

## Product Summary

BV <sub>DSS</sub>	R <sub>DS(ON)</sub> max	I <sub>D</sub> max T <sub>C</sub> = +25°C
30V	4.4mΩ @ V <sub>GS</sub> = 10V	62A
	5.5mΩ @ V <sub>GS</sub> = 4.5V	56A

## Description and Applications

This MOSFET is designed to meet the stringent requirements of Automotive applications. It is qualified to AEC-Q101, supported by a PPAP and is ideal for use in:

- Backlighting
- Power Management Functions
- DC-DC Converters

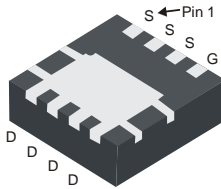
## Features and Benefits

- Low R<sub>DS(ON)</sub> – Ensures on-state losses are minimized
- Small, form factor thermally efficient package enables higher density end products
- Occupies only 33% of the board area occupied by SO-8 enabling smaller end products
- 100% Unclamped Inductive Switch (UIS) Test in Production
- **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**
- **PPAP Capable (Note 4)**

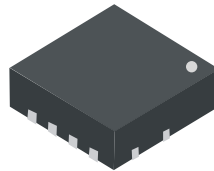
## Mechanical Data

- 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
- Weight: 0.072 grams (Approximate)

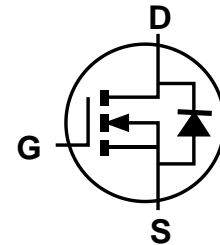
PowerDI3333-8



Bottom View



Top View



Equivalent Circuit

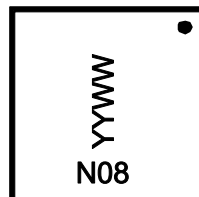
## Ordering Information (Note 5)

Part Number	Case	Packaging
DMN3008SFGQ-7	PowerDI3333-8	2,000/Tape & Reel
DMN3008SFGQ-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. Automotive products are AEC-Q101 qualified and are PPAP capable. Refer to [http://www.diodes.com/product\\_compliance\\_definitions.html](http://www.diodes.com/product_compliance_definitions.html).
  5. For packaging details, go to our website at <http://www.diodes.com/products/packages.html>.

## Marking Information

PowerDI3333-8



N08 = 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>	30	V
Gate-Source Voltage			V <sub>GSS</sub>	±20	V
Continuous Drain Current (Note 7) V <sub>GS</sub> = 10V	Steady State	T <sub>A</sub> = +25°C T <sub>A</sub> = +70°C	I <sub>D</sub>	17.6 14.1	A
	t < 10s	T <sub>A</sub> = +25°C T <sub>A</sub> = +70°C	I <sub>D</sub>	23.0 18.4	A
	Steady State	T <sub>C</sub> = +25°C T <sub>C</sub> = +70°C	I <sub>D</sub>	62 50	A
Pulsed Drain Current (10µs pulse, duty cycle = 1%)			I <sub>DM</sub>	80	A
Maximum Continuous Body Diode Forward Current (Note 7)			I <sub>S</sub>	2	A
Avalanche Current, L = 0.1mH			I <sub>AS</sub>	45	A
Avalanche Energy, L = 0.1mH			E <sub>AS</sub>	101	mJ

