

## Product Summary

$V_{(BR)DSS}$	$R_{DS(ON)}$ max	$I_D$ max $T_A = +25^\circ\text{C}$
-30V	13m $\Omega$ @ $V_{GS} = -10\text{V}$	-9.8A
	25m $\Omega$ @ $V_{GS} = -4.5\text{V}$	-7.0A

## Description

This MOSFET has been designed to minimize the on-state resistance ( $R_{DS(ON)}$ ) and yet maintain superior switching performance, making it ideal for high efficiency power management applications.

## Applications

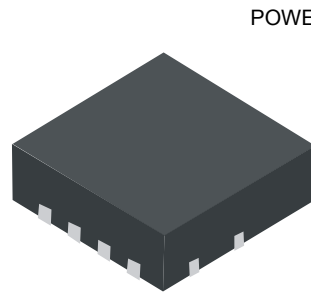
- Backlighting
- Power Management Functions
- DC-DC Converters

## Features and Benefits

- Low  $R_{DS(ON)}$  – ensures on state losses are minimized
- Small form factor thermally efficient package enables higher density end products
- Occupies just 33% of the board area occupied by SO-8 enabling smaller end product
- **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**

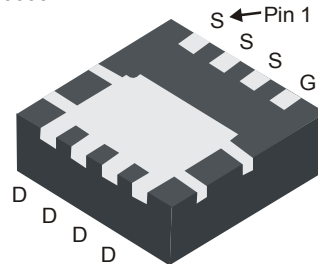
## Mechanical Data

- Case: POWERDI3333
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Connections Indicator: See diagram
- Terminals: Finish — Matte Tin annealed over Copper leadframe. Solderable per MIL-STD-202, Method 208  $\text{\textcircled{E3}}$
- Weight: 0.0174 grams (approximate)

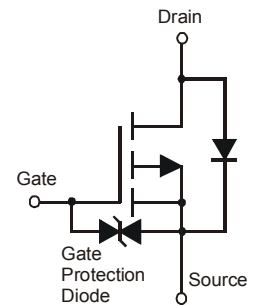


Top View

POWERDI3333



Bottom View



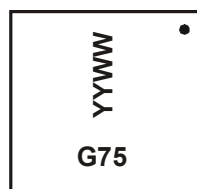
Equivalent Circuit

## Ordering Information (Note 4)

Part Number	Case	Packaging
DMG7401SFG-7	POWERDI3333	2000/Tape & Reel
DMG7401SFG-13	POWERDI3333	3000/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](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



G75 = Product marking code  
YYWW = Date code marking  
YY = Last digit of year (ex: 10 for 2010)  
WW = Week code (01 – 53)

**Maximum Ratings** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic	Symbol	Value	Units
Drain-Source Voltage	V <sub>DSS</sub>	-30	V
Gate-Source Voltage	V <sub>GSS</sub>	±25	V
Continuous Drain Current (Note 6) V <sub>GS</sub> = -10V	I <sub>D</sub>	T <sub>A</sub> = +25°C	-9.8
		T <sub>A</sub> = +70°C	-7.7
	I <sub>D</sub>	T <sub>A</sub> = +25°C	-13.5
		T <sub>A</sub> = +70°C	-10.8
Maximum Continuous Body Diode Forward Current (Note 5)	I <sub>S</sub>	-3.0	A
Pulsed Drain Current (10µs pulse, duty cycle = 1%)	I <sub>DM</sub>	-80	A
Avalanche Current (Notes 7 & 8)	I <sub>AR</sub>	14	A
Repetitive Avalanche Energy (Notes 7 & 8) L = 1mH	E <sub>AR</sub>	104	mJ

**Thermal Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic	Symbol	Value	Units
Total Power Dissipation (Note 5)	P <sub>D</sub>	T <sub>A</sub> = +25°C	0.94
		T <sub>A</sub> = +70°C	0.6
Thermal Resistance, Junction to Ambient (Note 5)	R <sub>θJA</sub>	Steady State	137
		t < 10s	82
Total Power Dissipation (Note 6)	P <sub>D</sub>	T <sub>A</sub> = +25°C	2.2
		T <sub>A</sub> = +70°C	1.3
Thermal Resistance, Junction to Ambient (Note 6)	R <sub>θJA</sub>	Steady State	60
		t < 10s	36
Thermal Resistance, Junction to Case (Note 6)	R <sub>θJC</sub>	3.0	°C/W
Operating and Storage Temperature Range	T <sub>J</sub> , T <sub>STG</sub>	-55 to +150	°C

