

## Product Summary

<b>BV<sub>DSS</sub></b>	<b>R<sub>D(on)</sub> max</b>	<b>I<sub>D</sub> max T<sub>A</sub> = +25°C (Note 6)</b>
<b>-40V</b>	25mΩ @ V <sub>GS</sub> = -10V	-8.6A
	45mΩ @ V <sub>GS</sub> = -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

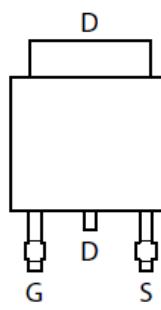
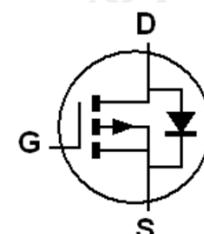
- Low On-Resistance
- Fast Switching Speed
- Low Input/Output Leakage
- **Lead-Free Finish; RoHS compliant (Note 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- Qualified to AEC-Q101 Standards for High Reliability

## 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 ③
- Weight: 0.315 grams (approximate)


**TO252**

Top View


 Top View  
Pin Out


Device symbol

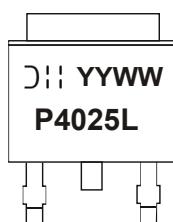
## Ordering Information (Note 4)

<b>Product</b>	<b>Marking</b>	<b>Reel size (inches)</b>	<b>Tape width (mm)</b>	<b>Quantity per reel</b>
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](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



DII = Manufacturer's Marking  
 P4025L = 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		$V_{GSS}$	$\pm 20$	
Continuous Drain Current	$V_{GS} = -10\text{V}$	(Notes 6)	-8.6	A
		$T_A = +70^\circ\text{C}$ (Notes 6)	-6.9	
		(Notes 5)	-6.7	
		(Notes 7)	-35	
Pulsed Drain Current	$V_{GS} = -10\text{V}$	$I_{DM}$	-35	
Continuous Source Current (Body diode)	(Notes 7)	$I_S$	-8.6	
Pulsed Source Current (Body diode)	(Notes 7)	$I_{SM}$	-35	

**Thermal Characteristics** (@ $T_A = +25^\circ\text{C}$  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 300 $\mu\text{s}$  – pulse width by maximum junction temperature.
- 8. Thermal resistance from junction to solder-point (at the end of the drain lead).

