

40V DUAL P-CHANNEL ENHANCEMENT MODE MOSFET

Product Summary

$V_{(BR)DSS}$	$R_{DS(on)}$ max	I_D max (A) $T_A = 25^\circ C$ (Notes 6 & 8)
-40V	25m Ω @ $V_{GS} = -10V$	-7.6
	45m Ω @ $V_{GS} = -4.5V$	-6.0

Description and Applications

This MOSFET has been designed to minimize the on-state resistance and yet maintain superior switching performance, making it ideal for high efficiency power management applications.

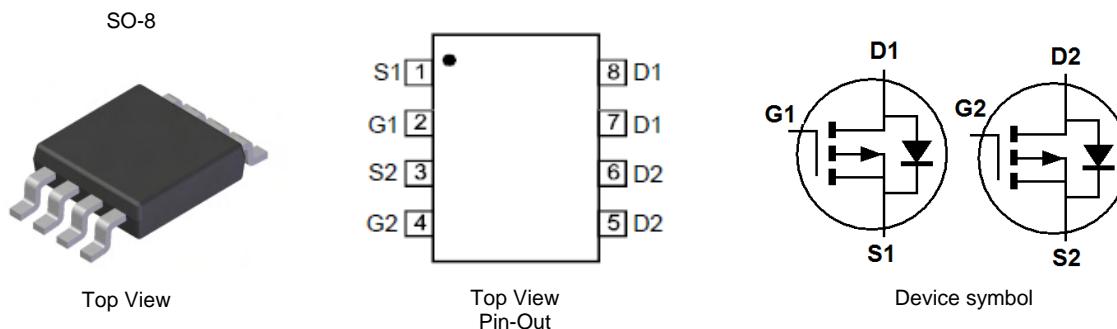
- Motor control
- Backlighting
- DC-DC Converters
- Printer equipment

Features and Benefits

- Low $R_{DS(on)}$ – Minimizes conduction losses
- Fast switching speed – Minimizes switching losses
- **Totally Lead-Free & Fully RoHS compliant (Notes 1 & 2)**
- Halogen and Antimony Free. "Green" Device (Note 3)
- Qualified to AEC-Q101 Standards for High Reliability

Mechanical Data

- Case: SO-8
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0 (Note 1)
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish - Matte Tin annealed over Copper lead frame. Solderable per MIL-STD-202, Method 208 (E3)
- Weight: 0.074 grams (approximate)



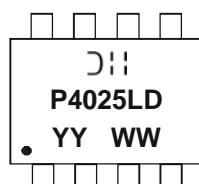
Ordering Information (Note 4)

Product	Marking	Reel size (inches)	Tape width (mm)	Quantity per reel
DMP4025LSD-13	P4025LD	13	12	2,500

Notes:

1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant.
2. See <http://www.diodes.com> for more information about Diodes Incorporated's definitions of Halogen and Antimony free, "Green" and Lead-Free.
3. Halogen and Antimony free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
4. For packaging details, go to our website at <http://www.diodes.com>

Marking Information



DII = Manufacturer's Marking
 P4025LD = Product Type Marking Code
 YYWW = Date Code Marking
 YY = Year (ex: 10 = 2010)
 WW = Week (01 - 53)

Maximum Ratings @ $T_A = 25^\circ\text{C}$ unless otherwise specified

Characteristic		Symbol	Value	Units
Drain-Source Voltage		V_{DSS}	-40	V
Gate-Source Voltage		V_{GSS}	± 20	
Continuous Drain Current	$V_{GS} = -10\text{V}$	(Notes 6 & 8)	-7.6	A
		$T_A = 70^\circ\text{C}$ (Notes 6 & 8)	-6.1	
		(Notes 5 & 8)	-5.8	
		(Notes 5 & 9)	-6.9	
Pulsed Drain Current	$V_{GS} = -10\text{V}$	I_{DM}	-28.0	
Continuous Source Current (Body diode)		I_S	-3.0	
Pulsed Source Current (Body diode)		I_{SM}	-28.0	

