

## Product Summary

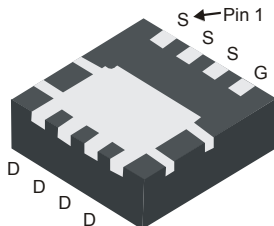
BV <sub>DSS</sub>	R <sub>DS(ON)</sub> Max	I <sub>D</sub> MAX T <sub>C</sub> = +25°C
100V	8.5mΩ @ V <sub>GS</sub> = 10V	50A
	12.5mΩ @ V <sub>GS</sub> = 4.5V	41A

## Description

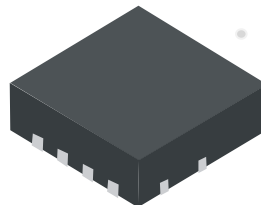
This MOSFET is designed to minimize the on-state resistance (R<sub>DS(ON)</sub>) and yet maintain superior switching performance, making it ideal for high-efficiency power management applications.

## Applications

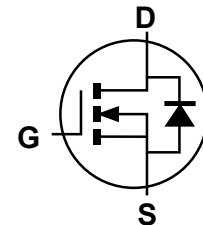
- Synchronous Rectifier
- Backlighting
- Power Management Functions
- DC-DC Converters



Bottom View



Top View



Equivalent Circuit

## Features and Benefits

- Low R<sub>DS(ON)</sub> – Ensures On State Losses are Minimized
- Excellent Q<sub>gd</sub> x R<sub>DS(ON)</sub> Product (FOM)
- Advanced Technology for DC/DC Converters
- 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
- 100% Unclamped Inductive Switching (UIS) Test in Production Ensures More Reliable and Robust End Application
- **Lead-Free Finish; RoHS Compliant (Notes 1 & 2)**
- **Halogen- and Antimony-Free. "Green" Device (Note 3)**
- **For automotive applications requiring specific change control (i.e. parts qualified to AEC-Q100/101/200, PPAP capable, and manufactured in IATF 16949 certified facilities), please [contact us](mailto:contact@diodes.com) or your local Diodes representative. <https://www.diodes.com/quality/product-definitions/>**

## Mechanical Data

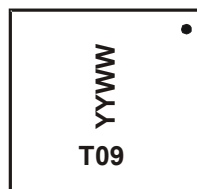
- Case: PowerDI<sup>®</sup> 3333-8
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Connections Indicator: See Diagram
- Terminals: Finish—Matte Tin Annealed over Copper Lead-Frame. Solderable per MIL-STD-202, Method 208 <sup>Ⓔ</sup>3
- Weight: 0.034 grams (Approximate)

## Ordering Information (Note 4)

Part Number	Case	Packaging
DMT10H009LFG-7	PowerDI3333-8	2,000/Tape & Reel
DMT10H009LFG-13	PowerDI3333-8	3,000/Tape & Reel

- Notes:
1. EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant. All applicable RoHS exemptions applied.
  2. See <https://www.diodes.com/quality/lead-free/> 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 <https://www.diodes.com/design/support/packaging/diodes-packaging/>.

## Marking Information



T09 = Product Type Marking Code  
 YYWW = Date Code Marking  
 YY = Last Two Digits of Year (ex: 20 = 2020)  
 WW = Week Code (01 to 53)

