

40V DUAL P-CHANNEL ENHANCEMENT MODE MOSFET

Product Summary

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

Description

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.

Applications

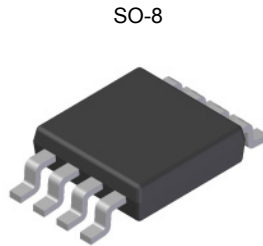
- Motor Control
- Backlighting
- DC-DC Converters
- Printer Equipment

Features and Benefits

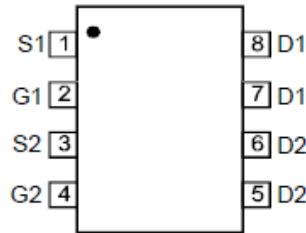
- Low $R_{DS(on)}$ – Minimizes conduction losses
- Fast switching speed – Minimizes switching losses
- **Totally Lead-Free & Fully RoHS compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**
- **PPAP Capable (Note 4)**

Mechanical Data

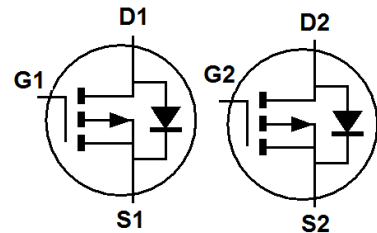
- Case: SO-8
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0 (Note 1)
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish - Matte Tin annealed over Copper lead frame. Solderable per MIL-STD-202, Method 208E3
- Weight: 0.074 grams (approximate)



Top View



Top View Pin-Out



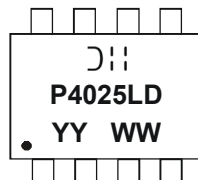
Device symbol

Ordering Information (Notes 4 & 5)

Part Number	Compliance	Case	Packaging
DMP4025LSD-13	Standard	SO-8	2500 / Tape & Reel
DMP4025LSDQ-13	Automotive	SO-8	2500 / Tape & Reel

- 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/quality/lead_free.html 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/products/packages.html>.
 5. Automotive products are AEC-Q101 qualified and are PPAP capable. Automotive, AEC-Q101 and standard products are electrically and thermally the same, except where specified. For more information, please refer to http://www.diodes.com/quality/product_grade_definitions/.

Marking Information



- ☺ = 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.)

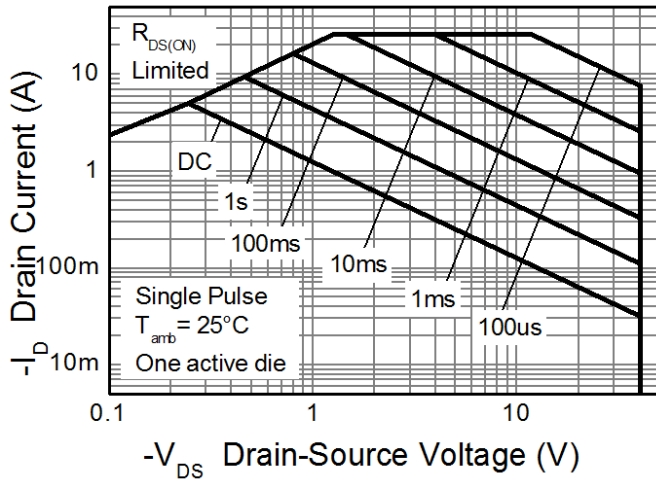
Characteristic			Symbol	Value	Units
Drain-Source Voltage			V_{DSS}	-40	V
Gate-Source Voltage			V_{GSS}	± 20	
Continuous Drain Current	$V_{GS} = -10\text{V}$	(Notes 7 & 9)	I_D	-7.6	A
		$T_A = +70^\circ\text{C}$ (Notes 7 & 9)		-6.1	
		(Notes 6 & 9)		-5.8	
		(Notes 6 & 10)		-6.9	
Pulsed Drain Current	$V_{GS} = -10\text{V}$	(Notes 8 & 9)	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.)

