

## Product Summary

$BV_{DSS}$	$R_{DS(ON)}$ Max	$I_D$ Max $T_A = +25^\circ C$
75V	22m $\Omega$ @ $V_{GS} = 10V$	7.8A
	28m $\Omega$ @ $V_{GS} = 4.5V$	6.9A

## 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:

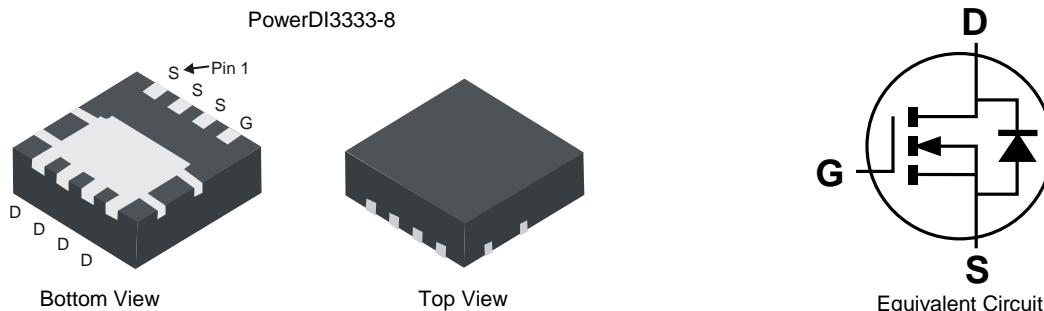
- Backlighting
- Power Management Functions
- DC-DC Converters

## Features and Benefits

- 100% Unclamped Inductive Switching – Ensures More Reliable and Robust End Application
- 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**
- **PPAP Capable (Note 4)**

## 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 (E3)
- Weight: 0.072 grams (Approximate)



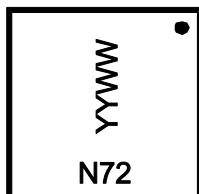
## Ordering Information (Note 5)

Part Number	Case	Packaging
DMN7022LFGQ-7	PowerDI3333-8	2,000/Tape & Reel
DMN7022LFGQ-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 <https://www.diodes.com/design/support/packaging/diodes-packaging/>.

## Marking Information



N72= 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			$V_{DSS}$	75	V
Gate-Source Voltage			$V_{GSS}$	$\pm 20$	V
Continuous Drain Current (Note 7) $V_{GS} = 10\text{V}$	Steady State	$T_A = +25^\circ\text{C}$ $T_A = +70^\circ\text{C}$	$I_D$	7.8 6.2	A
Continuous Drain Current (Note 8) $V_{GS} = 10\text{V}$	Steady State	$T_C = +25^\circ\text{C}$ $T_C = +70^\circ\text{C}$	$I_D$	23 18	A
Pulsed Drain Current (10 $\mu\text{s}$ Pulse, Duty Cycle = 1%)			$I_{DM}$	56	A
Maximum Continuous Body Diode Forward Current (Note 6)			$I_S$	2.1	A
Pulsed Body Diode Forward Current (10 $\mu\text{s}$ Pulse, Duty Cycle = 1%)			$I_{SM}$	50	A
Avalanche Current, $L = 0.1\text{mH}$ (Note 9)			$I_{AS}$	28.8	A
Avalanche Energy, $L = 0.1\text{mH}$ (Note 9)			$E_{AS}$	42.2	mJ

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

Characteristic			Symbol	Value	Unit
Total Power Dissipation (Note 6)			$P_D$	0.9	W
Thermal Resistance, Junction to Ambient (Note 6)	Steady State		$R_{\theta JA}$	125	°C/W
	$t < 10\text{s}$			67	
Total Power Dissipation (Note 7)			$P_D$	2	W
Thermal Resistance, Junction to Ambient (Note 7)	Steady State		$R_{\theta JA}$	62	°C/W
	$t < 10\text{s}$			34	
Thermal Resistance, Junction to Case (Note 8)			$R_{\theta JC}$	6.9	
Operating and Storage Temperature Range			$T_J, T_{STG}$	-55 to +150	°C

