

## Product Summary

BV <sub>DSS</sub>	R <sub>DS(ON)</sub> max	I <sub>D</sub> max T <sub>C</sub> = +25°C
-20V	4.0mΩ @ V <sub>GS</sub> = -4.5V	-89A
	6.5mΩ @ V <sub>GS</sub> = -2.5V	-70A

## Description

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

## Applications

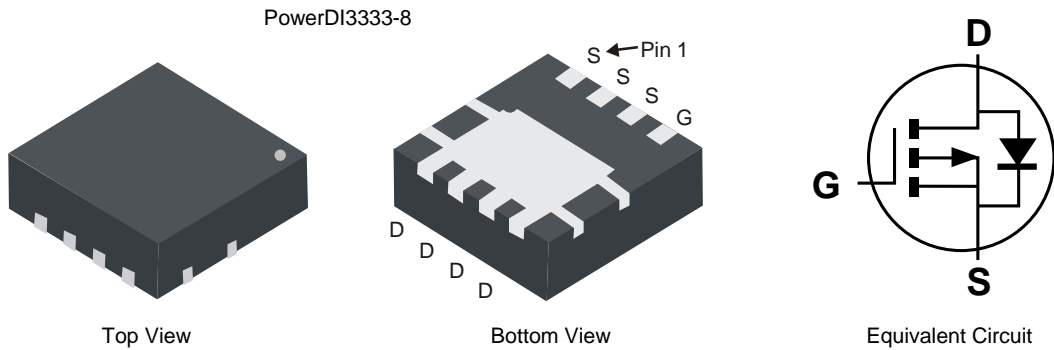
- Load Switch
- Power Management Functions

## Features

- Low R<sub>DS(ON)</sub> – ensures on state losses are minimized
- Small form factor, thermally efficient package enables higher density end products (PowerDI<sup>®</sup>)
- Occupies just 33% of the board area occupied by SO-8 enabling smaller end product
- **Lead-Free Finish; 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
- Terminal Finish — Matte Tin Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208 <sup>(3)</sup>
- Weight: 0.072 grams (Approximate)

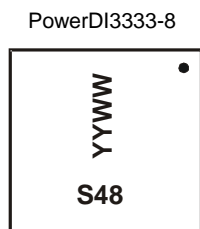


## Ordering Information (Note 4)

Part Number	Case	Packaging
DMP2005UFG-7	PowerDI3333-8	2,000/Tape & Reel
DMP2005UFG-13	PowerDI3333-8	3,000/Tape & Reel

- 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



S48 = Product Type Marking Code  
 YYWW = Date Code Marking  
 YY = Last Two Digits of Year (ex: 16 = 2016)  
 WW = Week Code (01 to 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 V <sub>GS</sub> = -4.5V (Note 7)	Steady State	T <sub>C</sub> = +25°C T <sub>C</sub> = +70°C	I <sub>D</sub>	-89 -70	A
Continuous Drain Current V <sub>GS</sub> = -4.5V (Note 6)	Steady State	T <sub>A</sub> = +25°C T <sub>A</sub> = +70°C	I <sub>D</sub>	-19 -15	A
Pulsed Drain Current (380µs pulse, duty cycle = 1%)			I <sub>DM</sub>	-100	A
Maximum Continuous Body Diode Forward Current (Note 6)			I <sub>S</sub>	-2.5	A
Avalanche Current (Note 8) L = 0.1mH			I <sub>AS</sub>	-27	A
Avalanche Energy (Note 8) L = 0.1mH			E <sub>AS</sub>	35	mJ