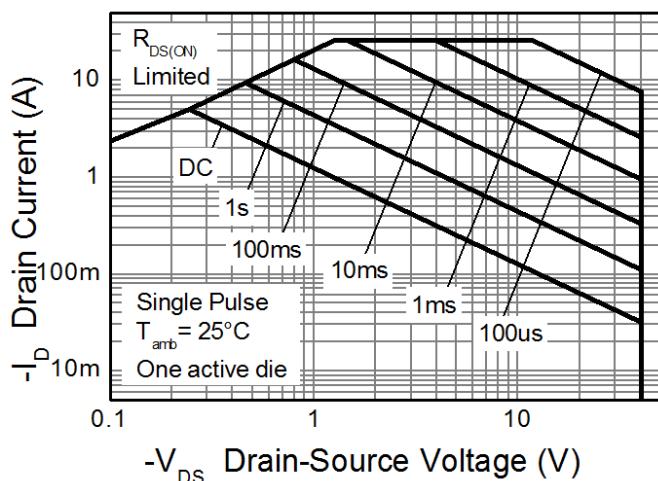
Thermal Characteristics @ $T_A = 25^\circ\text{C}$ unless otherwise specified

Characteristic		Symbol	Value	Unit
Power Dissipation	(Notes 5 & 8)	P_D	1.25	W
			10	
	(Notes 5 & 9)		1.8	
Linear Derating Factor	(Notes 6 & 8)		14.3	
			2.14	
			17.2	
Thermal Resistance, Junction to Ambient	(Notes 5 & 8)	$R_{\theta JA}$	100	°C/W
	(Notes 5 & 9)		70	
	(Notes 6 & 8)		58	
Thermal Resistance, Junction to Lead	(Notes 8 & 10)	$R_{\theta JL}$	51	
Operating and Storage Temperature Range		T_J, T_{STG}	-55 to +150	°C

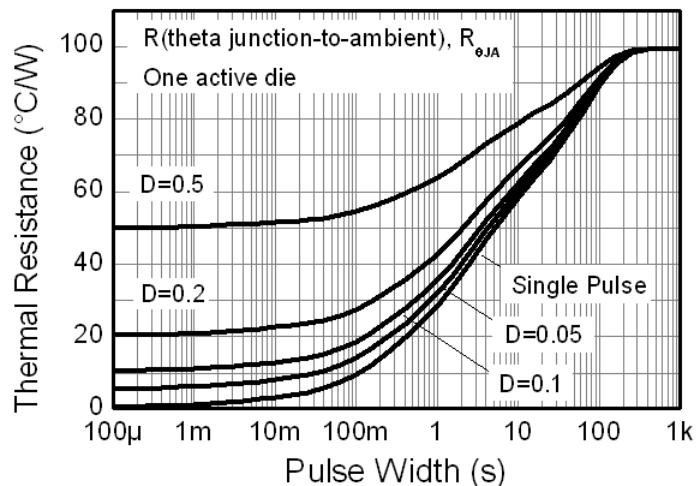
Notes:

5. For a device surface mounted on 25mm x 25mm x 1.6mm FR4 PCB with high coverage of single sided 1oz copper, in still air conditions; the device is measured when operating in a steady-state condition.
6. Same as note (2), except the device is measured at $t \leq 10$ sec.
7. Same as note (2), except the device is pulsed with $D = 0.02$ and pulse width 300 μs .
8. For a dual device with one active die.
9. For a device with two active die running at equal power.
10. Thermal resistance from junction to solder-point (at the end of the drain lead).

