

ZXMC4A16DN8

COMPLEMENTARY 40V ENHANCEMENT MODE MOSFET

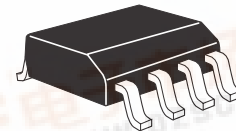
SUMMARY

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.



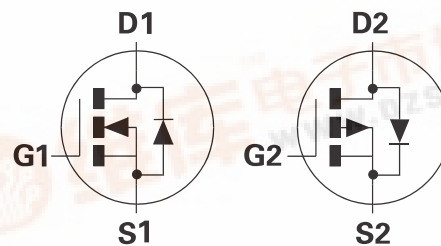
SO8

FEATURES

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

APPLICATIONS

- Motor drive
- LCD backlighting



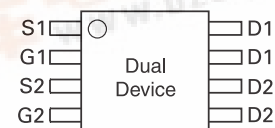
ORDERING INFORMATION

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.

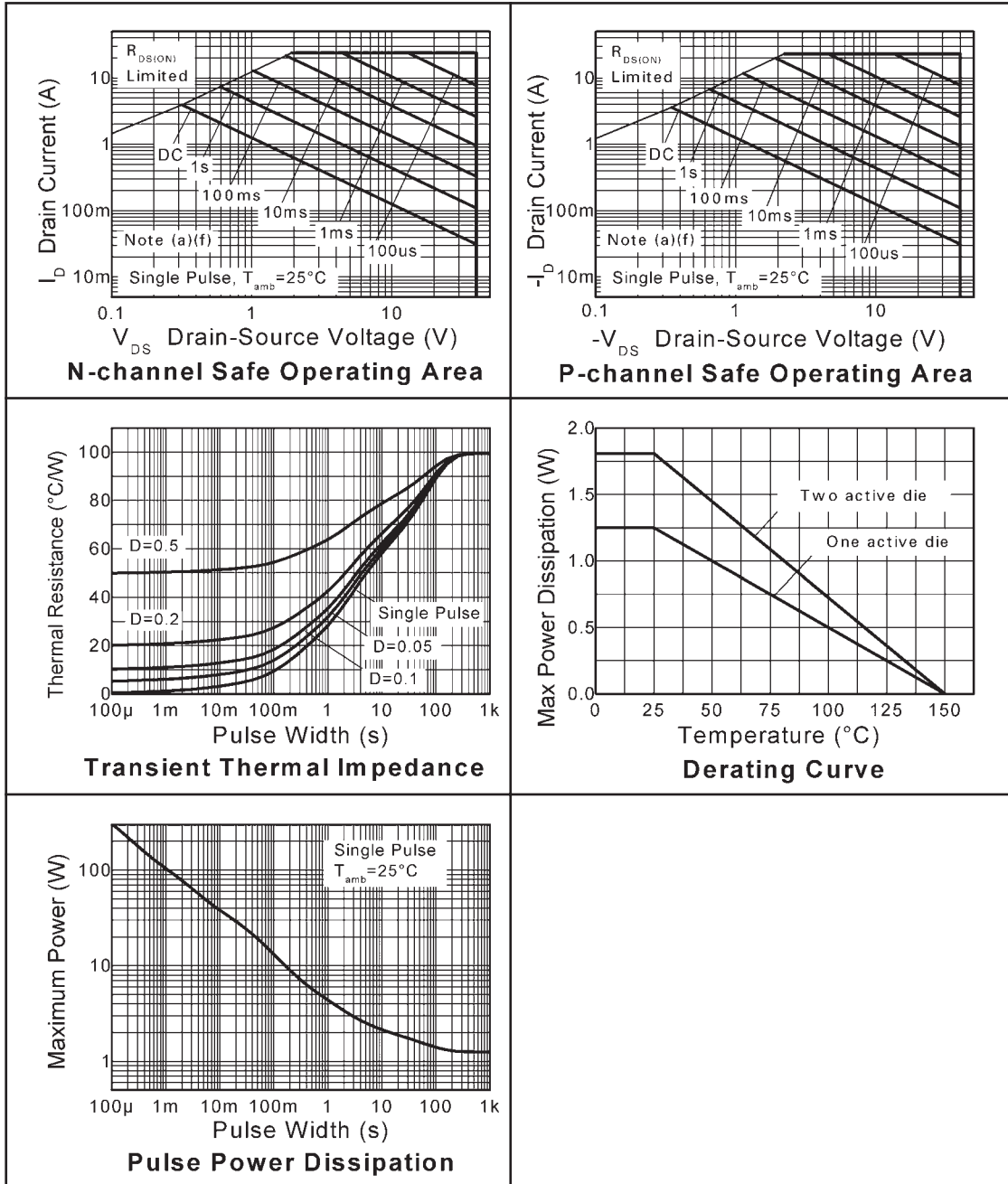
(c) Repetitive rating - pulse width limited by maximum junction temperature. Pulse width 300us, $d \leq 0.02$. Refer to Transient Thermal Impedance graph.

