

40V P-CHANNEL ENHANCEMENT MODE MOSFET

Product Summary

BV _{DSS}	R _{DS(on)} max	I _D max T _A = +25°C (Notes 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

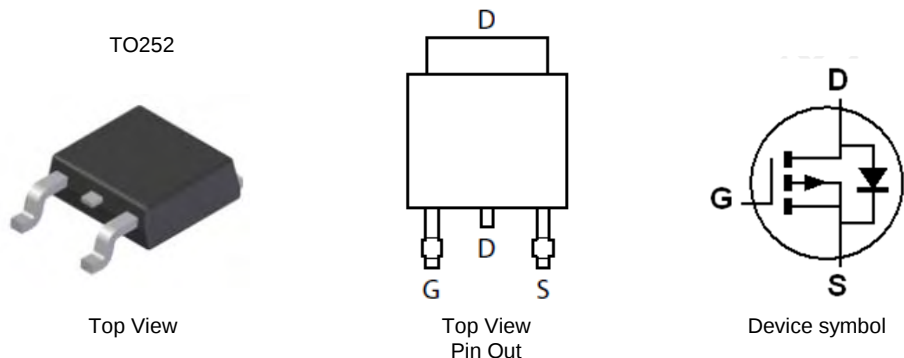
- Motor control
- Backlighting
- DC-DC Converters
- Printer equipment

Features

- Low On-Resistance
- Fast Switching Speed
- Low Input/Output Leakage
- **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: 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)

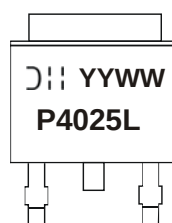


Ordering Information (Note 4)

Product	Marking	Reel size (inches)	Tape width (mm)	Quantity per reel
DMP4025LK3-13	P4025L	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
 P4025L = Product Type Marking Code
 YYWW = Date Code Marking
 YY = Year (ex: 10 = 2010)
 WW = Week (01 - 53)

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 _{θJA}	74	°C/W
	(Notes 6)		45	
Thermal Resistance, Junction to Lead	(Notes 8)	R _{θJL}	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).

