40V P-CHANNEL ENHANCEMENT MODE MOSFET

Product Summary

BV_{DSS}	$R_{DS(on)}$ max	I_D max T_A = +25°C (Note 6)
-40V	25mΩ @ V_{GS} = -10V	-8.6A
	45mΩ @ V_{GS} = -4.5V	-7.0A

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

- Low On-Resistance
- Fast Switching Speed
- Low Input/Output Leakage
- **Lead-Free Finish; RoHS compliant (Note 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**

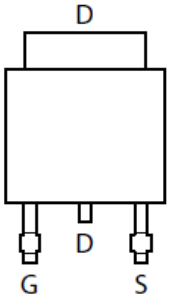
Mechanical Data

- Case: TO252 (DPAK)
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0 (Note 1)
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals Connections: See diagram below
- Terminals: Finish - Matte Tin annealed over Copper lead frame. Solderable per MIL-STD-202, Method 208 e3
- Weight: 0.315 grams (approximate)

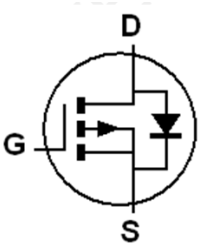
TO252



Top View



Top View
Pin Out



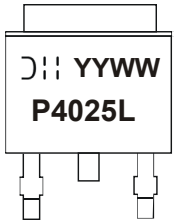
Device symbol

Ordering Information (Note 4)

Product	Marking	Reel size (inches)	Tape width (mm)	Quantity per reel
DMP4025LK3-13	P4025L	13	16	2,500

Notes:
1. EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant. All applicable RoHS exemptions applied.
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.

Marking Information



= Manufacturer's Marking
P4025L = Product Type Marking Code
YYWW = Date Code Marking
YY = Year (ex: 10 = 2010)
WW = Week (01 - 53)

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Maximum Ratings (@T_A = +25°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} = -10V	(Notes 6)	I_D	-8.6	A
		T_A = +70°C (Notes 6)		-6.9	
		(Notes 5)		-6.7	
Pulsed Drain Current	V_{GS} = -10V	(Notes 7)	I_{DM}	-35	
Continuous Source Current (Body diode)		(Notes 7)	I_S	-8.6	
Pulsed Source Current (Body diode)		(Notes 7)	I_{SM}	-35	

Thermal Characteristics (@T_A = +25°C unless otherwise specified.)

Characteristic		Symbol	Value	Unit
Power Dissipation	(Notes 5)	P_D	1.7	W
	(Notes 6)		2.78	
Thermal Resistance, Junction to Ambient	(Notes 5)	$R_{\theta JA}$	74	°C/W
	(Notes 6)		45	
Thermal Resistance, Junction to Case	(Notes 6)	$R_{\theta JC}$	7.1	
Thermal Resistance, Junction to Lead	(Notes 8)	$R_{\theta JL}$	1.43	
Operating and Storage Temperature Range		T_J, T_{STG}	-55 to +150	°C

Notes:
5. For a device surface mounted on minimum recommended 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 (5), except the device is surface mounted on 25mm X 25mm X 1.6mm FR4 PCB.
7. Repetitive rating on 25mm X 25mm FR4 PCB, D=0.02, pulse width 300µs – pulse width by maximum junction temperature.
8. Thermal resistance from junction to solder-point (at the end of the drain lead).