(d) For device with one active die.

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

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TYPICAL 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}	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
Gate Drain Charge	Q _{gd}		3.8		nC	I _D = 4.5A
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

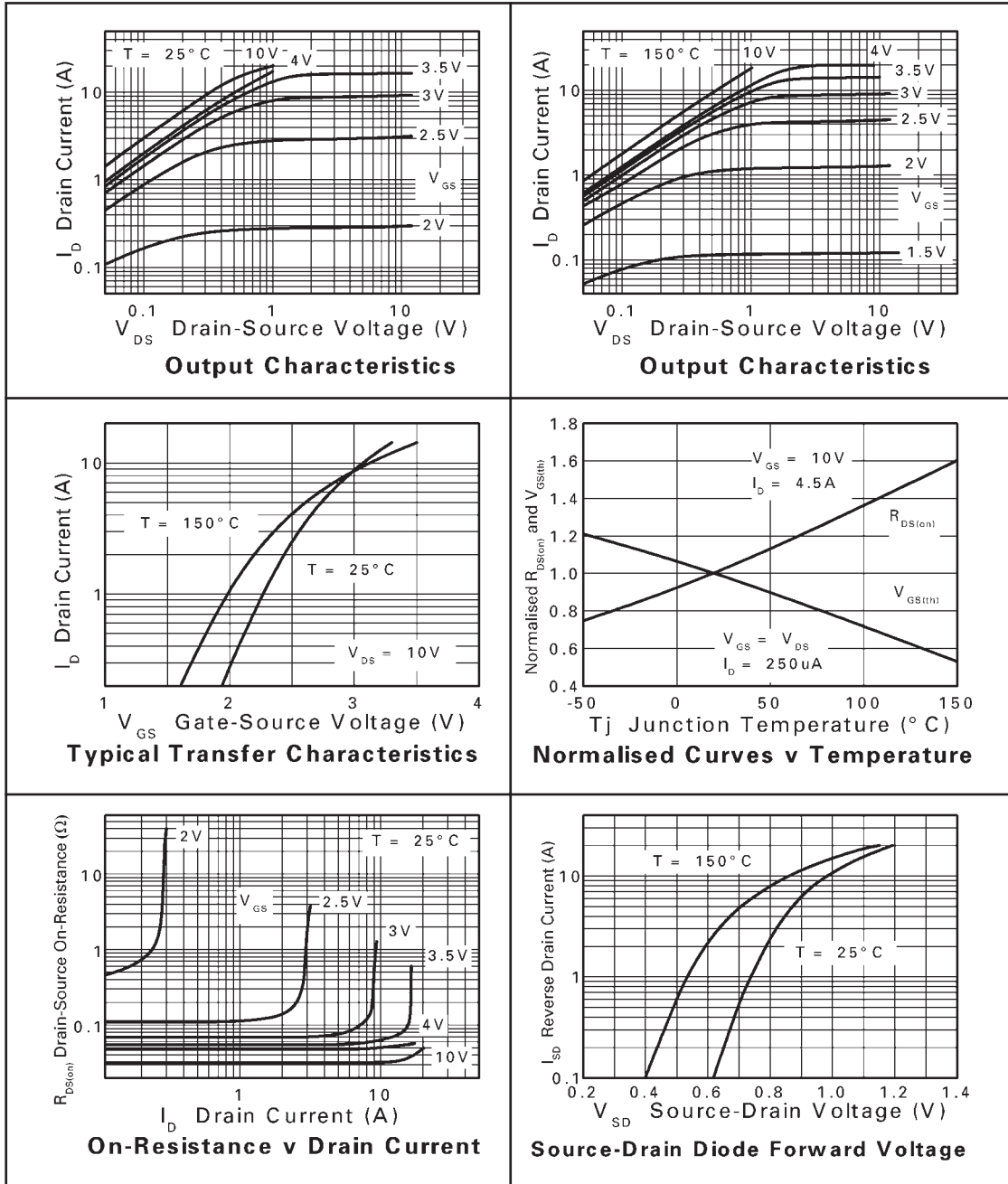
(1) Measured under pulsed conditions. Pulse width $\leq 300\mu\text{s}$; duty cycle $\leq 2\%$.