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

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS (Note 10)</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	75	—	—	V	$V_{GS} = 0\text{V}, I_D = 250\mu\text{A}$
Zero Gate Voltage Drain Current ( $T_J = +25^\circ\text{C}$ )	$I_{DSS}$	—	—	1	$\mu\text{A}$	$V_{DS} = 75\text{V}, V_{GS} = 0\text{V}$
Gate-Source Leakage	$I_{GSS}$	—	—	$\pm 100$	nA	$V_{GS} = \pm 20\text{V}, V_{DS} = 0\text{V}$
<b>ON CHARACTERISTICS (Note 10)</b>						
Gate Threshold Voltage	$V_{GS(TH)}$	1	—	3	V	$V_{DS} = V_{GS}, I_D = 250\mu\text{A}$
Static Drain-Source On-Resistance	$R_{DS(ON)}$	—	14.6	22	$\text{m}\Omega$	$V_{GS} = 10\text{V}, I_D = 7.2\text{A}$
		—	20.5	28		$V_{GS} = 4.5\text{V}, I_D = 6.4\text{A}$
Diode Forward Voltage	$V_{SD}$	—	0.72	—	V	$V_{GS} = 0\text{V}, I_S = 3.2\text{A}$
<b>DYNAMIC CHARACTERISTICS (Note 11)</b>						
Input Capacitance	$C_{iss}$	—	2737	—	pF	$V_{DS} = 35\text{V}, V_{GS} = 0\text{V}, f = 1\text{MHz}$
Output Capacitance	$C_{oss}$	—	126	—	pF	
Reverse Transfer Capacitance	$C_{rss}$	—	96.1	—	pF	
Gate Resistance	$R_g$	—	0.89	—	$\Omega$	$V_{DS} = 0\text{V}, V_{GS} = 0\text{V}, f = 1\text{MHz}$
Total Gate Charge ( $V_{GS} = 4.5\text{V}$ )	$Q_g$	—	26.4	—	nC	$V_{DS} = 38\text{V}, I_D = 7.2\text{A}$
Total Gate Charge ( $V_{GS} = 10\text{V}$ )	$Q_g$	—	56.5	—	nC	
Gate-Source Charge	$Q_{gs}$	—	12	—	nC	
Gate-Drain Charge	$Q_{gd}$	—	11.8	—	nC	
Turn-On Delay Time	$t_{D(ON)}$	—	6.1	—	ns	$V_{GS} = 10\text{V}, V_{DS} = 38\text{V}, R_g = 1\Omega, I_D = 5.7\text{A}$
Turn-On Rise Time	$t_R$	—	5.7	—	ns	
Turn-Off Delay Time	$t_{D(OFF)}$	—	19.6	—	ns	
Turn-Off Fall Time	$t_F$	—	3.9	—	ns	
Body Diode Reverse Recovery Time	$t_{RR}$	—	26.2	—	ns	$I_F = 5.7\text{A}, di/dt = 100\text{A}/\mu\text{s}$
Body Diode Reverse Recovery Charge	$Q_{RR}$	—	25.2	—	nC	

Notes:

6. Device mounted on FR-4 PC board, with minimum recommended pad layout, single sided.
7. Device mounted on FR-4 substrate PC board, 2oz copper, with thermal bias to bottom layer 1inch square copper plate.
8. Thermal resistance from junction to soldering point (on the exposed drain pad).
9.  $I_{AS}$  and  $E_{AS}$  ratings are based on low frequency and duty cycles to keep  $T_J = +25^\circ\text{C}$ .
10. Short duration pulse test used to minimize self-heating effect.
11. Guaranteed by design. Not subject to product testing.