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Thermal Characteristics

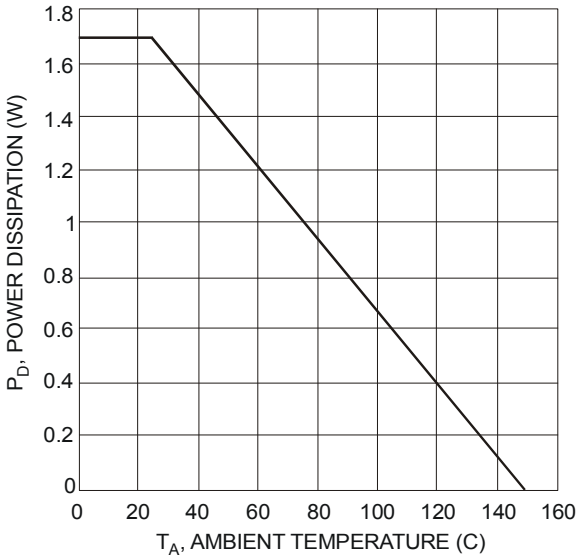


Figure 1. Power Dissipation vs. Ambient Temperature

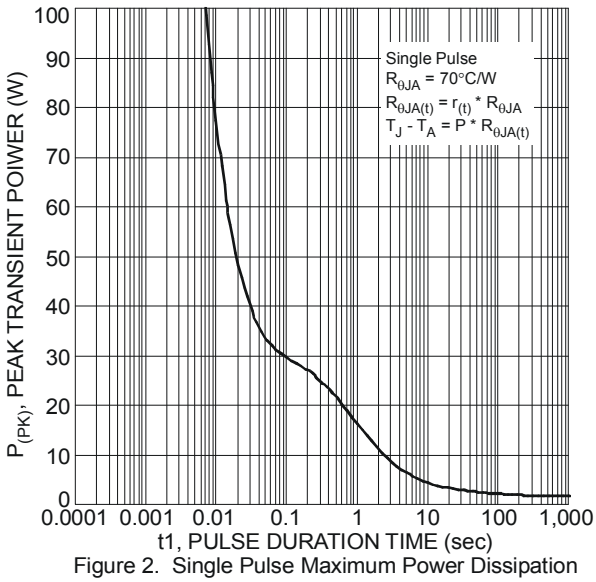


Figure 2. Single Pulse Maximum Power Dissipation

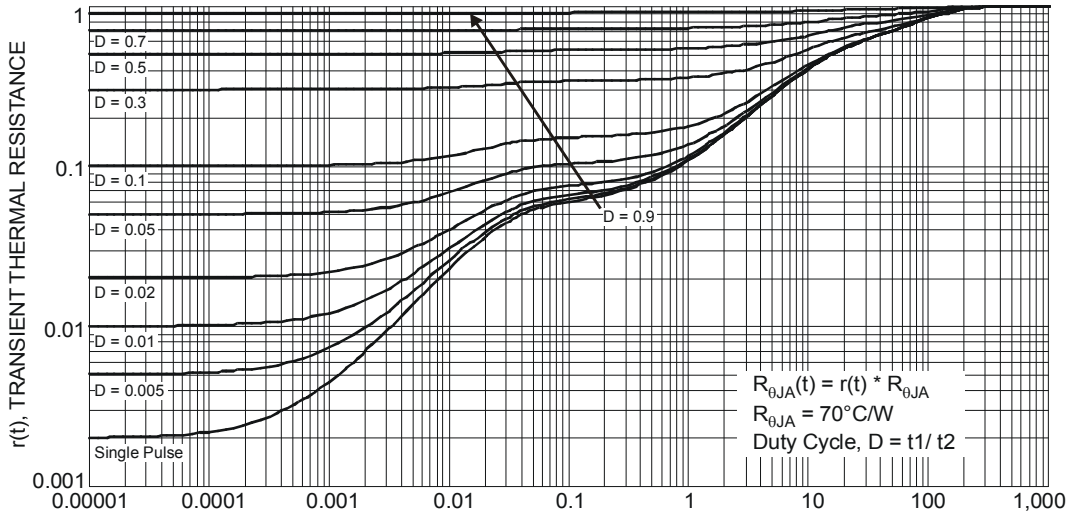


Figure 3. Transient Thermal Resistance

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Electrical Characteristics (@T_A = +25°C unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV_{DSS}	-40	—	—	V	I_D = -250μA, V_{GS} = 0V
Zero Gate Voltage Drain Current	I_{DSS}	—	—	-1	μA	V_{DS} = -40V, V_{GS} = 0V
Gate-Source Leakage	I_{GSS}	—	—	±100	nA	V_{GS} = ±20V, V_{DS} = 0V
ON CHARACTERISTICS						
Gate Threshold Voltage	$V_{GS(th)}$	-0.8	-1.3	-1.8	V	I_D = -250μA, V_{DS} = V_{GS}
Static Drain-Source On-Resistance (Note 9)	$R_{DS\ (ON)}$	—	18	25	mΩ	V_{GS} = -10V, I_D = -3A
			30	45		V_{GS} = -4.5V, I_D = -3A
Forward Transconductance (Notes 9 & 10)	g_{fs}	—	16.6	—	S	V_{DS} = -5V, I_D = -3A
Diode Forward Voltage (Note 9)	V_{SD}	—	-0.7	-1	V	I_S = -1A, V_{GS} = 0V
DYNAMIC CHARACTERISTICS (Note 10)						
Input Capacitance	C_{iss}	—	1643	—	pF	V_{DS} = -20V, V_{GS} = 0V f = 1MHz
