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ZXMC4A16DN8

COMPLEMENTARY 40V ENHANCEMENT MODE MOSFET

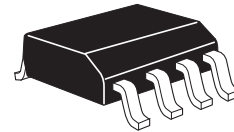
SUMMARY

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

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

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.



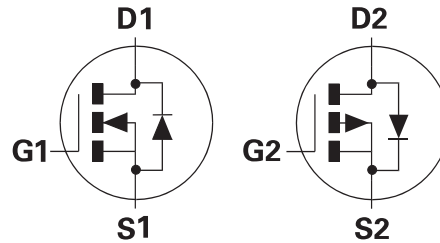
SO8

FEATURES

- Low on-resistance
- Fast switching speed
- Low threshold
- Low gate drive
- Low profile SOIC package

APPLICATIONS

- Motor drive
- LCD backlighting



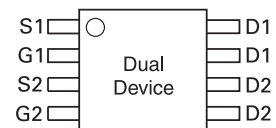
ORDERING INFORMATION

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 ($V_{GS} = 10V$; $T_A = 25^\circ C$) (b)(d) ($V_{GS} = 10V$; $T_A = 70^\circ C$) (b)(d) ($V_{GS} = 10V$; $T_A = 25^\circ C$) (a)(d)	I_D	5.2 4.1 4.0	-4.7 -3.8 -3.6	A A 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 $T_A = 25^\circ C$ (a) (d) Linear derating factor	P_D	1.25 10		W mW/ $^\circ C$
Power dissipation at $T_A = 25^\circ C$ (a) (e) Linear derating factor	P_D	1.8 14		W mW/ $^\circ C$
Power dissipation at $T_A = 25^\circ C$ (b) (d) Linear derating factor	P_D	2.1 17		W mW/ $^\circ C$
Operating and storage temperature range	T_j, T_{stg}	-55 to +150		$^\circ C$

THERMAL RESISTANCE

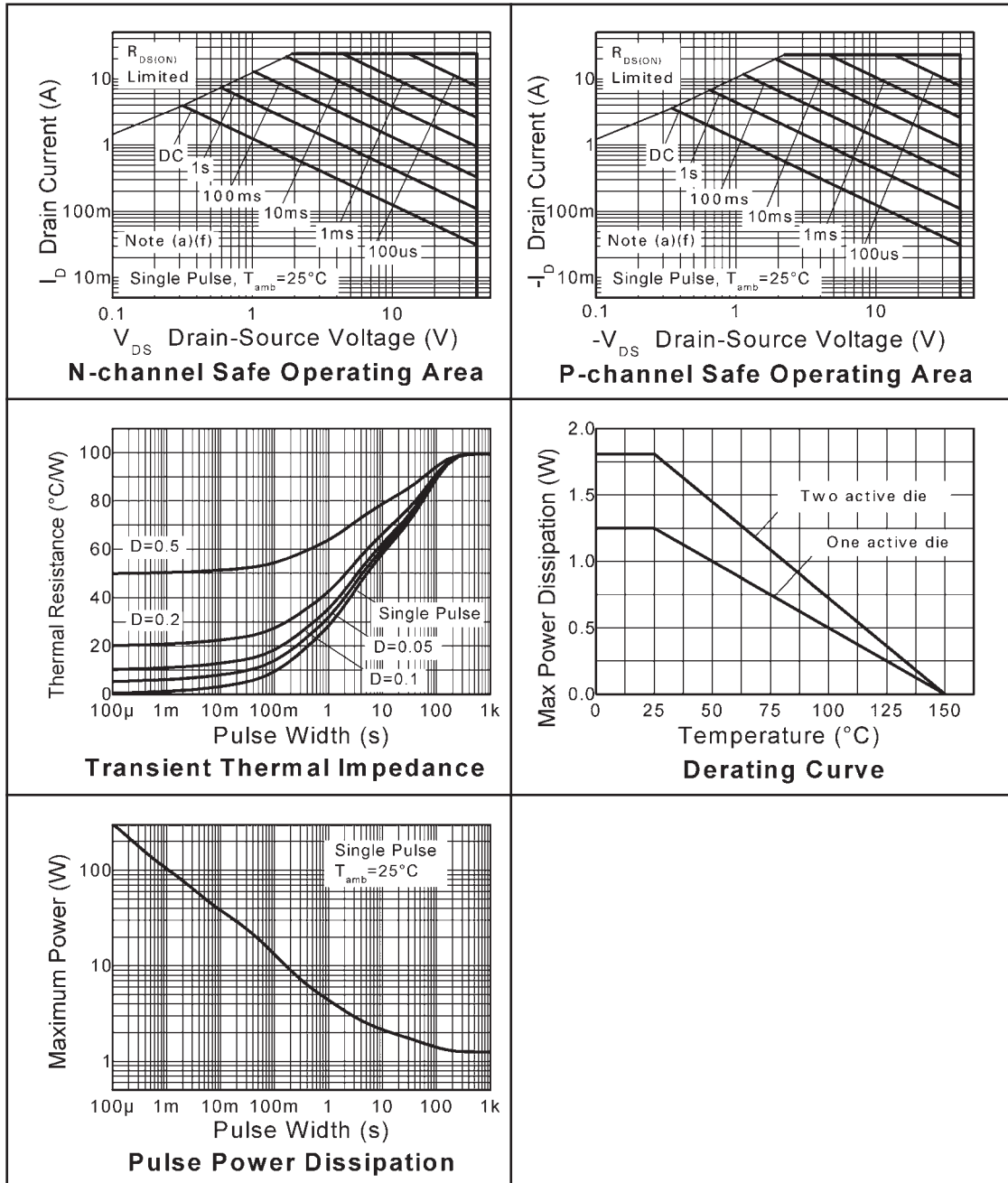
PARAMETER	SYMBOL	VALUE	UNIT
Junction to ambient (a) (d)	$R_{\theta JA}$	100	$^\circ C/W$
Junction to ambient (a) (e)	$R_{\theta JA}$	70	$^\circ C/W$
Junction to ambient (b) (d)	$R_{\theta JA}$	60	$^\circ C/W$