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

Characteristic	Symbol	Value	Unit
Drain-Source Voltage	$V_{DSS}$	100	V
Gate-Source Voltage	$V_{GSS}$	$\pm 20$	V
Continuous Drain Current (Note 5) $V_{GS} = 10\text{V}$	$I_D$	$T_A = +25^\circ\text{C}$	13
		$T_A = +70^\circ\text{C}$	11
	$I_D$	$T_C = +25^\circ\text{C}$	50
		$T_C = +70^\circ\text{C}$	40
Maximum Continuous Body Diode Forward Current (Note 5)	$I_S$	25	A
Pulsed Drain Current (10 $\mu\text{s}$ Pulse, Duty Cycle = 1%)	$I_{DM}$	200	A
Pulsed Body Diode Continuous Current (10 $\mu\text{s}$ Pulse, Duty Cycle = 1%)	$I_{SM}$	200	A
Avalanche Current (L = 1mH)	$I_{AS}$	17	A
Avalanche Energy (L = 1mH)	$E_{AS}$	144.5	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	W
Thermal Resistance, Junction to Ambient (Note 5)	$R_{\theta JA}$	59	$^\circ\text{C/W}$
Total Power Dissipation $T_C = +25^\circ\text{C}$	$P_D$	30	W
Thermal Resistance, Junction to Case	$R_{\theta JC}$	3.8	$^\circ\text{C/W}$
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 6)</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	100	—	—	V	$V_{GS} = 0\text{V}, I_D = 1\text{mA}$
Zero Gate Voltage Drain Current	$I_{DSS}$	—	—	1	$\mu\text{A}$	$V_{DS} = 80\text{V}, V_{GS} = 0\text{V}$
Gate-Source Leakage	$I_{GSS}$	—	—	$\pm 100$	nA	$V_{GS} = \pm 20\text{V}, V_{DS} = 0\text{V}$
<b>ON CHARACTERISTICS (Note 6)</b>						
Gate Threshold Voltage	$V_{GS(TH)}$	1.1	—	2.5	V	$V_{DS} = V_{GS}, I_D = 250\mu\text{A}$
Static Drain-Source On-Resistance	$R_{DS(ON)}$	—	6.4	8.5	m $\Omega$	$V_{GS} = 10\text{V}, I_D = 20\text{A}$
		—	8.2	12.5		$V_{GS} = 4.5\text{V}, I_D = 10\text{A}$
Diode Forward Voltage	$V_{SD}$	—	0.8	1.2	V	$V_{GS} = 0\text{V}, I_S = 20\text{A}$
<b>DYNAMIC CHARACTERISTICS (Note 7)</b>						
Input Capacitance	$C_{ISS}$	—	2361	—	pF	$V_{DS} = 50\text{V}, V_{GS} = 0\text{V}$ $f = 1\text{MHz}$
Output Capacitance	$C_{OSS}$	—	611	—		
Reverse Transfer Capacitance	$C_{RSS}$	—	16	—		
Gate Resistance	$R_g$	—	1.7	—	$\Omega$	$V_{DS} = 0\text{V}, V_{GS} = 0\text{V}, f = 1\text{MHz}$
Total Gate Charge	$Q_g$	—	41	—	nC	$V_{DD} = 50\text{V}, I_D = 13\text{A},$ $V_{GS} = 10\text{V}$
Gate-Source Charge	$Q_{gs}$	—	7.3	—		
Gate-Drain Charge	$Q_{gd}$	—	9.3	—		
Turn-On Delay Time	$t_{D(ON)}$	—	7	—	ns	$V_{DD} = 50\text{V}, V_{GS} = 10\text{V},$ $I_D = 13\text{A}, R_g = 6\Omega$
Turn-On Rise Time	$t_R$	—	12	—		
Turn-Off Delay Time	$t_{D(OFF)}$	—	42	—		
Turn-Off Fall Time	$t_F$	—	24	—		
Reverse Recovery Time	$t_{RR}$	—	45	—	ns	$I_F = 13\text{A}, di/dt = 100\text{A}/\mu\text{s}$
Reverse Recovery Charge	$Q_{RR}$	—	68	—	nC	

- Notes: 5. Device mounted on FR-4 substrate PC board, 2oz copper, with thermal bias to bottom layer 1inch square copper plate.  
6. Short duration pulse test used to minimize self-heating effect.  
7. Guaranteed by design. Not subject to product testing.

