

## Product Summary

$V_{(BR)DSS}$	$R_{DS(ON)}$ max	$I_D$ max $T_C = +25^\circ C$
-20V	5.5mΩ @ $V_{GS} = -4.5V$	-40A
	7.5mΩ @ $V_{GS} = -2.5V$	-40A

## Description

This MOSFET is 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

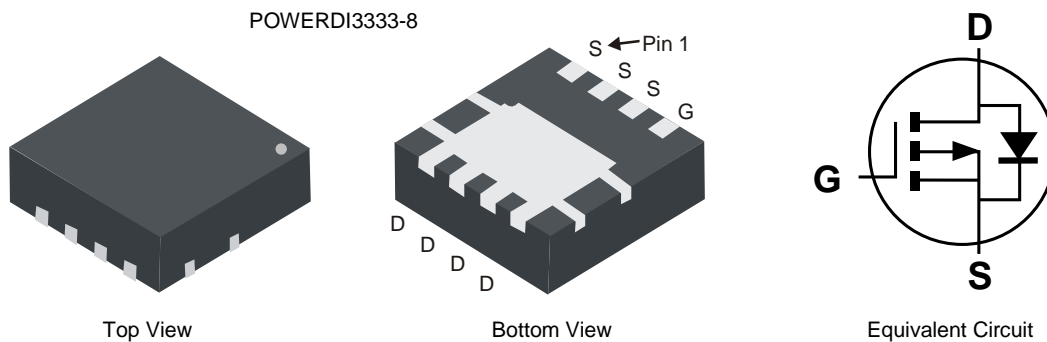
- Load Switch
- Power Management Functions

## Features

- 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: POWERDI3333-8
- 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 (E3)
- Weight: 0.008 grams (Approximate)



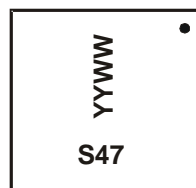
## Ordering Information (Note 4)

Part Number	Case	Packaging
DMP2006UFG-7	POWERDI3333-8	2,000/Tape & Reel
DMP2006UFG-13	POWERDI3333-8	3,000/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

POWERDI3333-8



S47 = Product Type Marking Code  
 YYWW = Date Code Marking  
 YY = Last Digit of Year (ex: 13 = 2013)  
 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>	-20	V
Gate-Source Voltage			V <sub>GSS</sub>	±10	V
Continuous Drain Current (Note 5) V <sub>GS</sub> = -4.5V	Steady State	T <sub>A</sub> = +25°C	I <sub>D</sub>	-17.5	A
		T <sub>A</sub> = +70°C		-14.0	
		T <sub>C</sub> = +25°C		-40	
Pulsed Drain Current (10µs pulse, duty cycle = 1%)			I <sub>DM</sub>	-80	A
Maximum Continuous Body Diode Forward Current (Note 5)			I <sub>S</sub>	-2.2	A
Avalanche Current (Note 7) L=0.1mH			I <sub>AS</sub>	-23	A
Avalanche Energy (Note 7) L=0.1mH			E <sub>AS</sub>	28	mJ

