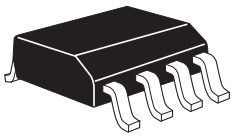
ZXMC4A16DN8

COMPLEMENTARY 40V ENHANCEMENT MODE MOSFET

SUMMARY

N-Channel = $V_{(BR)DSS}$= 40V : $R_{DS(on)}$= 0.05Ω; I_D= 5.2A

P-Channel = $V_{(BR)DSS}$= -40V : $R_{DS(on)}$= 0.06Ω; I_D= -4.7A



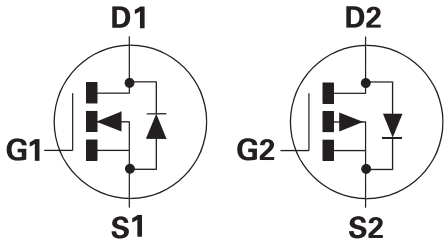
SO8

DESCRIPTION

This new generation of trench MOSFETs from Zetex utilises 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
- Low profile SOIC package



APPLICATIONS

- Motor drive
- LCD backlighting

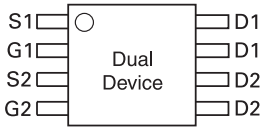
ORDERING INFORMATION

DEVICE	REEL SIZE	TAPE WIDTH	QUANTITY PER REEL
ZXMC4A16DN8TA	7"	12mm	500
ZXMC4A16DN8TC	13"	12mm	2,500

DEVICE MARKING

- ZXMC
  4A16

PINOUT



TOP VIEW

ZXMC4A16DN8

ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	N-channel	P-channel	UNIT
Drain-source voltage	V_{DSS}	40	-40	V
Gate-source voltage	V_{GS}	±20	±20	V
Continuous drain current	I_D			
(V_{GS}= 10V; T_A=25°C) (b)(d)		5.2	-4.7	A
(V_{GS}= 10V; T_A=70°C) (b)(d)		4.1	-3.8	A
(V_{GS}= 10V; T_A=25°C) (a)(d)		4.0	-3.6	A
Pulsed drain current (c)	I_{DM}	24	-23	A
Continuous source current (body diode) (b)	I_S	2.5	2.3	A
Pulsed source current (body diode) (c)	I_{SM}	24	23	A
Power dissipation at T_A =25°C (a) (d)	P_D	1.25		W
Linear derating factor		10		mW/°C
Power dissipation at T_A =25°C (a) (e)	P_D	1.8		W
Linear derating factor		14		mW/°C
Power dissipation at T_A =25°C (b) (d)	P_D	2.1		W
Linear derating factor		17		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) (d)	$R_{\Theta JA}$	100	°C/W
Junction to ambient (a) (e)	$R_{\Theta JA}$	70	°C/W
Junction to ambient (b) (d)	$R_{\Theta JA}$	60	°C/W

NOTES

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

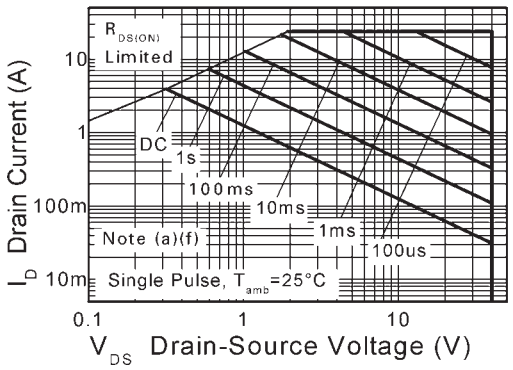
(b) For a device surface mounted on FR4 PCB measured at t ≤ 10 sec.

(c) Repetitive rating - pulse width limited by maximum junction temperature. Pulse width 300us, d<= 0.02. Refer to Transient Thermal Impedance graph.

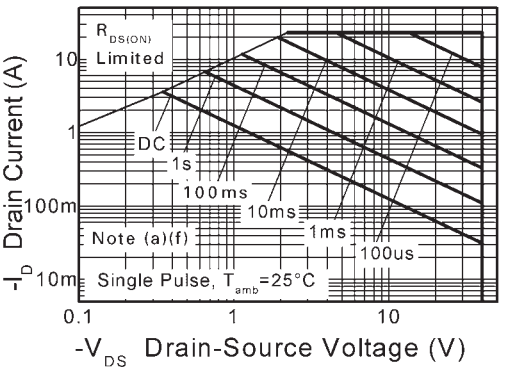
(d) For device with one active die.

(e) For device with two active die running at equal power.