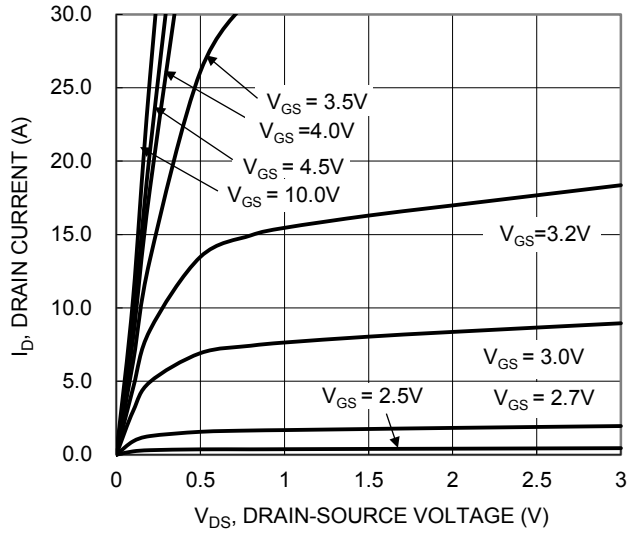


Figure 1. Typical Output Characteristic

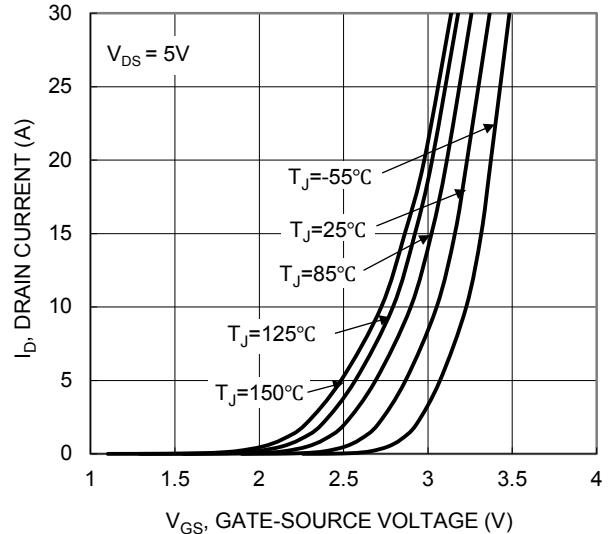


Figure 2. Typical Transfer Characteristic

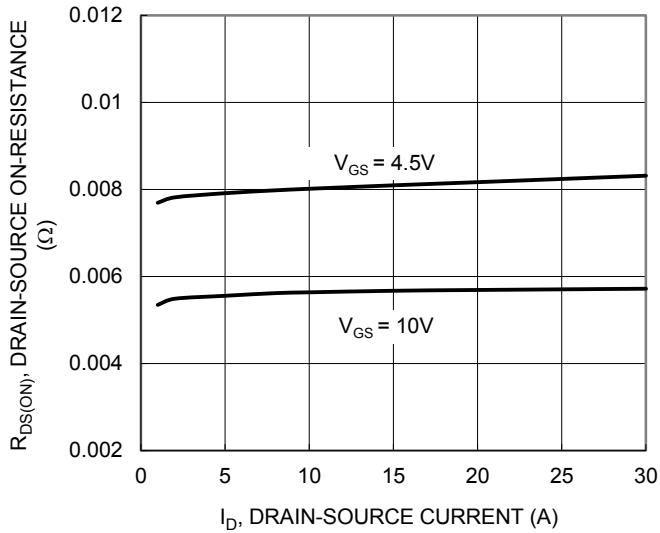


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

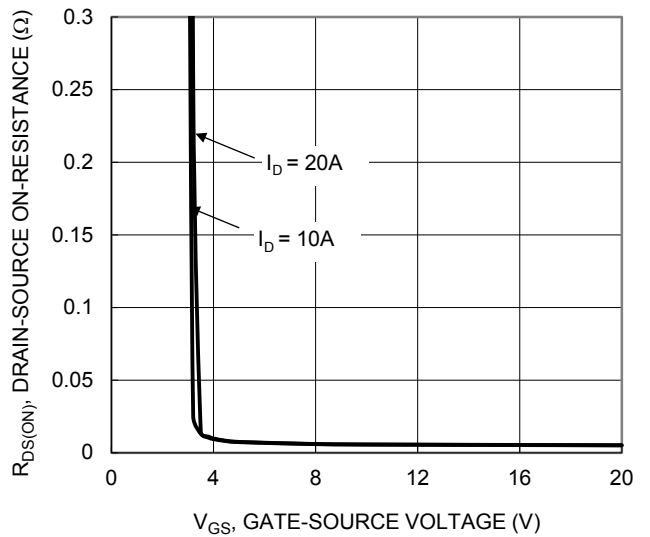


Figure 4. Typical Transfer Characteristic

