



YOUSHANG SEMICONDUCTOR

设计研发新型功率器件

各类小信号开关

中低压及高压大电流等场效应管

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企业微信二维码



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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

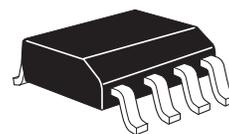
- Motor drive
- LCD backlighting

ORDERING INFORMATION

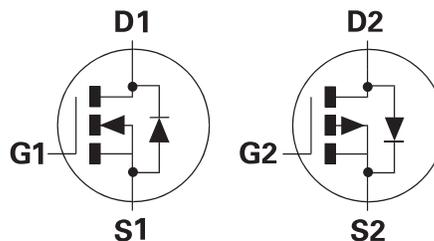
DEVICE	REEL SIZE	TAPE WIDTH	QUANTITY PER REEL
NK-ZXMC4A16DN8TA	7"	12mm	500
NK-ZXMC4A16DN8TC	13"	12mm	2,500

DEVICE MARKING

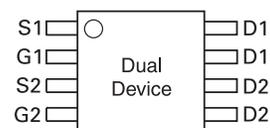
- NK-ZXMC 4A16



SO8



PINOUT



TOP VIEW

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/°C
Power dissipation at $T_A = 25^\circ C$ ^{(a)(e)} Linear derating factor	P_D	1.8 14		W mW/°C
Power dissipation at $T_A = 25^\circ C$ ^{(b)(d)} Linear derating factor	P_D	2.1 17		W 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.

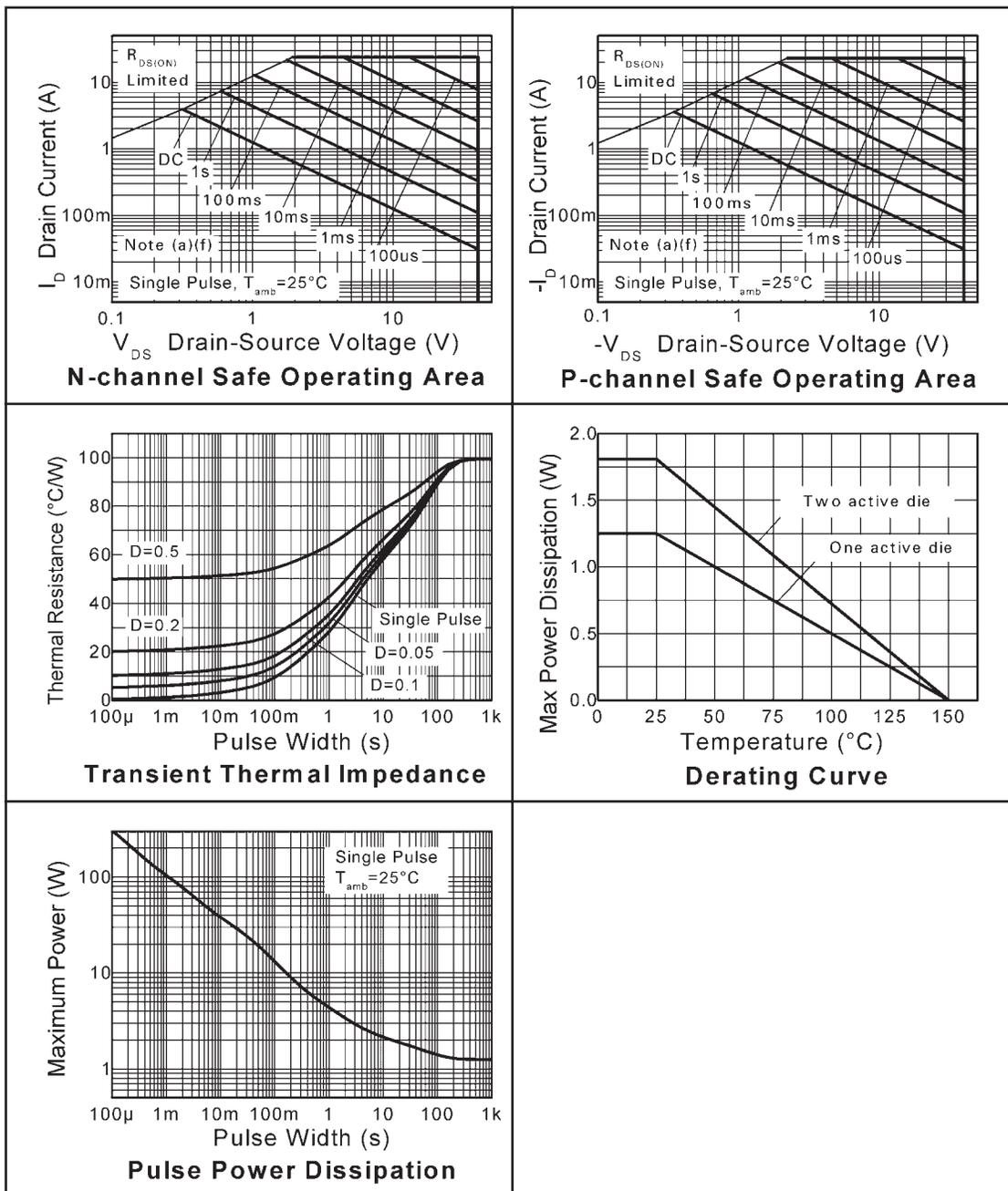
(b) For a device surface mounted on FR4 PCB measured at $t \leq 10$ sec.