**Electrical Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS (Note 8)</b>						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	-30	—	—	V	V <sub>GS</sub> = 0V, I <sub>D</sub> = -250µA
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	—	—	-1	µA	V <sub>DS</sub> = -30V, V <sub>GS</sub> = 0V
Gate-Source Leakage	I <sub>GSS</sub>	—	—	±10	µA	V <sub>GS</sub> = ±20V, V <sub>DS</sub> = 0V
<b>ON CHARACTERISTICS (Note 8)</b>						
Gate Threshold Voltage	V <sub>GS(th)</sub>	-1.7	—	-3.0	V	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = -250µA
Static Drain-Source On-Resistance	R <sub>DS(on)</sub>	—	9	11	mΩ	V <sub>GS</sub> = -20V, I <sub>D</sub> = -12A
		—	10	13		V <sub>GS</sub> = -10V, I <sub>D</sub> = -9A
		—	17	25		V <sub>GS</sub> = -4.5V, I <sub>D</sub> = -5A
		—	—	—		V <sub>DS</sub> = -5V, I <sub>D</sub> = -10A
Forward Transfer Admittance	Y <sub>fs</sub>	—	21	—	S	V <sub>DS</sub> = -5V, I <sub>D</sub> = -10A
<b>DYNAMIC CHARACTERISTICS (Note 9)</b>						
Input Capacitance	C <sub>iss</sub>	—	2246	2987	pF	V <sub>DS</sub> = -15V, V <sub>GS</sub> = 0V, f = 1.0MHz
Output Capacitance	C <sub>oss</sub>	—	352	468	pF	
Reverse Transfer Capacitance	C <sub>rss</sub>	—	294	391	pF	V <sub>DS</sub> = -15V, I <sub>D</sub> = -12A
Gate resistance	R <sub>g</sub>	—	5.1	10	Ω	
Total Gate Charge (V <sub>GS</sub> = 4.5V)	Q <sub>g</sub>	—	20.5	30	nC	
Total Gate Charge (V <sub>GS</sub> = 10V)	Q <sub>g</sub>	—	41	58	nC	
Gate-Source Charge	Q <sub>gs</sub>	—	7.6	-	nC	
Gate-Drain Charge	Q <sub>gd</sub>	—	8.0	-	nC	
Turn-On Delay Time	t <sub>D(on)</sub>	—	11.3	23	ns	
Turn-On Rise Time	t <sub>r</sub>	—	15.4	31	ns	
Turn-Off Delay Time	t <sub>D(off)</sub>	—	38.0	61	ns	V <sub>DD</sub> = -15V, V <sub>GS</sub> = -10V, R <sub>L</sub> = 1.25Ω, R <sub>G</sub> = 3Ω,
Turn-Off Fall Time	t <sub>f</sub>	—	22.0	38	ns	
<b>BODY DIODE CHARACTERISTICS</b>						
Diode Forward Voltage	V <sub>SD</sub>	—	-0.7	-1.0	V	V <sub>GS</sub> = 0V, I <sub>S</sub> = -1A
Reverse Recovery Time (Note 9)	t <sub>rr</sub>	—	20	31	ns	I <sub>S</sub> = -9.5A, dI/dt = 100A/µs
Reverse Recovery Charge (Note 9)	Q <sub>rr</sub>	—	9.5	18	nC	

- Notes:
- Device mounted on FR-4 substrate PC board, 2oz copper, with minimum recommended pad layout.
  - Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper plate.
  - I<sub>AR</sub> and E<sub>AR</sub> rating are based on low frequency and duty cycles to keep T<sub>J</sub> = +25°C.
  - Short duration pulse test used to minimize self-heating effect
  - Guaranteed by design. Not subject to product testing