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 $t \leq 10$ sec.
(c) Repetitive rating - pulse width limited by maximum junction temperature. Pulse width 300us, $d \leq 0.02$. Refer to Transient Thermal Impedance graph.
(d) For device with one active die.
(e) For device with two active die running at equal power.

ZXMC4A16DN8

TYPICAL CHARACTERISTICS



ZXMC4A16DN8

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}	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	C _{iss}		770		pF	V _{DS} = 40V, V _{GS} =0V f=1MHz
Output Capacitance	C _{oss}		92		pF	
Reverse Transfer Capacitance	C _{rss}		61		pF	
SWITCHING ^{(2) (3)}						
Turn-On-Delay Time	t _{d(on)}		3.3		ns	V _{DD} = 30V, I _D = 1A R _G ≅6.0Ω, V _{GS} = 10V
Rise Time	t _r		4.7		ns	
Turn-Off Delay Time	t _{d(off)}		29		ns	
Fall Time	t _f		14		ns	
Total Gate Charge	Q _g		17		nC	
Gate-Source Charge	Q _{gs}		2.5		nC	V _{DS} = 30V, V _{GS} = 10V I _D = 4.5A
Gate Drain Charge	Q _{gd}		3.8		nC	
SOURCE-DRAIN DIODE						
Diode Forward Voltage ⁽¹⁾	V _{SD}		0.8	0.95	V	T _J =25°C, I _S = 4.5A, V _{GS} =0V
Reverse Recovery Time ⁽³⁾	t _{rr}		20		ns	T _J =25°C, I _S = 2.5A,
Reverse Recovery Charge ⁽³⁾	Q _{rr}		16		nC	di/dt=100A/μs