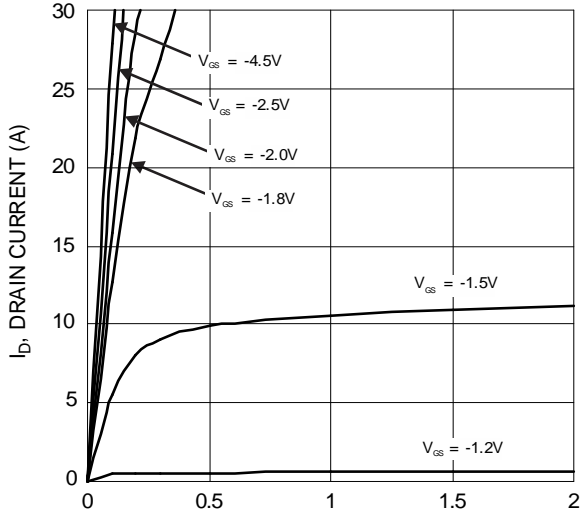
**Thermal Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic		Symbol	Value	Units
Total Power Dissipation (Note 5)	T <sub>A</sub> = +25°C	P <sub>D</sub>	1.0	W
Thermal Resistance, Junction to Ambient (Note 5)	Steady State	R <sub>θJA</sub>	128	°C/W
Total Power Dissipation (Note 6)	T <sub>A</sub> = +25°C	P <sub>D</sub>	2.2	W
Thermal Resistance, Junction to Ambient (Note 6)	Steady State	R <sub>θJA</sub>	57	°C/W
Total Power Dissipation (Note 7)	T <sub>C</sub> = +25°C	P <sub>D</sub>	48	W
Thermal Resistance, Junction to Case (Note 7)		R <sub>θJC</sub>	2.6	°C/W
Operating and Storage Temperature Range		T <sub>J</sub> , T <sub>STG</sub>	-55 to +150	°C

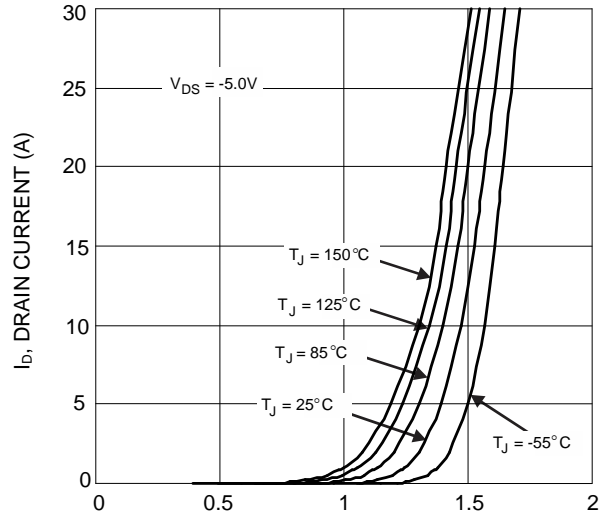
**Electrical Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS (Note 9)</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 9)</b>						
Gate Threshold Voltage	V <sub>GS(TH)</sub>	-0.3	-0.7	-0.9	V	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = -250µA
Static Drain-Source On-Resistance	R <sub>DS(ON)</sub>	—	3.5	4.0	mΩ	V <sub>GS</sub> = -4.5V, I <sub>D</sub> = -15A
		—	5.4	6.5		V <sub>GS</sub> = -2.5V, I <sub>D</sub> = -10A
		—	8.0	14		V <sub>GS</sub> = -1.8V, 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 10)</b>						
Input Capacitance	C <sub>iSS</sub>	—	4,670	—	pF	V <sub>DS</sub> = -10V, V <sub>GS</sub> = 0V f = 1.0MHz
Output Capacitance	C <sub>oSS</sub>	—	650	—		
Reverse Transfer Capacitance	C <sub>rSS</sub>	—	550	—		
Gate Resistance	R <sub>G</sub>	—	3.5	—	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>	—	55	—	nC	V <sub>DD</sub> = -10V, I <sub>D</sub> = -20A
Total Gate Charge (V <sub>GS</sub> = -10V)	Q <sub>g</sub>	—	125	—		
Gate-Source Charge	Q <sub>gs</sub>	—	7.8	—		
Gate-Drain Charge	Q <sub>gd</sub>	—	16.5	—		
Turn-On Delay Time	t <sub>D(ON)</sub>	—	9.5	—	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>	—	10.5	—		
Turn-Off Delay Time	t <sub>D(OFF)</sub>	—	115	—		
Turn-Off Fall Time	t <sub>f</sub>	—	85	—		
Reverse Recovery Time	t <sub>RR</sub>	—	25	—	ns	I <sub>F</sub> = -10A, di/dt = 100A/µs
Reverse Recovery Charge	Q <sub>RR</sub>	—	14	—	nC	I <sub>F</sub> = -10A, di/dt = 100A/µs