## Thermal Characteristics

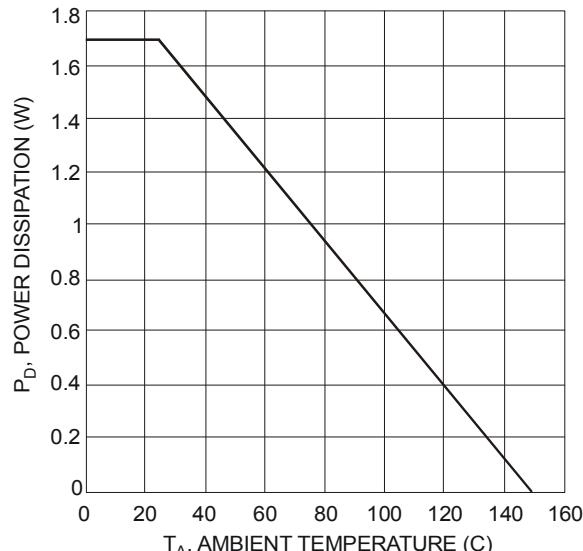


Figure 1. Power Dissipation vs. Ambient Temperature

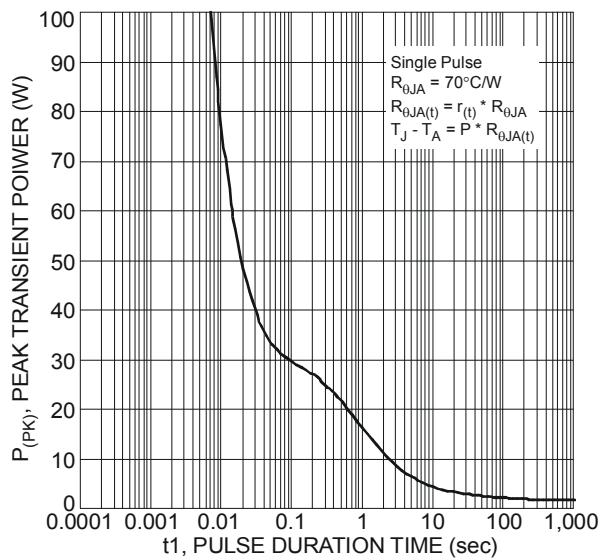


Figure 2. Single Pulse Maximum Power Dissipation

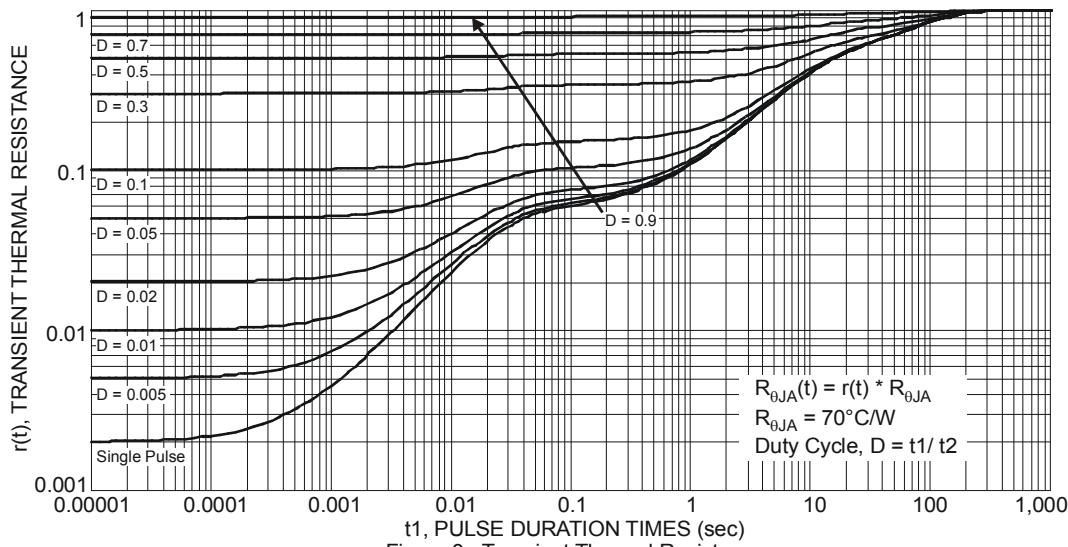


Figure 3. Transient Thermal Resistance

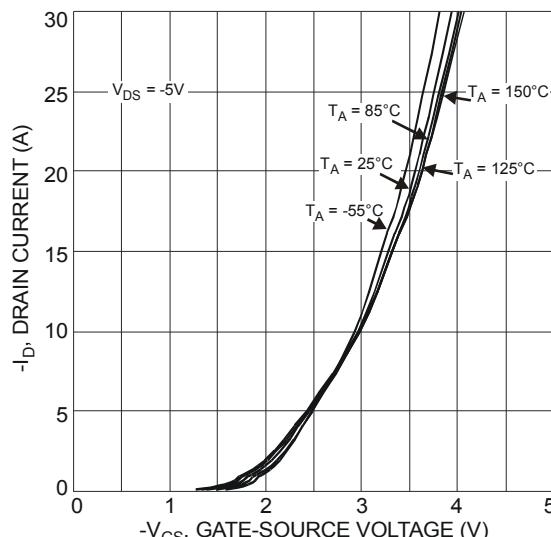
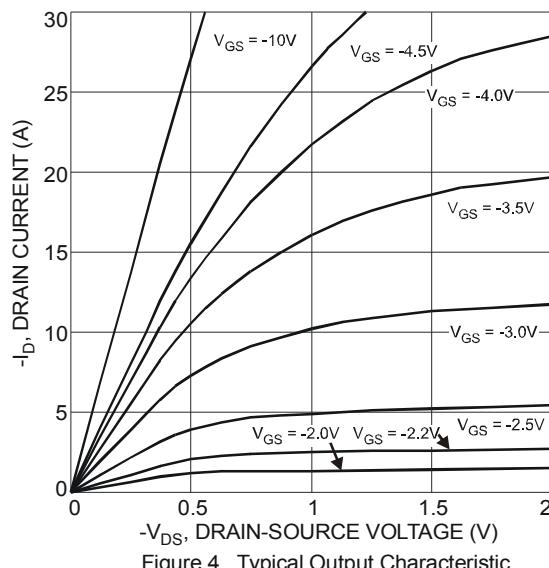
**Electrical Characteristics (@ $T_A = +25^\circ\text{C}$  unless otherwise specified.)**

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

 Notes: 9. Measured under pulsed conditions. Pulse width  $\leq 300\mu\text{s}$ ; duty cycle  $\leq 2\%$ .