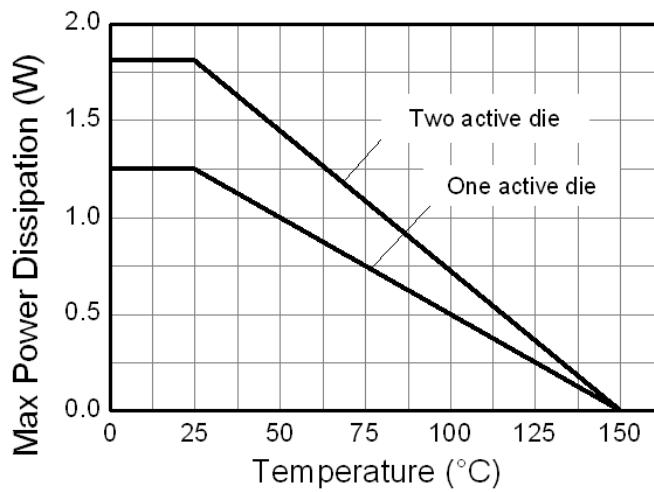
Thermal Characteristics



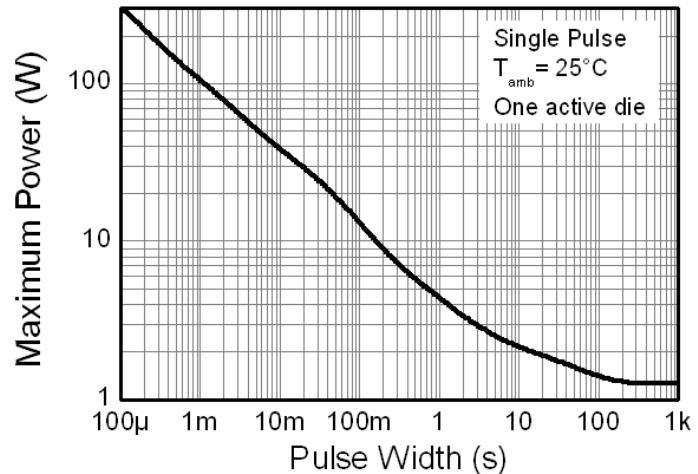
P-channel Safe Operating Area



Transient Thermal Impedance



Derating Curve



Pulse Power Dissipation

Electrical Characteristics $T_A = 25^\circ\text{C}$ unless otherwise specified

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV_{DSS}	-40	—	—	V	$I_D = -250\mu\text{A}$, $V_{\text{GS}} = 0\text{V}$
Zero Gate Voltage Drain Current	I_{DSS}	—	—	-1.0	μA	$V_{\text{DS}} = -40\text{V}$, $V_{\text{GS}} = 0\text{V}$
Gate-Source Leakage	I_{GSS}	—	—	± 100	nA	$V_{\text{GS}} = \pm 20\text{V}$, $V_{\text{DS}} = 0\text{V}$
ON CHARACTERISTICS						
Gate Threshold Voltage	$V_{\text{GS}(\text{th})}$	-0.8	-1.3	-1.8	V	$I_D = -250\mu\text{A}$, $V_{\text{DS}} = V_{\text{GS}}$
Static Drain-Source On-Resistance (Note 11)	$R_{\text{DS}(\text{ON})}$	—	18	25	$\text{m}\Omega$	$V_{\text{GS}} = -10\text{V}$, $I_D = -3\text{A}$
Forward Transconductance (Notes 11 & 12)	g_{fs}	—	16.6	—	S	$V_{\text{DS}} = -5\text{V}$, $I_D = -3\text{A}$
Diode Forward Voltage (Note 11)	V_{SD}	—	-0.7	-1.0	V	$I_S = -1\text{A}$, $V_{\text{GS}} = 0\text{V}$
DYNAMIC CHARACTERISTICS (Note 12)						
Input Capacitance	C_{iss}	—	1640	—	pF	$V_{\text{DS}} = -20\text{V}$, $V_{\text{GS}} = 0\text{V}$ $f = 1\text{MHz}$
Output Capacitance	C_{oss}	—	179	—		
Reverse Transfer Capacitance	C_{rss}	—	128	—		
Gate Resistance	R_g	—	6.43	—	Ω	$V_{\text{DS}} = 0\text{V}$, $V_{\text{GS}} = 0\text{V}$, $f = 1\text{MHz}$
Total Gate Charge (Note 10)	Q_g	—	14.0	—	nC	$V_{\text{GS}} = -4.5\text{V}$ $V_{\text{GS}} = -10\text{V}$
Total Gate Charge (Note 10)	Q_g	—	33.7	—		
Gate-Source Charge (Note 10)	Q_{gs}	—	5.5	—		
Gate-Drain Charge (Note 10)	Q_{gd}	—	7.3	—		
Turn-On Delay Time (Note 10)	$t_{\text{D}(\text{on})}$	—	6.9	—	ns	$V_{\text{DD}} = -20\text{V}$, $V_{\text{GS}} = -10\text{V}$ $I_D = -3\text{A}$
Turn-On Rise Time (Note 10)	t_r	—	14.7	—		
Turn-Off Delay Time (Note 10)	$t_{\text{D}(\text{off})}$	—	53.7	—		
Turn-Off Fall Time (Note 10)	t_f	—	30.9	—		

