

## Product Summary

<b>BV<sub>DSS</sub></b>	<b>R<sub>DSON</sub> max</b>	<b>I<sub>D</sub> max</b> <b>T<sub>C</sub> = +25°C</b>
-20V	5.5mΩ @ V <sub>GS</sub> = -4.5V	-40A
	7.5mΩ @ V <sub>GS</sub> = -2.5V	-40A

## Description

This MOSFET is designed to minimize the on-state resistance (R<sub>DSON</sub>) and yet maintain superior switching performance, making it ideal for high efficiency power management applications.

## Applications

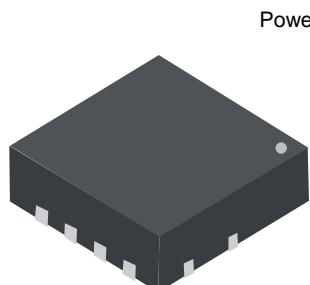
- Load Switch
- Power Management Functions

## Features

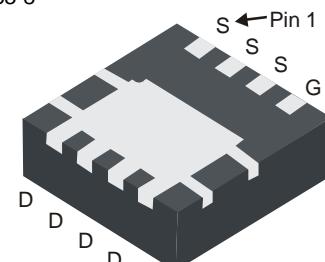
- Low R<sub>DSON</sub> – ensures on state losses are minimized
- Small form factor, thermally efficient package enables higher density end products
- Occupies just 33% of the board area occupied by SO-8 enabling smaller end product
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**

## Mechanical Data

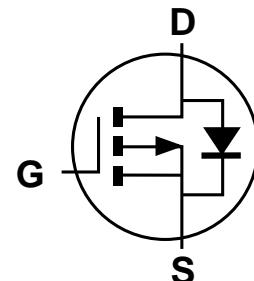
- Case: PowerDI®3333-8
- Case Material: Molded Plastic, "Green" Molding Compound; UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Connections Indicator: See Diagram
- Terminals: Finish — Matte Tin Annealed over Copper Leadframe; Solderable per MIL-STD-202, Method 208 (③)
- Weight: 0.030 grams (Approximate)



Top View



Bottom View



Equivalent Circuit

## Ordering Information (Note 4)

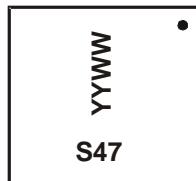
Part Number	Case	Packaging
DMP2006UFG-7	PowerDI3333-8	2,000/Tape & Reel
DMP2006UFG-13	PowerDI3333-8	3,000/Tape & Reel

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 Two Digits of Year (ex: 17 = 2017)  
 WW = Week Code (01 to 53)

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

Characteristic			Symbol	Value	Unit
Drain-Source Voltage			$V_{DSS}$	-20	V
Gate-Source Voltage			$V_{GSS}$	$\pm 10$	V
Continuous Drain Current (Note 5) $V_{GS} = -4.5\text{V}$	Steady State	$T_A = +25^\circ\text{C}$ $T_A = +70^\circ\text{C}$ $T_C = +25^\circ\text{C}$	$I_D$	-17.5 -14.0 -40	A
Pulsed Drain Current (10 $\mu\text{s}$ Pulse, Duty Cycle = 1%)			$I_{DM}$	-80	A
Maximum Continuous Body Diode Forward Current (Note 5)			$I_S$	-2.2	A
Avalanche Current (Note 7) $L = 0.1\text{mH}$			$I_{AS}$	-23	A
Avalanche Energy (Note 7) $L = 0.1\text{mH}$			$E_{AS}$	28	$\text{mJ}$

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

Characteristic		Symbol	Value	Unit
Total Power Dissipation (Note 5)	$T_A = +25^\circ\text{C}$	$P_D$	2.3	W
	$T_C = +25^\circ\text{C}$		41	
Thermal Resistance, Junction to Ambient	(Note 5)	$R_{\theta JA}$	54	$^\circ\text{C/W}$
	(Note 6)		136	
Thermal Resistance, Junction to Case (Note 5)		$R_{\theta JC}$	3.0	
Operating and Storage Temperature Range		$T_J, T_{STG}$	-55 to +150	$^\circ\text{C}$