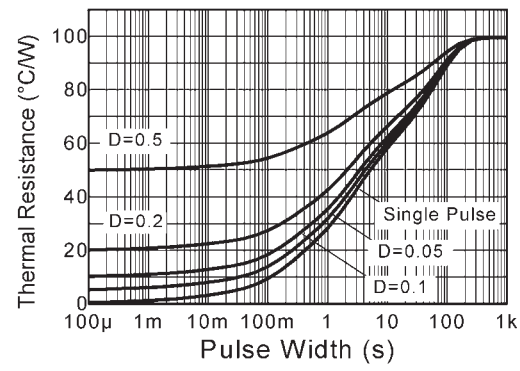
TYPICAL CHARACTERISTICS



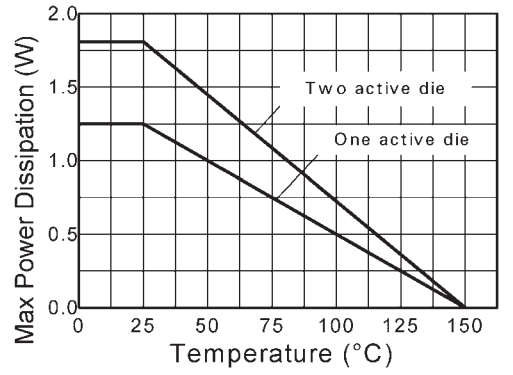
N-channel Safe Operating Area



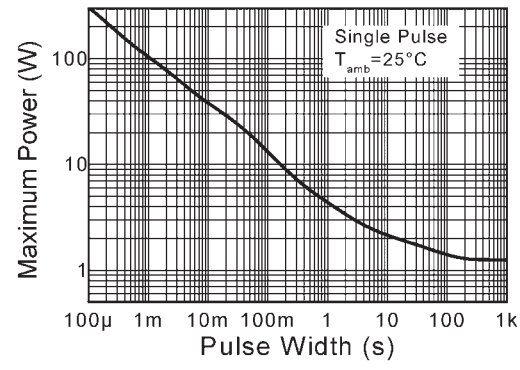
P-channel Safe Operating Area



Transient Thermal Impedance



Derating Curve



Pulse Power Dissipation

ZXMC4A16DN8

ELECTRICAL CHARACTERISTICS (at T_{amb} = 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}			0.5	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= 250mA, V_{DS}=V_{GS}
Static Drain-Source On-State Resistance (1)	$R_{DS(on)}$			0.050 0.075	Ω	V_{GS}= 10V, I_D= 4.5A V_{GS}= 4.5V, I_D= 3.2A
Forward Transconductance (1) (3)	g_{fs}		8.6		S	V_{DS}= 15V, I_D= 4.5A
DYNAMIC (3)						
Input Capacitance	Ciss		770		pF	V_{DS}= 40V, V_{GS}=0V f=1MHz
Output Capacitance	Coss		92		pF	
Reverse Transfer Capacitance	Crss		61		pF	
SWITCHING(2) (3)						
Turn-On-Delay Time	td(on)		3.3		ns	V_{DD}= 30V, I_D= 1A R_G ≅6.0Ω, V_{GS}= 10V
Rise Time	tr		4.7		ns	
Turn-Off Delay Time	td(off)		29		ns	
Fall Time	tf		14		ns	
Total Gate Charge	Qg		17		nC	
Gate-Source Charge	Qgs		2.5		nC	V_{DS}= 30V, V_{GS}= 10V I_D= 4.5A
Gate Drain Charge	Qgd		3.8		nC	
SOURCE-DRAIN DIODE						
Diode Forward Voltage (1)	VSD		0.8	0.95	V	T_j=25°C, I_S= 4.5A, V_{GS}=0V
Reverse Recovery Time (3)	trr		20		ns	T_j=25°C, I_S= 2.5A, di/dt=100A/μs
Reverse Recovery Charge (3)	Qrr		16		nC	

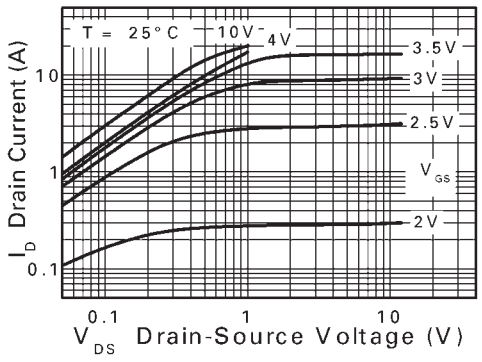
NOTES

(1) Measured under pulsed conditions. Pulse width ≤ 300μs; duty cycle ≤ 2%.