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

Characteristic		Symbol	Value	Units
Total Power Dissipation (Note 6)	T <sub>A</sub> = +25°C	P <sub>D</sub>	0.9	W
	T <sub>A</sub> = +70°C		0.6	
Thermal Resistance, Junction to Ambient (Note 6)	Steady State	R <sub>θJA</sub>	134	°C/W
	t < 10s		79	°C/W
Total Power Dissipation (Note 7)	T <sub>A</sub> = +25°C	P <sub>D</sub>	2.1	W
	T <sub>A</sub> = +70°C		1.3	
Thermal Resistance, Junction to Ambient (Note 7)	Steady State	R <sub>θJA</sub>	58	°C/W
	t < 10s		34	°C/W
Thermal Resistance, Junction to Case (Note 7)		R <sub>θJC</sub>	4.8	°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</b> (Note 8)						
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>	—	—	10	µA	V <sub>DS</sub> = 30V, V <sub>GS</sub> = 0V
Gate-Source Leakage	I <sub>GSS</sub>	—	—	±100	nA	V <sub>GS</sub> = ±20V, V <sub>DS</sub> = 0V
<b>ON CHARACTERISTICS</b> (Note 8)						
Gate Threshold Voltage	V <sub>GS(TH)</sub>	1	—	2.3	V	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250µA
Static Drain-Source On-Resistance	R <sub>DS(ON)</sub>	—	3.9	4.4	mΩ	V <sub>GS</sub> = 10V, I <sub>D</sub> = 13.5A
		—	4.6	5.5		V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 13.5A
Diode Forward Voltage	V <sub>SD</sub>	—	0.75	1.2	V	V <sub>GS</sub> = 0V, I <sub>S</sub> = 1A
<b>DYNAMIC CHARACTERISTICS</b> (Note 9)						
Input Capacitance	C <sub>iss</sub>	—	3,690	—	pF	V <sub>DS</sub> = 10V, V <sub>GS</sub> = 0V, f = 1MHz
Output Capacitance	C <sub>oss</sub>	—	530	—	pF	
Reverse Transfer Capacitance	C <sub>rss</sub>	—	459	—	pF	
Gate Resistance	R <sub>g</sub>	—	0.9	—	Ω	V <sub>DS</sub> = 0V, V <sub>GS</sub> = 0V, f = 1MHz
Total Gate Charge (V <sub>GS</sub> = 4.5V)	Q <sub>g</sub>	—	41	—	nC	V <sub>DS</sub> = 24V, I <sub>D</sub> = 27A
Total Gate Charge (V <sub>GS</sub> = 10V)	Q <sub>g</sub>	—	86	—	nC	
Gate-Source Charge	Q <sub>gs</sub>	—	9.2	—	nC	
Gate-Drain Charge	Q <sub>gd</sub>	—	18.6	—	nC	
Turn-On Delay Time	t <sub>D(ON)</sub>	—	5.7	—	ns	V <sub>DD</sub> = 15V, V <sub>GS</sub> = 10V, R <sub>L</sub> = 1.11Ω, R <sub>G</sub> = 4.7Ω, I <sub>D</sub> = 13.5A
Turn-On Rise Time	t <sub>r</sub>	—	14.0	—	ns	
Turn-Off Delay Time	t <sub>D(OFF)</sub>	—	63.7	—	ns	
Turn-Off Fall Time	t <sub>f</sub>	—	28.4	—	ns	
Reverse Recovery Time	t <sub>RR</sub>	—	19.3	—	ns	I <sub>F</sub> = 13.5A, di/dt = 100A/µs
Reverse Recovery Charge	Q <sub>RR</sub>	—	10.7	—	nC	

- Notes:
6. Device mounted on FR-4 substrate PC board, 2oz copper, with minimum recommended pad layout.
  7. Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper plate.
  8. Short duration pulse test used to minimize self-heating effect.
  9. Guaranteed by design. Not subject to product testing.