Notes:

11. Measured under pulsed conditions. Pulse width $\leq 300\mu\text{s}$; duty cycle $\leq 2\%$
12. For design aid only, not subject to production testing.
13. Switching characteristics are independent of operating junction temperatures.

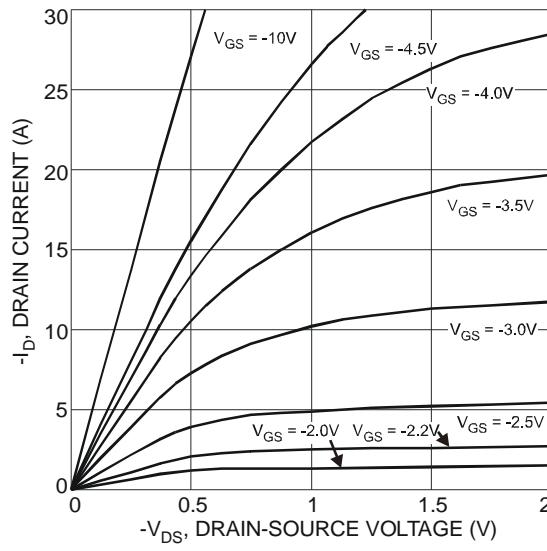
Typical Characteristics


Fig. 1 Typical Output Characteristic

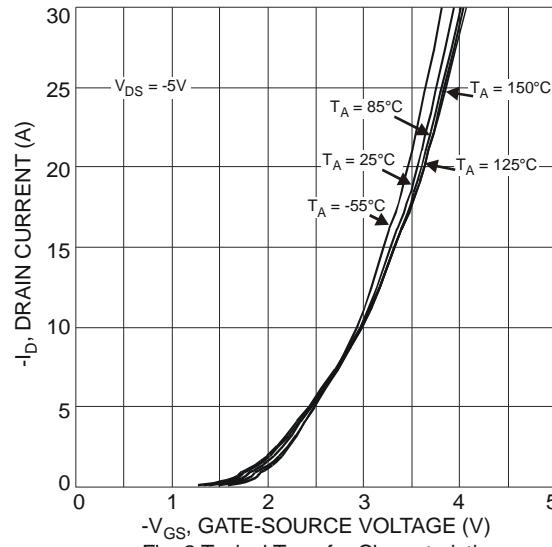


Fig. 2 Typical Transfer Characteristic