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

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

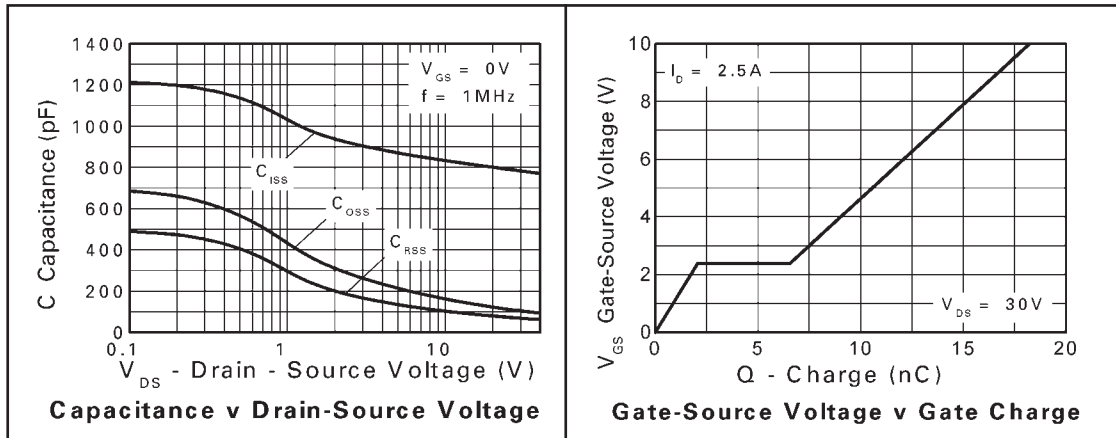
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ELECTRICAL CHARACTERISTICS (at $T_{amb} = 25^{\circ}\text{C}$ unless otherwise stated)

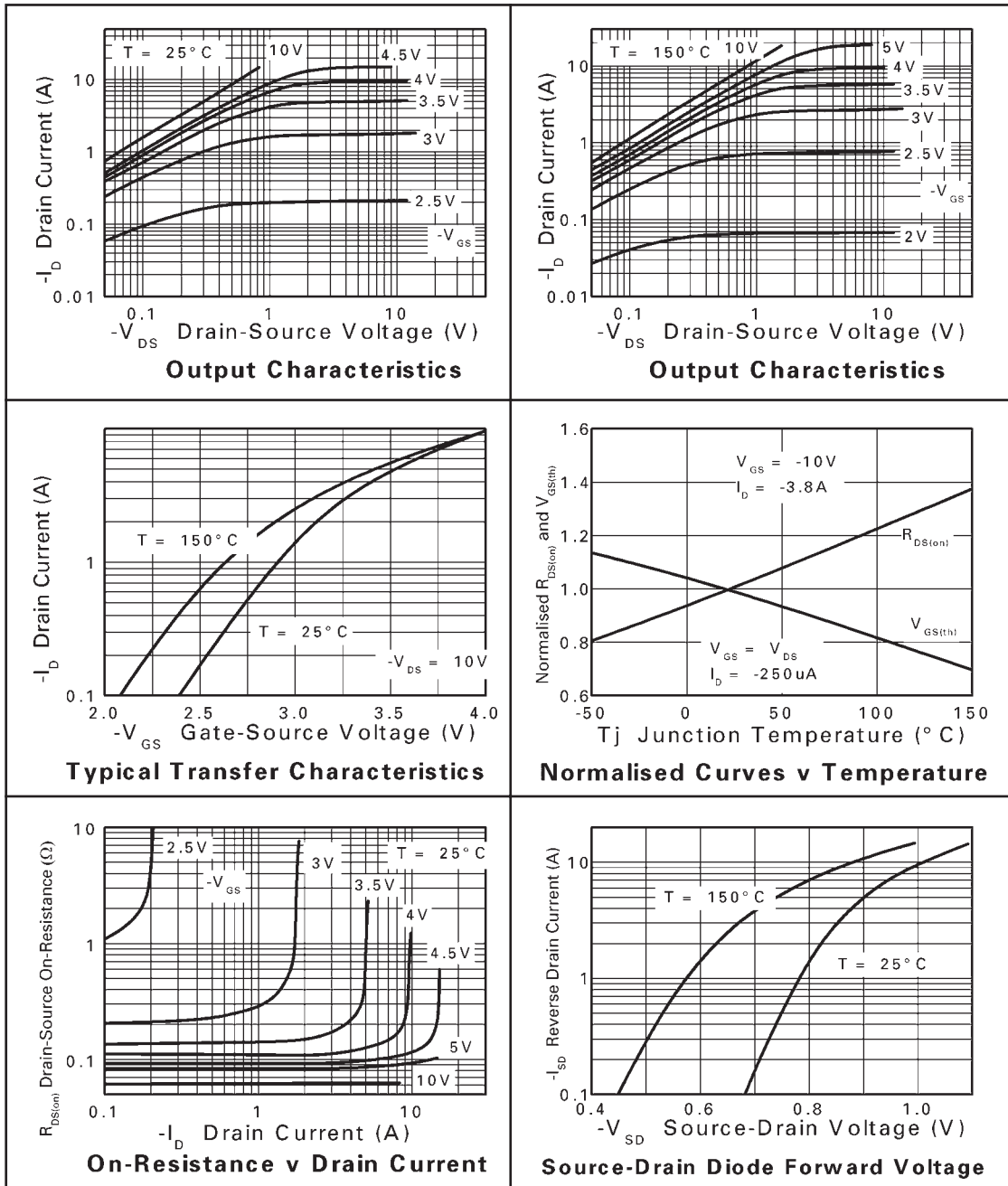
PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	CONDITIONS
STATIC						
Drain-Source Breakdown Voltage	V _{(BR)DSS}	-40			V	I _D = -250μA, V _{GS} =0V
Zero Gate Voltage Drain Current	I _{DSS}			-1.0	μA	V _{DS} = -40V, V _{GS} =0V
Gate-Body Leakage	I _{GSS}			100	nA	V _{GS} =±20V, V _{DS} =0V
Gate-Source Threshold 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

