

## Product Summary

BV <sub>DSS</sub>	R <sub>DS(ON)</sub> Max	I <sub>D</sub> Max T <sub>C</sub> = +25°C
40V	10.8mΩ @ V <sub>GS</sub> = 10V	30.2A
	15mΩ @ V <sub>GS</sub> = 4.5V	25.6A

## 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:

- Motor Control
- Power Management Functions
- DC-DC Converters

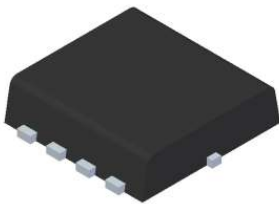
## Features

- 100% Unclamped Inductive Switching, Test in Production – Ensures More Reliable and Robust End Application
- High Conversion Efficiency
- Low R<sub>DS(ON)</sub> – Minimizes On-State Losses
- Low Input Capacitance
- Fast Switching Speed
- **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)**

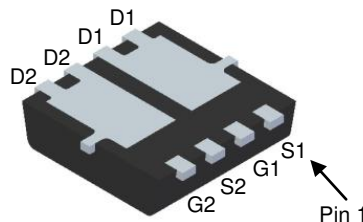
## Mechanical Data

- Case: PowerDI<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 Leadframe. Solderable per MIL-STD-202, Method 208 (E3)
- Weight: 0.072 grams (Approximate)

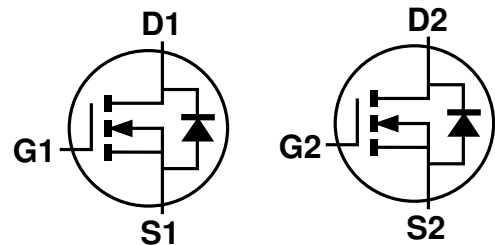
PowerDI3333-8 (Type UXC)



Top View



Bottom View



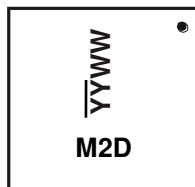
Equivalent Circuit

## Ordering Information (Note 5)

Part Number	Case	Packaging
DMT47M2LDVQ-7	PowerDI3333-8 (Type UXC)	2000/Tape & Reel
DMT47M2LDVQ-13	PowerDI3333-8 (Type UXC)	3000/Tape & Reel

- Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant.
  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. Automotive products are AEC-Q101 qualified and are PPAP capable. Refer to <https://www.diodes.com/quality/>.
  5. For packaging details, go to our website at <https://www.diodes.com/design/support/packaging/diodes-packaging/>.

## Marking Information



M2D = Product Type Marking Code  
 YYWW = Date Code Marking  
 YY = Last Two Digits of Year (ex: 19 for 2019)  
 WW = Week Code (01 to 53)

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

Characteristic	Symbol	Value	Unit
Drain-Source Voltage	$V_{DSS}$	40	V
Gate-Source Voltage	$V_{GSS}$	$\pm 20$	V
Continuous Drain Current (Note 7), $V_{GS} = 10\text{V}$	$I_D$	$T_C = +25^\circ\text{C}$	30.2
		$T_C = +100^\circ\text{C}$	24.2
Continuous Drain Current (Note 6), $V_{GS} = 10\text{V}$	$I_D$	$T_A = +25^\circ\text{C}$	11.9
		$T_A = +70^\circ\text{C}$	9.5
Pulsed Drain Current (10 $\mu\text{s}$ Pulse, Duty Cycle = 1%)	$I_{DM}$	120	A
Maximum Continuous Body Diode Forward Current (Note 7)	$I_S$	16.4	A
Pulsed Body Diode Forward Current (10 $\mu\text{s}$ Pulse, Duty Cycle = 1%)	$I_{SM}$	120	A
Avalanche Current, $L = 0.1\text{mH}$ (Note 8)	$I_{AS}$	22.1	A
Avalanche Energy, $L = 0.1\text{mH}$ (Note 8)	$E_{AS}$	24.4	mJ