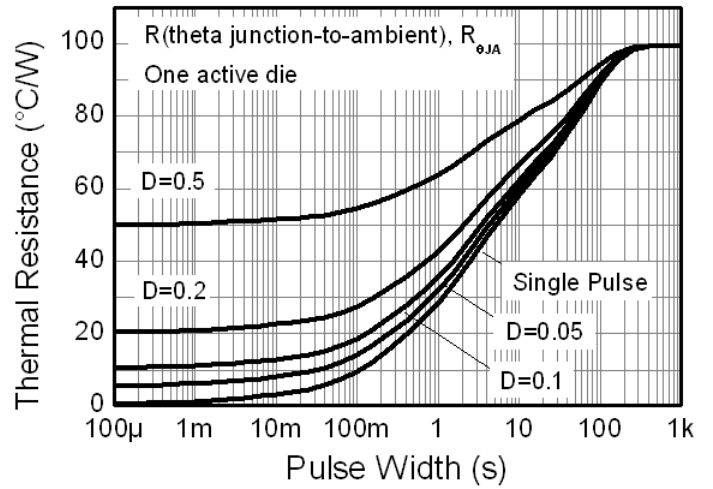
Characteristic			Symbol	Value	Unit
Power Dissipation Linear Derating Factor		(Notes 6 & 9)	P_D	1.25 10	W mW/ $^\circ\text{C}$
		(Notes 6 & 10)		1.8 14.3	
		(Notes 7 & 9)		2.14 17.2	
Thermal Resistance, Junction to Ambient		(Notes 6 & 9)	$R_{\theta JA}$	100	$^\circ\text{C/W}$
		(Notes 6 & 10)		70	
		(Notes 7 & 9)		58	
Thermal Resistance, Junction to Lead		(Notes 9 & 11)	$R_{\theta JL}$	51	
Operating and Storage Temperature Range			T_J, T_{STG}	-55 to +150	$^\circ\text{C}$

- Notes:
6. 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.
 7. Same as note (2), except the device is measured at $t \leq 10$ sec.
 8. Same as note (2), except the device is pulsed with $D = 0.02$ and pulse width 300 μs .
 9. For a dual device with one active die.
 10. For a device with two active die running at equal power.
 11. Thermal resistance from junction to solder-point (at the end of the drain lead).