(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.

TYPICAL CHARACTERISTICS



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	$V_{DS} = 30\text{V}, V_{GS} = 10\text{V}$ $I_D = 4.5\text{A}$
Gate Drain Charge	Q_{gd}		3.8		nC	
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	$T_J = 25^{\circ}\text{C}, I_S = 2.5\text{A}, di/dt = 100\text{A}/\mu\text{s}$
Reverse Recovery Charge ⁽³⁾	Q_{rr}		16		nC	

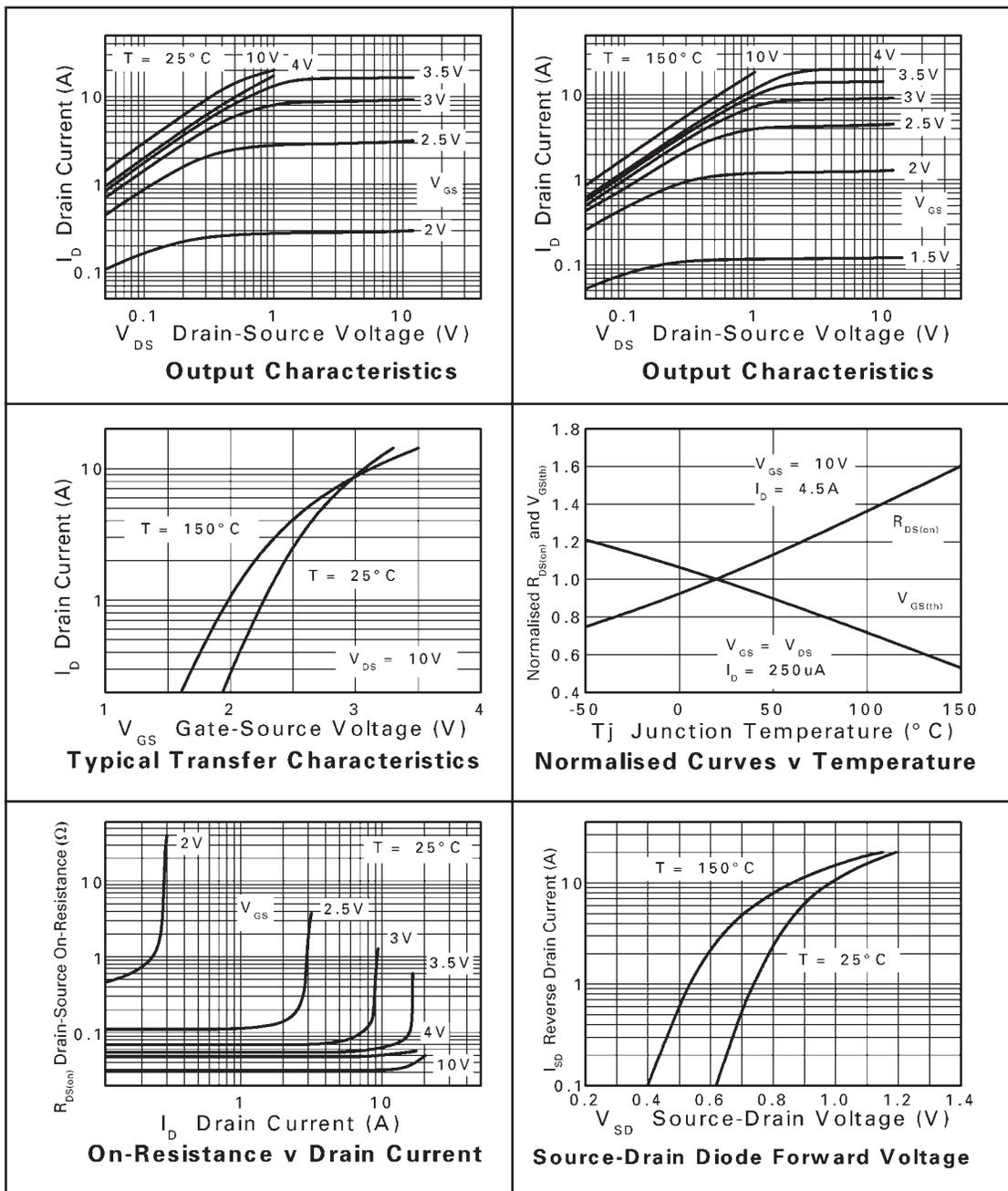
NOTES

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

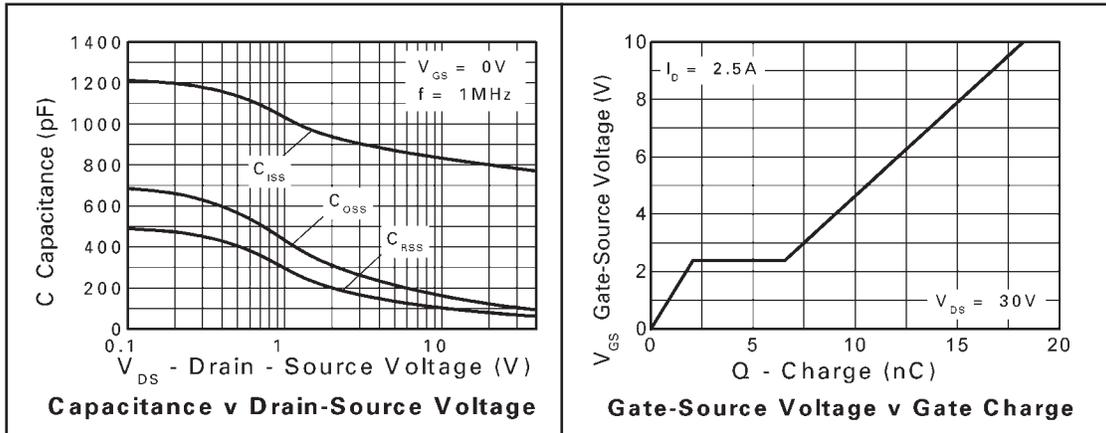
(2) Switching characteristics are independent of operating junction temperature.

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

TYPICAL CHARACTERISTICS



TYPICAL CHARACTERISTICS



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	
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	$di/dt = 100\text{A}/\mu\text{s}$