NOTES

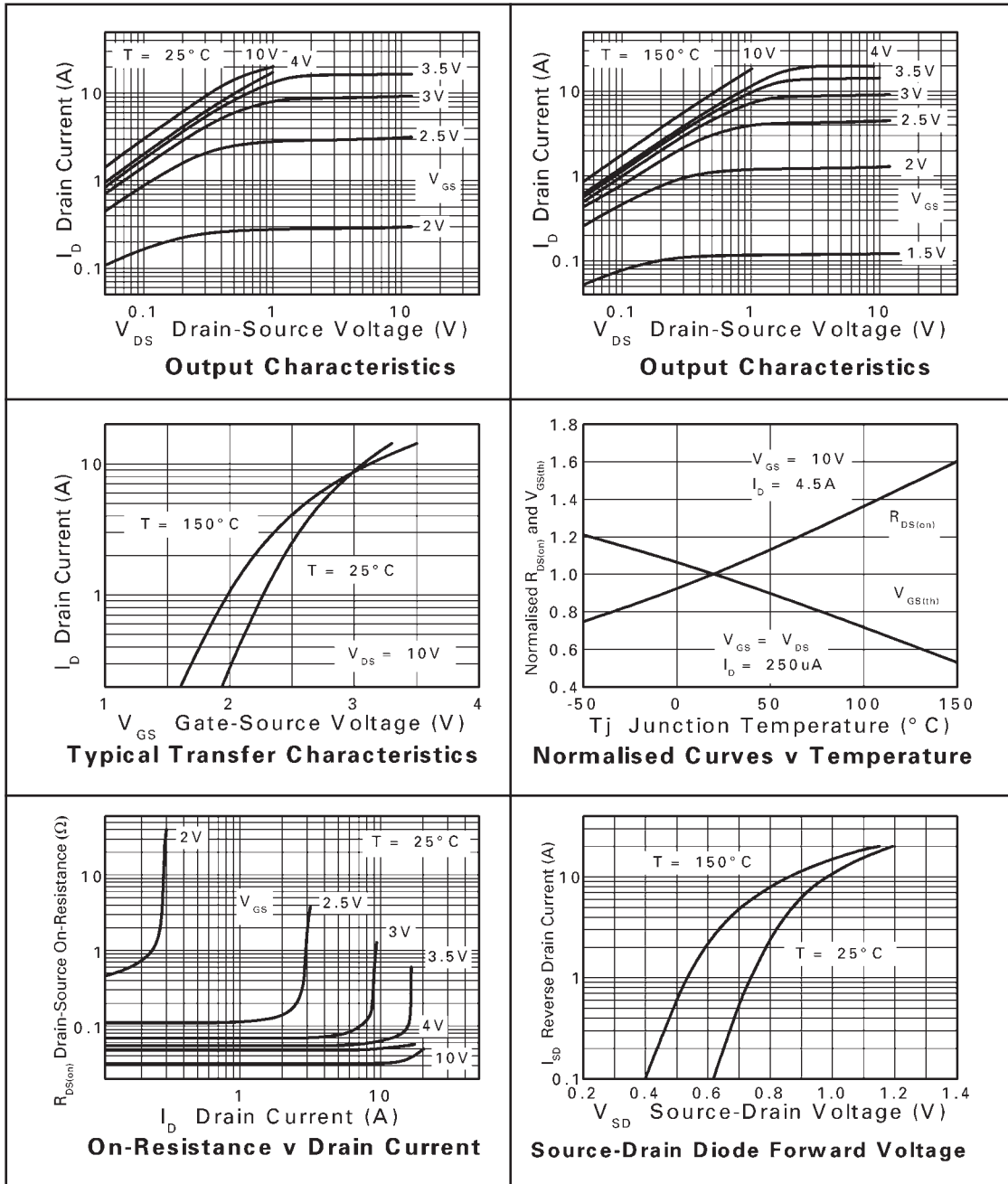
(1) Measured under pulsed conditions. Pulse width $\leq 300\mu\text{s}$; duty cycle $\leq 2\%$.