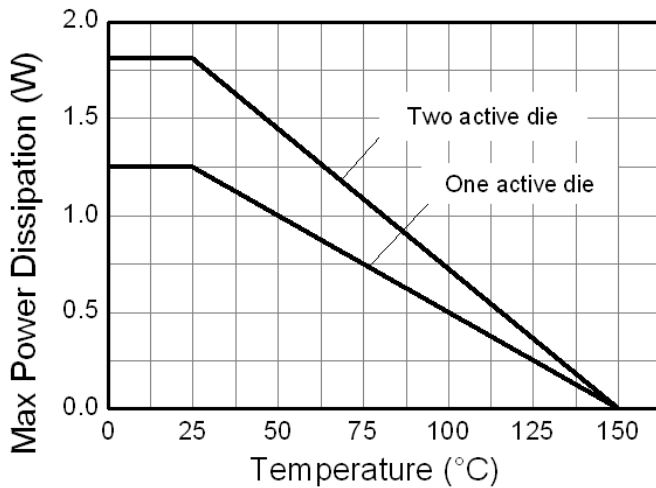
Thermal Characteristics



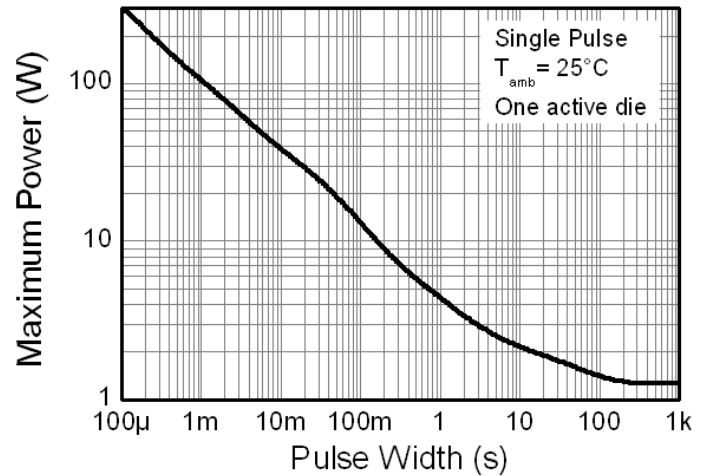
P-channel Safe Operating Area



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_{DS}	-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-Source Leakage	I_{GSS}	—	—	± 100	nA	$V_{GS} = \pm 20\text{V}$, $V_{DS} = 0\text{V}$
ON CHARACTERISTICS						
Gate Threshold Voltage	$V_{GS(th)}$	-0.8	-1.3	-1.8	V	$I_D = -250\mu\text{A}$, $V_{DS} = V_{GS}$
Static Drain-Source On-Resistance (Note 12)	$R_{DS(ON)}$	—	18	25	m Ω	$V_{GS} = -10\text{V}$, $I_D = -3\text{A}$
			30	45		$V_{GS} = -4.5\text{V}$, $I_D = -3\text{A}$
Forward Transconductance (Notes 12 & 13)	g_{fs}	—	16.6	—	S	$V_{DS} = -5\text{V}$, $I_D = -3\text{A}$
Diode Forward Voltage (Note 12)	V_{SD}	—	-0.7	-1.0	V	$I_S = -1\text{A}$, $V_{GS} = 0\text{V}$
DYNAMIC CHARACTERISTICS (Note 13)						
Input Capacitance	C_{iss}	—	1640	—	pF	$V_{DS} = -20\text{V}$, $V_{GS} = 0\text{V}$ $f = 1\text{MHz}$
Output Capacitance	C_{oss}	—	179	—		
Reverse Transfer Capacitance	C_{rss}	—	128	—		
Gate Resistance	R_g	—	6.43	—	Ω	$V_{DS} = 0\text{V}$, $V_{GS} = 0\text{V}$, $f = 1\text{MHz}$
Total Gate Charge (Note 14)	Q_g	—	14.0	—	nC	$V_{GS} = -4.5\text{V}$ $V_{DS} = -20\text{V}$ $I_D = -3\text{A}$
Total Gate Charge (Note 14)	Q_g	—	33.7	—		
Gate-Source Charge (Note 14)	Q_{gs}	—	5.5	—		
Gate-Drain Charge (Note 14)	Q_{gd}	—	7.3	—		
Turn-On Delay Time (Note 14)	$t_{D(on)}$	—	6.9	—	ns	$V_{DD} = -20\text{V}$, $V_{GS} = -10\text{V}$ $I_D = -3\text{A}$
Turn-On Rise Time (Note 14)	t_r	—	14.7	—		
Turn-Off Delay Time (Note 14)	$t_{D(off)}$	—	53.7	—		
Turn-Off Fall Time (Note 14)	t_f	—	30.9	—		