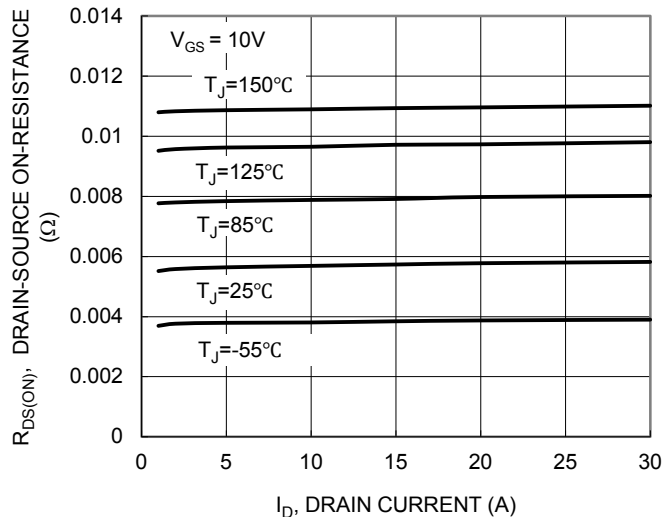


Figure 5. Typical On-Resistance vs. Drain Current and Junction Temperature

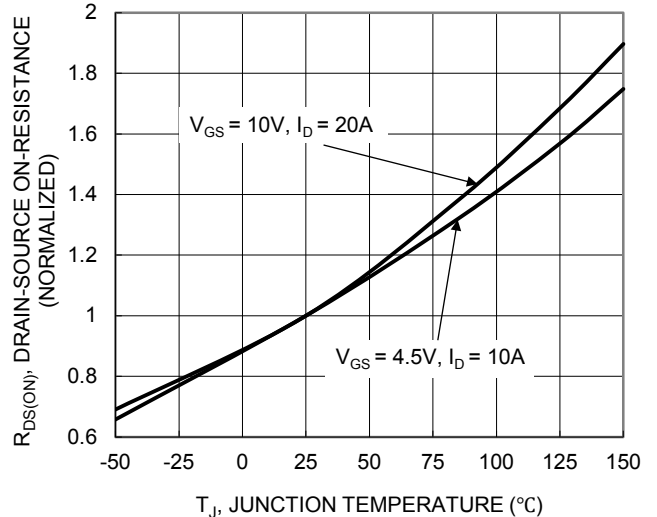


Figure 6. On-Resistance Variation with Junction Temperature

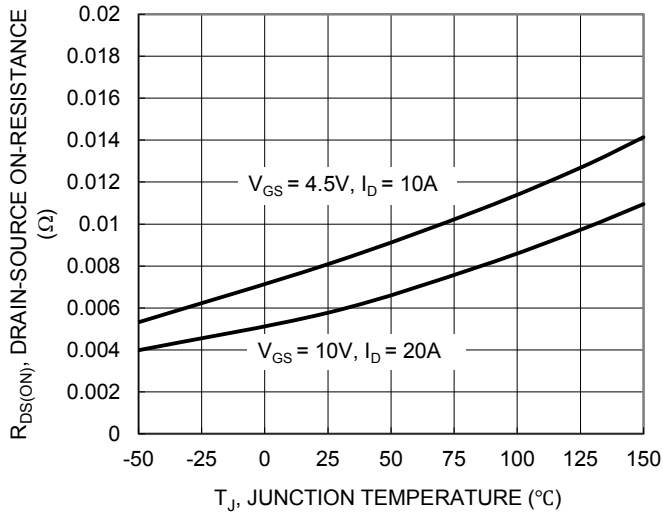


Figure 7. On-Resistance Variation with Junction Temperature

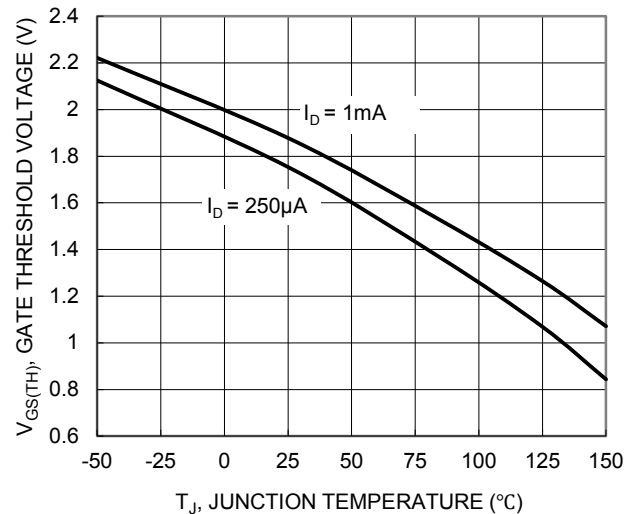


