

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

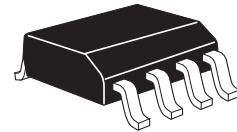
This new generation of trench MOSFETs from Zetex utilises a unique structure that combines the benefits of low on-resistance with fast switching speed. This makes them ideal for high efficiency, low voltage, power management applications.

FEATURES

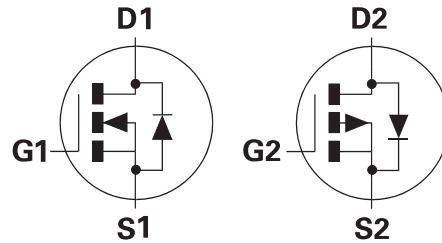
- Low on-resistance
- Fast switching speed
- Low threshold
- Low gate drive
- Low profile SOIC package

APPLICATIONS

- Motor drive
- LCD backlighting



SO8



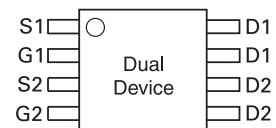
ORDERING INFORMATION

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

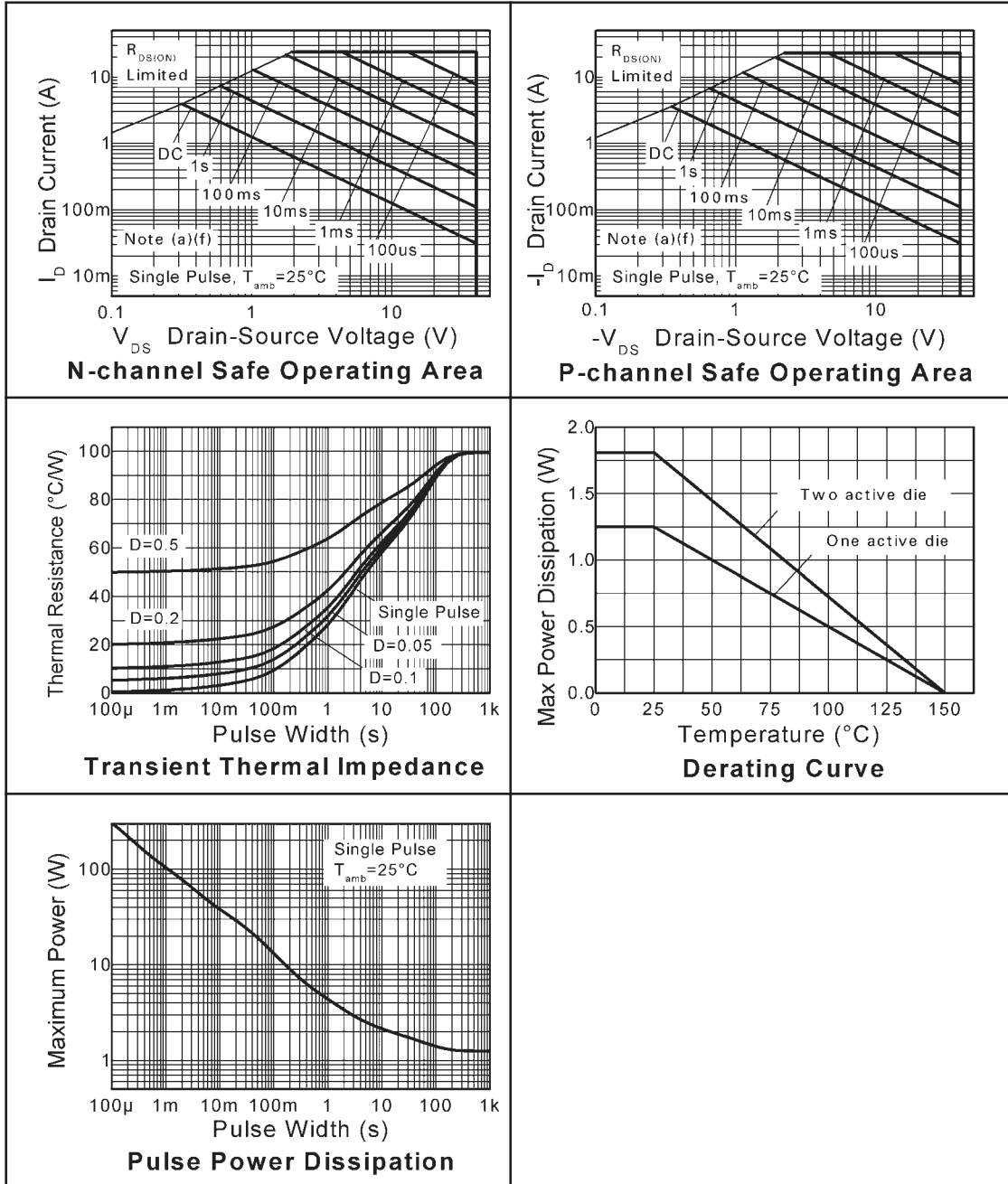
PARAMETER	SYMBOL	VALUE	UNIT
Junction to ambient ^{(a)(d)}	$R_{\theta JA}$	100	$^\circ C/W$
Junction to ambient ^{(a)(e)}	$R_{\theta JA}$	70	$^\circ C/W$
Junction to ambient ^{(b)(d)}	$R_{\theta JA}$	60	$^\circ C/W$