Thermal Characteristics

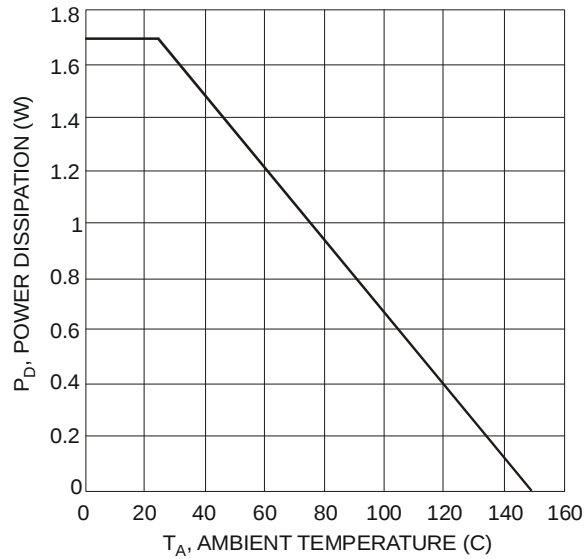


Figure 1. Power Dissipation vs. Ambient Temperature

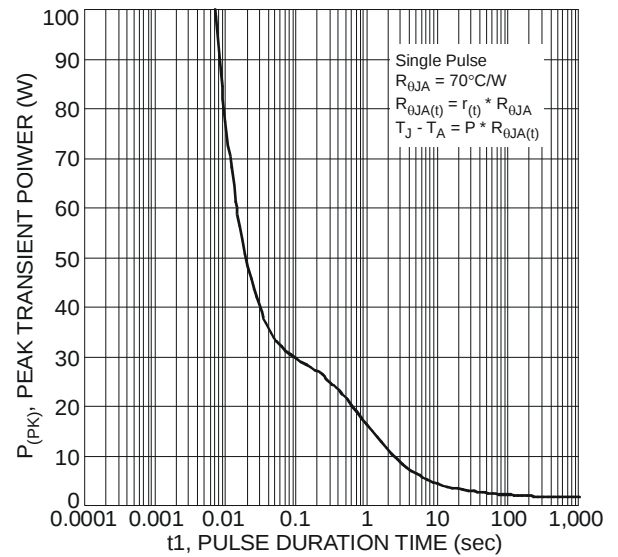


Figure 2. Single Pulse Maximum Power Dissipation

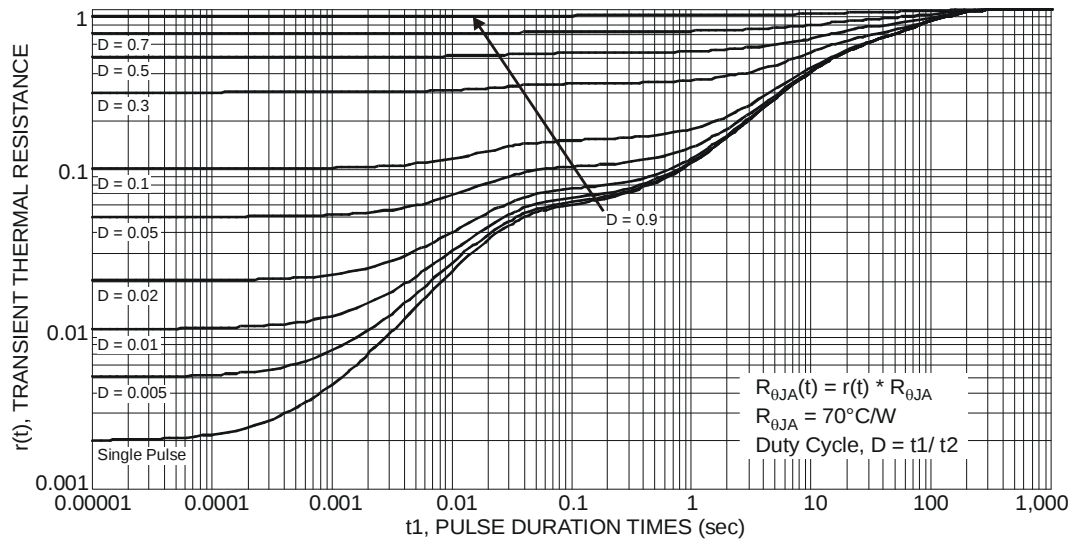


Figure 3. Transient Thermal Resistance

Electrical Characteristics (@T_A = +25°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}	—	—	-1.0	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	-1.0	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	—	14.0	—	nC	V _{DS} = -20V I _D = -3A
Total Gate Charge (Note 11)	Q _g	—	33.7	—		
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.