Figure 8. Gate Threshold Variation vs. Junction Temperature

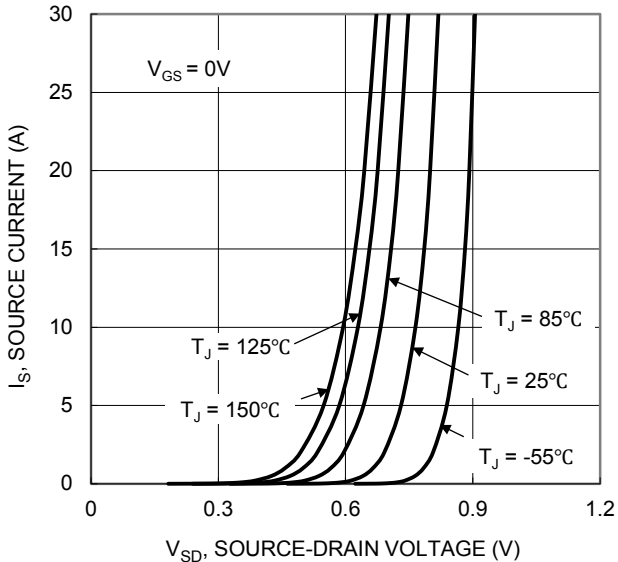


Figure 9. Diode Forward Voltage vs. Current

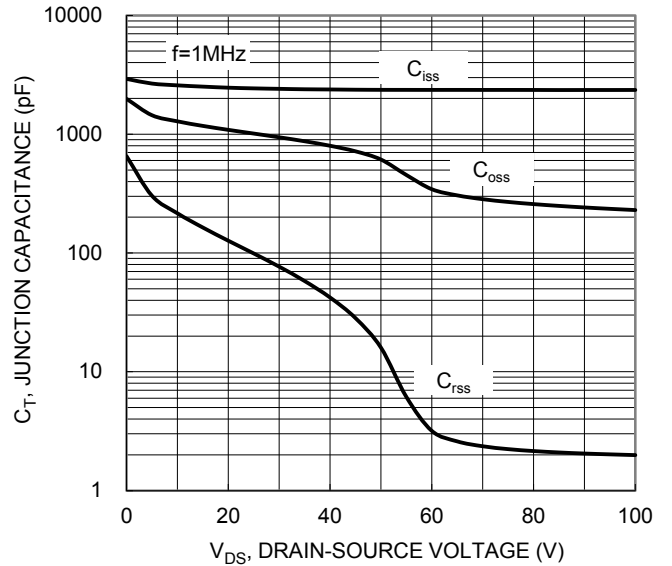


Figure 10. Typical Junction Capacitance

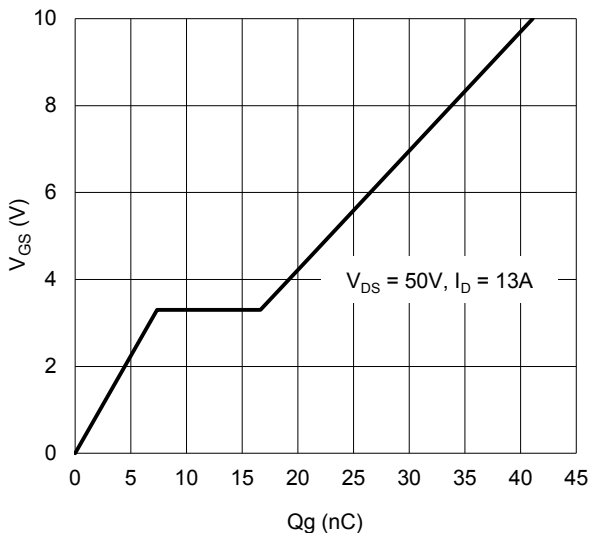


Figure 11. Gate Charge

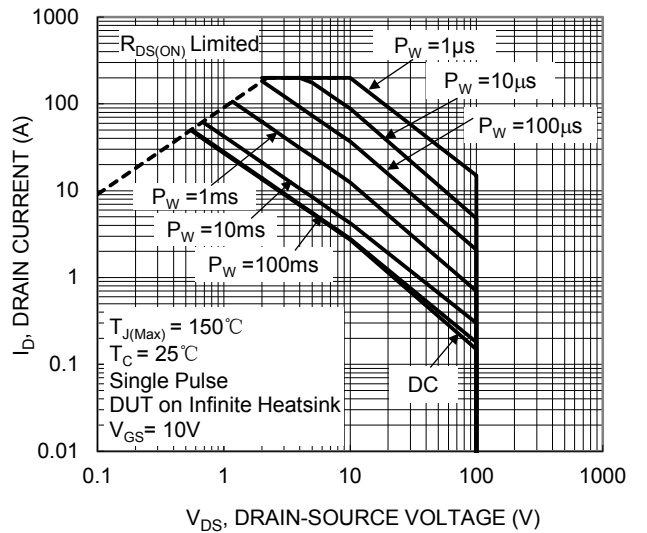