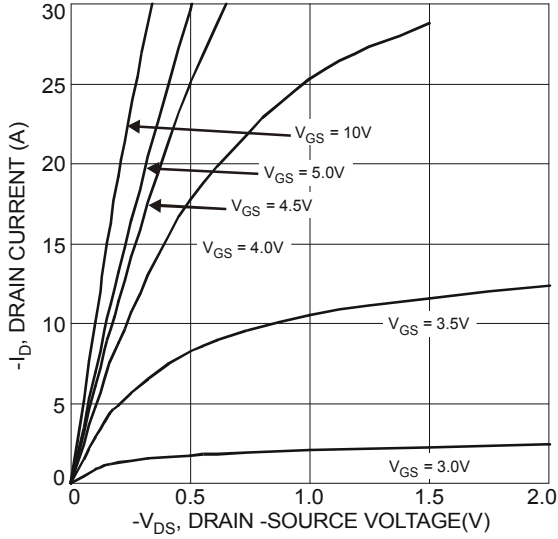


Fig. 1 Typical Output Characteristics

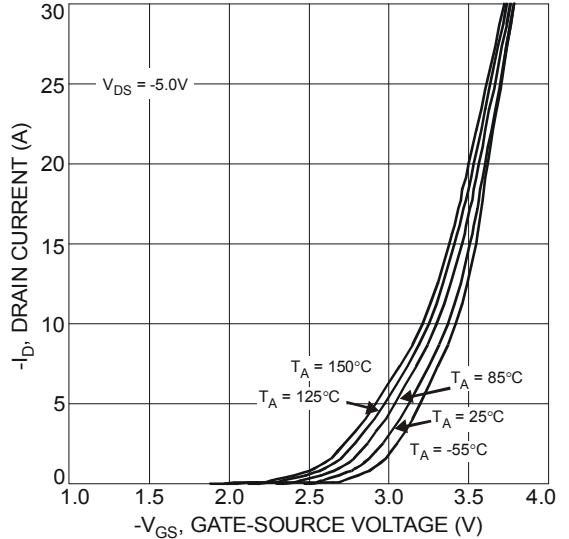


Fig. 2 Typical Transfer Characteristics

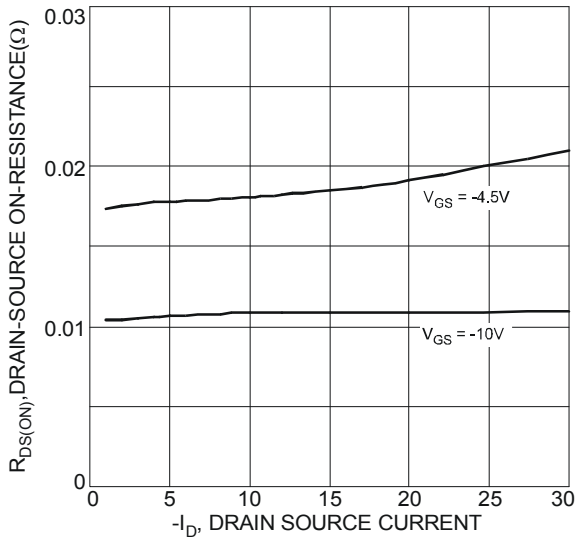


Fig. 3 Typical On-Resistance vs. Drain Current and Gate Voltage

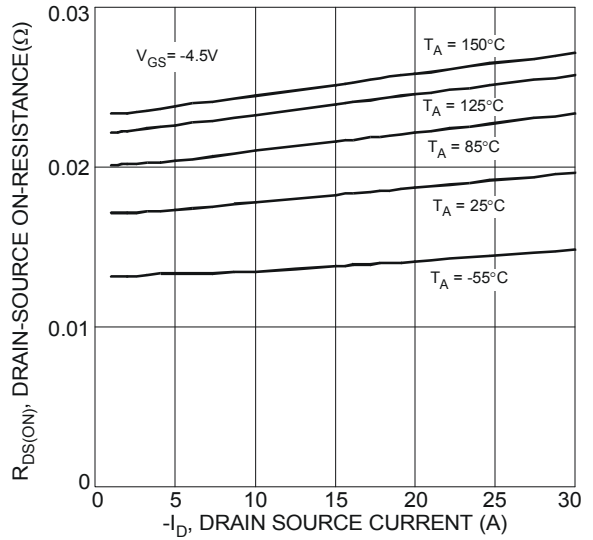


Fig. 4 Typical On-Resistance vs. Drain Current and Temperature

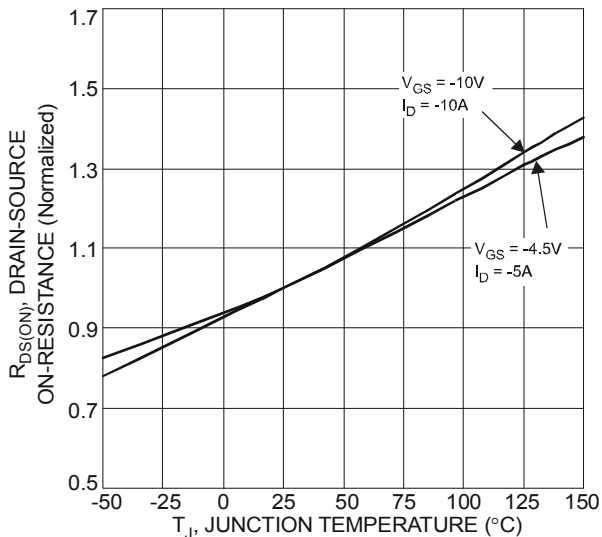