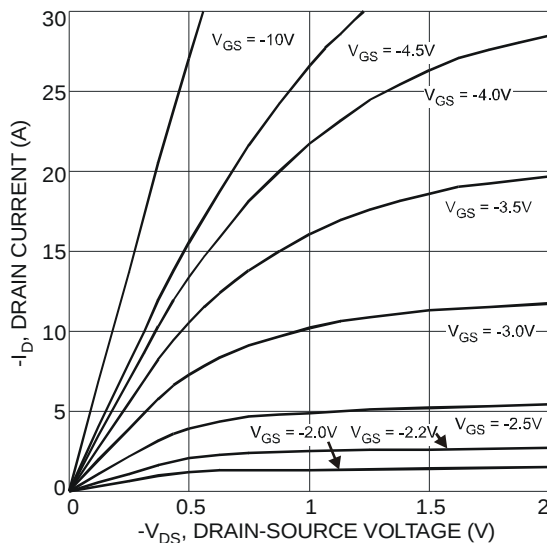
Typical Characteristics


Figure 4. Typical Output Characteristic

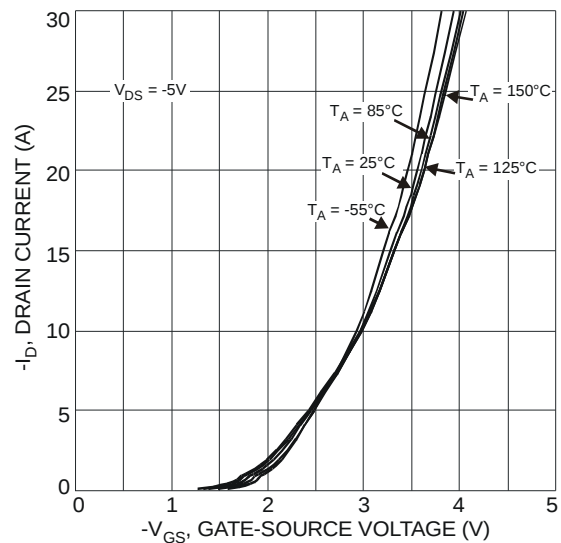


Figure 5. Typical Transfer Characteristic

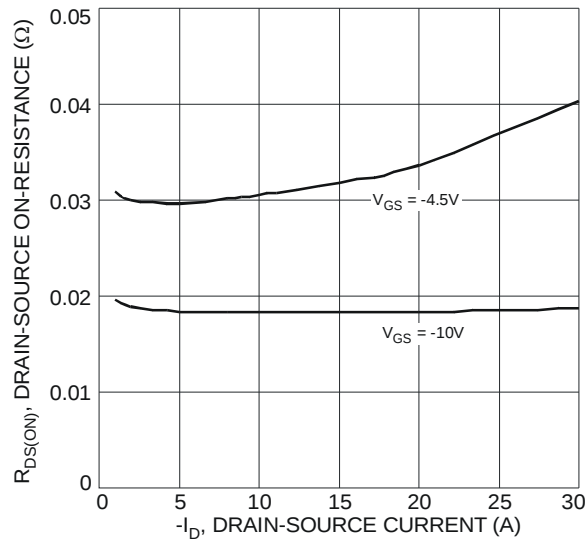


Figure 6. Typical On-Resistance vs. Drain Current and Gate Voltage

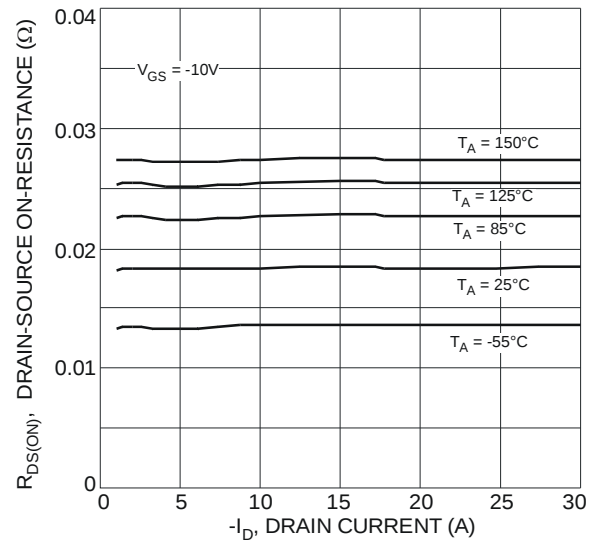


Figure 7. Typical On-Resistance vs. Drain Current and Temperature

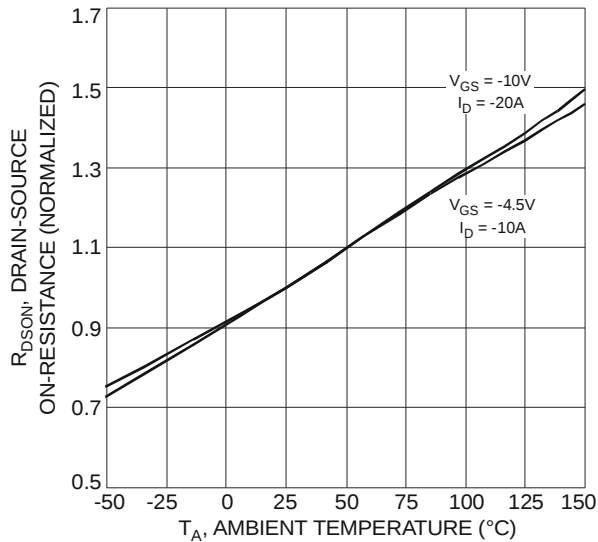