10. For design aid only, not subject to production testing.

11. Switching characteristics are independent of operating junction temperatures.

**Typical Characteristics**


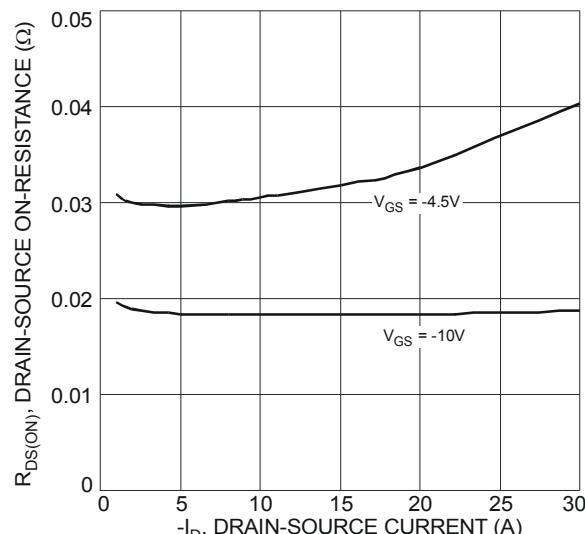


Figure 6. Typical On-Resistance  
vs. Drain Current and Gate Voltage

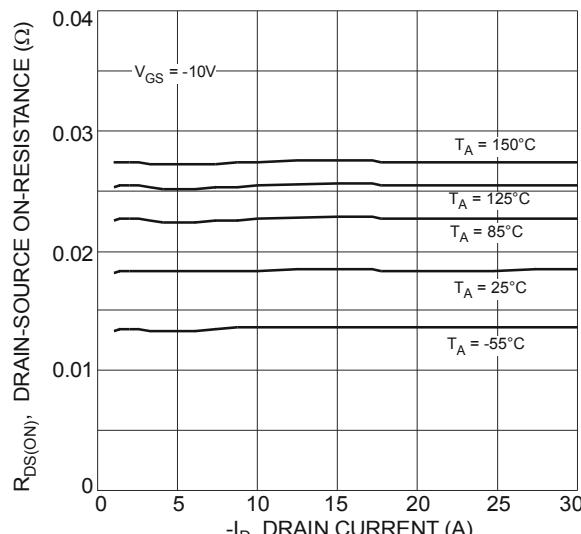


Figure 7. Typical On-Resistance  
vs. Drain Current and Temperature

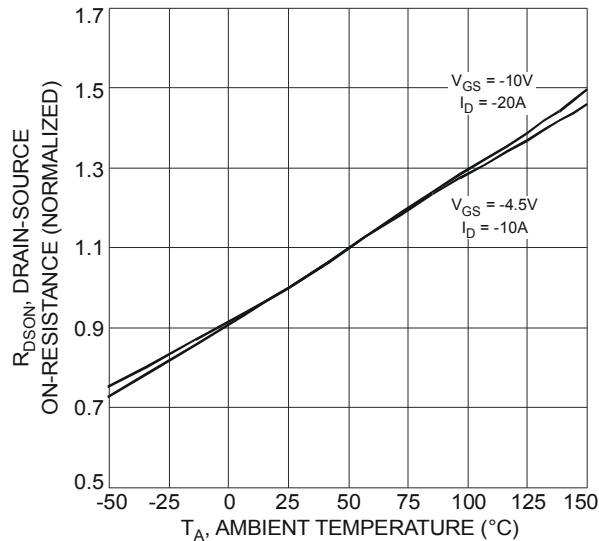


Figure 8. On-Resistance Variation with Temperature

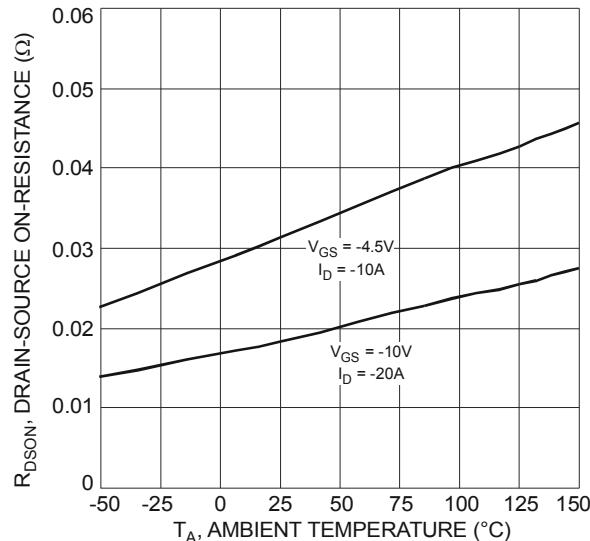


Figure 9. On-Resistance Variation with Temperature

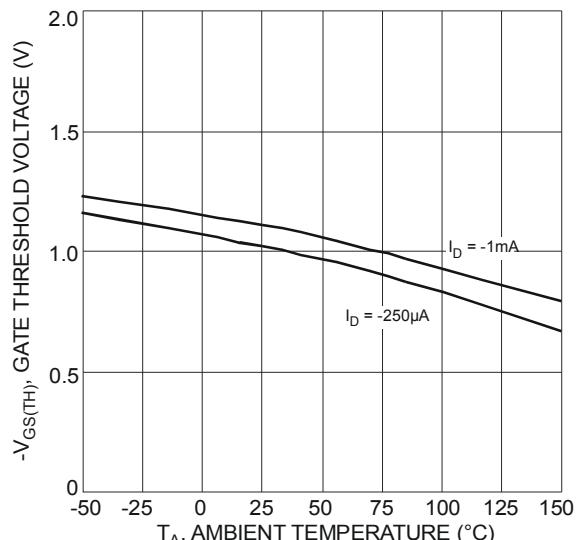