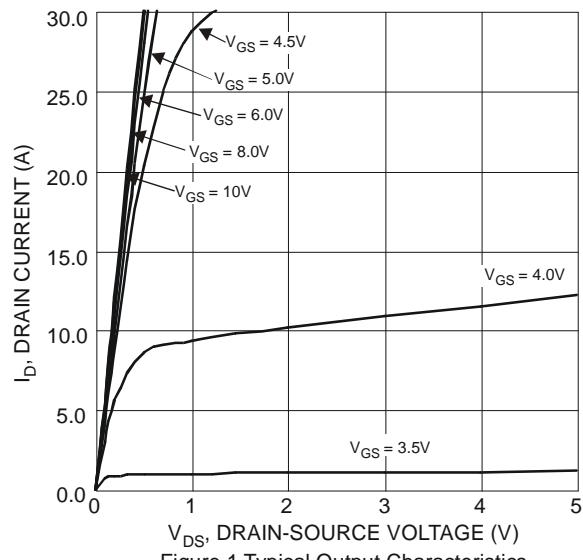


Figure 1 Typical Output Characteristics

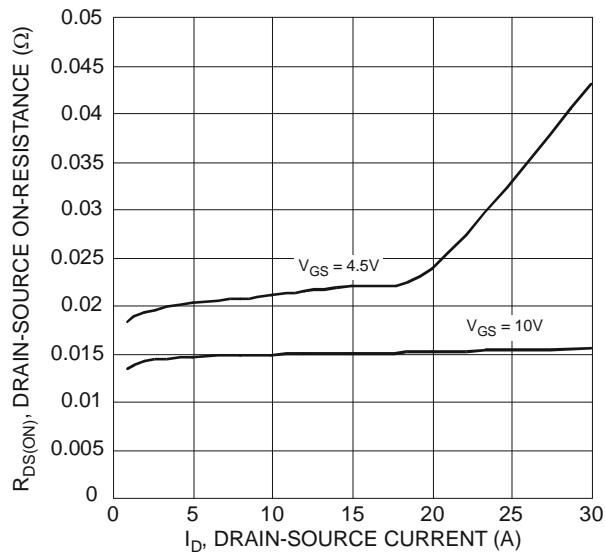


Figure 3 Typical On-Resistance vs.  
Drain Current and Gate Voltage

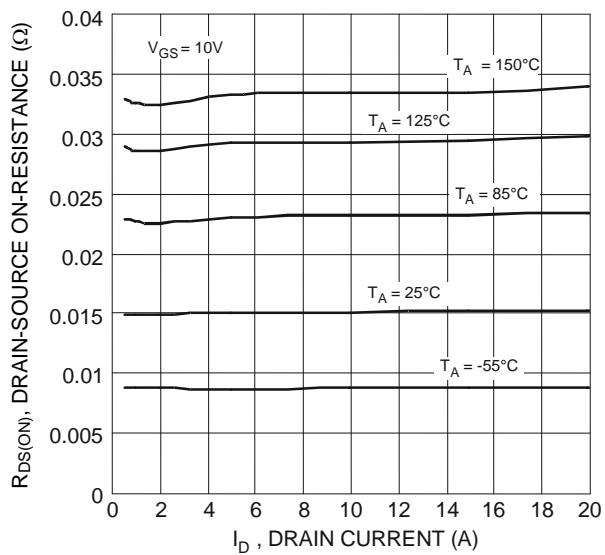


Figure 5 Typical On-Resistance vs.  