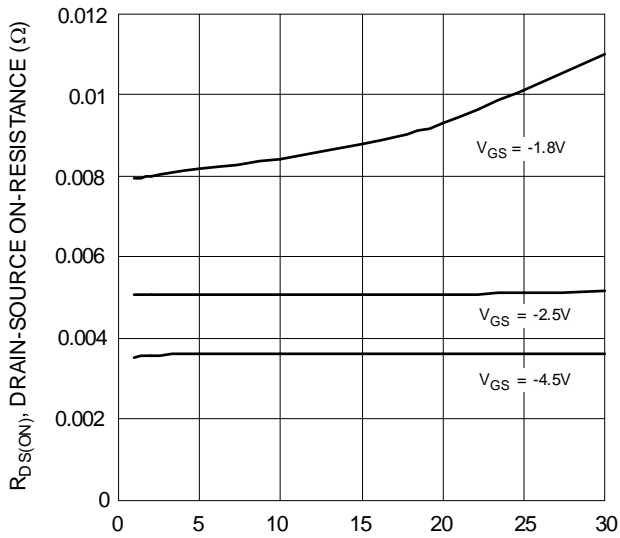
- Notes:
- Device mounted on FR-4 PC board, with minimum recommended pad layout, single sided.
  - Device mounted on FR-4 substrate PC board, 2oz copper, with thermal bias to bottom layer 1inch square copper plate.
  - Thermal resistance from junction to soldering point (on the exposed drain pad).
  - I<sub>AS</sub> and E<sub>AS</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.



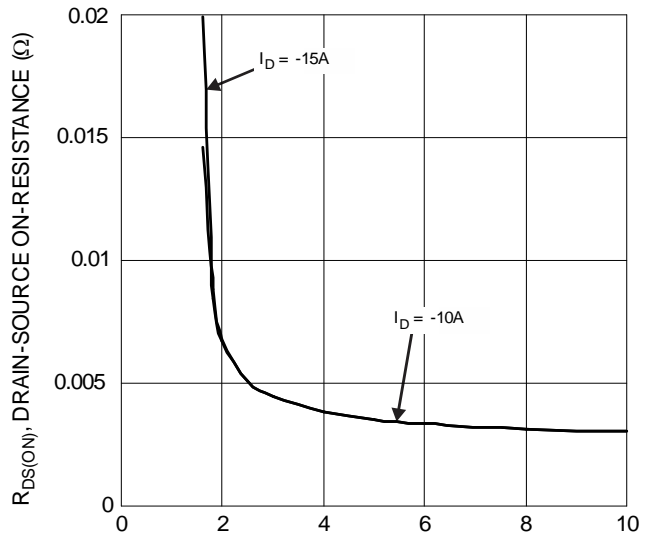
$V_{GS}$ , GATE-SOURCE VOLTAGE (V)  
Figure 1 Typical Output Characteristics



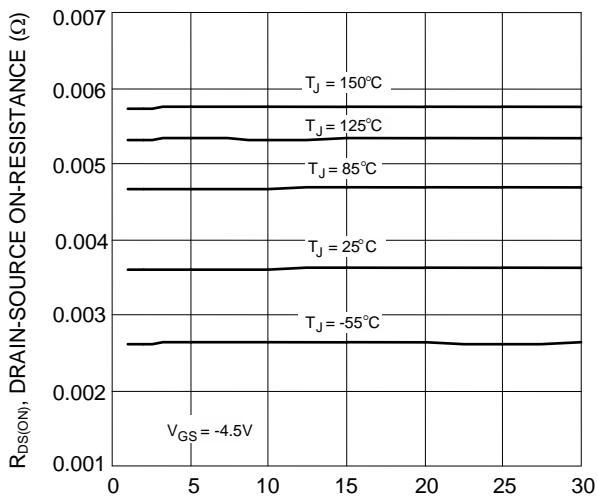
$V_{GS}$ , GATE-SOURCE VOLTAGE (V)  
Figure 2 Typical Transfer Characteristics



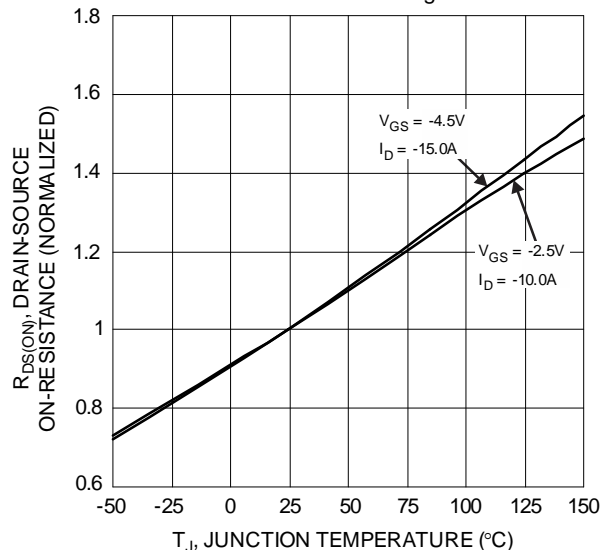
$I_D$ , DRAIN SOURCE CURRENT (A)  
Figure 3 Typical On-Resistance vs. Drain Current and Gate Voltage