Figure 10. Gate Threshold Variation vs. Ambient Temperature

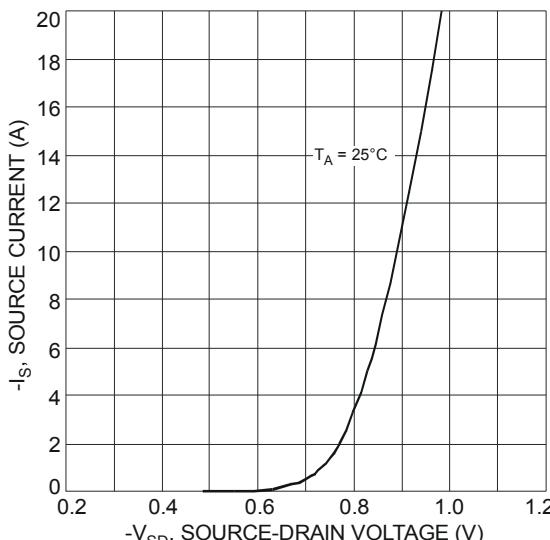


Figure 11. Diode Forward Voltage vs. Current

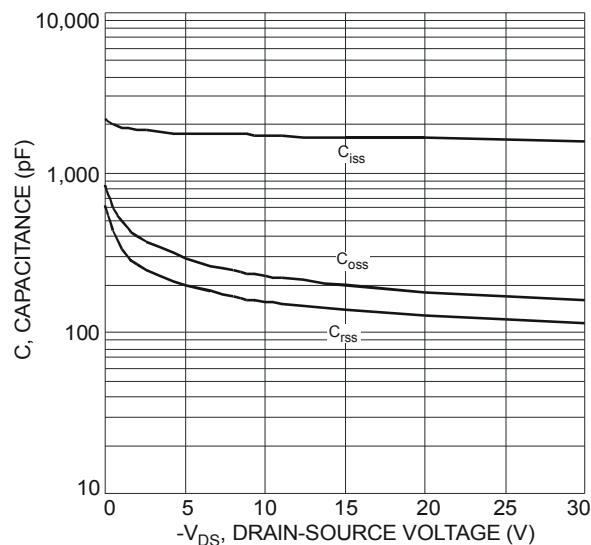


Figure 12. Typical Total Capacitance

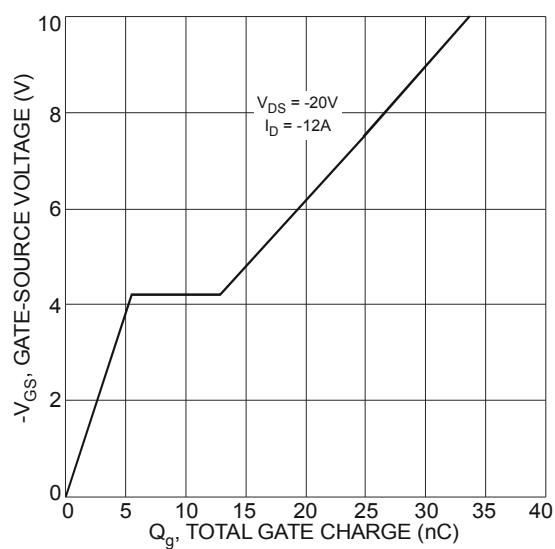


Figure 14. Gate-Charge Characteristics

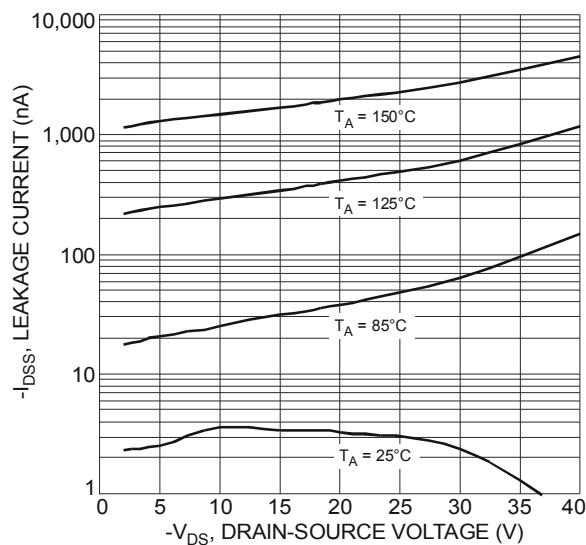


Figure 13. Typical Leakage Current vs. Drain-Source Voltage

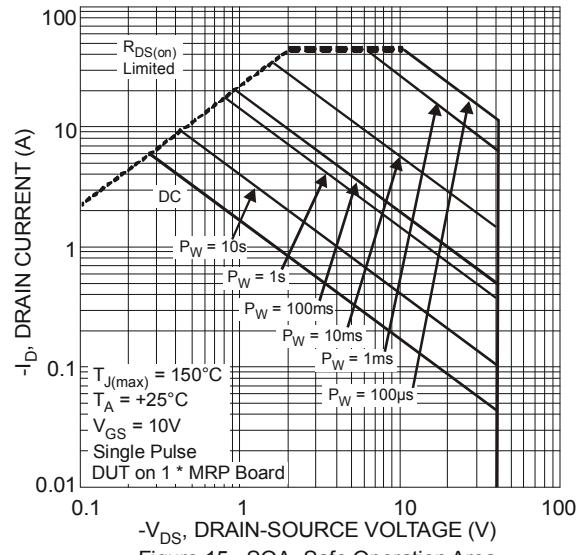
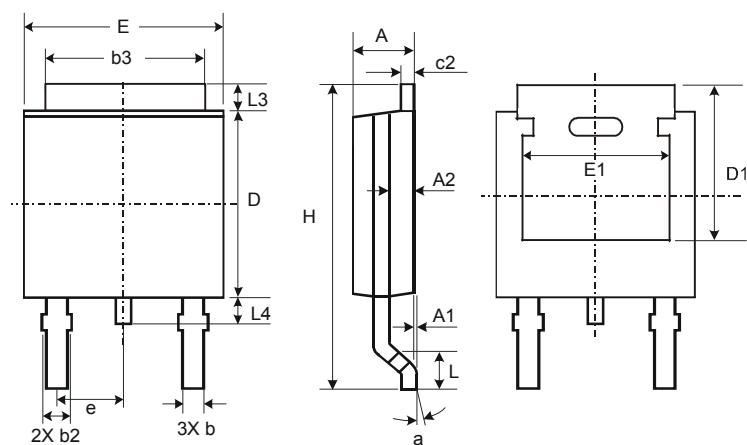


Figure 15. SOA, Safe Operation Area

## Package Outline Dimensions

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

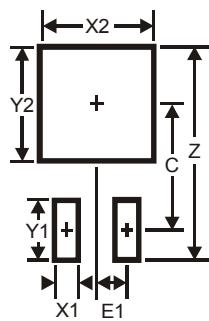


TO252			
Dim	Min	Max	Typ
<b>A</b>	2.19	2.39	2.29
<b>A1</b>	0.00	0.13	0.08
<b>A2</b>	0.97	1.17	1.07
<b>b</b>	0.64	0.88	0.783
<b>b2</b>	0.76	1.14	0.95
<b>b3</b>	5.21	5.46	5.33
<b>c2</b>	0.45	0.58	0.531
<b>D</b>	6.00	6.20	6.10
<b>D1</b>	5.21	—	—
<b>e</b>	—	—	2.286
<b>E</b>	6.45	6.70	6.58
<b>E1</b>	4.32	—	—
<b>H</b>	9.40	10.41	9.91
<b>L</b>	1.40	1.78	1.59
<b>L3</b>	0.88	1.27	1.08
<b>L4</b>	0.64	1.02	0.83
<b>a</b>	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)
<b>Z</b>	11.6
<b>X1</b>	1.5
<b>X2</b>	7.0
<b>Y1</b>	2.5
<b>Y2</b>	7.0
<b>C</b>	6.9
<b>E1</b>	2.3

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