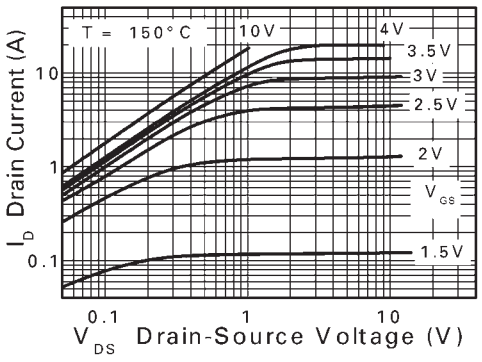
(2) Switching characteristics are independent of operating junction temperature.

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

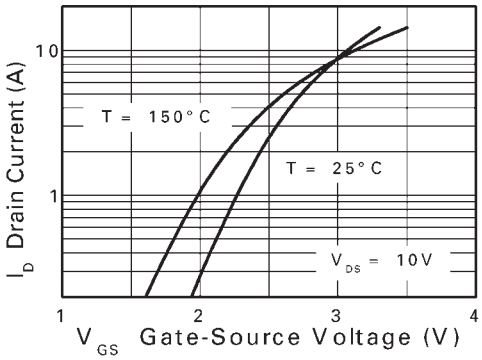
TYPICAL CHARACTERISTICS



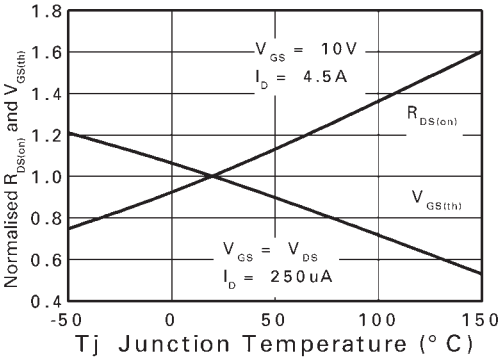
Output Characteristics



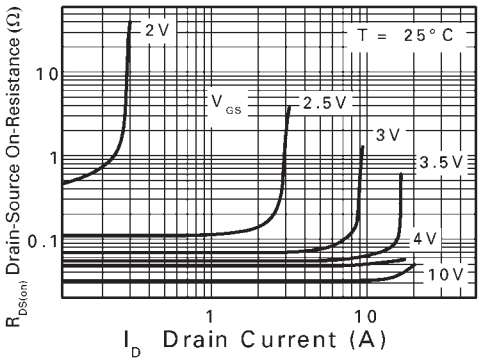
Output Characteristics



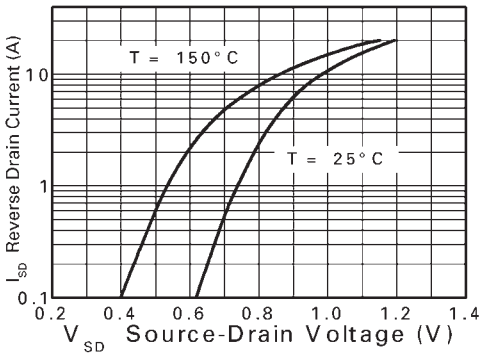
Typical Transfer Characteristics



Normalised Curves v Temperature

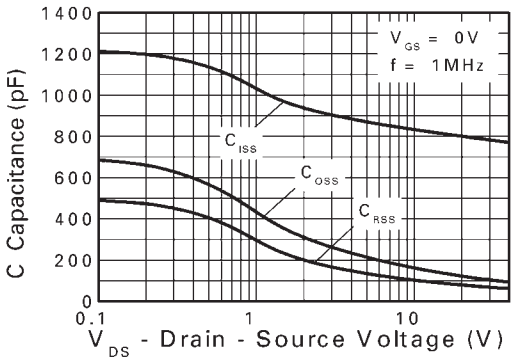


On-Resistance v Drain Current

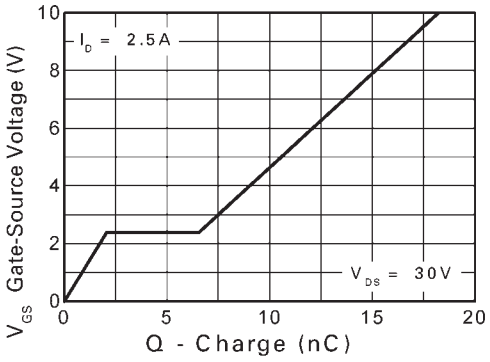


Source-Drain Diode Forward Voltage

TYPICAL CHARACTERISTICS



Capacitance v Drain-Source Voltage



Gate-Source Voltage v Gate Charge

ELECTRICAL CHARACTERISTICS (at T_{amb} = 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}			-1.0	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 (1)	$R_{DS(on)}$			0.060 0.100	Ω	V_{GS}= -10V, I_D= -3.8A V_{GS}= -4.5V, I_D= -2.9A
Forward Transconductance (1) (3)	g_{fs}		6.8		S	V_{DS}= -15V, I_D= -3.8A