Drain Current and Temperature

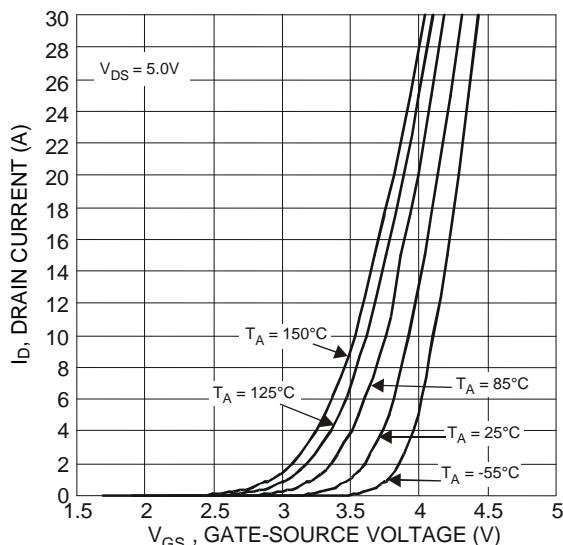


Figure 2 Typical Transfer Characteristics

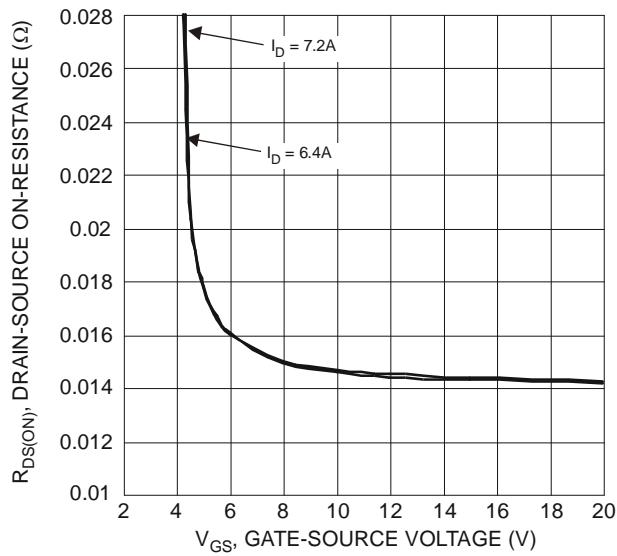


Figure 4 Typical Drain-Source On-Resistance  
vs. Gate-Source Voltage

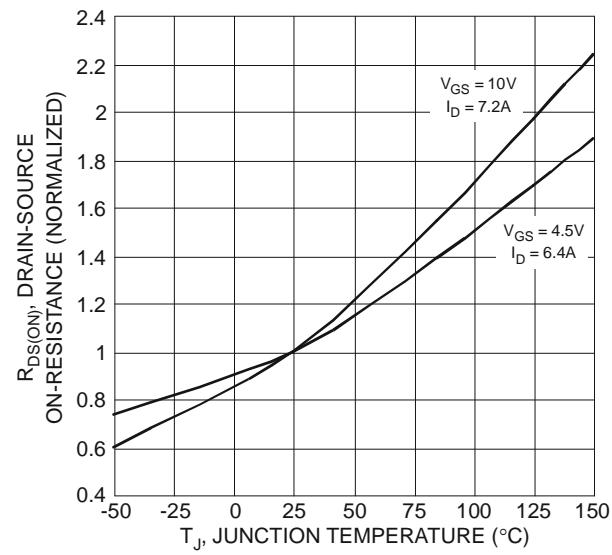