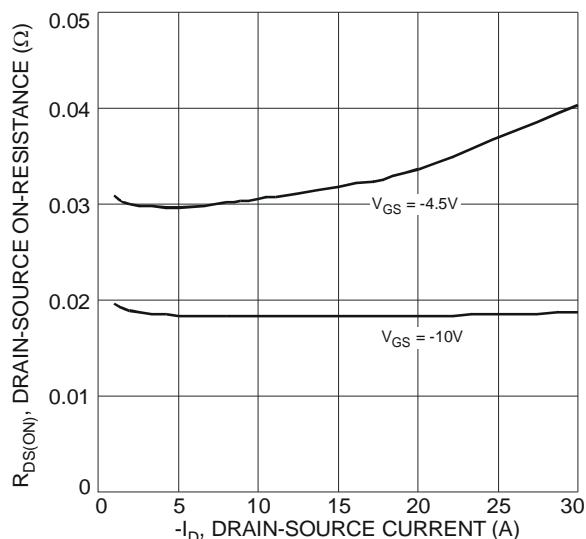


Fig. 3 Typical On-Resistance
vs. Drain Current and Gate Voltage

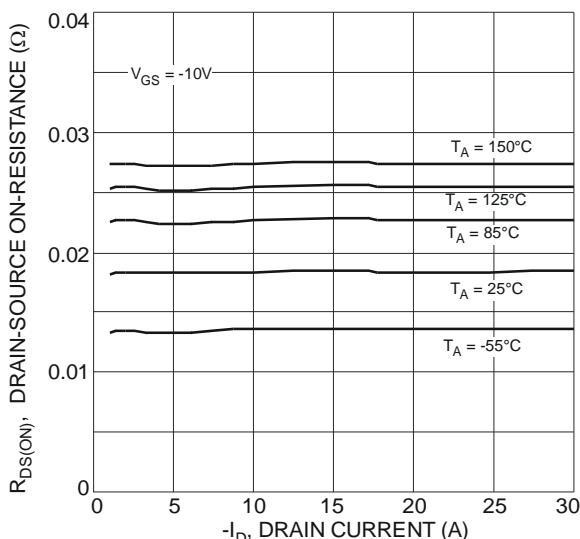


Fig. 4 Typical On-Resistance
vs. Drain Current and Temperature

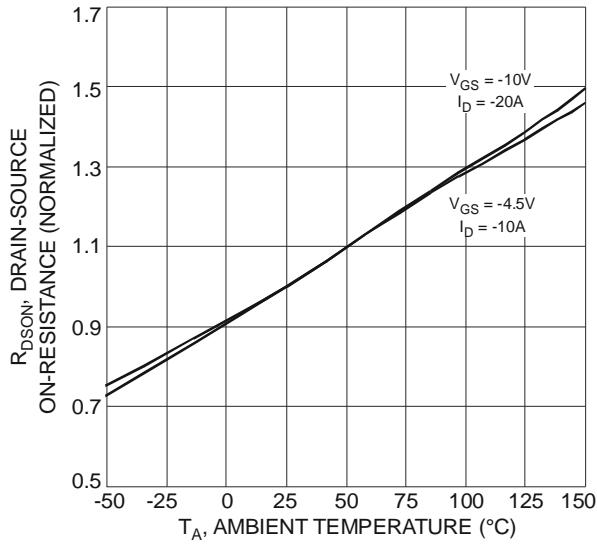


Fig. 5 On-Resistance Variation with Temperature

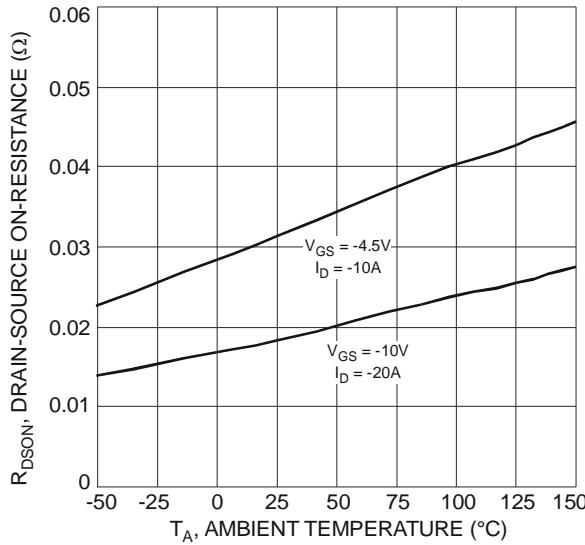


Fig. 6 On-Resistance Variation with Temperature