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	$I_D = 250\mu\text{A}$, $V_{GS} = 0\text{V}$
Zero Gate Voltage Drain Current	I_{DSS}			0.5	μA	$V_{DS} = 40\text{V}$, $V_{GS} = 0\text{V}$
Gate-Body Leakage	I_{GSS}			100	nA	$V_{GS} = \pm 20\text{V}$, $V_{DS} = 0\text{V}$
Gate-Source Threshold Voltage	$V_{GS(th)}$	1.0			V	$I_D = 250\text{mA}$, $V_{DS} = V_{GS}$
Static Drain-Source On-State Resistance ⁽¹⁾	$R_{DS(on)}$			0.050 0.075	Ω	$V_{GS} = 10\text{V}$, $I_D = 4.5\text{A}$ $V_{GS} = 4.5\text{V}$, $I_D = 3.2\text{A}$
Forward Transconductance ^{(1) (3)}	g_{fs}		8.6		S	$V_{DS} = 15\text{V}$, $I_D = 4.5\text{A}$
DYNAMIC ⁽³⁾						
Input Capacitance	C_{iss}		770		pF	$V_{DS} = 40\text{V}$, $V_{GS} = 0\text{V}$ $f = 1\text{MHz}$
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	$V_{DD} = 30\text{V}$, $I_D = 1\text{A}$ $R_G \cong 6.0\Omega$, $V_{GS} = 10\text{V}$
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	$V_{DS} = 30\text{V}$, $V_{GS} = 10\text{V}$
Gate Drain Charge	Q_{gd}		3.8		nC	$I_D = 4.5\text{A}$
SOURCE-DRAIN DIODE						
Diode Forward Voltage ⁽¹⁾	VSD		0.8	0.95	V	$T_J = 25^{\circ}\text{C}$, $I_S = 4.5\text{A}$, $V_{GS} = 0\text{V}$
Reverse Recovery Time ⁽³⁾	t_{rr}		20		ns	$T_J = 25^{\circ}\text{C}$, $I_S = 2.5\text{A}$,
Reverse Recovery Charge ⁽³⁾	Q_{rr}		16		nC	$di/dt = 100\text{A}/\mu\text{s}$