$V_{GS}$ , GATE-SOURCE VOLTAGE (V)  
Figure 4 Typical Drain-Source On-Resistance vs. Gate-Source Voltage



$I_D$ , DRAIN SOURCE CURRENT (A)  
Figure 5 Typical On-Resistance vs. Drain Current and Temperature



$T_J$ , JUNCTION TEMPERATURE (°C)  
Figure 6 On-Resistance Variation with Temperature

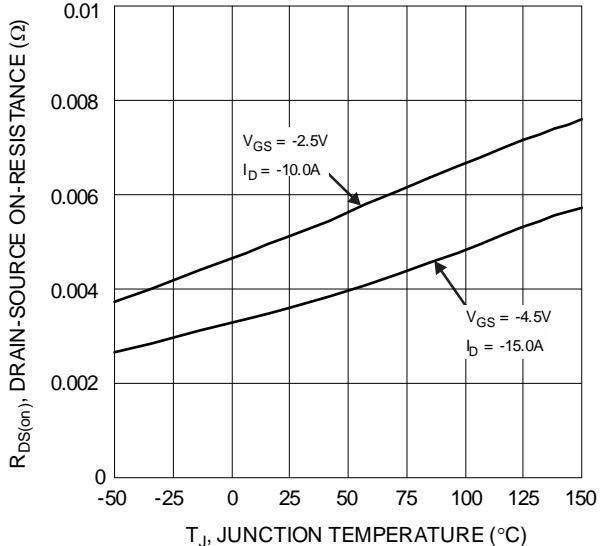


Figure 7 On-Resistance Variation with Temperature

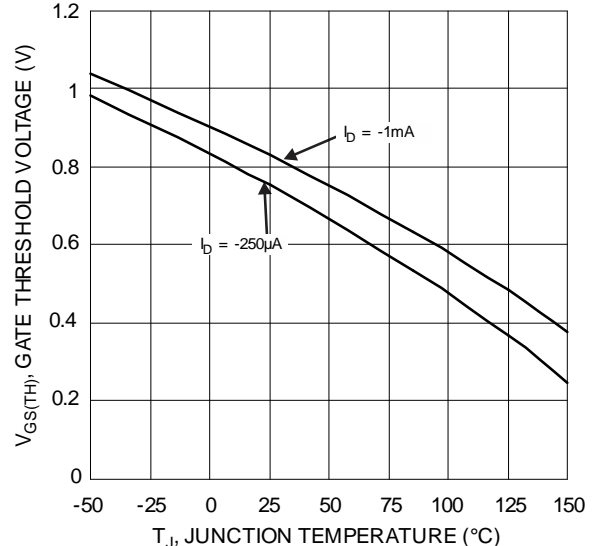


Figure 8 Gate Threshold Variation vs. Junction Temperature

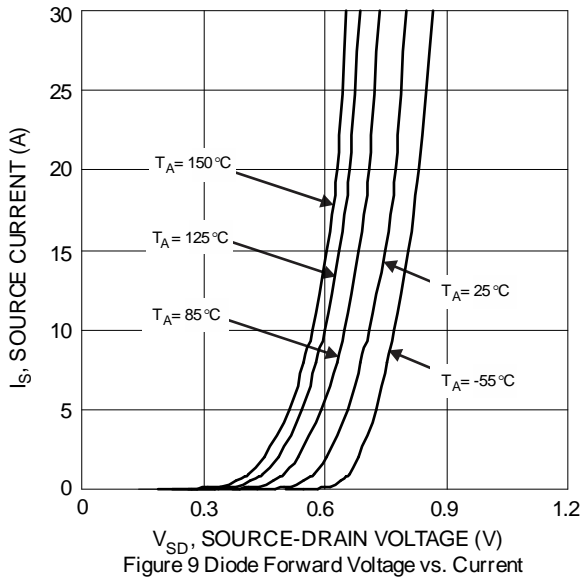