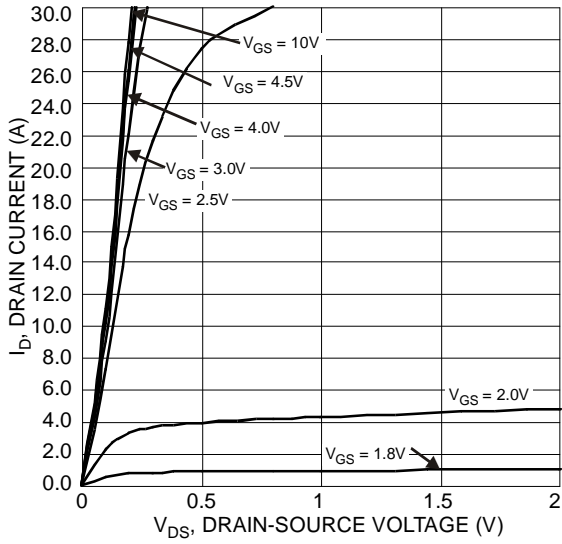


Figure 1 Typical Output Characteristic

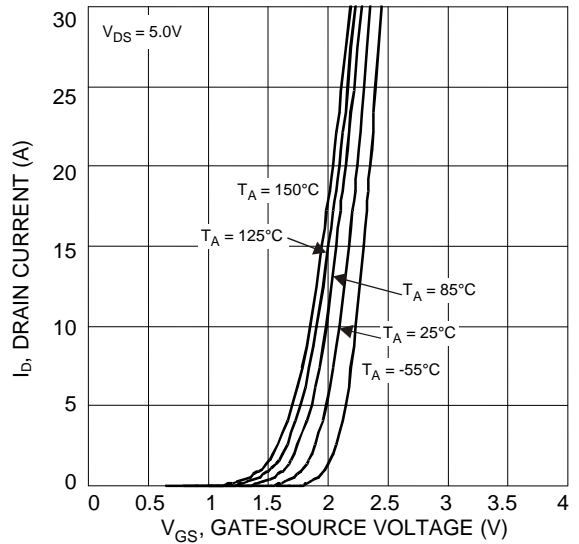


Figure 2 Typical Transfer Characteristics

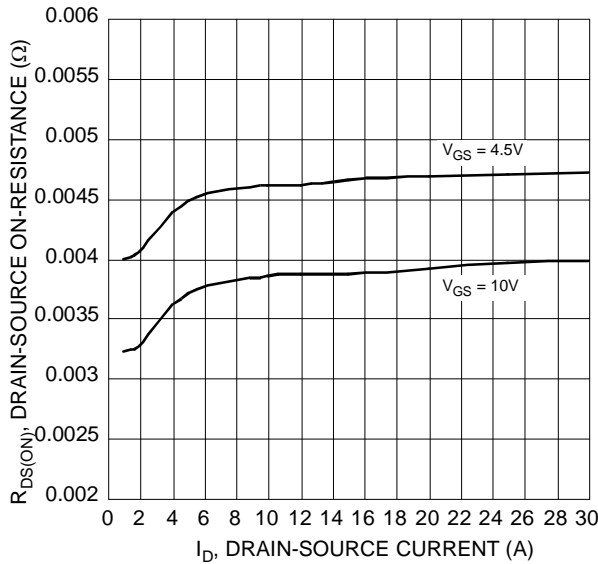


Figure 3 Typical On-Resistance vs. Drain Current and Gate Voltage

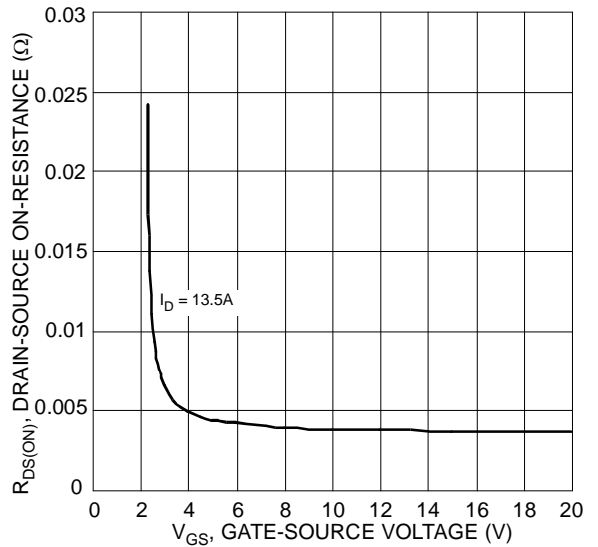


Figure 4 Typical Transfer Characteristic

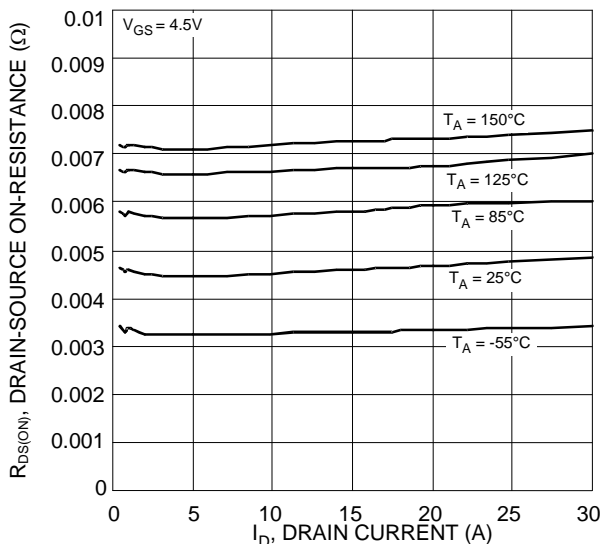