NOTES

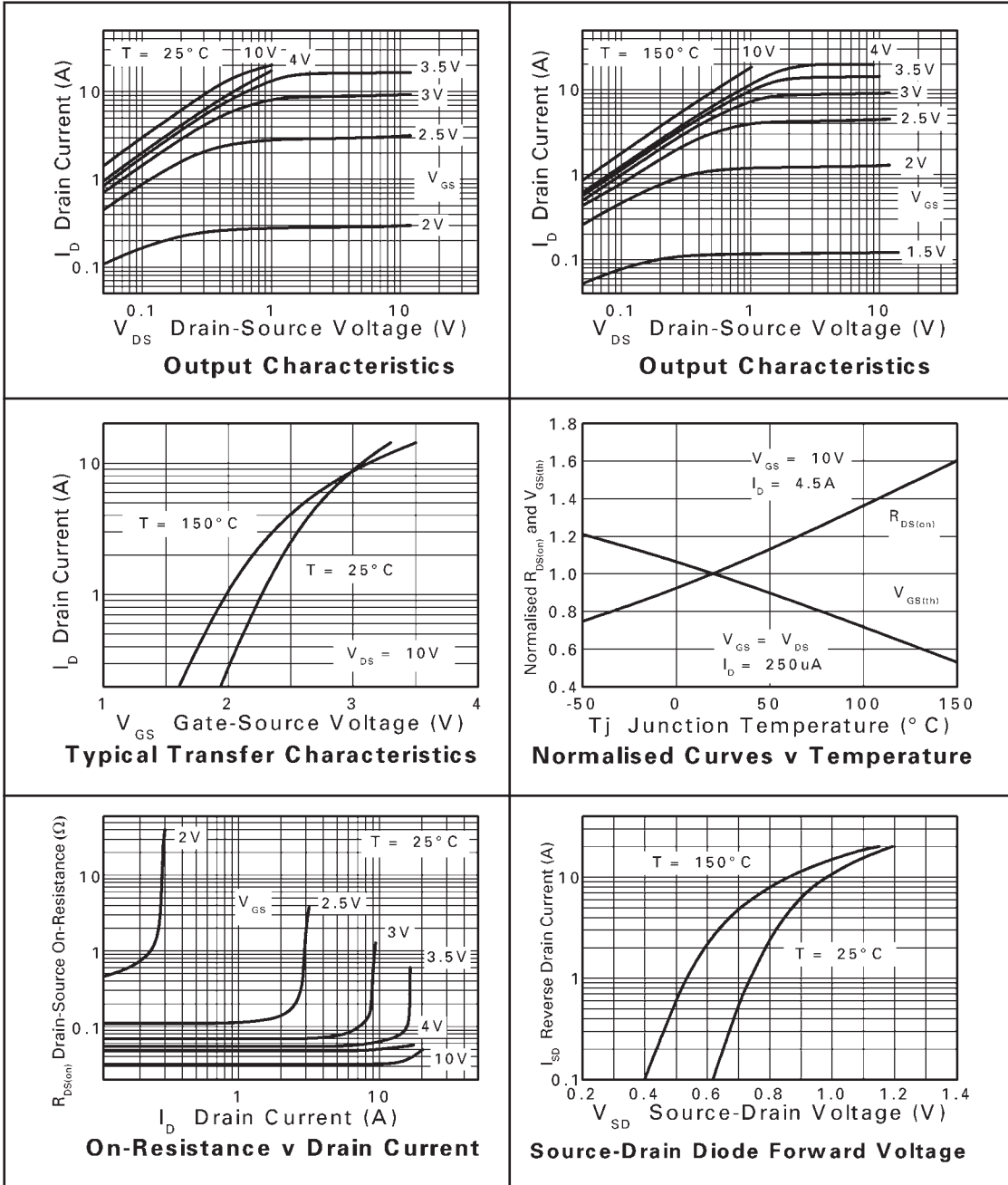
(1) Measured under pulsed conditions. Pulse width $\leq 300\mu\text{s}$; duty cycle $\leq 2\%$.

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

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

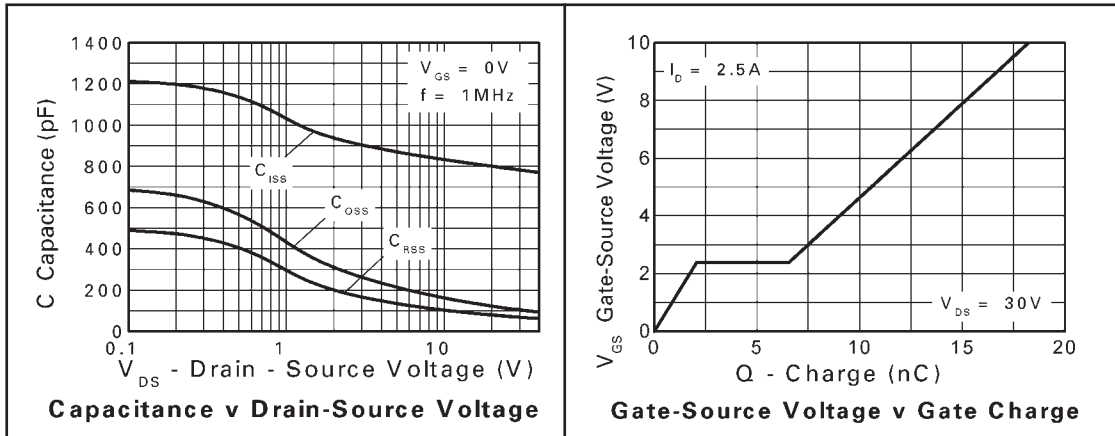
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ELECTRICAL CHARACTERISTICS (at $T_{amb} = 25^{\circ}\text{C}$ unless otherwise stated)