Figure 9 Diode Forward Voltage vs. Current

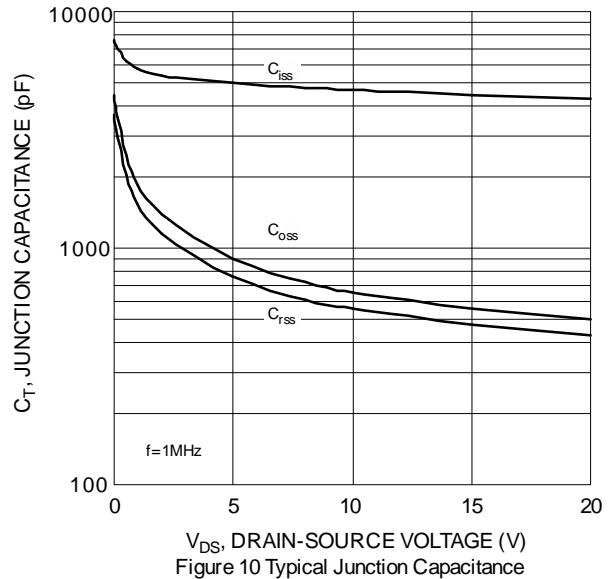


Figure 10 Typical Junction Capacitance

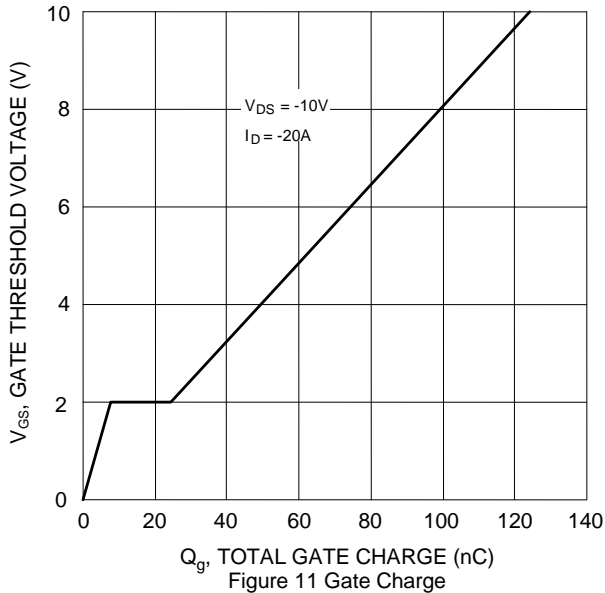


Figure 11 Gate Charge

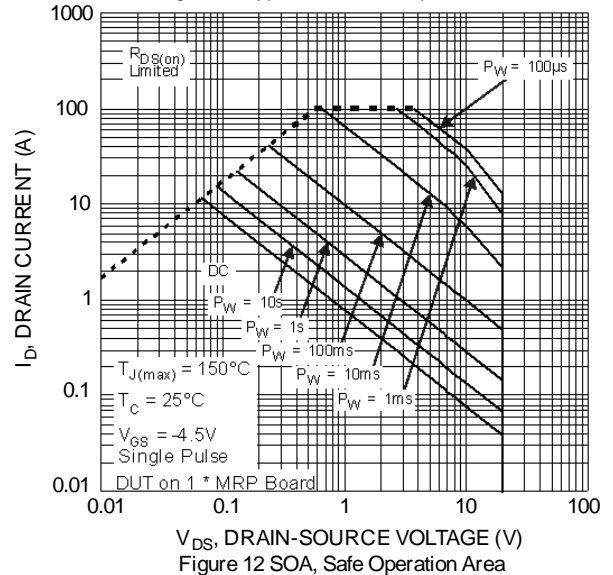


Figure 12 SOA, Safe Operation Area

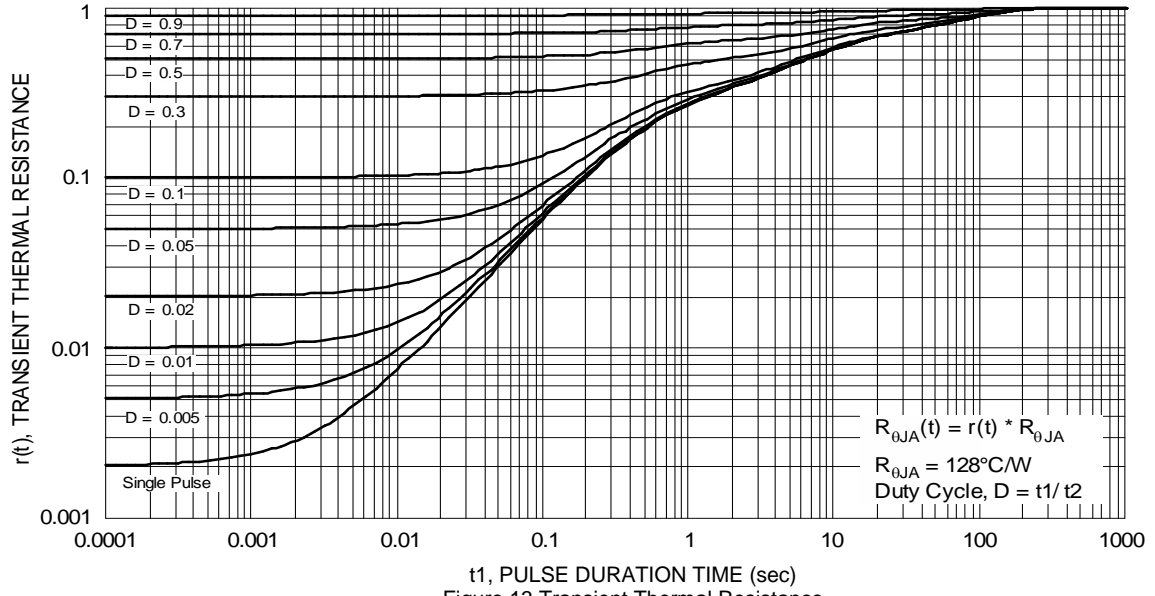
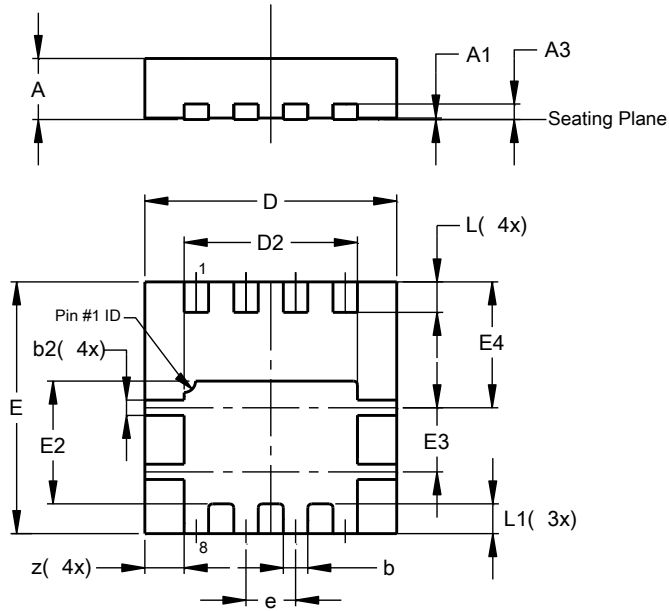


Figure 13 Transient Thermal Resistance

**Package Outline Dimensions**

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

**PowerDI3333-8**

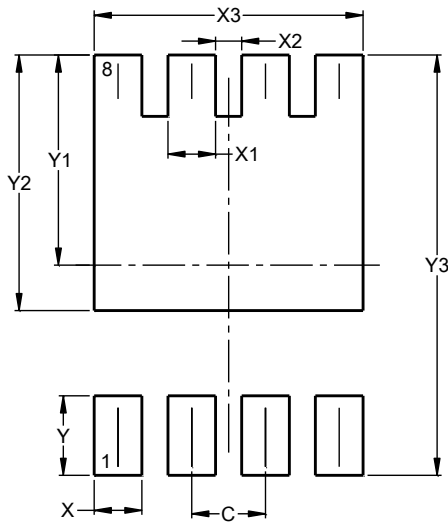


PowerDI3333-8			
Dim	Min	Max	Typ
A	0.75	0.85	0.80
A1	0.00	0.05	0.02
A3	-	-	0.203
b	0.27	0.37	0.32
b2	0.15	0.25	0.20
D	3.25	3.35	3.30
D2	2.22	2.32	2.27
E	3.25	3.35	3.30
E2	1.56	1.66	1.61
E3	0.79	0.89	0.84
E4	1.60	1.70	1.65
e	-	-	0.65
L	0.35	0.45	0.40
L1	-	-	0.39
z	-	-	0.515
All Dimensions in mm			

**Suggested Pad Layout**

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

**PowerDI3333-8**



Dimensions	Value (in mm)
C	0.650
X	0.420
X1	0.420
X2	0.230
X3	2.370
Y	0.700
Y1	1.850
Y2	2.250
Y3	3.700

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