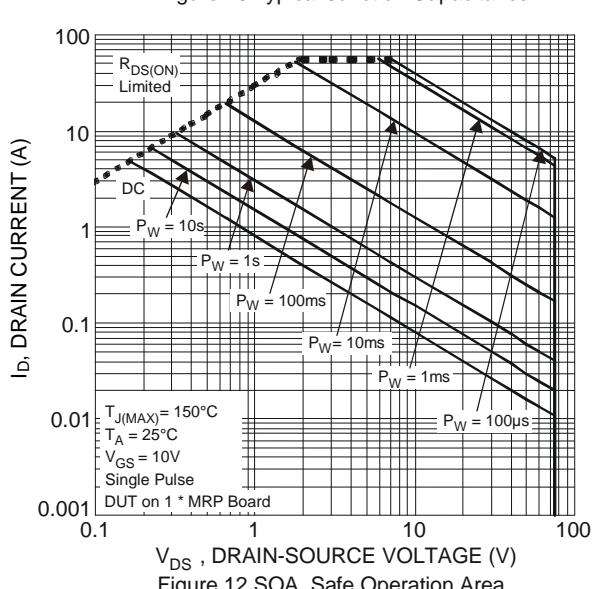
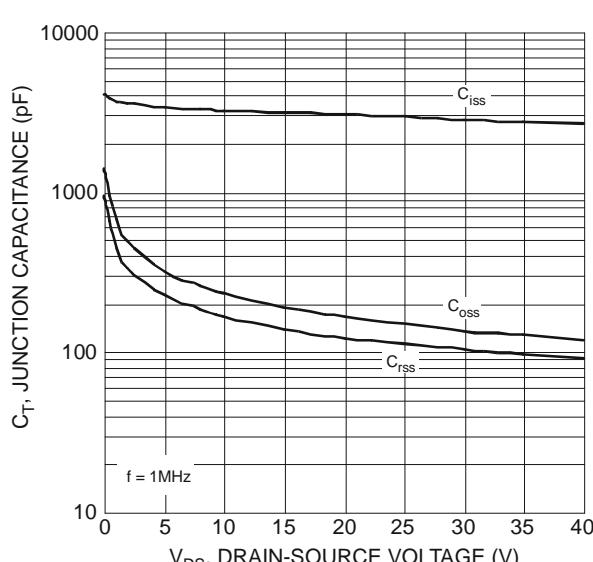
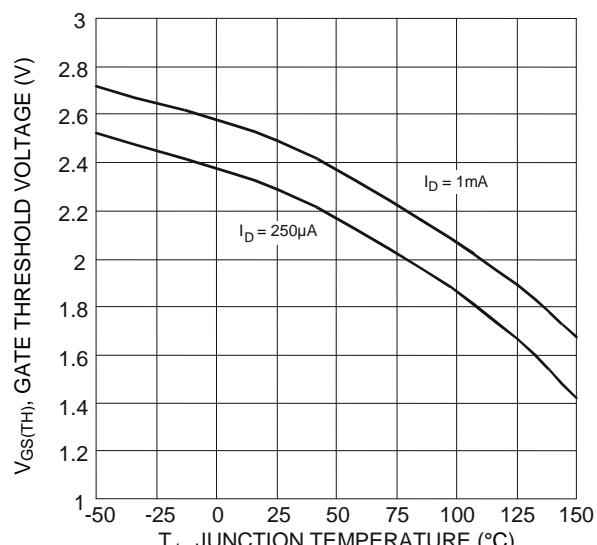
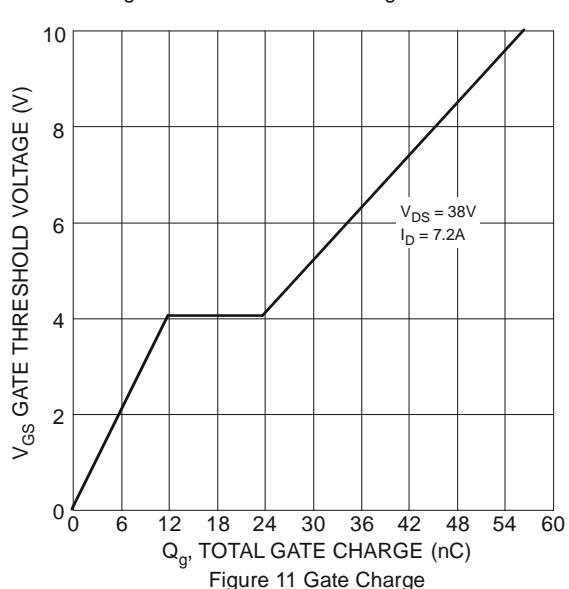
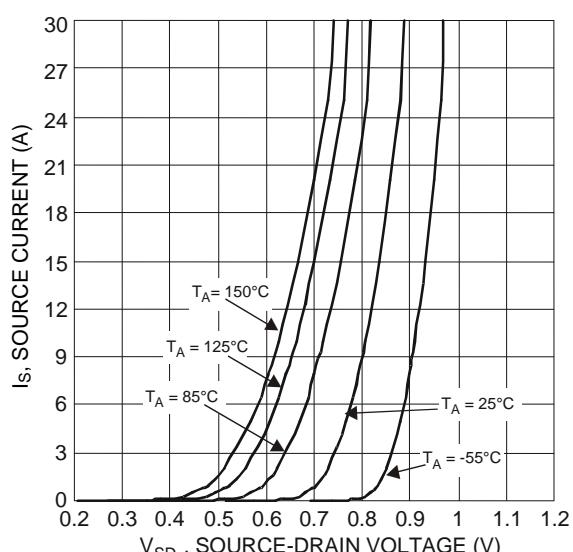
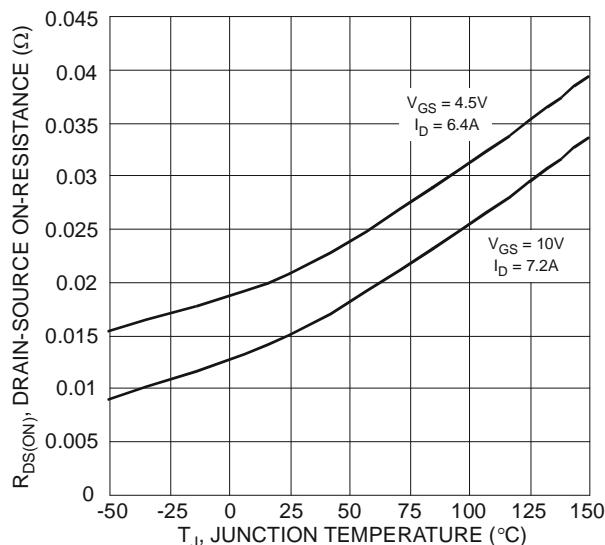