Fig. 5 On-Resistance Variation with Temperature

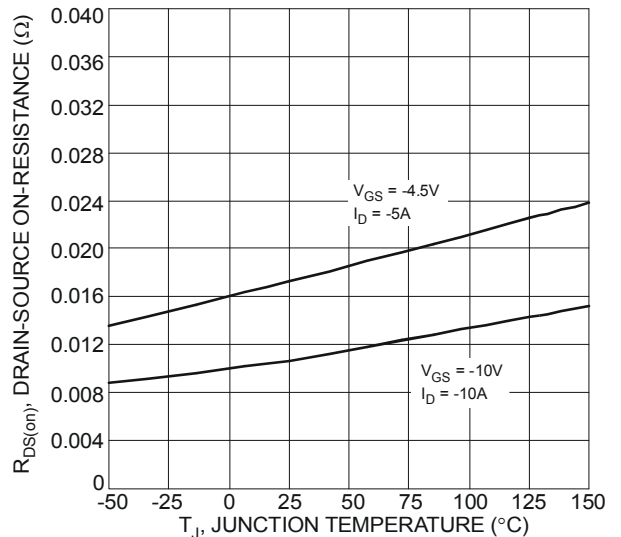


Fig. 6 On-Resistance Variation with Temperature

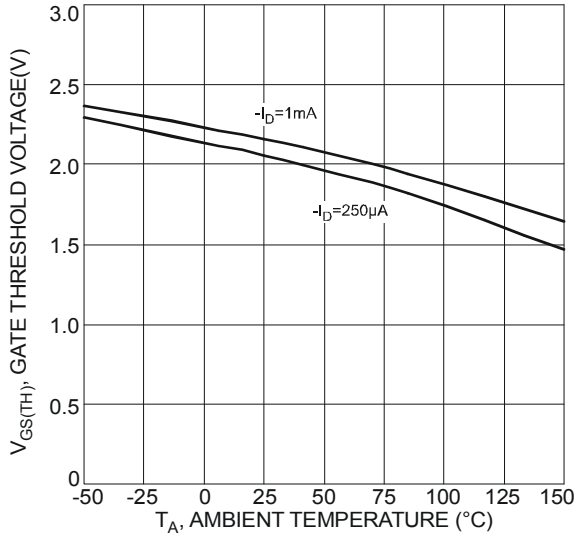


Fig. 7 Gate Threshold Variation vs. Ambient Temperature

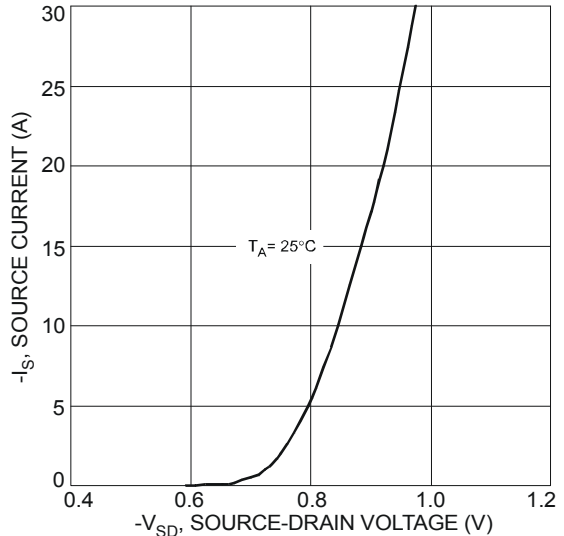


Fig. 8 Diode Forward Voltage vs. Current

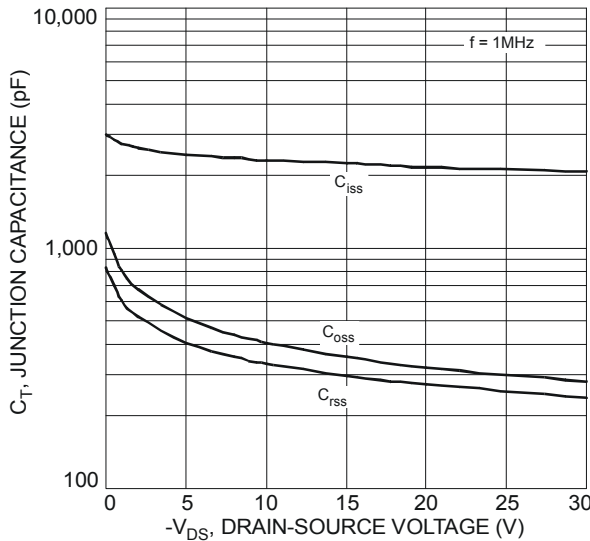


Fig. 9 Typical Junction Capacitance

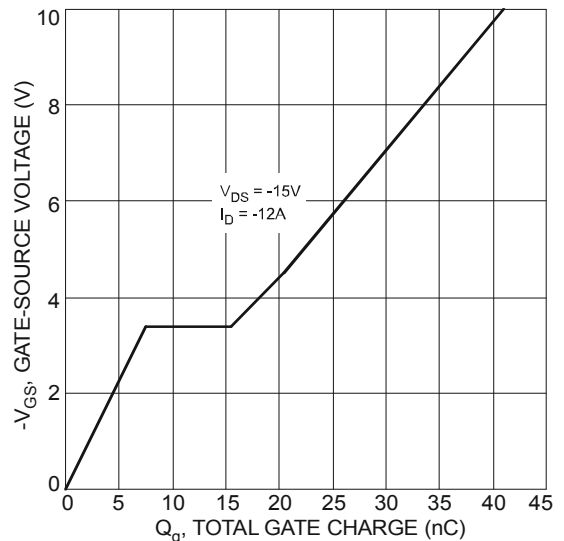