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

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS (Note 8)</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	-20	—	—	V	$V_{GS} = 0\text{V}, I_D = -250\mu\text{A}$
Zero Gate Voltage Drain Current	$I_{DSS}$	—	—	-1	$\mu\text{A}$	$V_{DS} = -16\text{V}, V_{GS} = 0\text{V}$
Gate-Source Leakage	$I_{GSS}$	—	—	$\pm 100$	nA	$V_{GS} = \pm 8\text{V}, V_{DS} = 0\text{V}$
<b>ON CHARACTERISTICS (Note 8)</b>						
Gate Threshold Voltage	$V_{GS(TH)}$	-0.4	—	-1.0	V	$V_{DS} = V_{GS}, I_D = -250\mu\text{A}$
Static Drain-Source On-Resistance	$R_{DS(ON)}$	—	4.2	5.5	$\text{m}\Omega$	$V_{GS} = -4.5\text{V}, I_D = -15\text{A}$
		—	5.4	7.5		$V_{GS} = -2.5\text{V}, I_D = -10\text{A}$
		—	8	12		$V_{GS} = -1.8\text{V}, I_D = -1\text{A}$
		—	12	17		$V_{GS} = -1.5\text{V}, I_D = -1\text{A}$
Diode Forward Voltage	$V_{SD}$	—	-0.7	-1.2	V	$V_{GS} = 0\text{V}, I_S = -10\text{A}$
<b>DYNAMIC CHARACTERISTICS (Note 9)</b>						
Input Capacitance	$C_{iss}$	—	5404	7500	$\text{pF}$	$V_{DS} = -10\text{V}, V_{GS} = 0\text{V}$ $f = 1.0\text{MHz}$
Output Capacitance	$C_{oss}$	—	728	1000		
Reverse Transfer Capacitance	$C_{rss}$	—	612	900		
Gate Resistance	$R_G$	—	3.8	8	$\Omega$	$V_{DS} = 0\text{V}, V_{GS} = 0\text{V}, f = 1.0\text{MHz}$
Total Gate Charge ( $V_{GS} = -4.5\text{V}$ )	$Q_g$	—	64	100	$\text{nC}$	$V_{DD} = -10\text{V}, I_D = -20\text{A}$
Total Gate Charge ( $V_{GS} = -10\text{V}$ )	$Q_g$	—	140	200		
Gate-Source Charge	$Q_{gs}$	—	8.5	15		
Gate-Drain Charge	$Q_{gd}$	—	17	30		
Turn-On Delay Time	$t_{D(ON)}$	—	9.1	20	$\text{ns}$	$V_{GS} = -4.5\text{V}, V_{DD} = -10\text{V}, R_G = 1\Omega, R_G = 1\Omega, I_D = -10\text{A}$
Turn-On Rise Time	$t_R$	—	19	35		
Turn-Off Delay Time	$t_{D(OFF)}$	—	146	220		
Turn-Off Fall Time	$t_F$	—	104	150		
Reverse Recovery Time (Note 9)	$t_{RR}$	—	61	100	$\text{ns}$	$I_F = -10\text{A}, di/dt = 100\text{A}/\mu\text{s}$
Reverse Recovery Charge (Note 9)	$Q_{RR}$	—	44	70	$\text{nC}$	$I_F = -10\text{A}, di/dt = 100\text{A}/\mu\text{s}$

Notes:

- $R_{\theta JA}$  is determined with the device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper plate.  $R_{\theta JC}$  is guaranteed by design while  $R_{\theta JA}$  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  $L = 0.1\text{mH}, T_J = +25^\circ\text{C}$ .
- Short duration pulse test used to minimize self-heating effect.
- Guaranteed by design. Not subject to product testing.