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

Characteristic		Symbol	Value	Units
Total Power Dissipation (Note 5)	T <sub>A</sub> = +25°C	P <sub>D</sub>	2.3	W
	T <sub>C</sub> = +25°C		41	
Thermal Resistance, Junction to Ambient	(Note 5)	R <sub>θJA</sub>	54	°C/W
	(Note 6)		136	
Thermal Resistance, Junction to Case (Note 5)		R <sub>θJC</sub>	3.0	
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>	-20	—	—	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> = -16V, V <sub>GS</sub> = 0V
Gate-Source Leakage	I <sub>GSS</sub>	—	—	±100	nA	V <sub>GS</sub> = ±8V, V <sub>DS</sub> = 0V
<b>ON CHARACTERISTICS (Note 8)</b>						
Gate Threshold Voltage	V <sub>GS(th)</sub>	-0.4	—	-1.0	V	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = -250µA
Static Drain-Source On-Resistance	R <sub>DS(on)</sub>	—	4.2	5.5	mΩ	V <sub>GS</sub> = -4.5V, I <sub>D</sub> = -15A
		—	5.4	7.5		V <sub>GS</sub> = -2.5V, I <sub>D</sub> = -10A
		—	8	12		V <sub>GS</sub> = -1.8V, I <sub>D</sub> = -1A
		—	12	17		V <sub>GS</sub> = -1.5V, I <sub>D</sub> = -1A
Diode Forward Voltage	V <sub>SD</sub>	—	-0.7	-1.2	V	V <sub>GS</sub> = 0V, I <sub>S</sub> = -10A
<b>DYNAMIC CHARACTERISTICS (Note 9)</b>						
Input Capacitance	C <sub>iss</sub>	—	5404	7500	pF	V <sub>DS</sub> = -10V, V <sub>GS</sub> = 0V f = 1.0MHz
Output Capacitance	C <sub>oss</sub>	—	728	1000		
Reverse Transfer Capacitance	C <sub>rss</sub>	—	612	900		
Gate Resistance	R <sub>G</sub>	—	3.8	8	Ω	V <sub>DS</sub> = 0V, V <sub>GS</sub> = 0V, f = 1.0MHz
Total Gate Charge (V <sub>GS</sub> = -4.5V)	Q <sub>g</sub>	—	64	100	nC	V <sub>DD</sub> = -10V, I <sub>D</sub> = -20A
Total Gate Charge (V <sub>GS</sub> = -10V)	Q <sub>g</sub>	—	140	200		
Gate-Source Charge	Q <sub>gs</sub>	—	8.5	15		
Gate-Drain Charge	Q <sub>gd</sub>	—	17	30		
Turn-On Delay Time	t <sub>D(on)</sub>	—	9.1	20	ns	V <sub>GS</sub> = -4.5V, V <sub>DD</sub> = -10V, R <sub>G</sub> = 1Ω, R <sub>G</sub> = 1Ω, I <sub>D</sub> = -10A
Turn-On Rise Time	t <sub>r</sub>	—	19	35		
Turn-Off Delay Time	t <sub>D(off)</sub>	—	146	220		
Turn-Off Fall Time	t <sub>f</sub>	—	104	150		
Reverse Recovery Time (Note 9)	t <sub>rr</sub>	—	61	100	ns	I <sub>F</sub> = -10A, di/dt = 100A/µs
Reverse Recovery Charge (Note 9)	Q <sub>rr</sub>	—	44	70	nC	I <sub>F</sub> = -10A, di/dt = 100A/µs

- Notes:
- R<sub>θJA</sub> is determined with the device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper plate. R<sub>θJC</sub> is guaranteed by design while R<sub>θJA</sub> is determined by the user's board design.
  - Device mounted on FR-4 substrate PC board, 2oz copper, with minimum recommended pad layout.
  - .UIS in production with L = 0.1mH, T<sub>J</sub> = +25°C
  - Short duration pulse test used to minimize self-heating effect.
  - Guaranteed by design. Not subject to product testing.