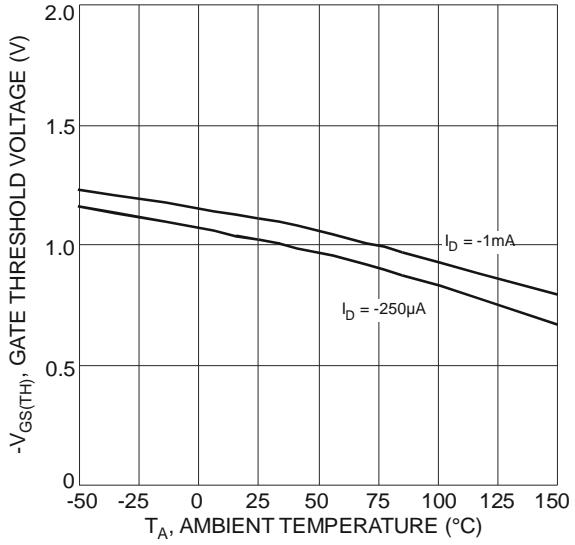


Fig. 7 Gate Threshold Variation vs. Ambient Temperature

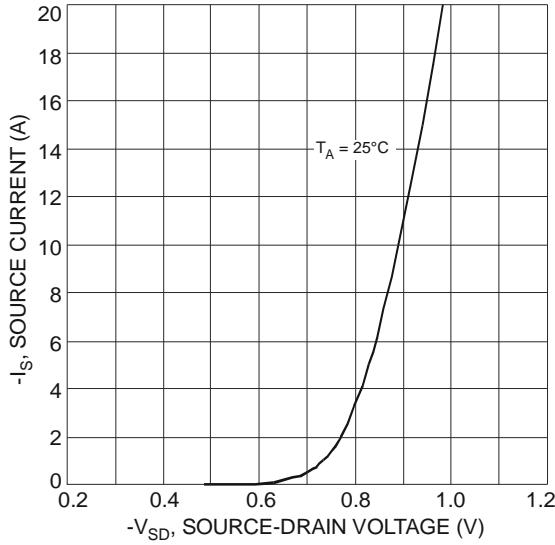


Fig. 8 Diode Forward Voltage vs. Current

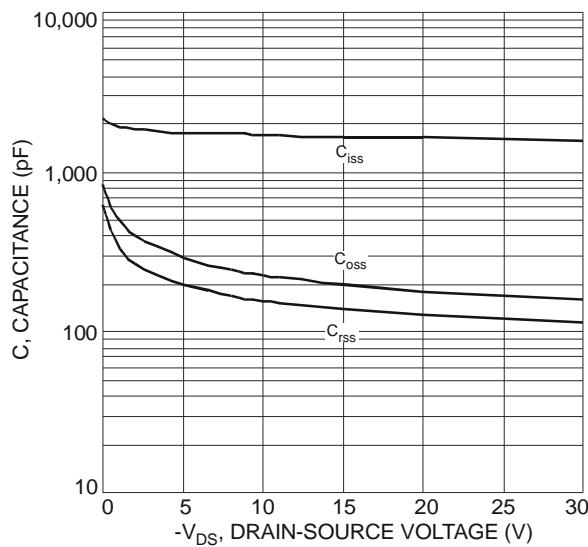


Fig. 9 Typical Total Capacitance

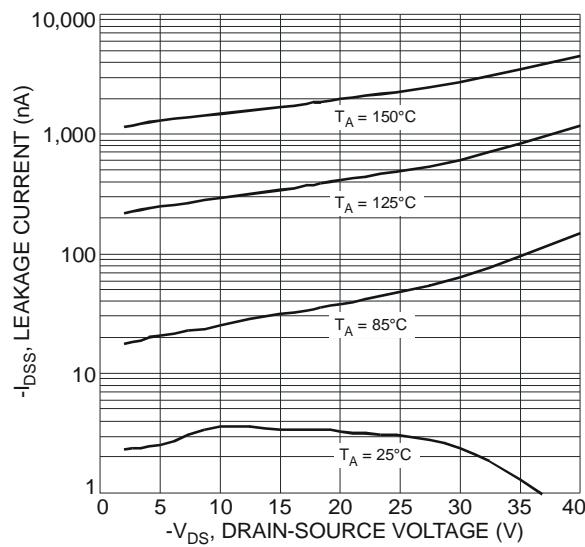


Fig. 10 Typical Leakage Current
vs. Drain-Source Voltage

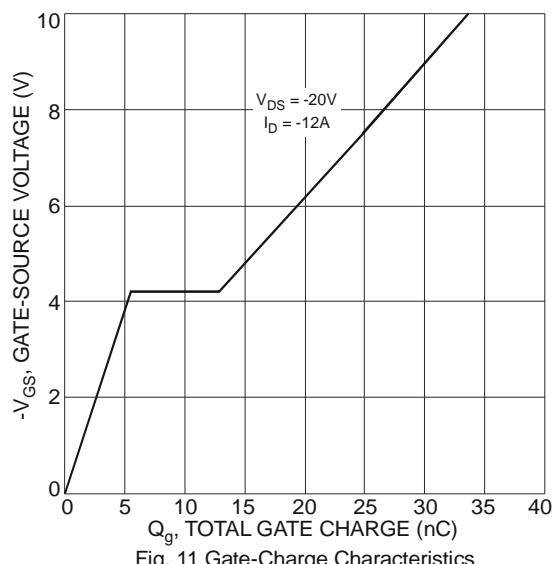
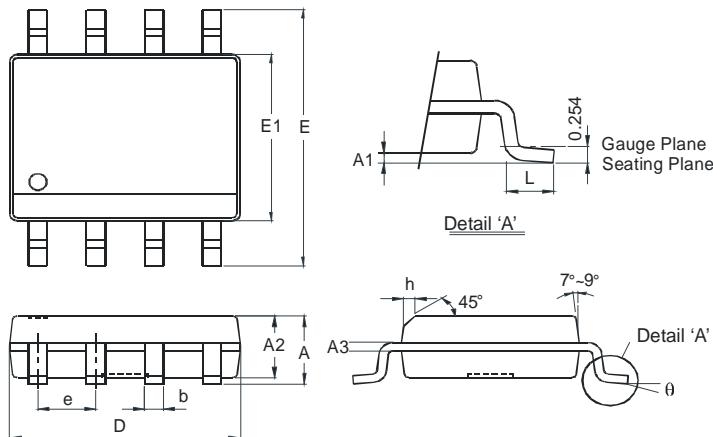


Fig. 11 Gate-Charge Characteristics

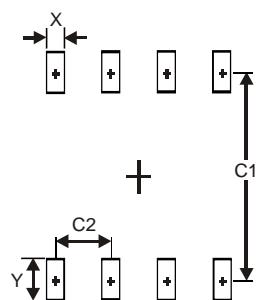
Package Outline Dimensions



SO-8		
Dim	Min	Max
A	-	1.75
A1	0.10	0.20
A2	1.30	1.50
A3	0.15	0.25
b	0.3	0.5
D	4.85	4.95
E	5.90	6.10
E1	3.85	3.95
e	1.27 Typ	
h	-	0.35
L	0.62	0.82
θ	0°	8°

All Dimensions in mm

Suggested Pad Layout



Dimensions	Value (in mm)
X	0.60
Y	1.55
C1	5.4
C2	1.27

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