Figure 5 Typical On-Resistance vs. Drain Current and Temperature

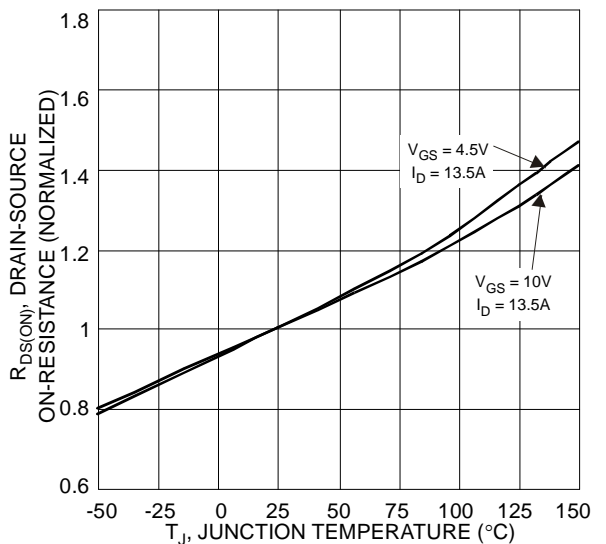


Figure 6 On-Resistance Variation with Temperature

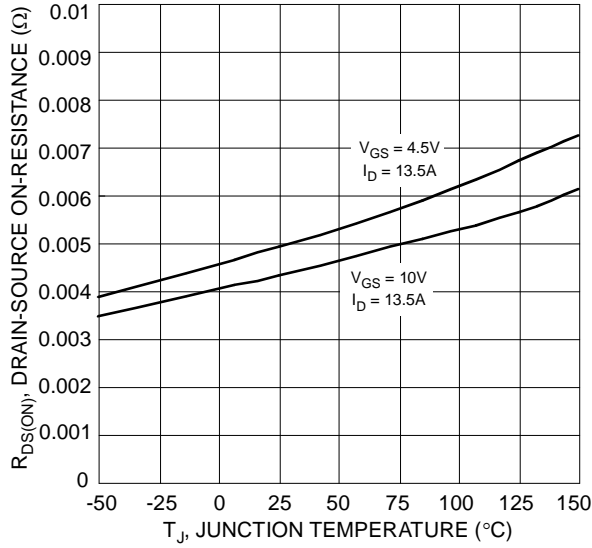


Figure 7 On-Resistance Variation with Temperature

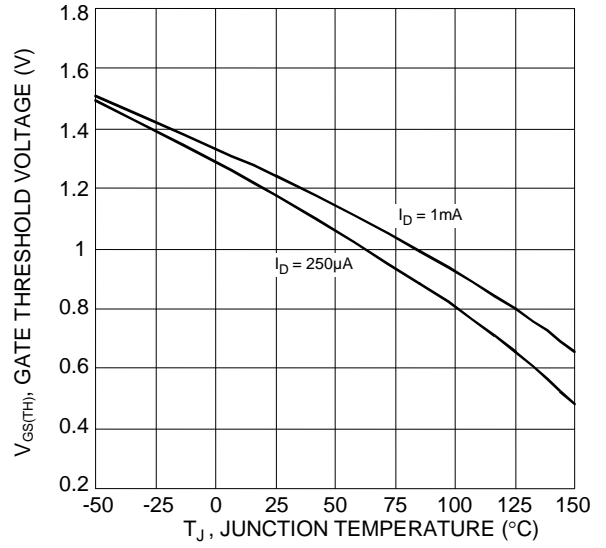


Figure 8 Gate Threshold Variation vs. Junction Temperature