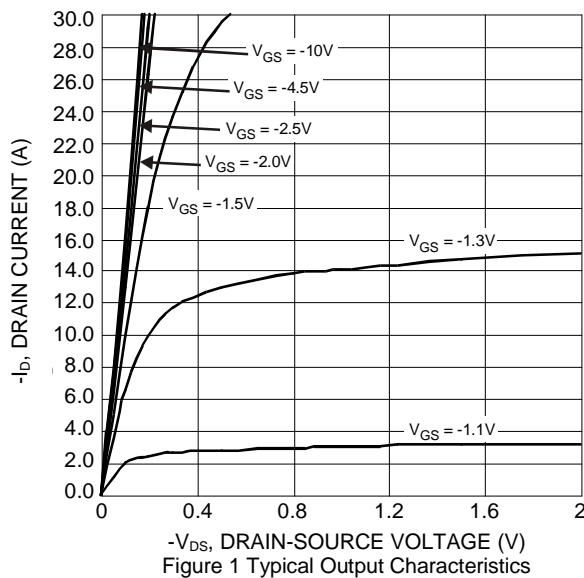


Figure 1 Typical Output Characteristics

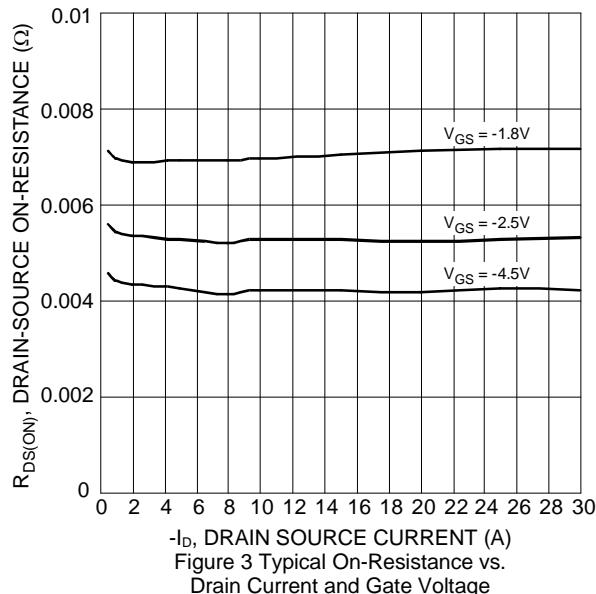


Figure 3 Typical On-Resistance vs.  
Drain Current and Gate Voltage

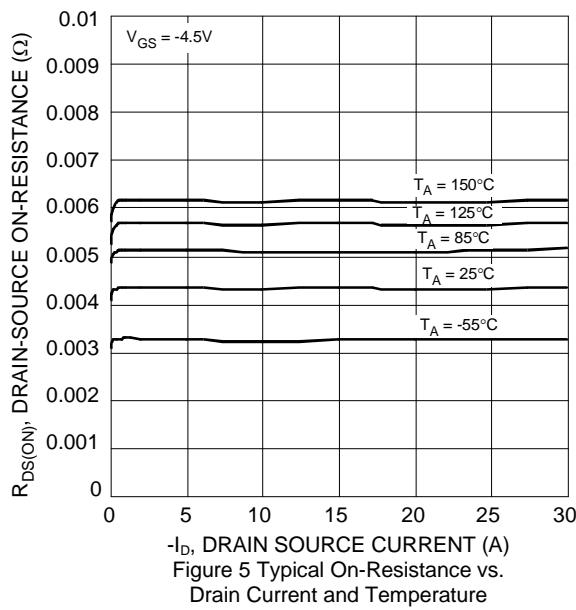


Figure 5 Typical On-Resistance vs.  
Drain Current and Temperature

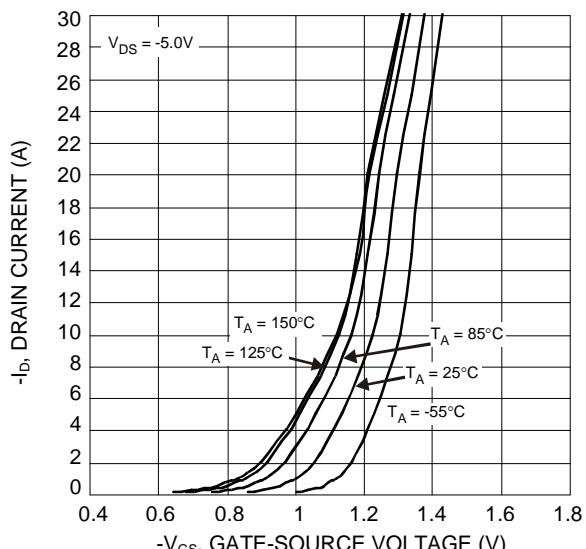


Figure 2 Typical Transfer Characteristics

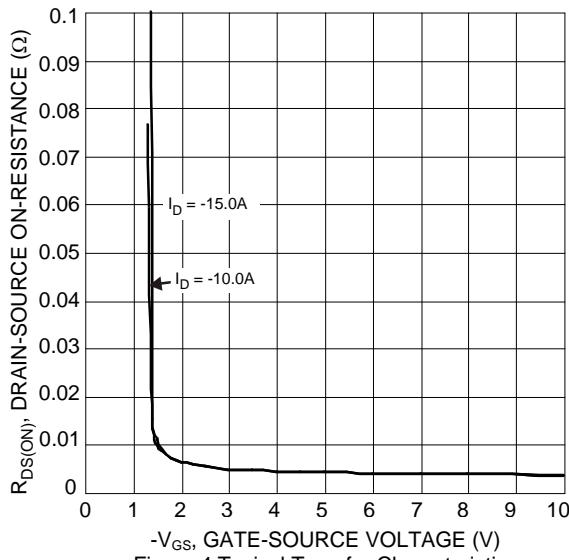