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

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

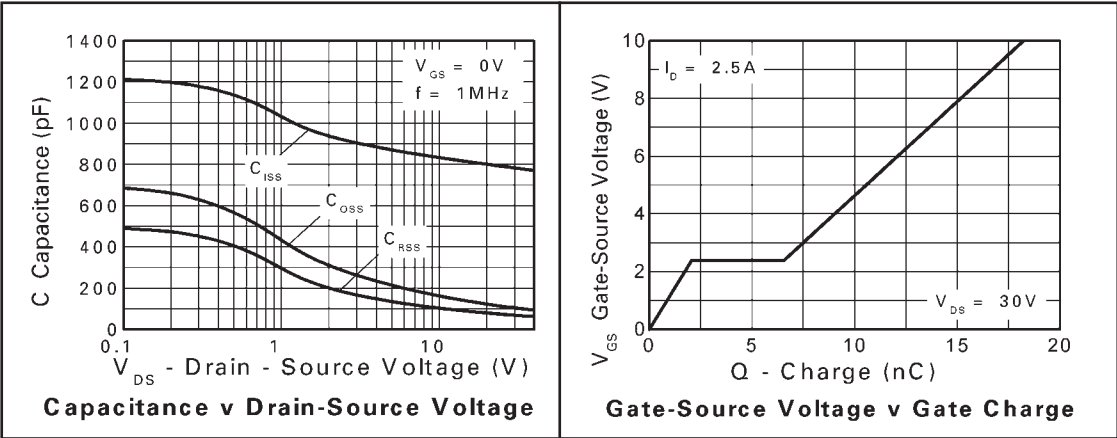
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TYPICAL CHARACTERISTICS



ZXMC4A16DN8

TYPICAL CHARACTERISTICS



ZXMC4A16DN8

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}	-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 ≅ 6.0Ω, 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