Figure 6 On-Resistance Variation with Temperature



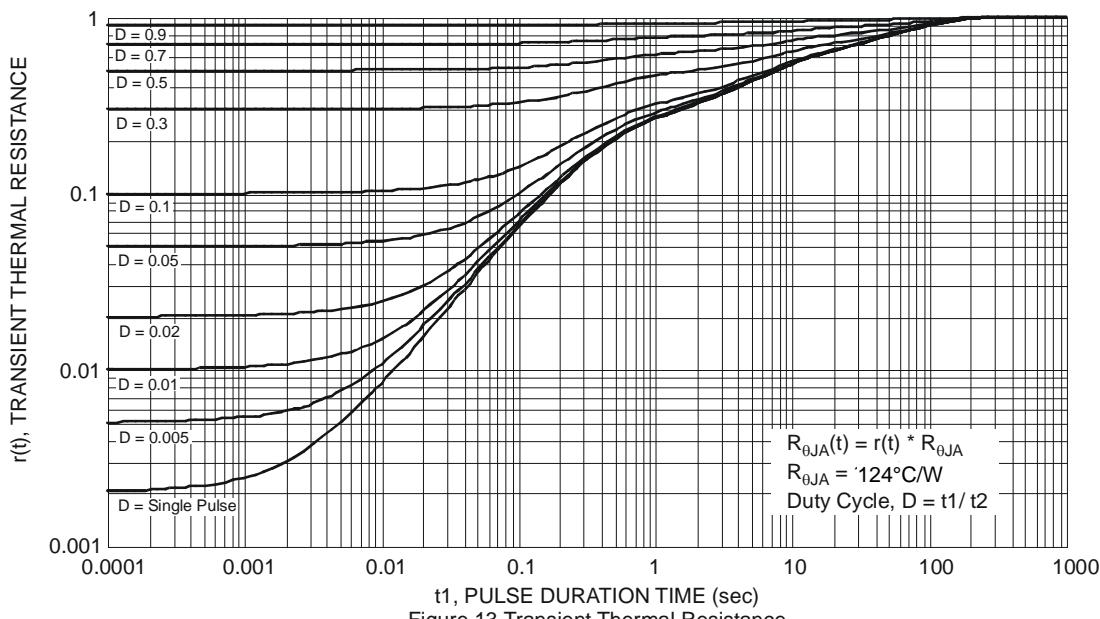
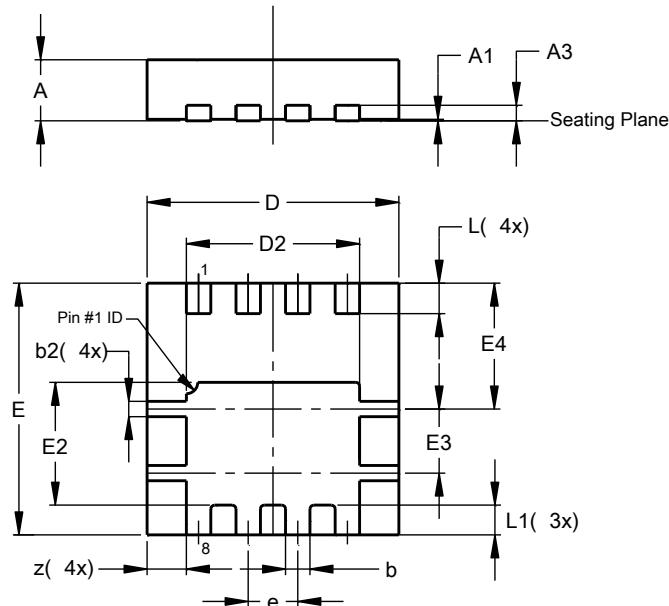


Figure 13 Transient Thermal Resistance

## Package Outline Dimensions

Please see <http://www.diodes.com/package-outlines.html> for the latest version.  
**PowerDI3333-8**



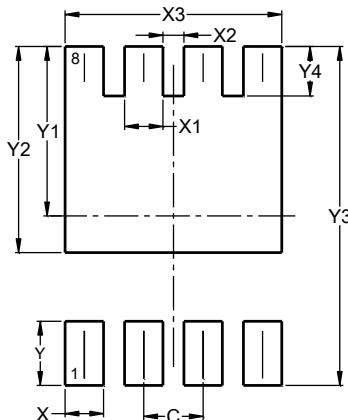
PowerDI3333-8			
Dim	Min	Max	Typ
A	0.75	0.85	0.80
A1	0.00	0.05	0.02
A3	—	—	0.203
b	0.27	0.37	0.32
b2	0.15	0.25	0.20
D	3.25	3.35	3.30
D2	2.22	2.32	2.27
E	3.25	3.35	3.30
E2	1.56	1.66	1.61
E3	0.79	0.89	0.84
E4	1.60	1.70	1.65
e	—	—	0.65
L	0.35	0.45	0.40
L1	—	—	0.39
z	—	—	0.515

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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