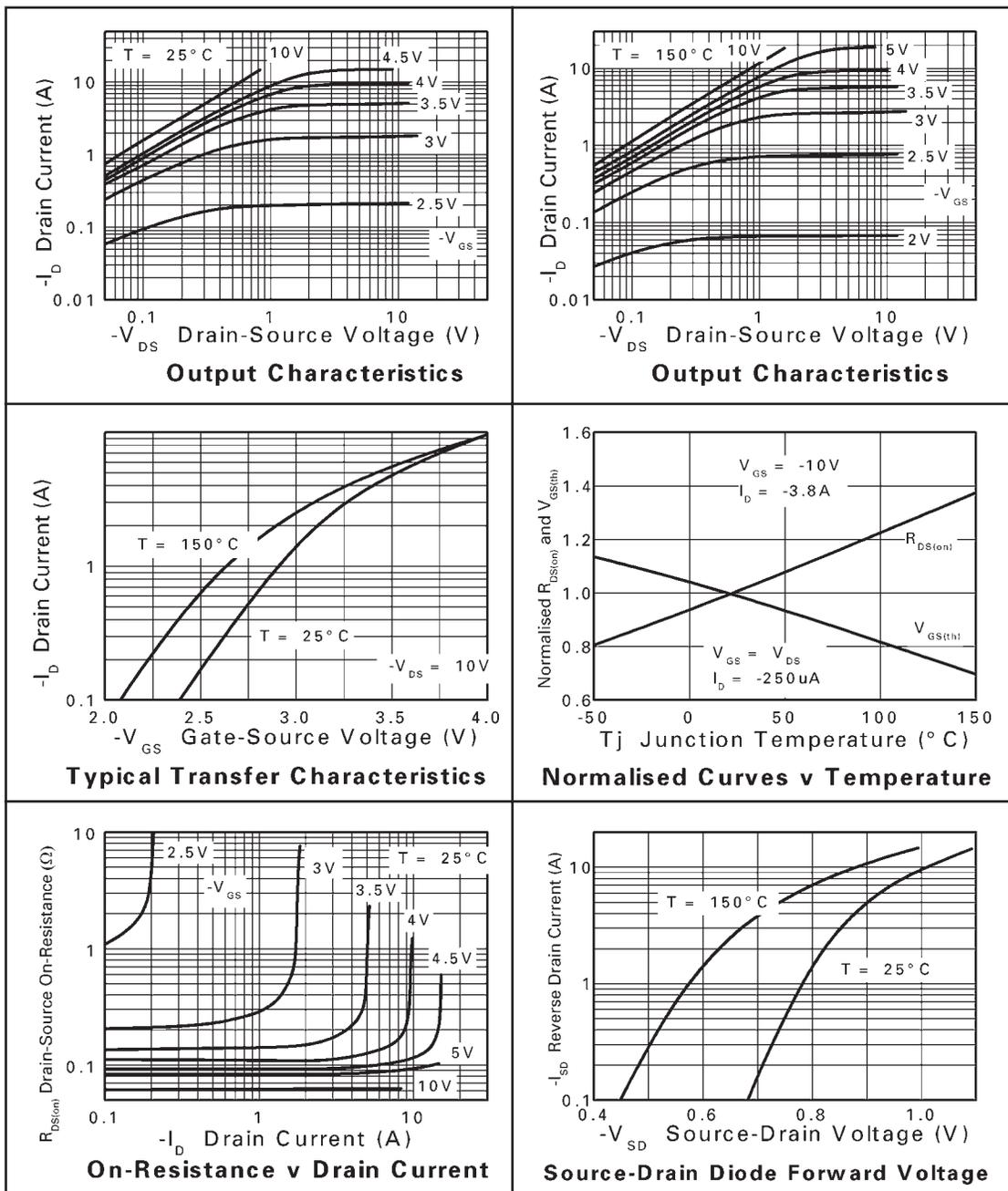
NOTES

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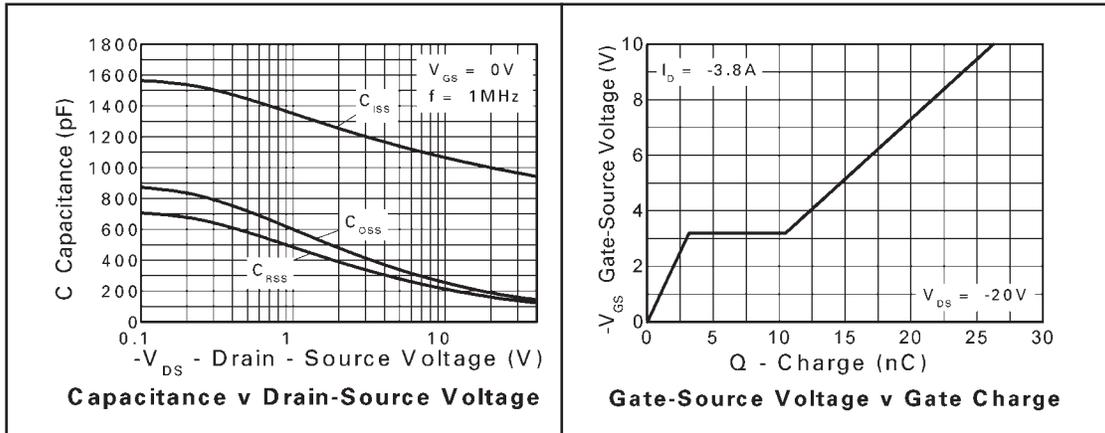
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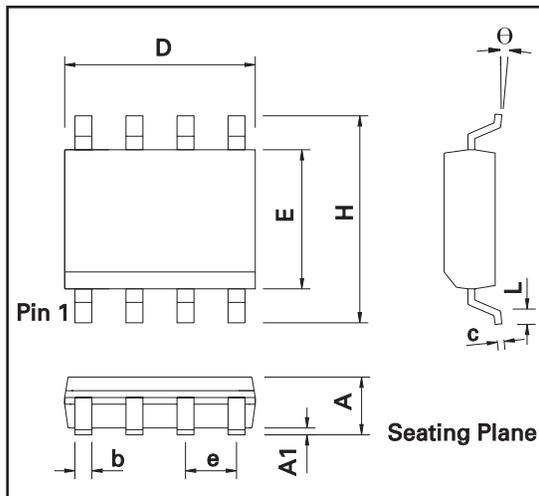
TYPICAL CHARACTERISTICS



TYPICAL CHARACTERISTICS



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	-	-	-	-	-