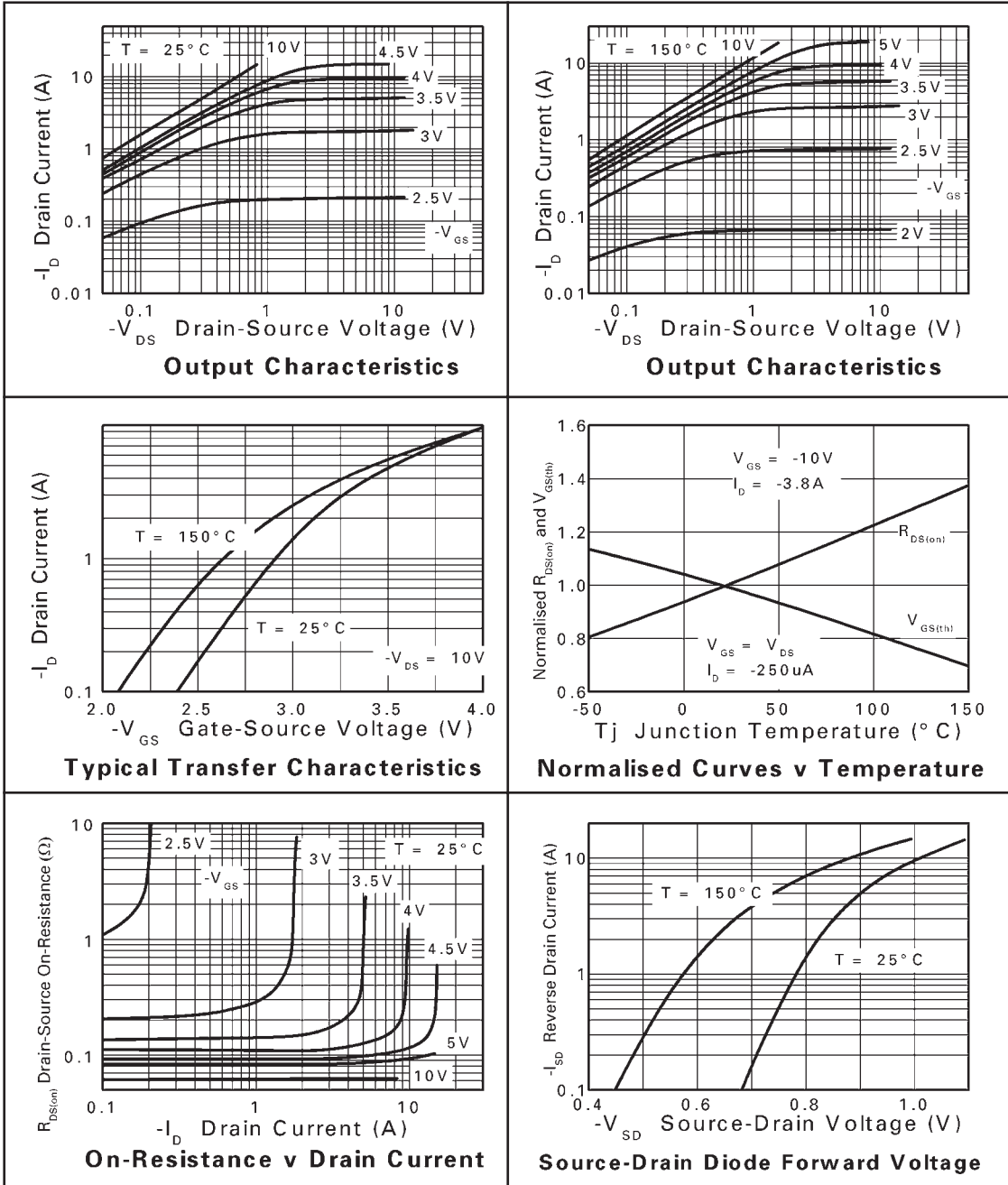
PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	CONDITIONS
STATIC						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	-40			V	$I_D = -250\mu\text{A}$, $V_{GS} = 0\text{V}$
Zero Gate Voltage Drain Current	I_{DSS}			-1.0	μA	$V_{DS} = -40\text{V}$, $V_{GS} = 0\text{V}$
Gate-Body Leakage	I_{GSS}			100	nA	$V_{GS} = \pm 20\text{V}$, $V_{DS} = 0\text{V}$
Gate-Source Threshold Voltage	$V_{GS(th)}$	-1.0			V	$I_D = -250\mu\text{A}$, $V_{DS} = V_{GS}$
Static Drain-Source On-State Resistance ⁽¹⁾	$R_{DS(on)}$			0.060 0.100	Ω	$V_{GS} = -10\text{V}$, $I_D = -3.8\text{A}$ $V_{GS} = -4.5\text{V}$, $I_D = -2.9\text{A}$
Forward Transconductance ^{(1) (3)}	g_{fs}		6.8		S	$V_{DS} = -15\text{V}$, $I_D = -3.8\text{A}$
DYNAMIC ⁽³⁾						
Input Capacitance	C_{iss}		1000		pF	$V_{DS} = -20\text{V}$, $V_{GS} = 0\text{V}$ $f = 1\text{MHz}$
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	$V_{DD} = -20\text{V}$, $I_D = -1\text{A}$ $R_G \cong 6.0\Omega$, $V_{GS} = 10\text{V}$
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	$V_{DS} = -20\text{V}$, $V_{GS} = -5\text{V}$ $I_D = -3.8\text{A}$
Total Gate Charge	Q_g		26		nC	$V_{DS} = -20\text{V}$, $V_{GS} = -10\text{V}$ $I_D = -3.8\text{A}$
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	$T_j = 25^{\circ}\text{C}$, $I_S = -3.4\text{A}$, $V_{GS} = 0\text{V}$
Reverse Recovery Time ⁽³⁾	t_{rr}		27		ns	$T_j = 25^{\circ}\text{C}$, $I_S = -3\text{A}$,
Reverse Recovery Charge ⁽³⁾	Q_{rr}		25		nC	$di/dt = 100\text{A}/\mu\text{s}$