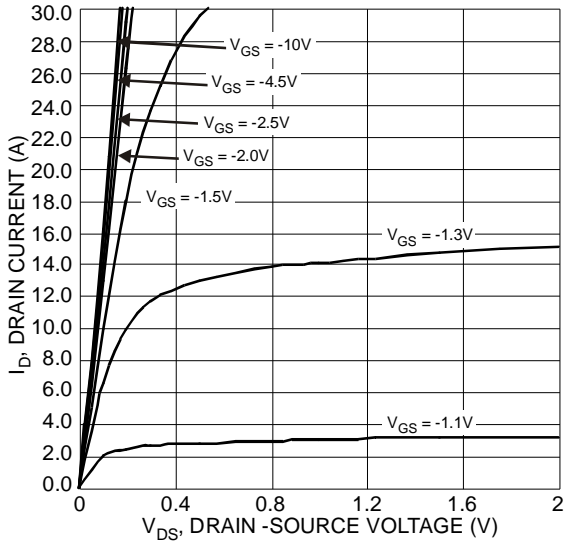


Figure 1 Typical Output Characteristics

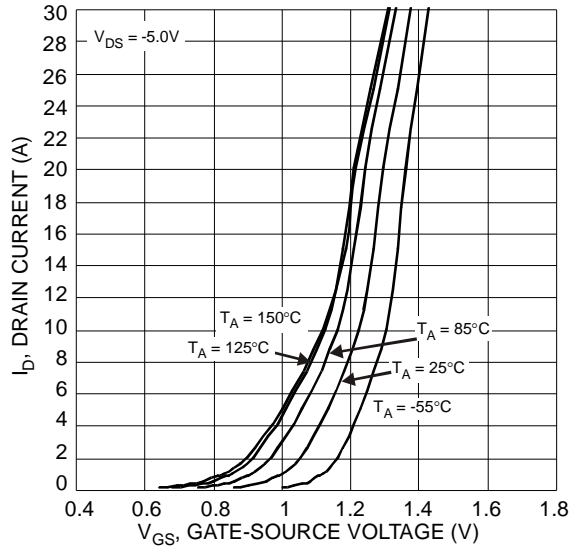


Figure 2 Typical Transfer Characteristics

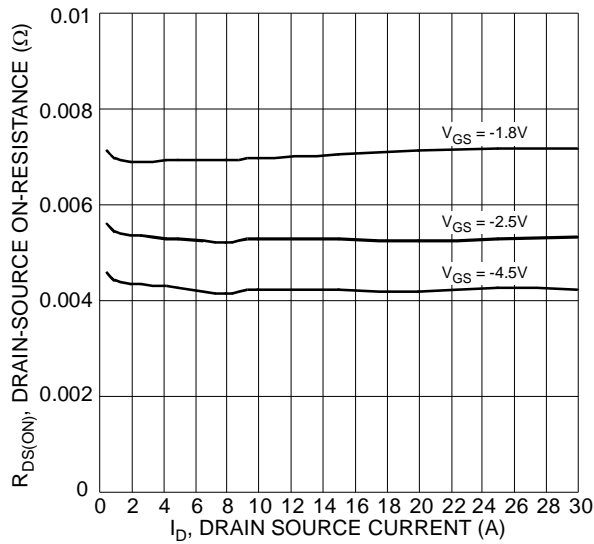


Figure 3 Typical On-Resistance vs. Drain Current and Gate Voltage

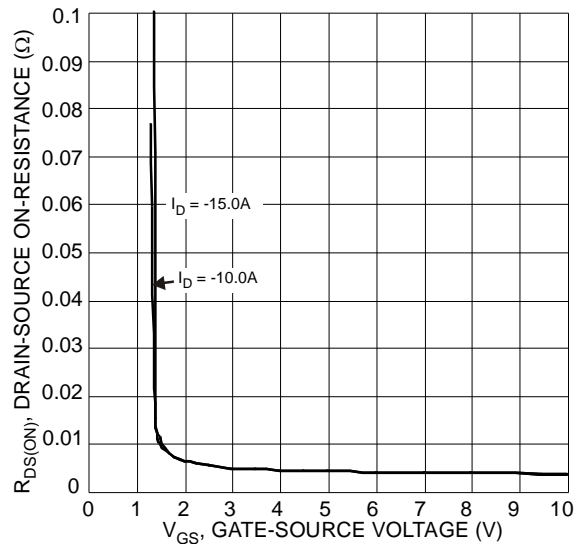


Figure 4 Typical Transfer Characteristics