DYNAMIC (3)						
Input Capacitance	C_{iss}		1000		pF	V_{DS}= -20V, V_{GS}=0V f=1MHz
Output Capacitance	C_{oss}		180		pF	
Reverse Transfer Capacitance	C_{rss}		160		pF	
SWITCHING(2) (3)						
Turn-On-Delay Time	$t_{d(on)}$		3.7		ns	V_{DD}= -20V, I_D= -1A $R_G \cong 6.0\Omega$, V_{GS}= 10V
Rise Time	t_r		5.5		ns	
Turn-Off Delay Time	$t_{d(off)}$		33		ns	
Fall Time	t_f		18		ns	
Gate Charge	Q_g		15		nC	V_{DS}= -20V, V_{GS}= -5V I_D= -3.8A
Total Gate Charge	Q_g		26		nC	V_{DS}= -20V, V_{GS}= -10V I_D= -3.8A
Gate-Source Charge	Q_{gs}		3.2		nC	
Gate Drain Charge	Q_{gd}		7.3		nC	
SOURCE-DRAIN DIODE						
Diode Forward Voltage (1)	V_{SD}		-0.86	-0.95	V	T_j=25°C, I_S= -3.4A, V_{GS}=0V
Reverse Recovery Time (3)	t_{rr}		27		ns	T_j=25°C, I_S= -3A, di/dt=100A/μs
Reverse Recovery Charge (3)	Q_{rr}		25		nC	

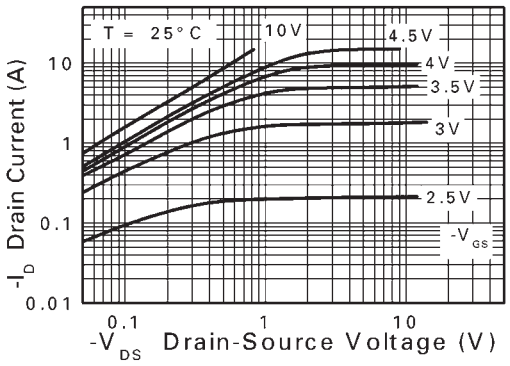
NOTES

(1) Measured under pulsed conditions. Pulse width ≤ 300μs; duty cycle ≤ 2%.

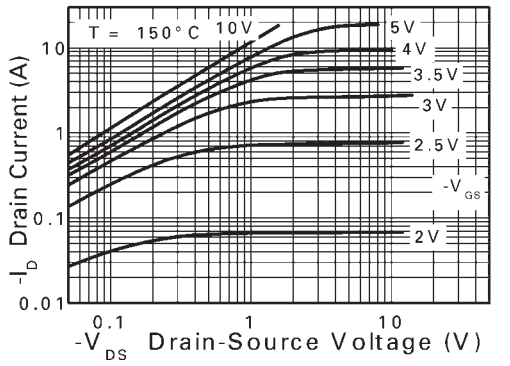
(2) Switching characteristics are independent of operating junction temperature.