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

Typical Characteristics

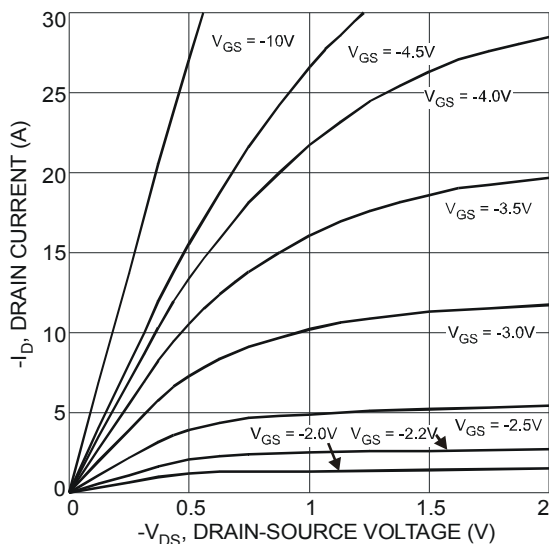


Fig. 1 Typical Output Characteristic

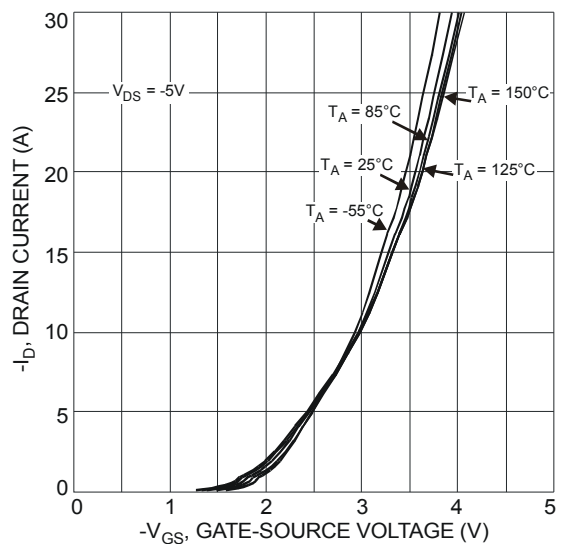


Fig. 2 Typical Transfer Characteristic

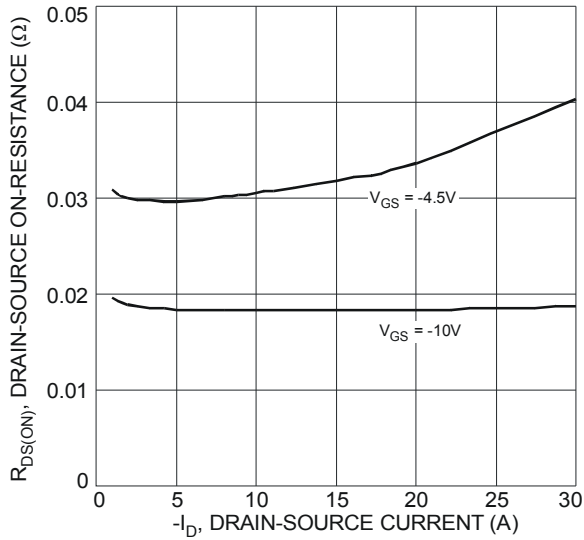


Fig. 3 Typical On-Resistance vs. Drain Current and Gate Voltage

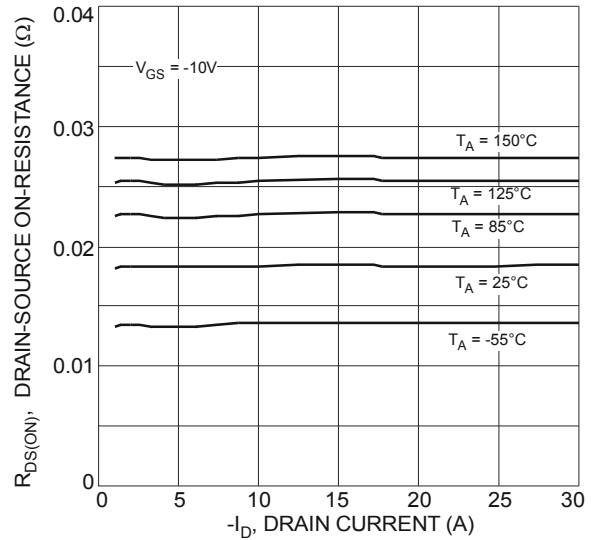


Fig. 4 Typical On-Resistance vs. Drain Current and Temperature

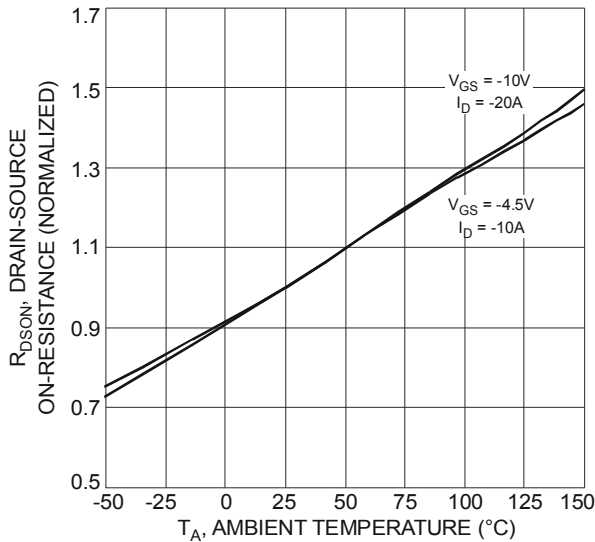