Figure 8. On-Resistance Variation with Temperature

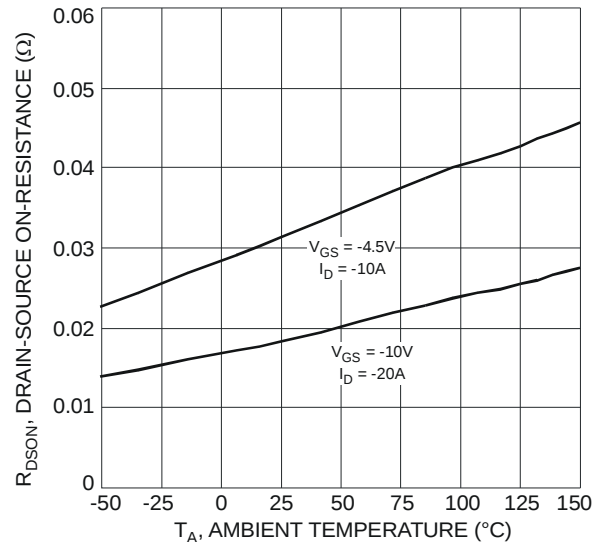


Figure 9. On-Resistance Variation with Temperature

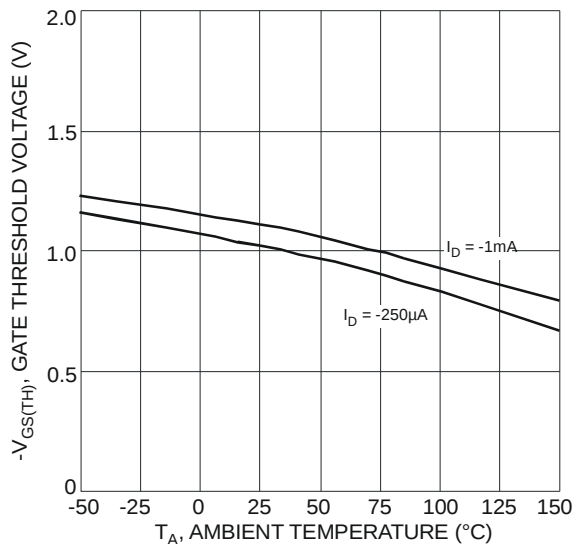


Figure 10. Gate Threshold Variation vs. Ambient Temperature

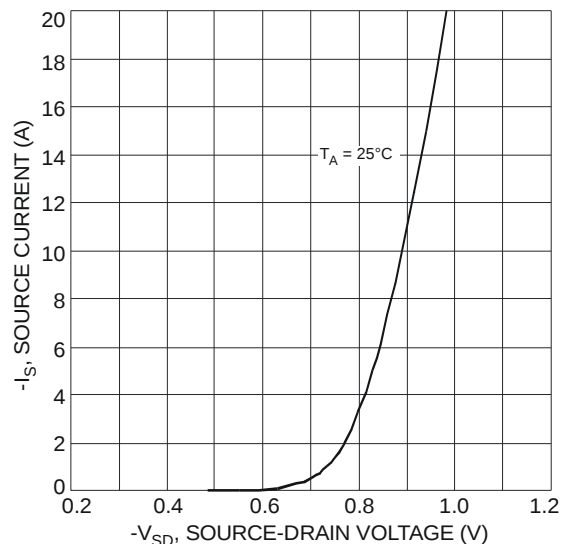


Figure 11. Diode Forward Voltage vs. Current

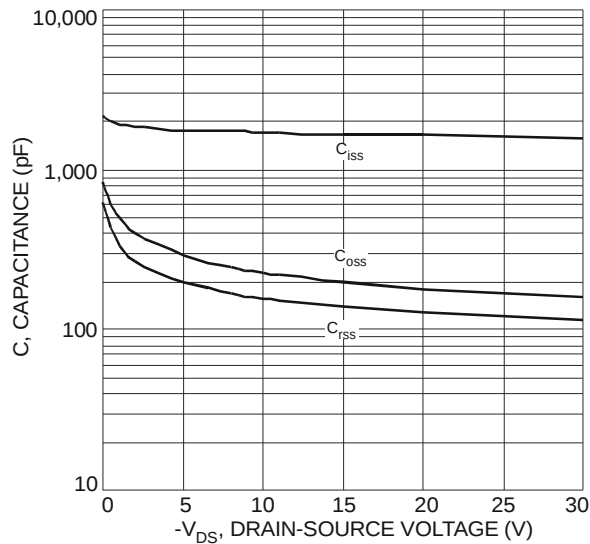


Figure 12. Typical Total Capacitance

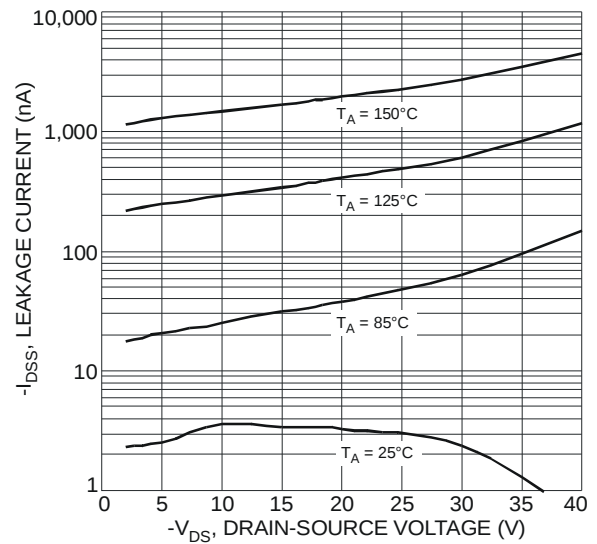