Figure 4 Typical Transfer Characteristics

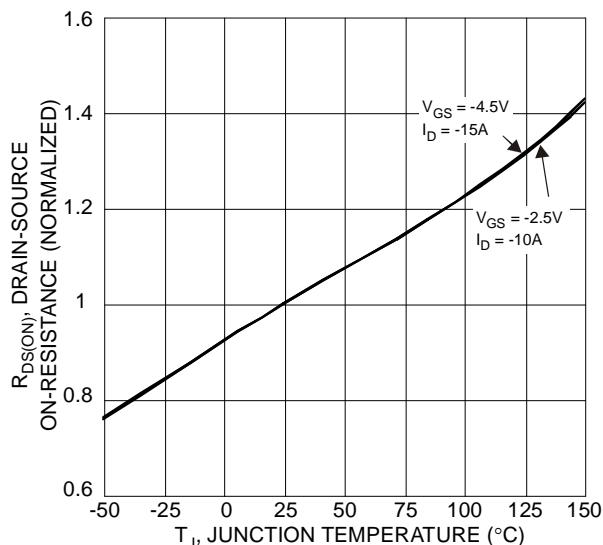


Figure 6 On-Resistance Variation with Temperature

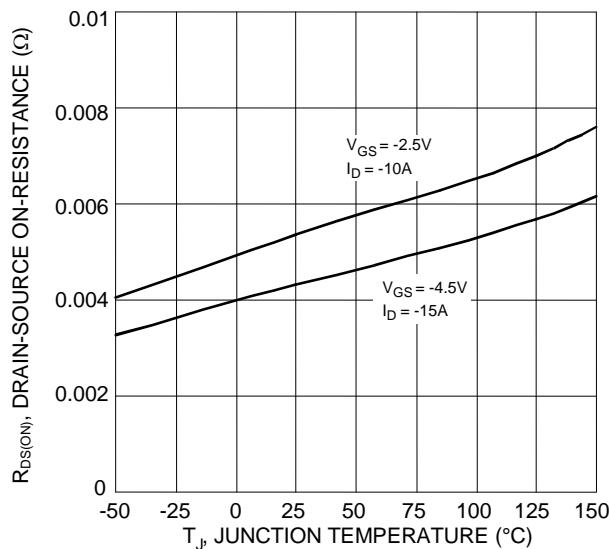


Figure 7 On-Resistance Variation with Temperature

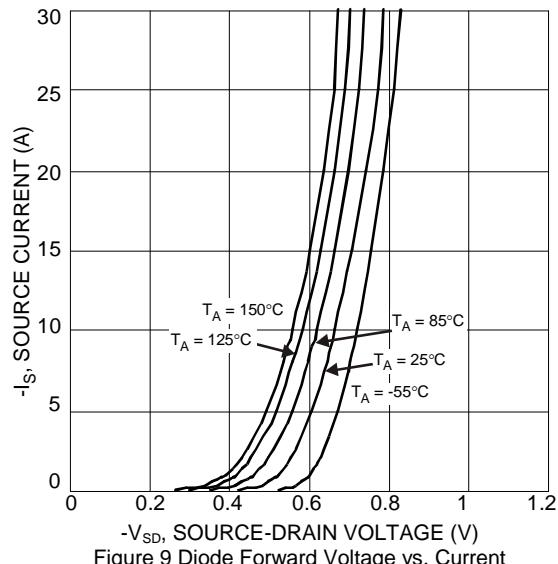


Figure 9 Diode Forward Voltage vs. Current

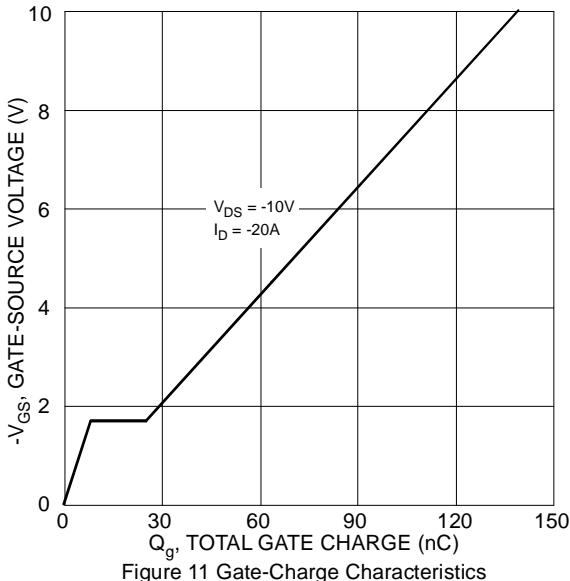


Figure 11 Gate-Charge Characteristics

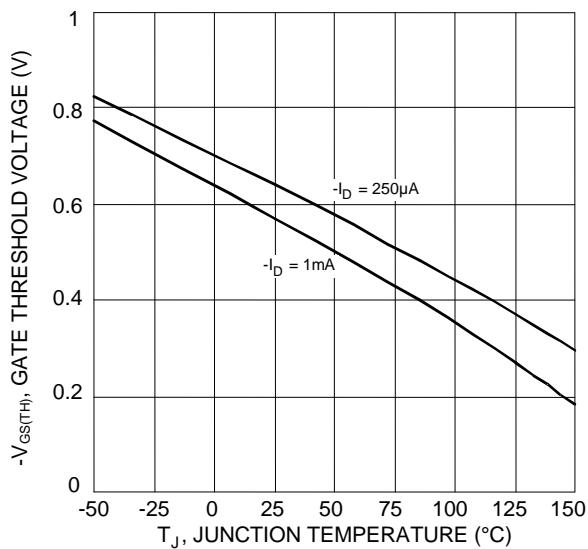