Fig. 5 On-Resistance Variation with Temperature

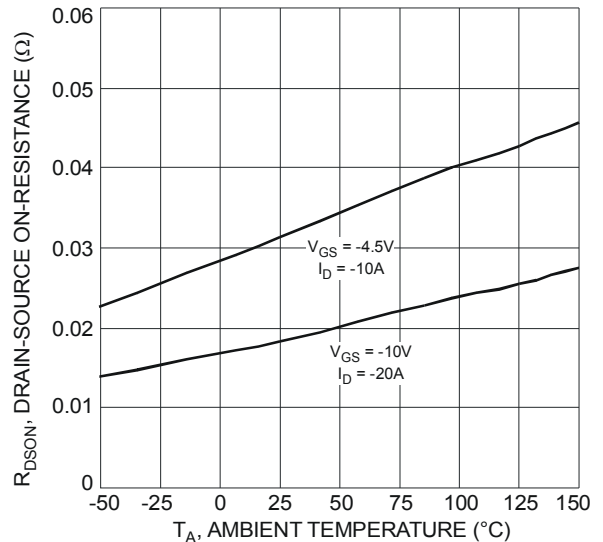


Fig. 6 On-Resistance Variation with Temperature

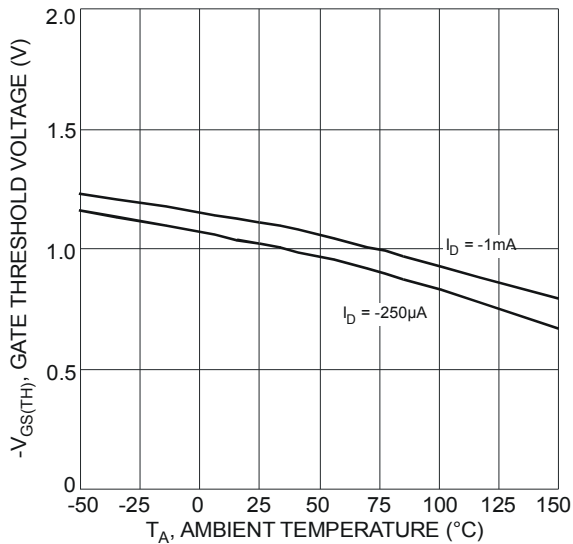


Fig. 7 Gate Threshold Variation vs. Ambient Temperature

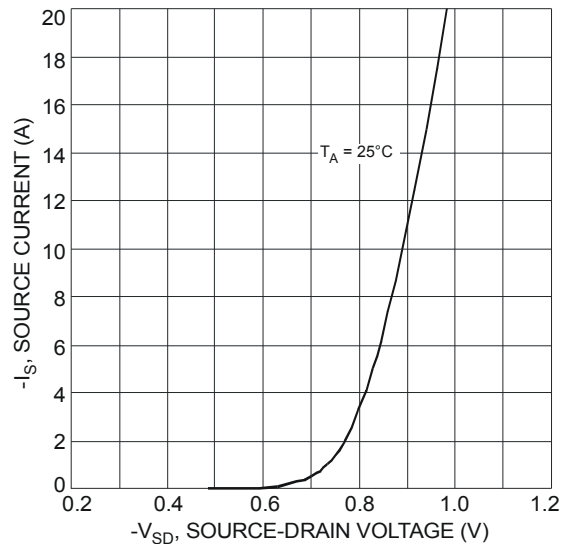


Fig. 8 Diode Forward Voltage vs. Current

DMP4025LSD

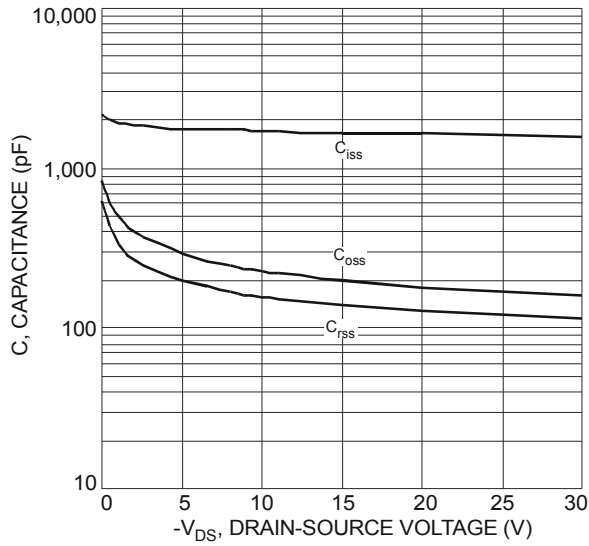


Fig. 9 Typical Total Capacitance

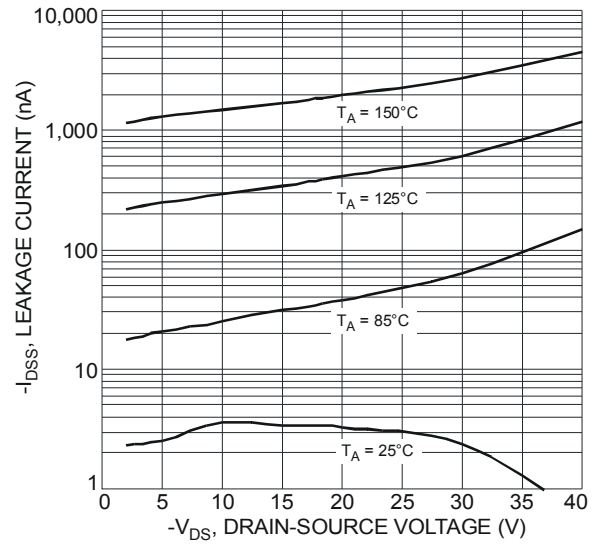