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.

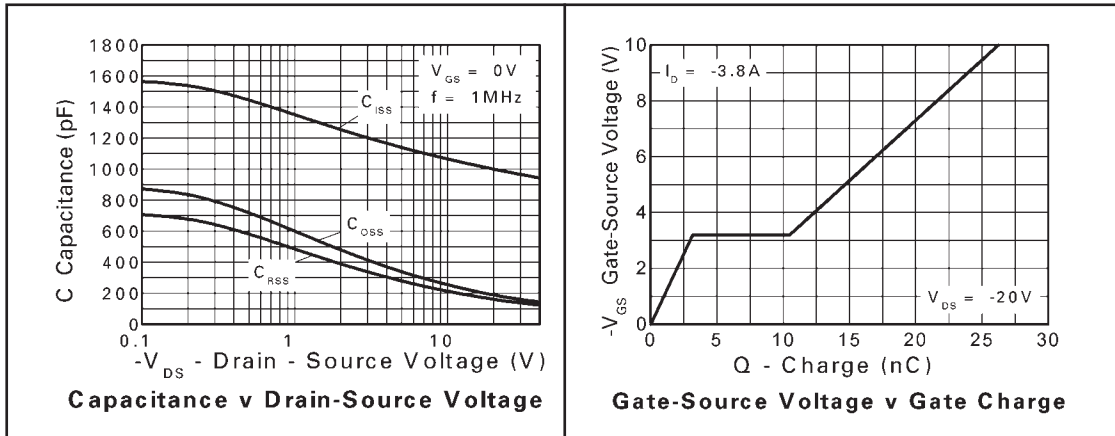
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TYPICAL CHARACTERISTICS



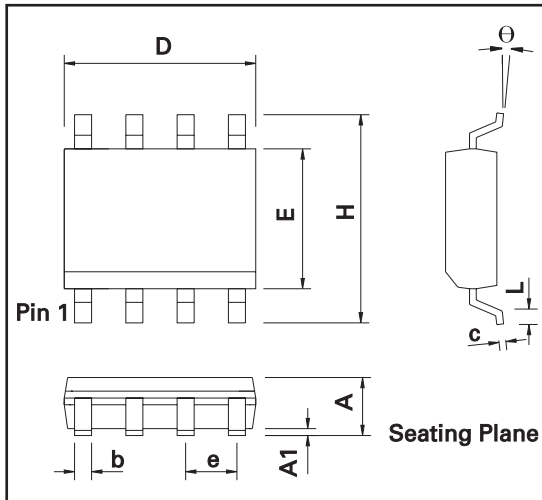
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TYPICAL CHARACTERISTICS



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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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