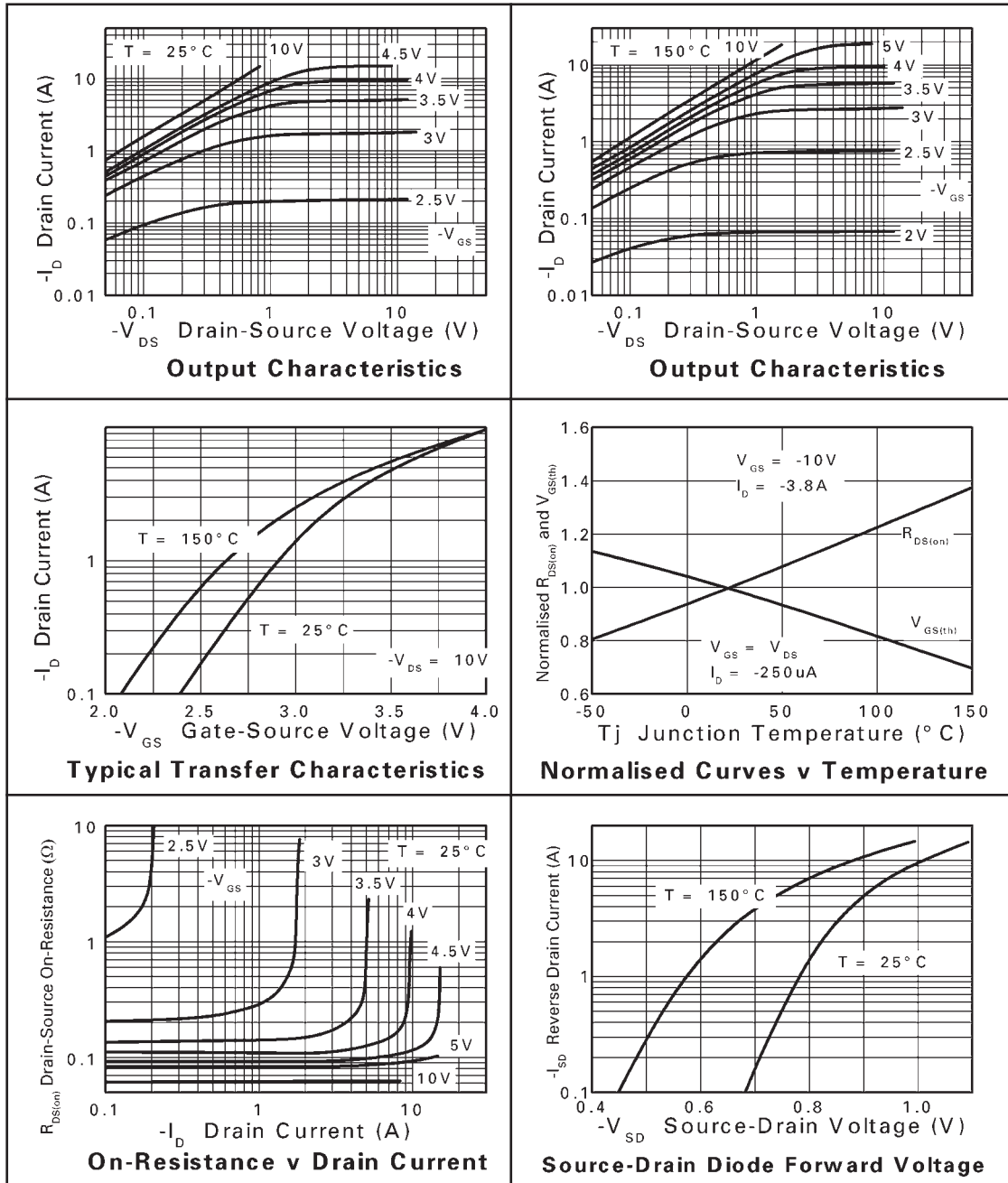
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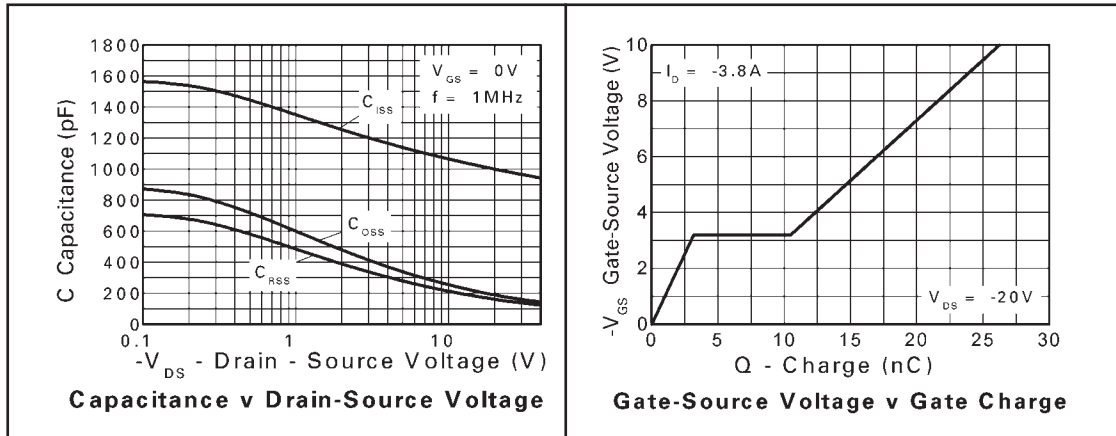
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TYPICAL CHARACTERISTICS



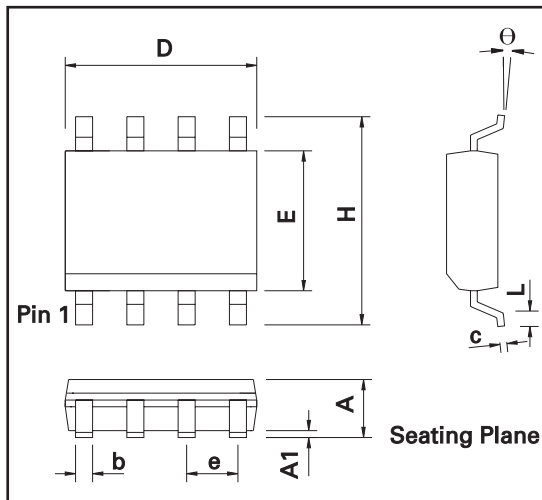
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TYPICAL CHARACTERISTICS



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	theta	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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