Output Capacitance	C_{oss}	—	179	—		
Reverse Transfer Capacitance	C_{rss}	—	128	—		
Gate Resistance	R_g	—	6.43	—	Ω	V_{DS} = 0V, V_{GS} = 0V, f = 1MHz
Total Gate Charge (Note 11)	Q_g	—	14	—	nC	V_{GS} = -4.5V; V_{DS} = -20V, I_D = -3A
Total Gate Charge (Note 11)	Q_g	—	33.7	—		V_{GS} = -10V; V_{DS} = -20V, I_D = -3A
Gate-Source Charge (Note 11)	Q_{gs}	—	5.5	—		
Gate-Drain Charge (Note 11)	Q_{gd}	—	7.3	—		
Turn-On Delay Time (Note 11)	$t_{D(on)}$	—	6.9	—	ns	V_{DD} = -20V, V_{GS} = -10V I_D = -3A
Turn-On Rise Time (Note 11)	t_r	—	14.7	—		
Turn-Off Delay Time (Note 11)	$t_{D(off)}$	—	53.7	—		
Turn-Off Fall Time (Note 11)	t_f	—	30.9	—		

Notes: 9. Measured under pulsed conditions. Pulse width ≤ 300μs; duty cycle ≤ 2%.
10. For design aid only, not subject to production testing.
11. Switching characteristics are independent of operating junction temperatures.

Typical Characteristics

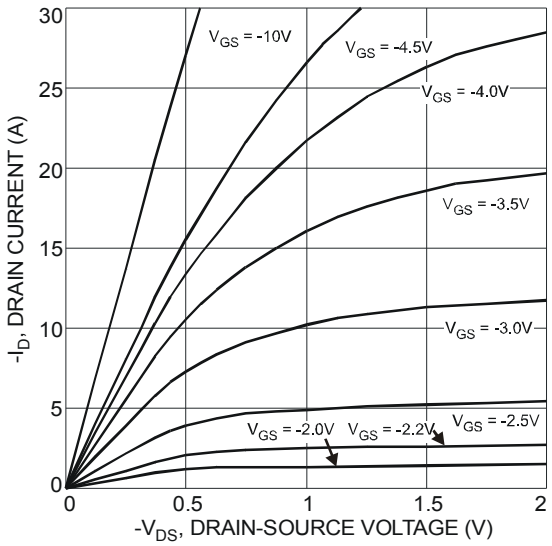


Figure 4. Typical Output Characteristic

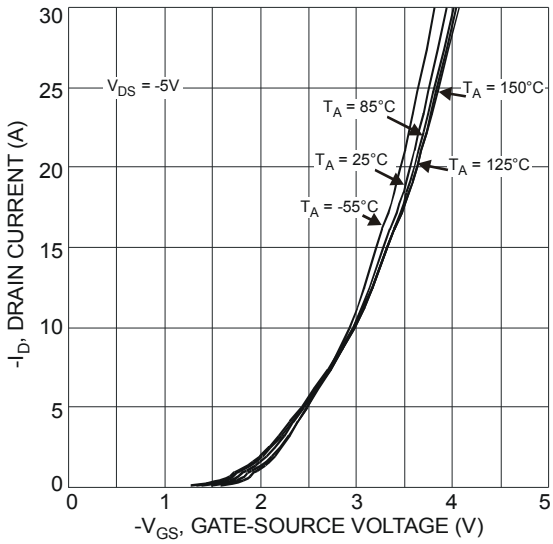


Figure 5. Typical Transfer Characteristic

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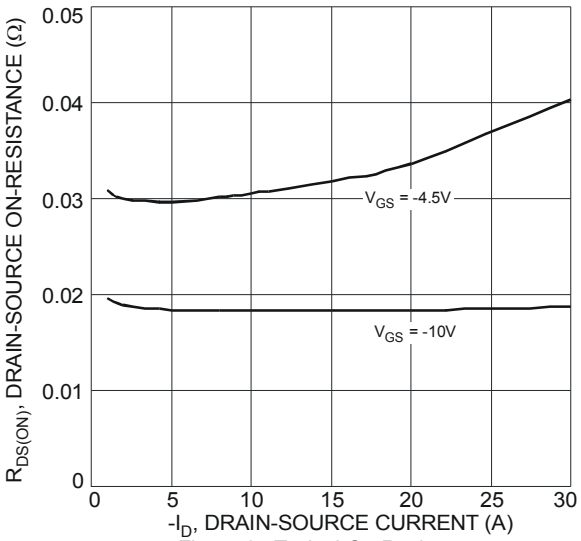