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

Characteristic	Symbol	Value	Unit
Total Power Dissipation (Note 6)	$P_D$	2.34	W
Thermal Resistance, Junction to Ambient (Note 6)	$R_{\theta JA}$	53.7	$^\circ\text{C/W}$
Total Power Dissipation (Note 7)	$P_D$	14.8	W
Thermal Resistance, Junction to Case (Note 7)	$R_{\theta JC}$	8.43	$^\circ\text{C/W}$
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 9)</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	40	—	—	V	$V_{GS} = 0\text{V}, I_D = 250\mu\text{A}$
Zero Gate Voltage Drain Current	$I_{DSS}$	—	—	1	$\mu\text{A}$	$V_{DS} = 32\text{V}, V_{GS} = 0\text{V}$
Gate-Source Leakage	$I_{GSS}$	—	—	$\pm 100$	nA	$V_{GS} = \pm 20\text{V}, V_{DS} = 0\text{V}$
<b>ON CHARACTERISTICS (Note 9)</b>						
Gate Threshold Voltage	$V_{GS(TH)}$	1.2	1.4	2.3	V	$V_{DS} = V_{GS}, I_D = 250\mu\text{A}$
Static Drain-Source On-Resistance	$R_{DS(ON)}$	—	8.4	10.8	m $\Omega$	$V_{GS} = 10\text{V}, I_D = 20\text{A}$
		—	10.9	15		$V_{GS} = 4.5\text{V}, I_D = 10\text{A}$
Diode Forward Voltage	$V_{SD}$	—	0.9	1.2	V	$V_{GS} = 0\text{V}, I_S = 20\text{A}$
<b>DYNAMIC CHARACTERISTICS (Note 10)</b>						
Input Capacitance	$C_{iss}$	—	891	—	pF	$V_{DS} = 20\text{V}, V_{GS} = 0\text{V}, f = 1\text{MHz}$
Output Capacitance	$C_{oss}$	—	490	—		
Reverse Transfer Capacitance	$C_{rss}$	—	14.8	—		
Gate Resistance	$R_g$	—	1.87	—	$\Omega$	$V_{DS} = 0\text{V}, V_{GS} = 0\text{V}, f = 1\text{MHz}$
Total Gate Charge ( $V_{GS} = 10\text{V}$ )	$Q_g$	—	14.0	—	nC	$V_{DS} = 20\text{V}, I_D = 20\text{A}$
Total Gate Charge ( $V_{GS} = 4.5\text{V}$ )	$Q_g$	—	6.72	—		
Gate-Source Charge	$Q_{gs}$	—	1.04	—		
Gate-Drain Charge	$Q_{gd}$	—	2.52	—		
Turn-On Delay Time	$t_{D(ON)}$	—	3.95	—	ns	$V_{DD} = 20\text{V}, V_{GS} = 10\text{V}, R_G = 3\Omega, I_D = 20\text{A}$
Turn-On Rise Time	$t_R$	—	5.41	—		
Turn-Off Delay Time	$t_{D(OFF)}$	—	15.4	—		
Turn-Off Fall Time	$t_F$	—	8.53	—		
Body Diode Reverse Recovery Time	$t_{RR}$	—	56.6	—	ns	$I_F = 20\text{A}, di/dt = 100\text{A}/\mu\text{s}$
Body Diode Reverse Recovery Charge	$Q_{RR}$	—	40.0	—	nC	