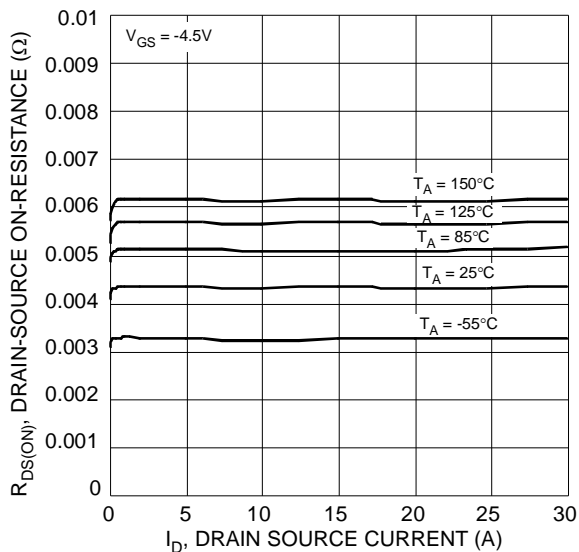


Figure 5 Typical On-Resistance vs. Drain Current and Temperature

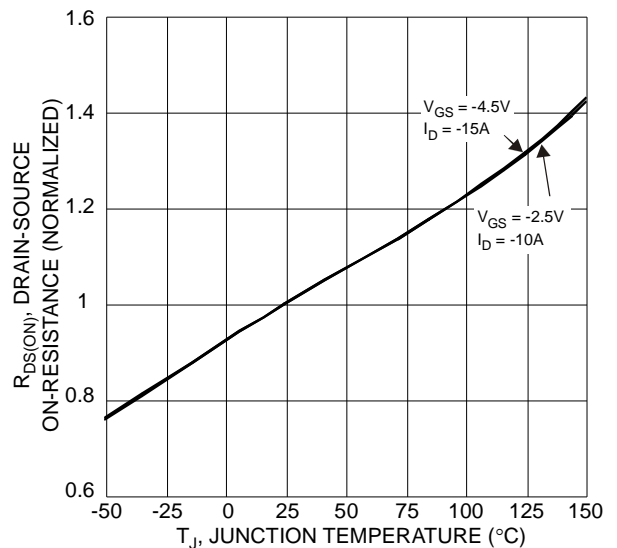


Figure 6 On-Resistance Variation with Temperature

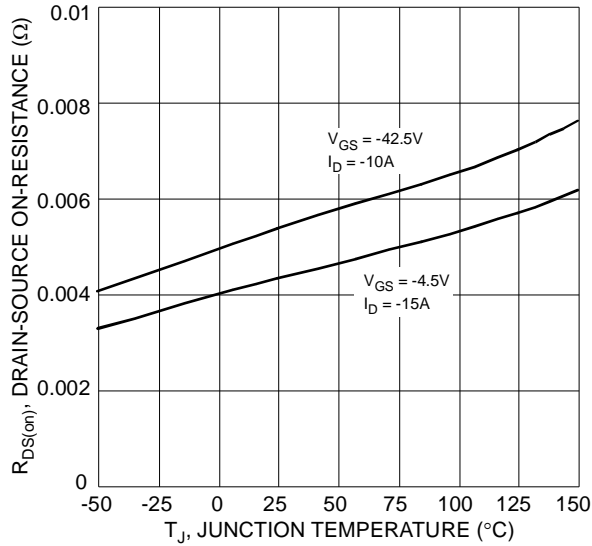


Figure 7 On-Resistance Variation with Temperature

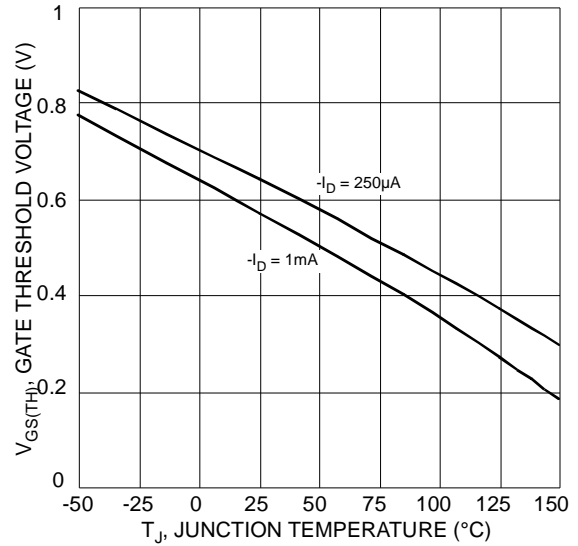