Figure 6. Typical On-Resistance vs. Drain Current and Gate Voltage

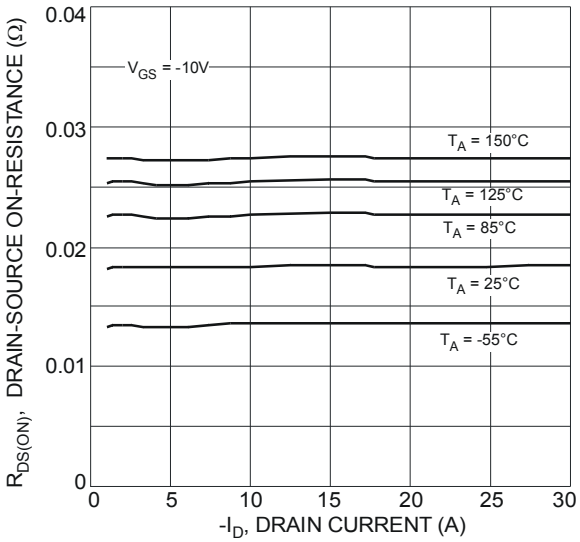


Figure 7. Typical On-Resistance vs. Drain Current and Temperature

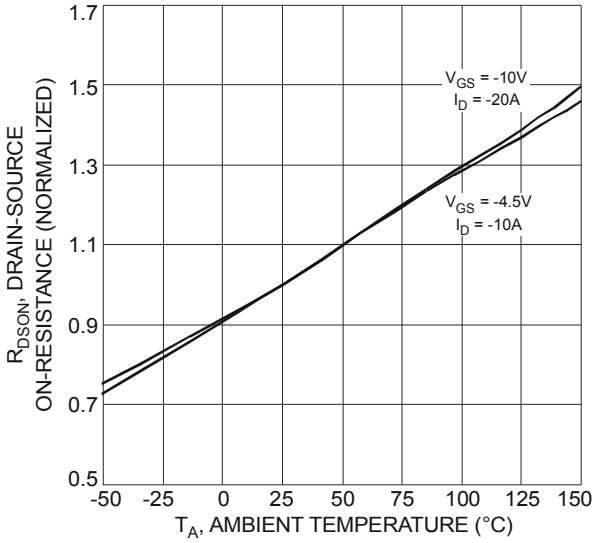


Figure 8. On-Resistance Variation with Temperature

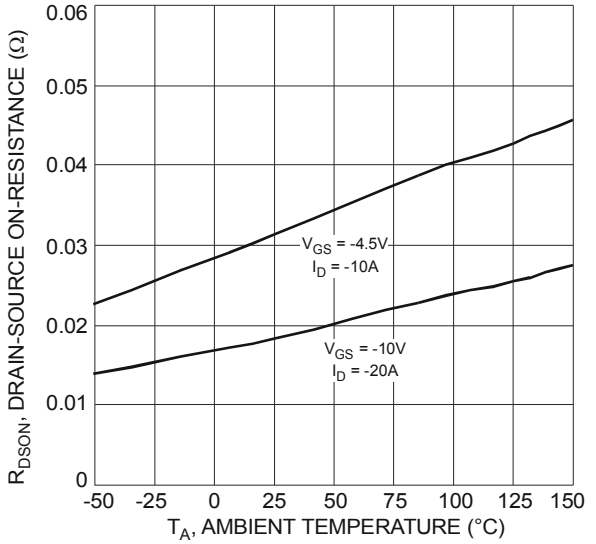