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

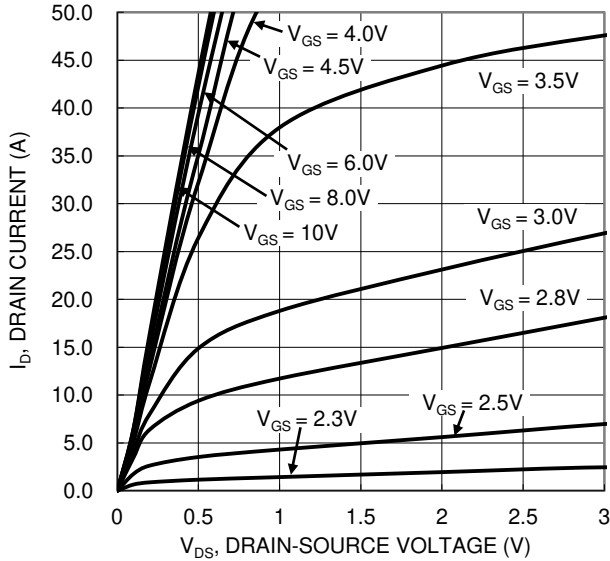


Figure 1. Typical Output Characteristic

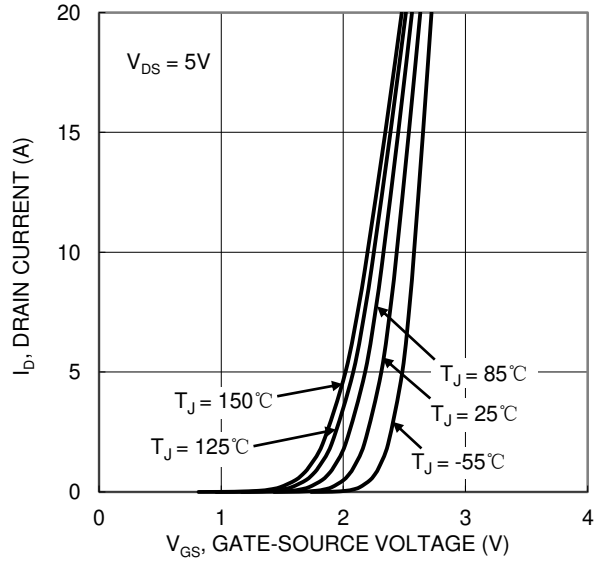


Figure 2. Typical Transfer Characteristic

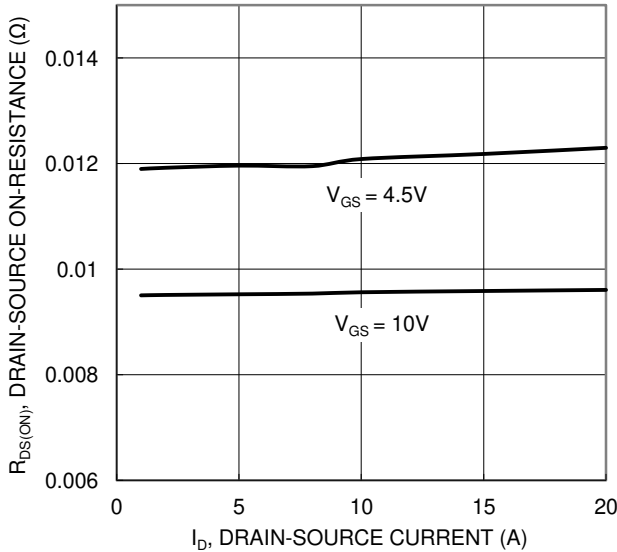


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

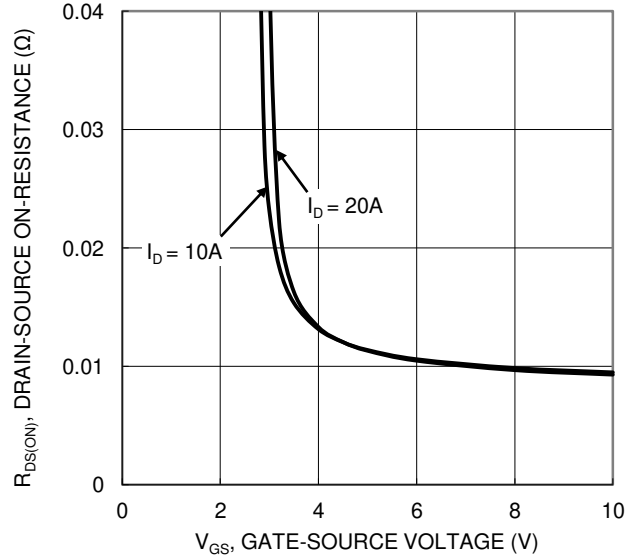


Figure 4. Typical Transfer Characteristic