Figure 8 Gate Threshold Variation vs. Junction Temperature

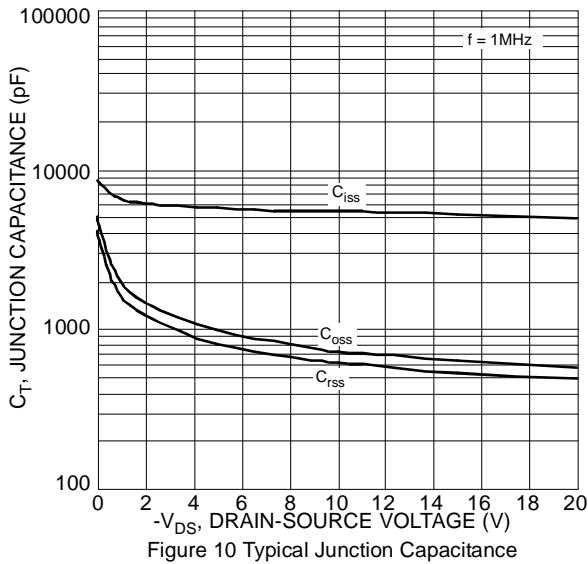


Figure 10 Typical Junction Capacitance

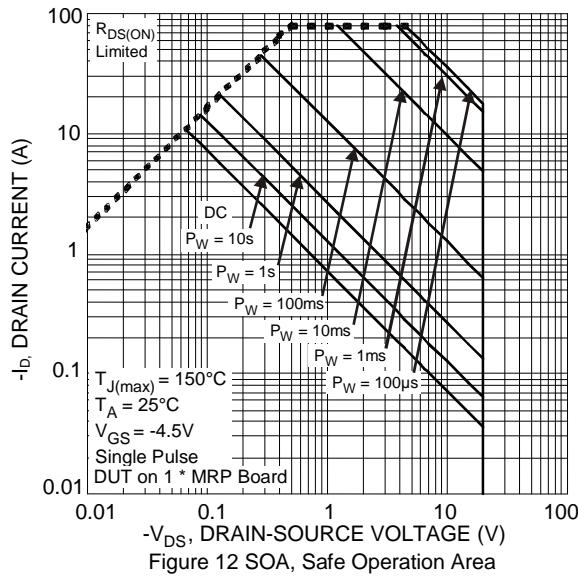


Figure 12 SOA, Safe Operation Area

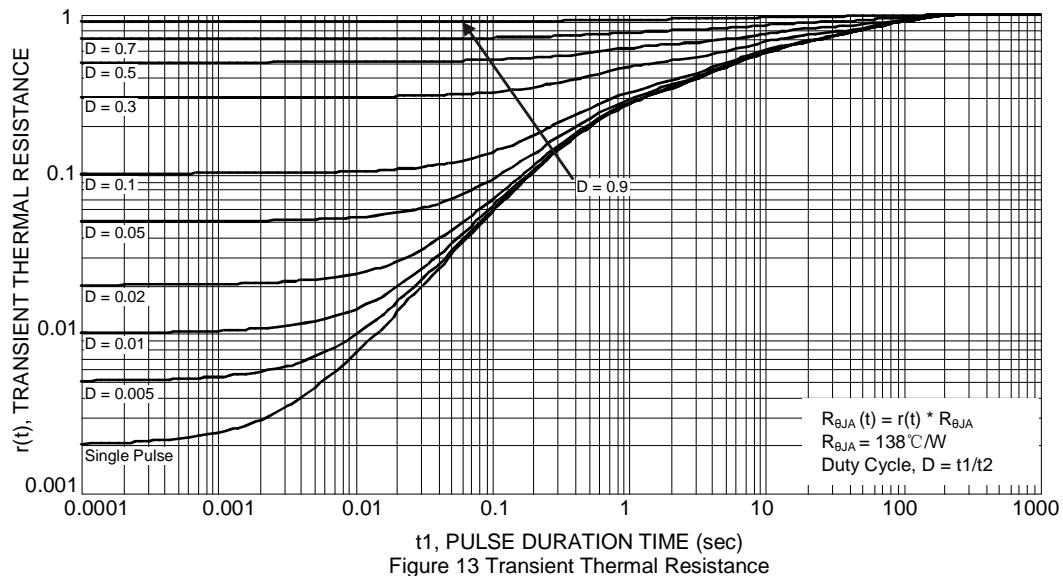
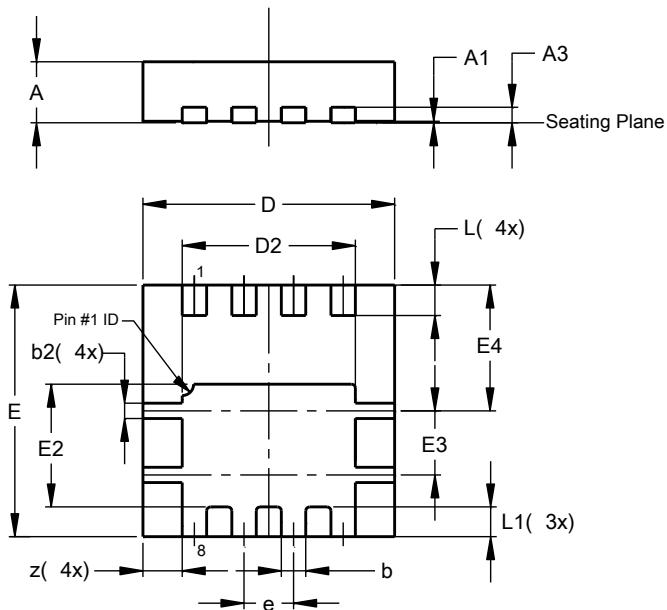


Figure 13 Transient Thermal Resistance

## Package Outline Dimensions

Please see <http://www.diodes.com/package-outlines.html> for the latest version.

