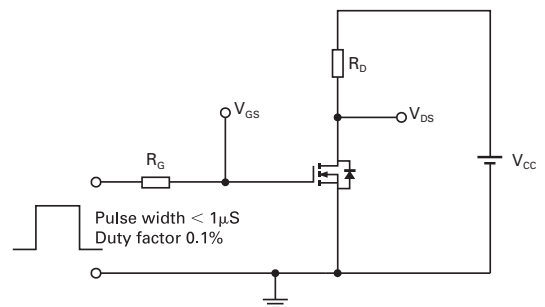
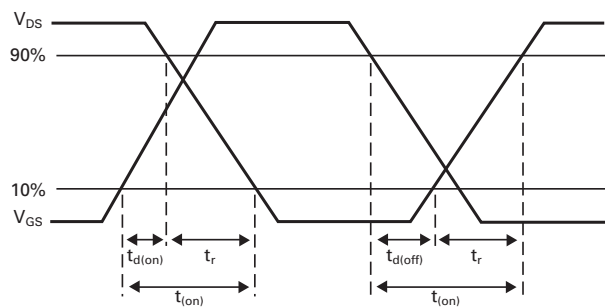
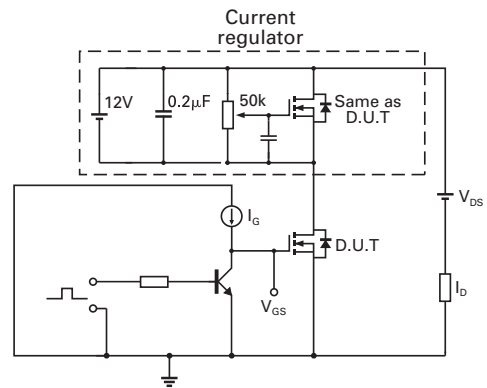
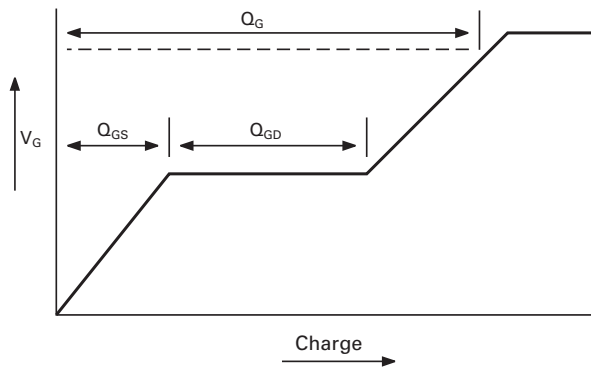
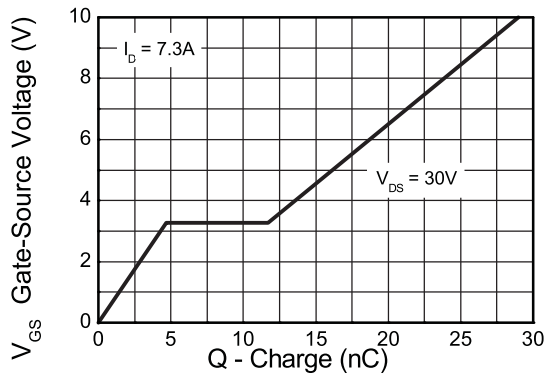
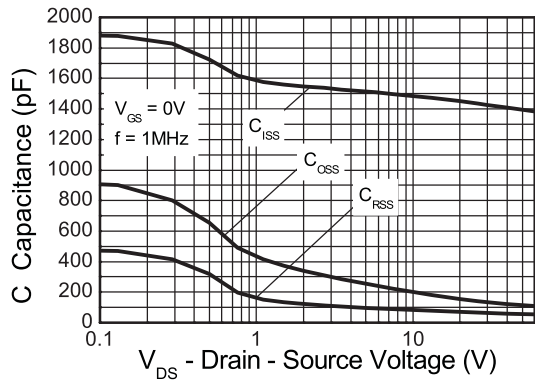
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Typical characteristics



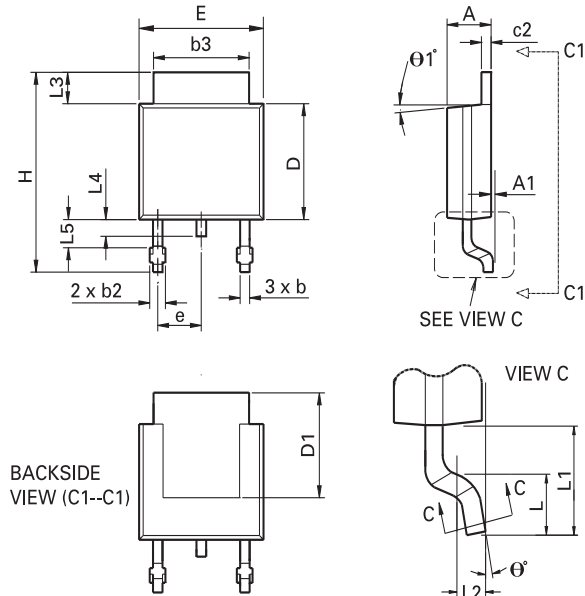
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Typical characteristics



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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	-	$\theta 1^\circ$	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

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