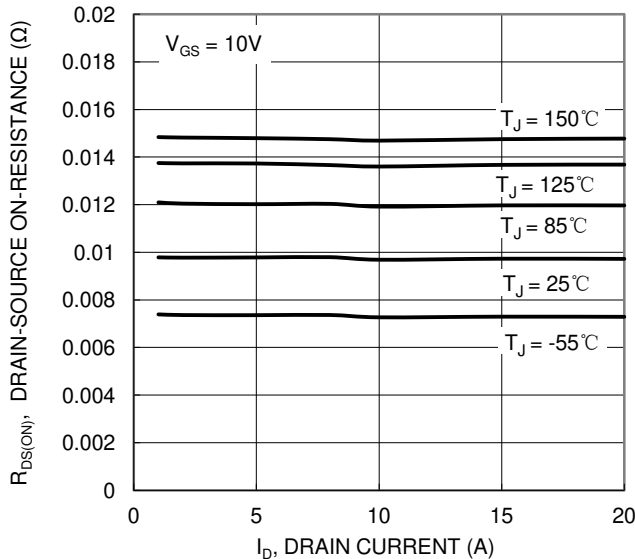


Figure 5. Typical On-Resistance vs. Drain Current and Junction Temperature

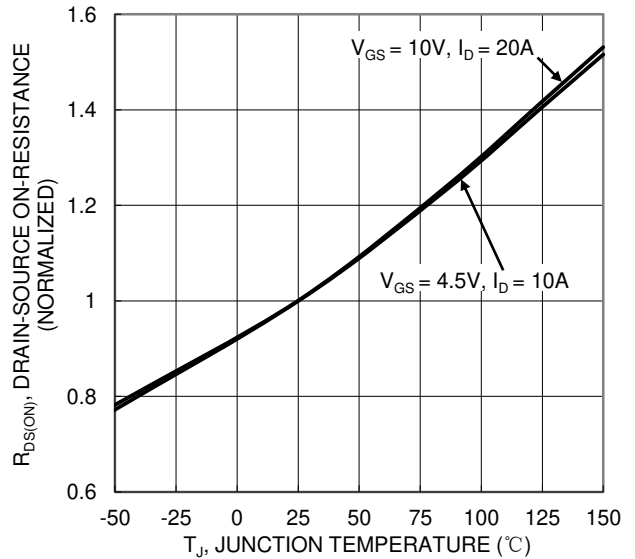


Figure 6. On-Resistance Variation with Junction Temperature

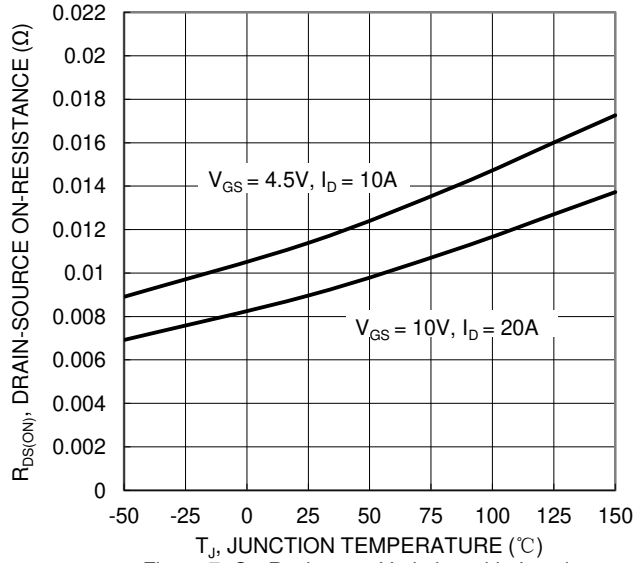


Figure 7. On-Resistance Variation with Junction Temperature

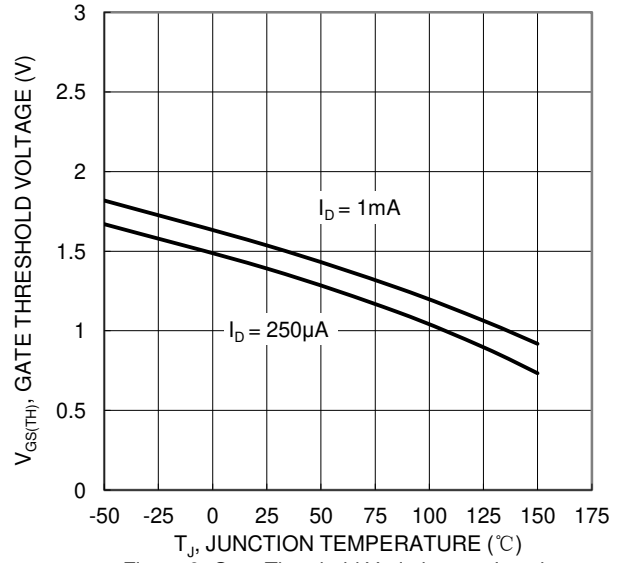


Figure 8. Gate Threshold Variation vs. Junction Temperature