Figure 9. On-Resistance Variation with Temperature

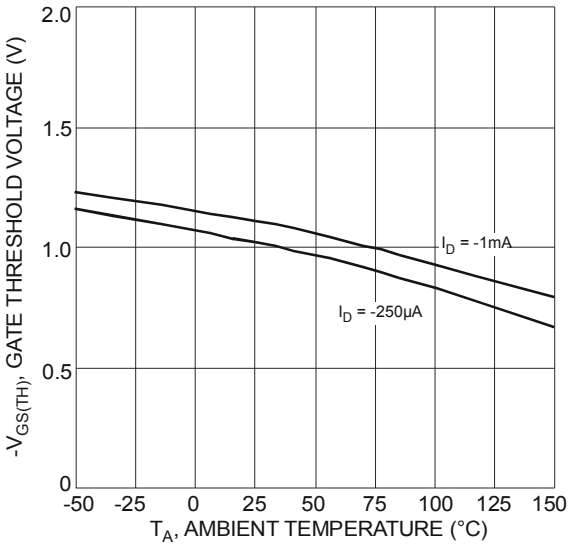


Figure 10. Gate Threshold Variation vs. Ambient Temperature

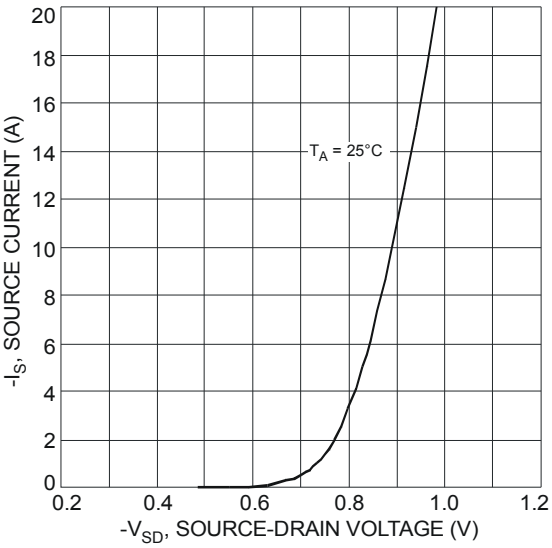


Figure 11. Diode Forward Voltage vs. Current

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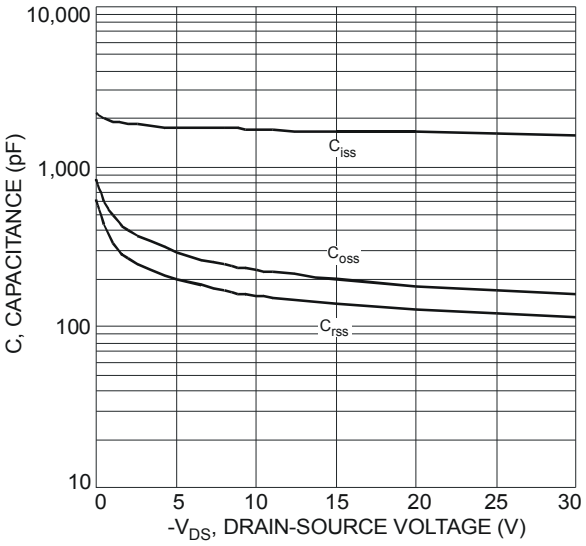