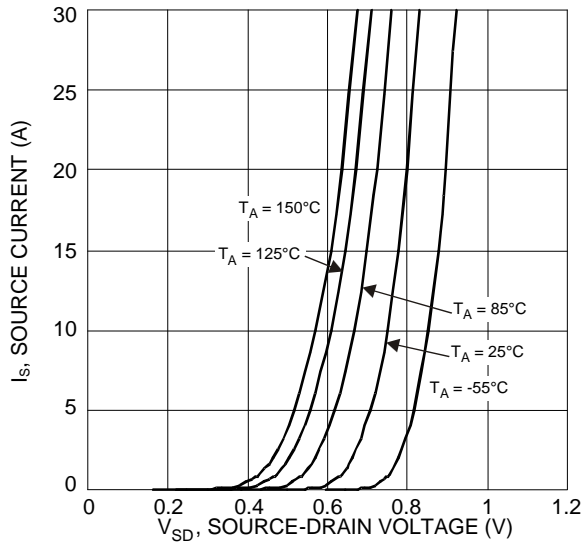


Figure 9 Diode Forward Voltage vs. Current

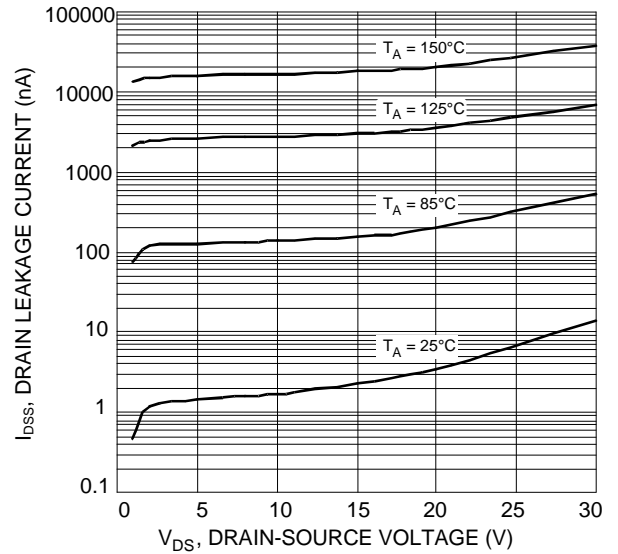


Figure 10 Typical Drain-Source Leakage Current vs. Voltage

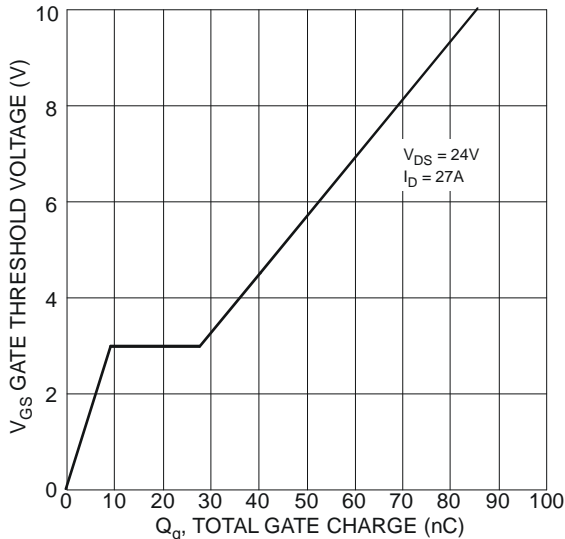


Figure 11 Gate Charge

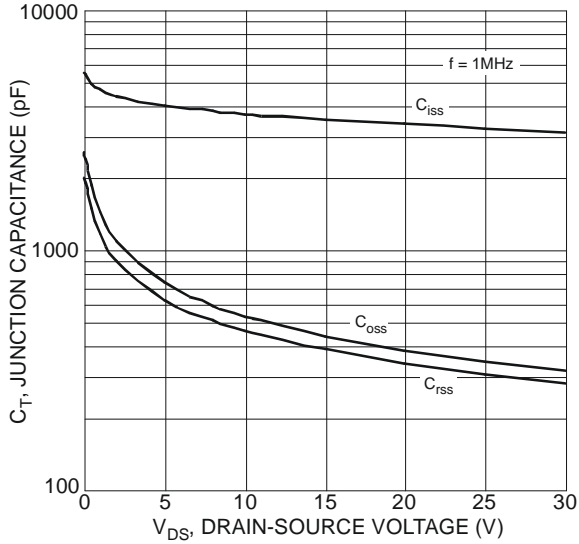


Figure 12 Typical Junction Capacitance

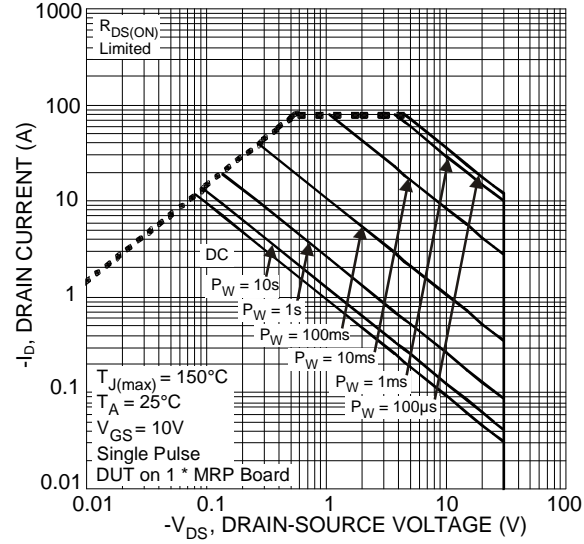


Figure 13 SOA, Safe Operation Area