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

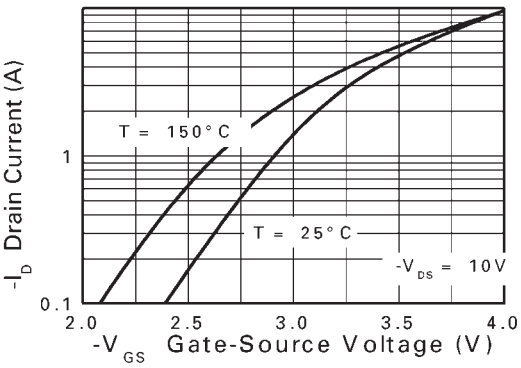
TYPICAL CHARACTERISTICS



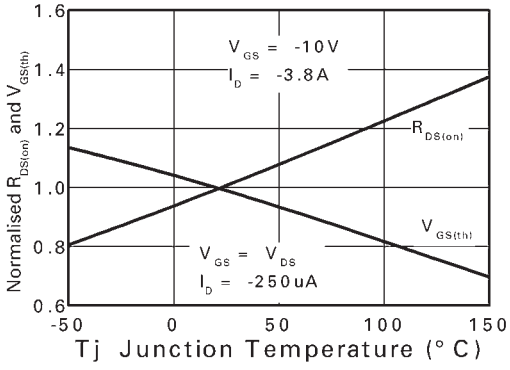
Output Characteristics



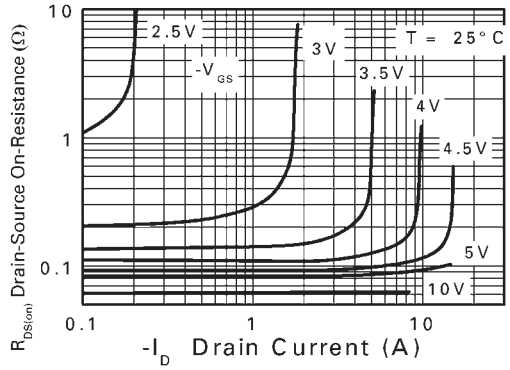
Output Characteristics



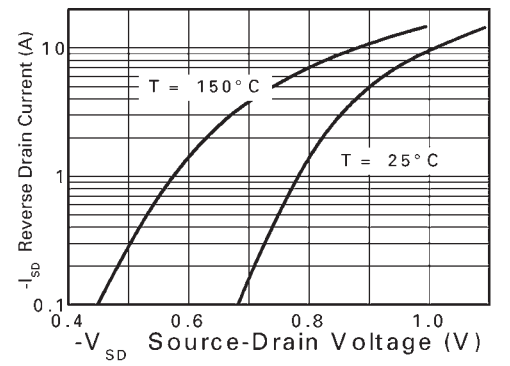
Typical Transfer Characteristics



Normalised Curves v Temperature

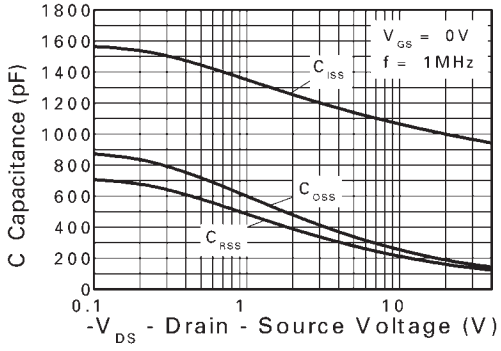


On-Resistance v Drain Current

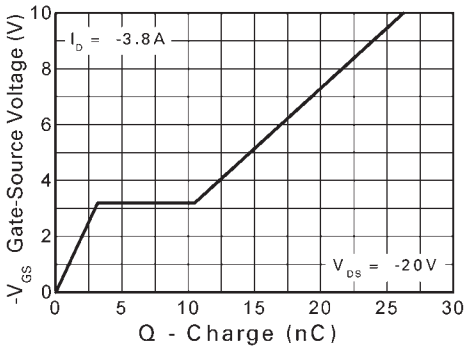


Source-Drain Diode Forward Voltage

TYPICAL CHARACTERISTICS



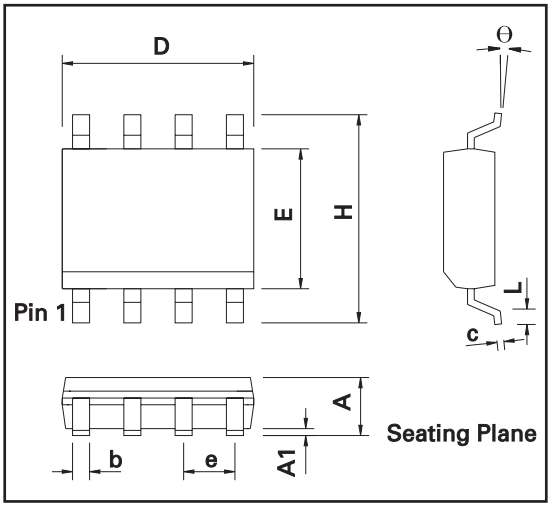
Capacitance v Drain-Source Voltage



Gate-Source Voltage v Gate Charge

ZXMC4A16DN8

PACKAGE OUTLINE



Controlling dimensions are in millimeters. Approximate conversions are given in inches

PACKAGE DIMENSIONS

DIM	Millimeters		Inches		DIM	Millimeters		Inches	
	Min	Max	Min	Max		Min	Max	Min	Max
A	1.35	1.75	0.053	0.069	e	1.27 BSC		0.050 BSC	
A1	0.10	0.25	0.004	0.010	b	0.33	0.51	0.013	0.020
D	4.80	5.00	0.189	0.197	c	0.19	0.25	0.008	0.010
H	5.80	6.20	0.228	0.244	θ	0°	8°	0°	8°
E	3.80	4.00	0.150	0.157	h	0.25	0.50	0.010	0.020
L	0.40	1.27	0.016	0.050	-	-	-	-	-

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