Fig. 10 Gate-Charge Characteristics

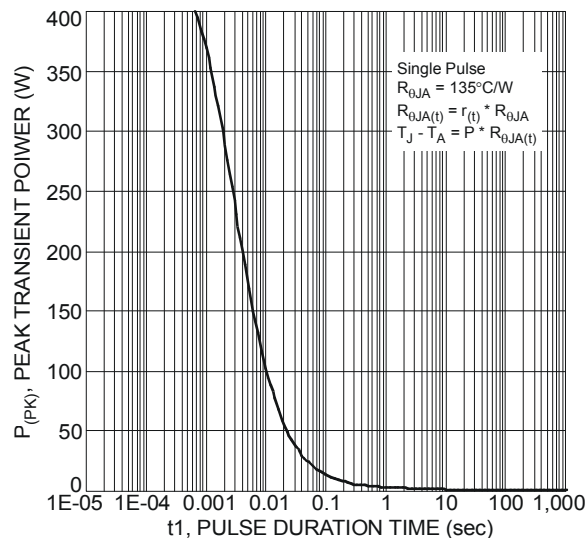


Fig. 11 Single Pulse Maximum Power Dissipation

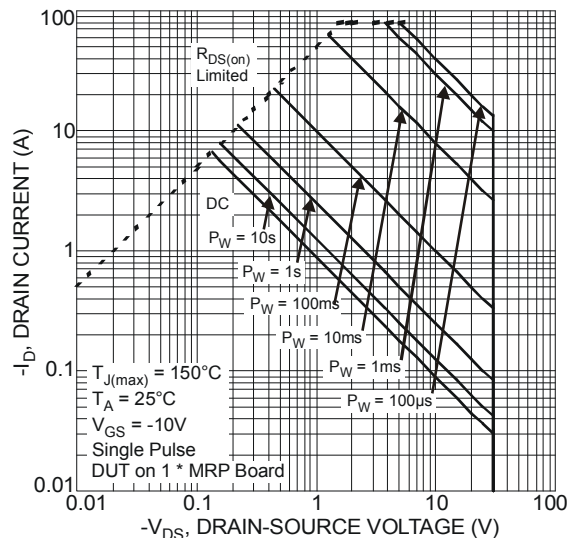
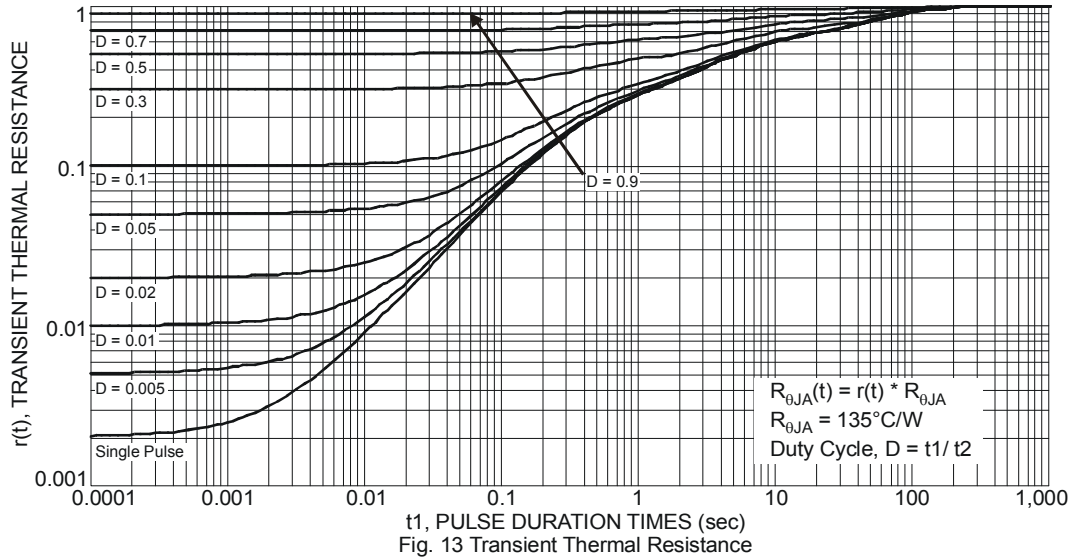
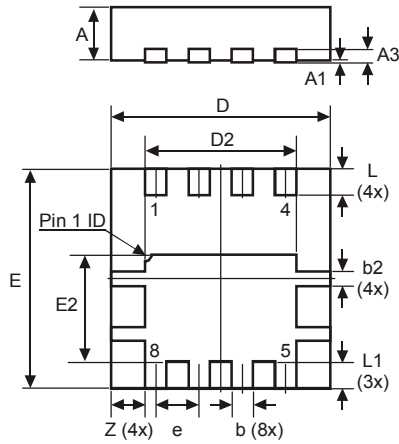


Fig. 12 SOA, Safe Operation Area



**Package Outline Dimensions**

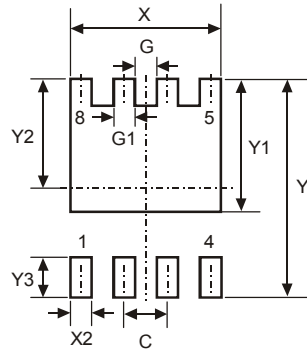
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for latest version.



POWERDI3333-8			
Dim	Min	Max	Typ
D	3.25	3.35	3.30
E	3.25	3.35	3.30
D2	2.22	2.32	2.27
E2	1.56	1.66	1.61
A	0.75	0.85	0.80
A1	0	0.05	0.02
A3	-	-	0.203
b	0.27	0.37	0.32
b2	-	-	0.20
L	0.35	0.45	0.40
L1	-	-	0.39
e	-	-	0.65
Z	-	-	0.515
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)
C	0.650
G	0.230
G1	0.420
Y	3.700
Y1	2.250
Y2	1.850
Y3	0.700
X	2.370
X2	0.420

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