PowerDI3333-8



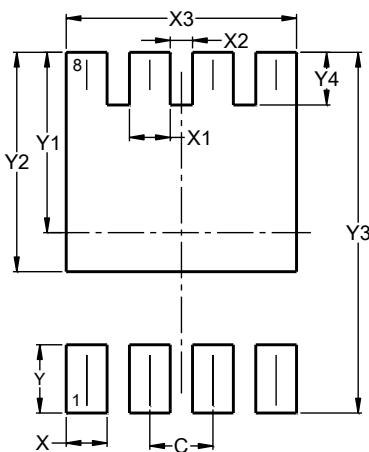
PowerDI3333-8			
Dim	Min	Max	Typ
<b>A</b>	0.75	0.85	0.80
<b>A1</b>	0.00	0.05	0.02
<b>A3</b>	—	—	0.203
<b>b</b>	0.27	0.37	0.32
<b>b2</b>	0.15	0.25	0.20
<b>D</b>	3.25	3.35	3.30
<b>D2</b>	2.22	2.32	2.27
<b>E</b>	3.25	3.35	3.30
<b>E2</b>	1.56	1.66	1.61
<b>E3</b>	0.79	0.89	0.84
<b>E4</b>	1.60	1.70	1.65
<b>e</b>	—	—	0.65
<b>L</b>	0.35	0.45	0.40
<b>L1</b>	—	—	0.39
<b>z</b>	—	—	0.515

All Dimensions in mm

## Suggested Pad Layout

Please see <http://www.diodes.com/package-outlines.html> for the latest version.

PowerDI3333-8



Dimensions	Value (in mm)
<b>C</b>	0.650
<b>X</b>	0.420
<b>X1</b>	0.420
<b>X2</b>	0.230
<b>X3</b>	2.370
<b>Y</b>	0.700
<b>Y1</b>	1.850
<b>Y2</b>	2.250
<b>Y3</b>	3.700
<b>Y4</b>	0.540

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