Fig. 10 Typical Leakage Current vs. Drain-Source Voltage

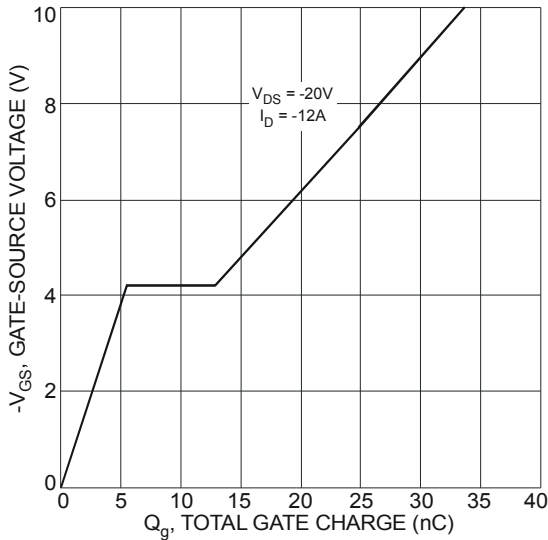
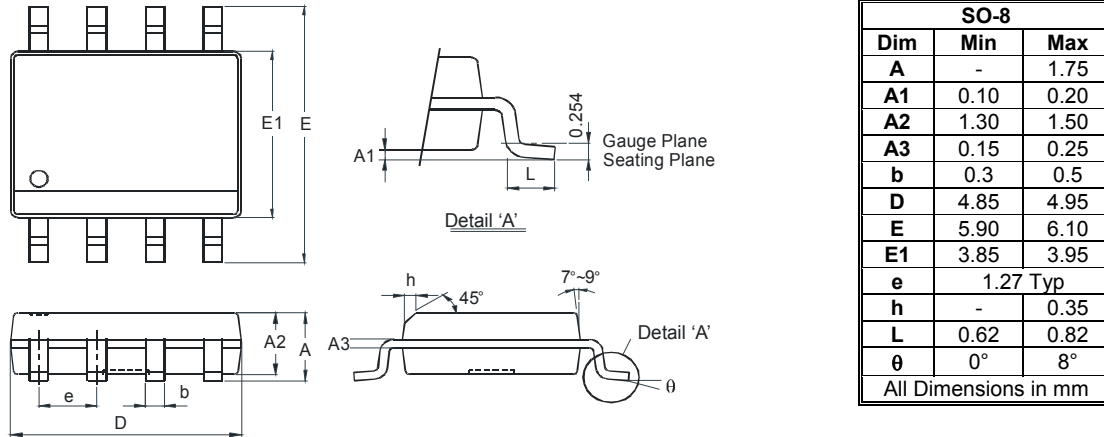


Fig. 11 Gate-Charge Characteristics

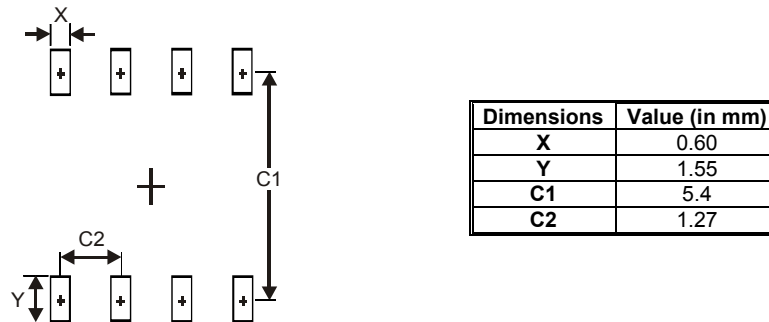
Package Outline Dimensions

Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for latest version.



Suggested Pad Layout

Please see AP02001 at <http://www.diodes.com/datasheets/ap02001.pdf> for the latest version.



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