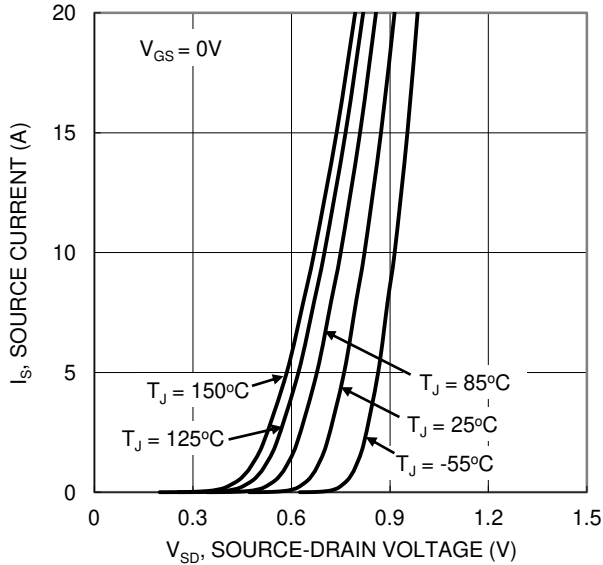


Figure 9. Diode Forward Voltage vs. Current

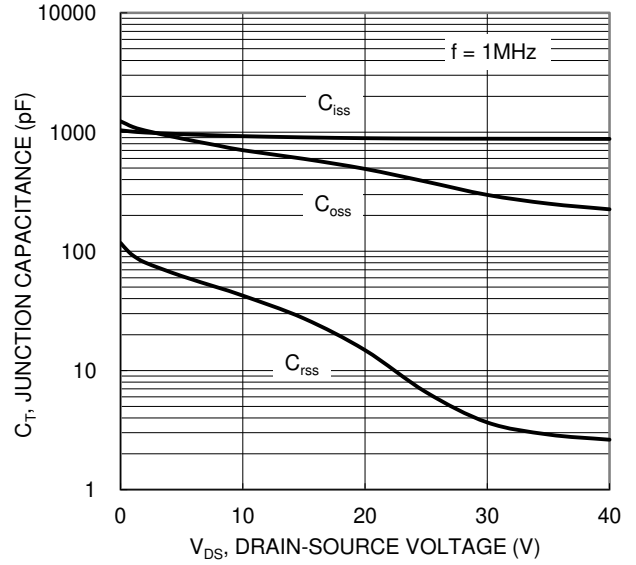


Figure 10. Typical Junction Capacitance

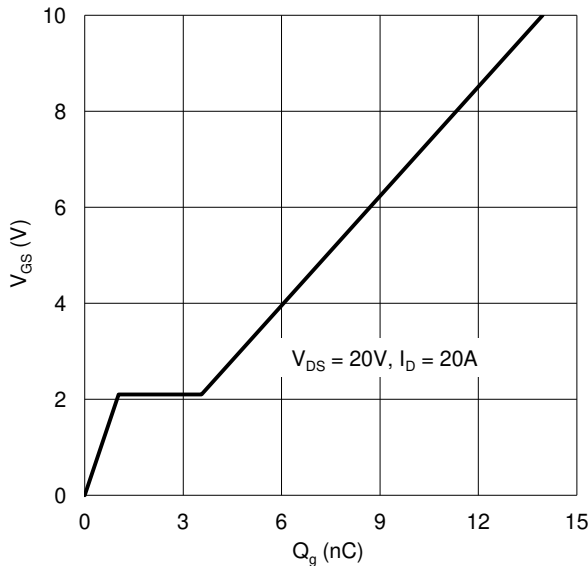


Figure 11. Gate Charge

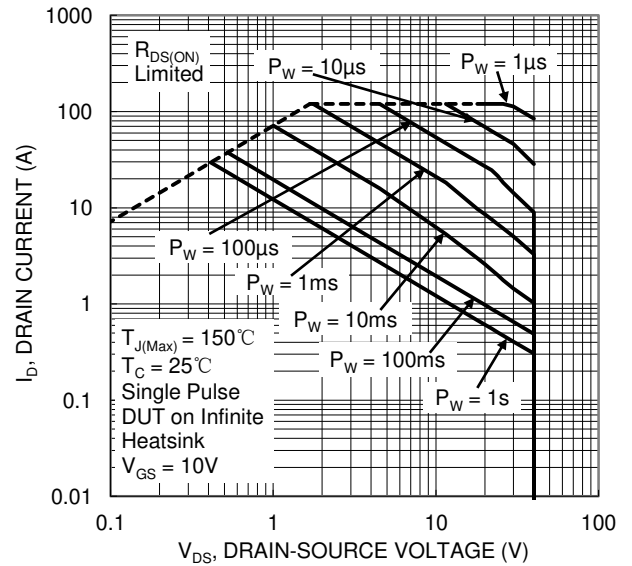


Figure 12. SOA, Safe Operation Area

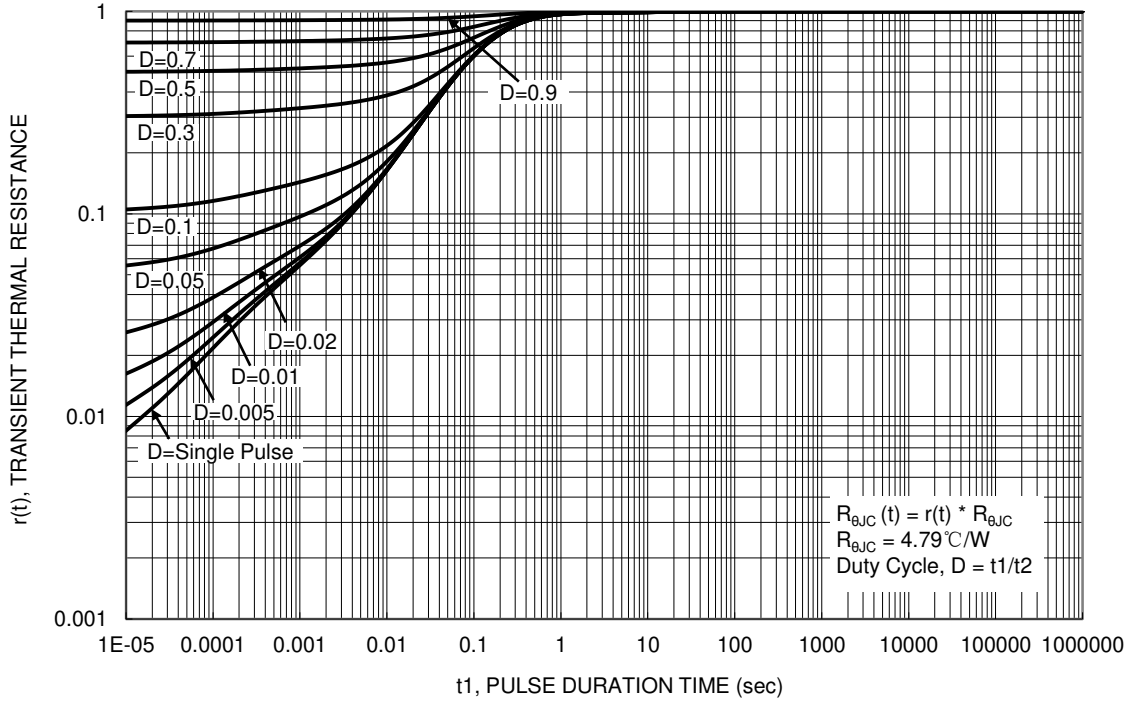
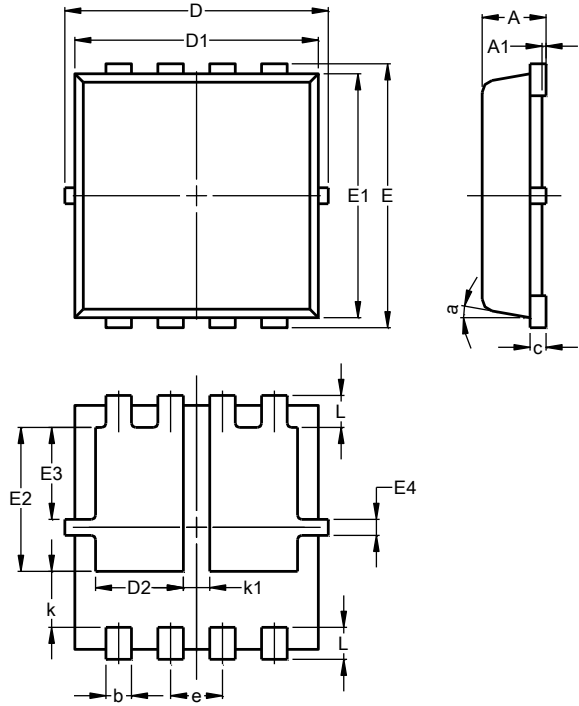