Figure 12. SOA, Safe Operation Area

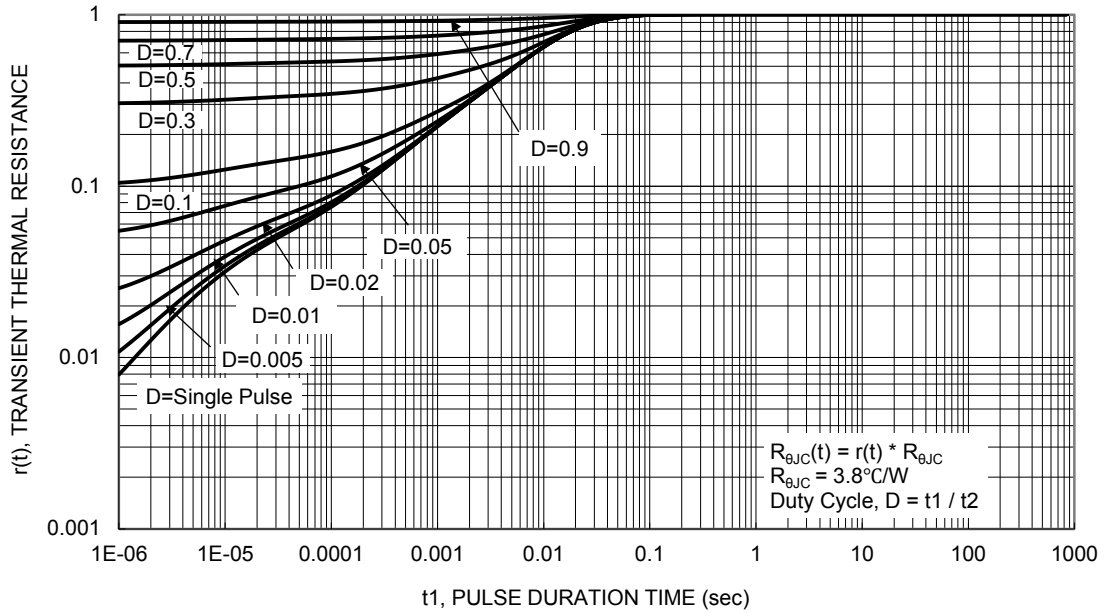
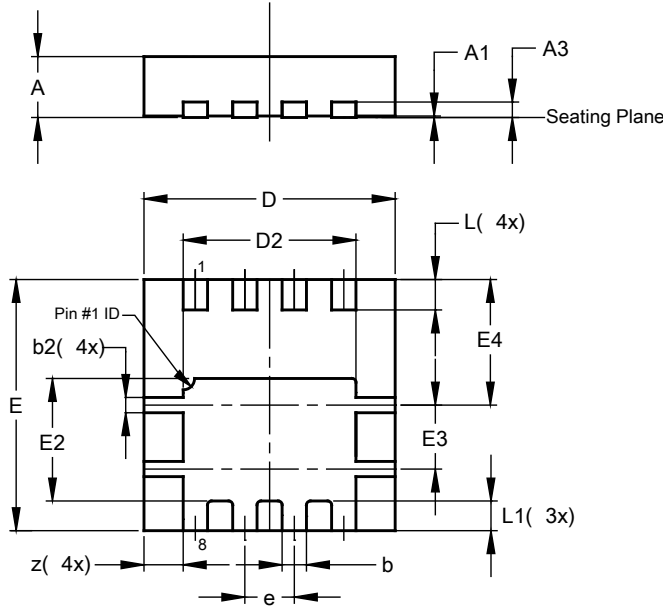


Figure 13. Transient Thermal Resistance

**Package Outline Dimensions**

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

**PowerDI3333-8**

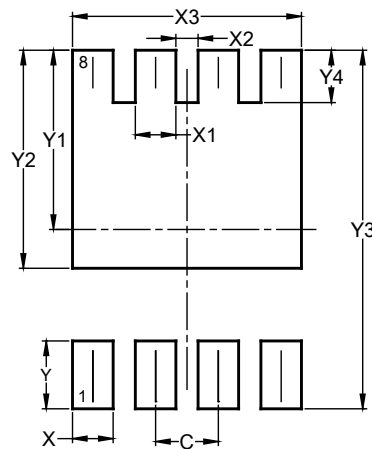


PowerDI3333-8			
Dim	Min	Max	Typ
A	0.75	0.85	0.80
A1	0.00	0.05	0.02
A3	-	-	0.203
b	0.27	0.37	0.32
b2	0.15	0.25	0.20
D	3.25	3.35	3.30
D2	2.22	2.32	2.27
E	3.25	3.35	3.30
E2	1.56	1.66	1.61
E3	0.79	0.89	0.84
E4	1.60	1.70	1.65
e	-	-	0.65
L	0.35	0.45	0.40
L1	-	-	0.39
z	-	-	0.515
All Dimensions in mm			

**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
Y4	0.540

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