Figure 8 Gate Threshold Variation vs. Ambient Temperature

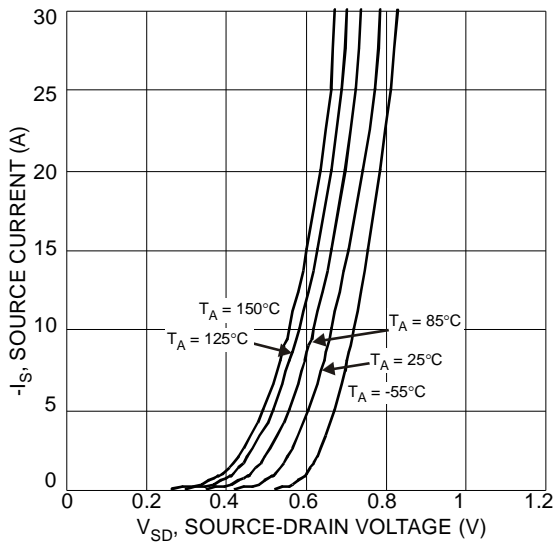


Figure 9 Diode Forward Voltage vs. Current

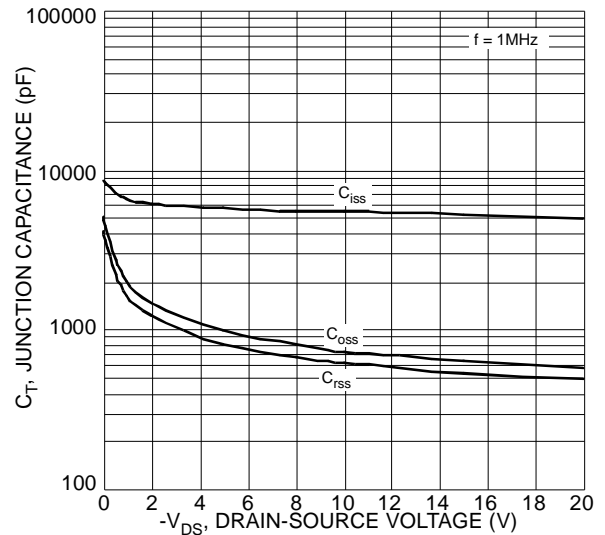


Figure 10 Typical Junction Capacitance

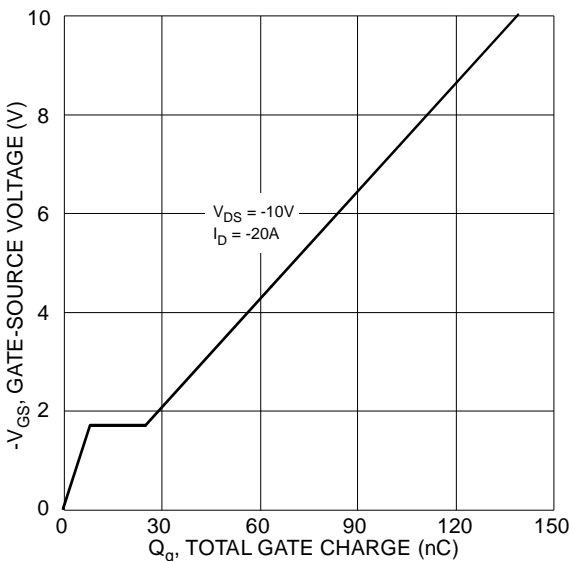


Figure 11 Gate-Charge Characteristics

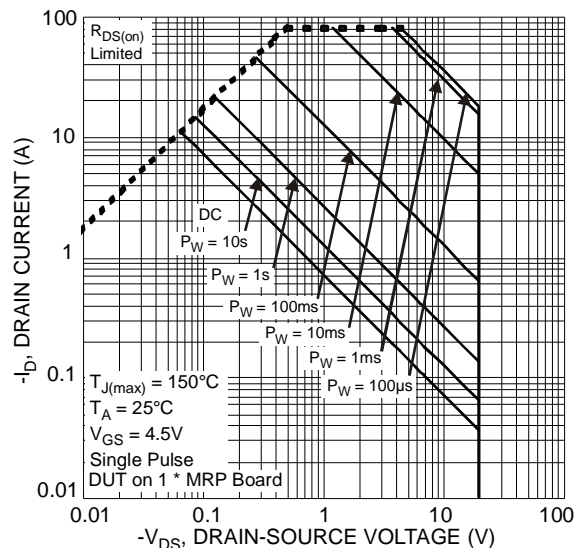
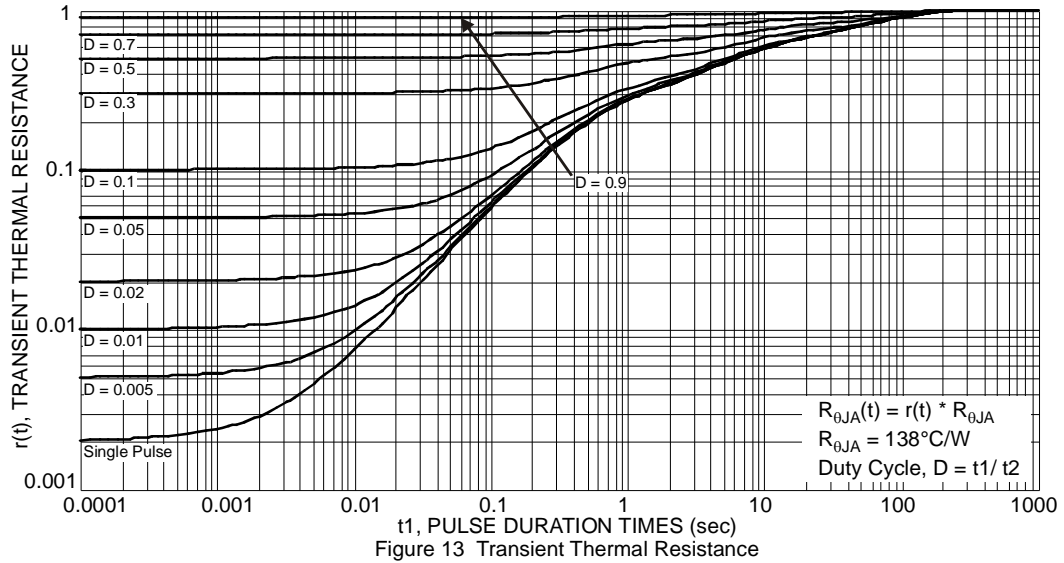
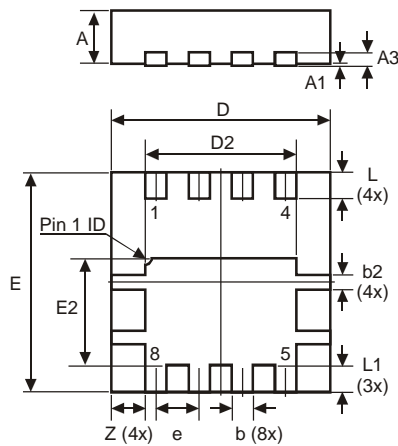


Figure 12 SOA, Safe Operation Area



**Package Outline Dimensions**

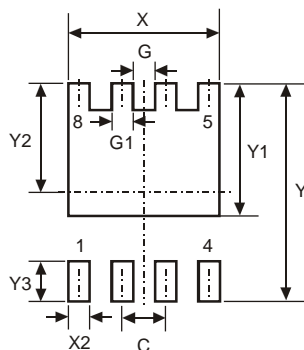
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for the latest version.



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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