Figure 13. Transient Thermal Resistance

**Package Outline Dimensions**

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

**PowerDI3333-8 (Type UXC)**

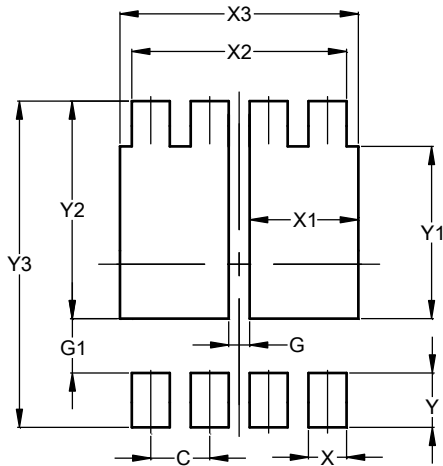


PowerDI3333-8 (Type UXC)			
Dim	Min	Max	Typ
A	0.75	0.85	0.80
A1	0.00	0.05	--
b	0.25	0.40	0.32
c	0.10	0.25	0.15
D	3.20	3.40	3.30
D1	2.95	3.15	3.05
D2	0.90	1.30	1.10
E	3.20	3.40	3.30
E1	2.95	3.15	3.05
E2	1.60	2.00	1.80
E3	0.95	1.35	1.15
E4	0.10	0.30	0.20
e	--	--	0.65
L	0.30	0.50	0.40
k	0.50	0.90	0.70
k1	0.13	0.53	0.33
a	0°	12°	10°
<b>All Dimensions in mm</b>			

**Suggested Pad Layout**

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

**PowerDI3333-8 (Type UXC)**



Dimensions	Value (in mm)
C	0.650
G	0.230
G1	0.600
X	0.420
X1	1.200
X2	2.370
X3	2.630
Y	0.600
Y1	1.900
Y2	2.400
Y3	3.600

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