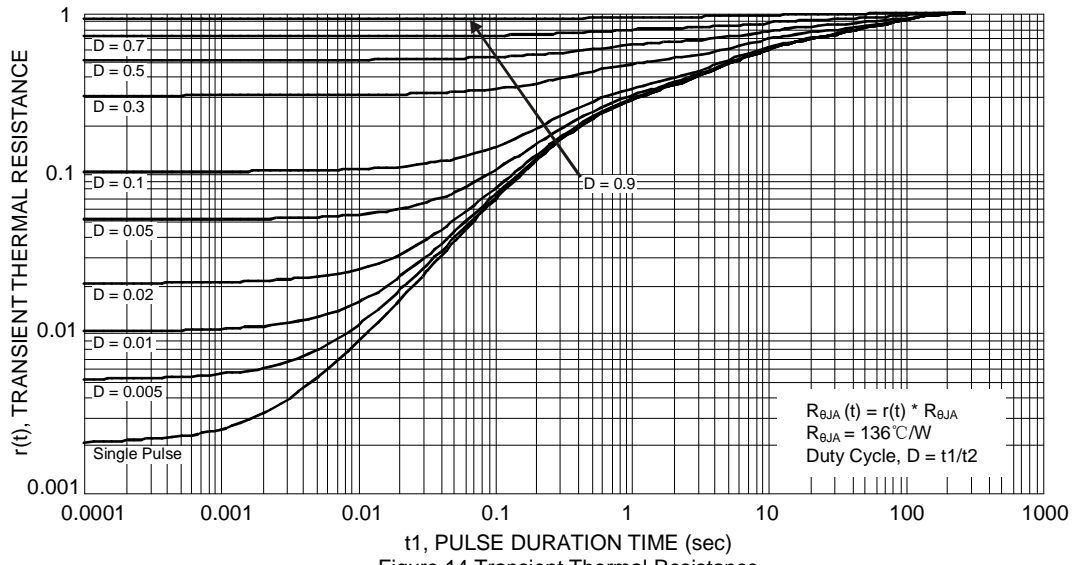


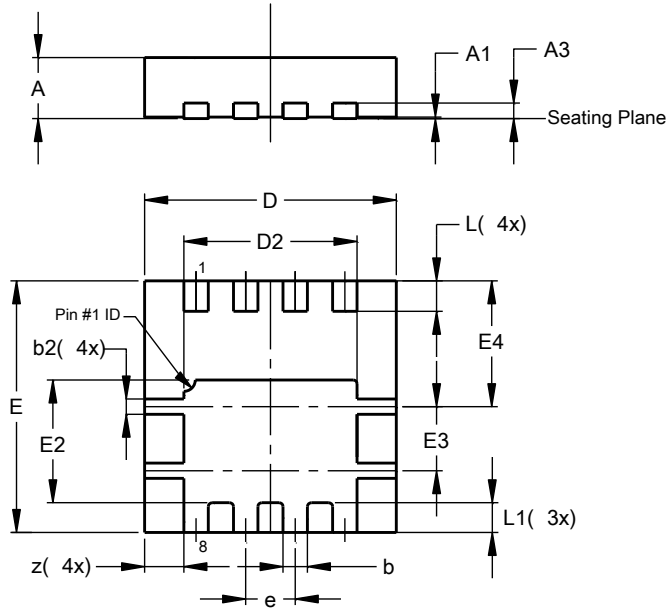
Figure 14 Transient Thermal Resistance

$R_{\theta JA}(t) = r(t) * R_{\theta JA}$   
 $R_{\theta JA} = 136^{\circ}\text{C/W}$   
 Duty Cycle,  $D = t1/t2$

**Package Outline Dimensions**

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

**PowerDI3333-8**

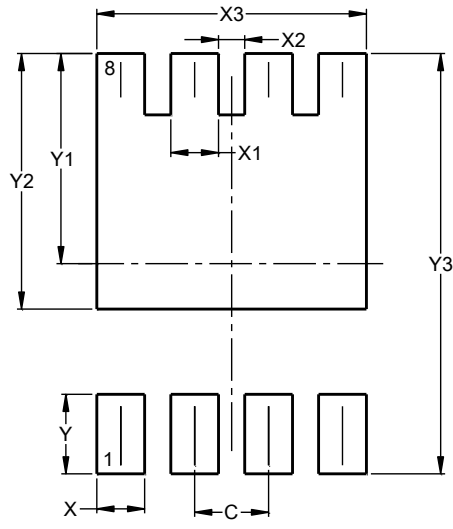


PowerDI3333-8			
Dim	Min	Max	Typ
A	0.75	0.85	0.80
A1	0.00	0.05	0.02
A3	-	-	0.203
b	0.27	0.37	0.32
D	3.25	3.35	3.30
D2	2.22	2.32	2.27
E	3.25	3.35	3.30
E2	1.56	1.66	1.61
E3	0.79	0.89	0.84
E4	1.60	1.70	1.65
e	-	-	0.65
L	0.35	0.45	0.40
L1	-	-	0.39
z	-	-	0.515
All Dimensions in mm			

**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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