Figure 13. Typical Leakage Current vs. Drain-Source Voltage

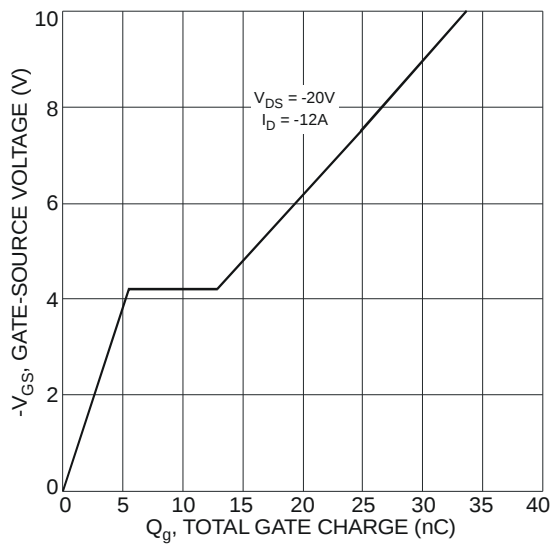


Figure 14. Gate-Charge Characteristics

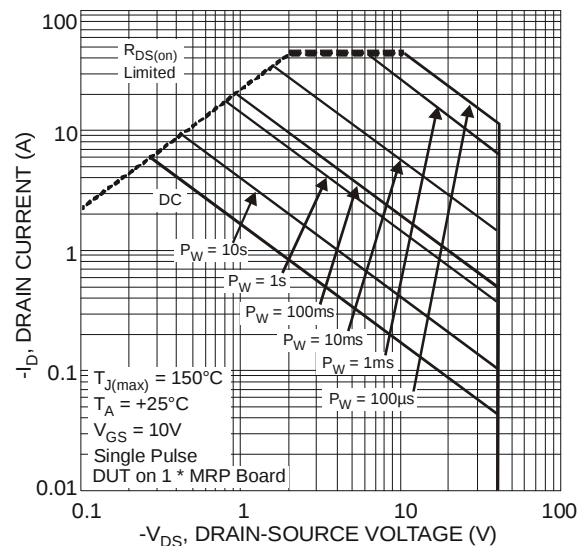
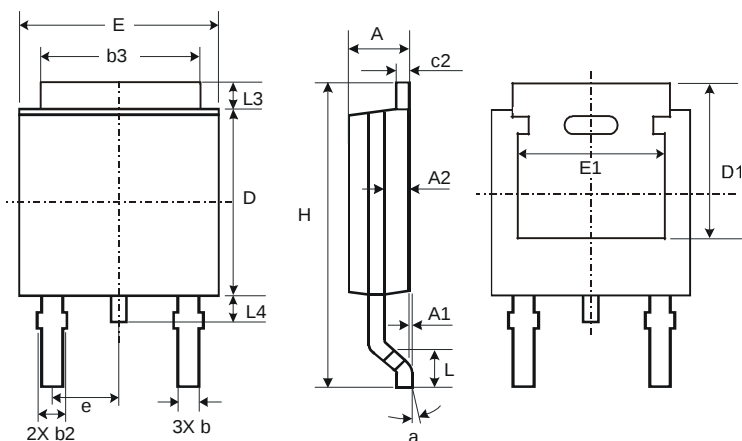


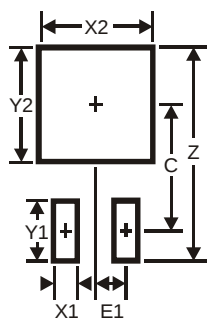
Figure 15. SOA, Safe Operation Area

Package Outline Dimensions



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



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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