Figure 12. Typical Total Capacitance

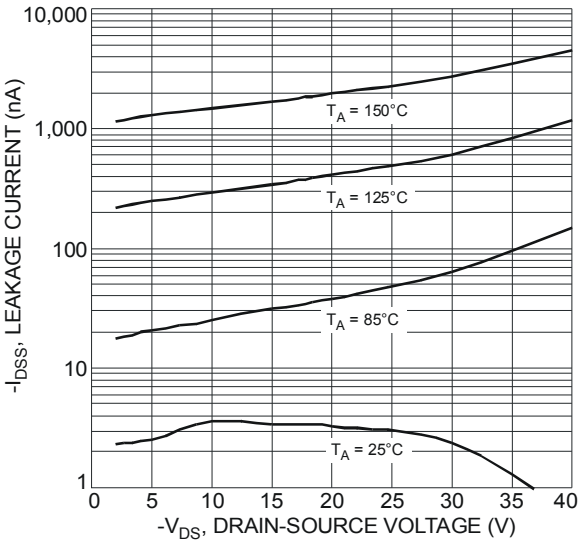


Figure 13. Typical Leakage Current vs. Drain-Source Voltage

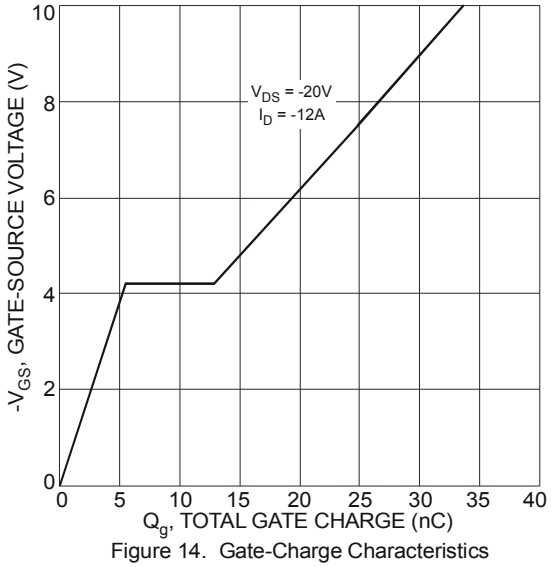


Figure 14. Gate-Charge Characteristics

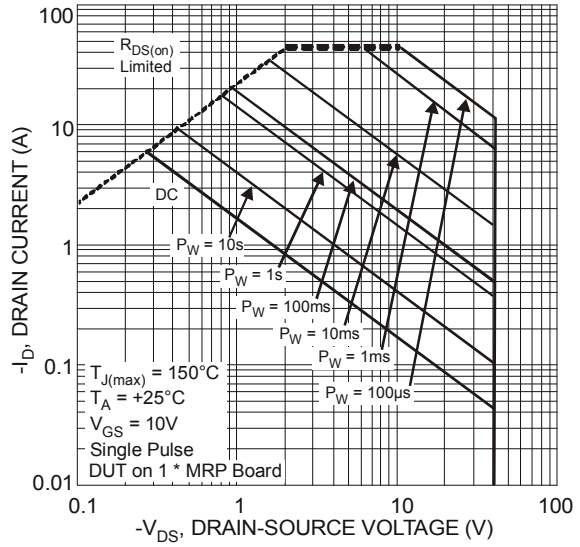
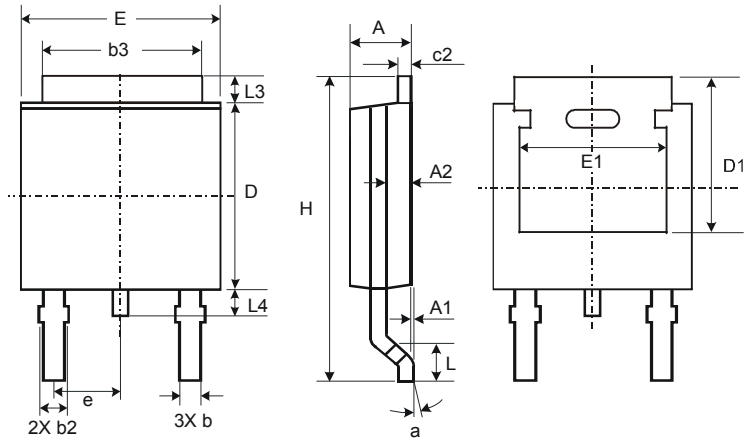


Figure 15. SOA, Safe Operation Area

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Package Outline Dimensions

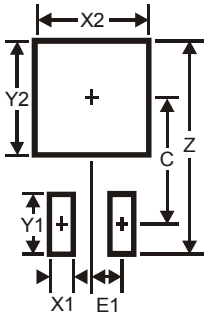
Please see AP02002 at http://www.diodes.com/datasheets/ap02002.pdf for latest version.



TO252			
Dim	Min	Max	Typ
A	2.19	2.39	2.29
A1	0.00	0.13	0.08
A2	0.97	1.17	1.07
b	0.64	0.88	0.783
b2	0.76	1.14	0.95
b3	5.21	5.46	5.33
c2	0.45	0.58	0.531
D	6.00	6.20	6.10
D1	5.21	–	–
e	–	–	2.286
E	6.45	6.70	6.58
E1	4.32	–	–
H	9.40	10.41	9.91
L	1.40	1.78	1.59
L3	0.88	1.27	1.08
L4	0.64	1.02	0.83
a	0°	10°	–
All Dimensions in mm			

Suggested Pad Layout

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



Dimensions	Value (in mm)
Z	11.6
X1	1.5
X2	7.0
Y1	2.5
Y2	7.0
C	6.9
E1	2.3

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