- (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.

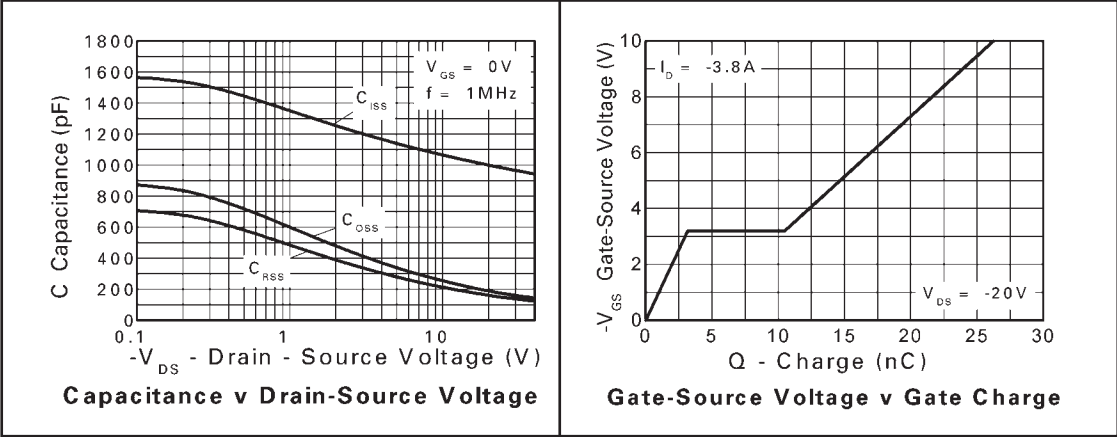
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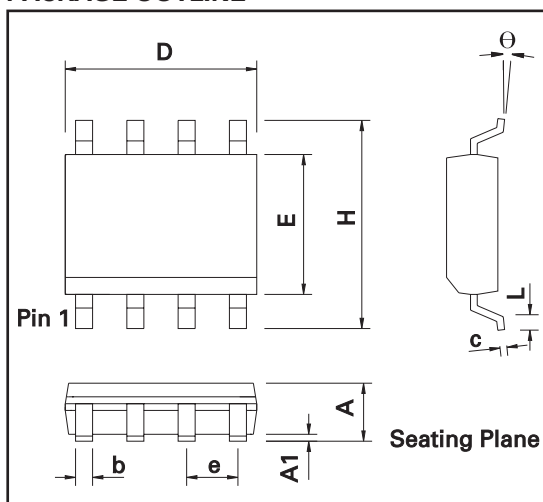
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TYPICAL CHARACTERISTICS



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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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