

## Product Summary

BV <sub>DSS</sub>	R <sub>DS(ON)</sub> Max	I <sub>D</sub> Max T <sub>C</sub> = +25°C
60V	9.5mΩ @ V <sub>GS</sub> = 10V	54.1A
	13.3mΩ @ V <sub>GS</sub> = 4.5V	45.7A

## Description and Applications

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.

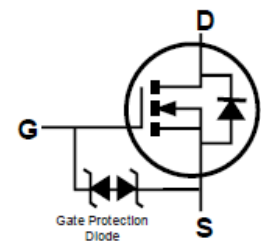
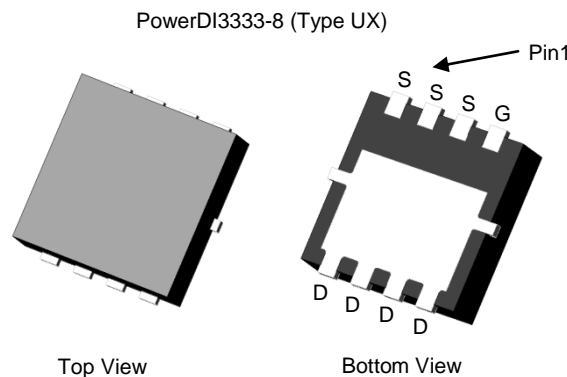
- Motor Control
- DC-DC Converters
- Power Management

## Features and Benefits

- 100% Unclamped Inductive Switching (UIS) Test in Production – Ensures More Reliable And Robust End Application
- Low R<sub>DS(ON)</sub> – 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
- ESD Protected Gate
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. “Green” Device (Note 3)**

## 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
- Terminals: Finish — Matte Tin Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208 @3
- Weight: 0.072 grams (Approximate)

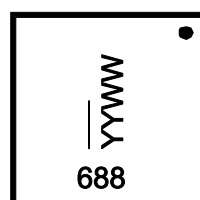


## Ordering Information (Note 4)

Part Number	Case	Packaging
DMT68M8LFV-7	PowerDI3333-8 (Type UX)	2000/Tape & Reel
DMT68M8LFV-13	PowerDI3333-8 (Type UX)	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. For packaging details, go to our website at <https://www.diodes.com/design/support/packaging/diodes-packaging/>

## Marking Information



688= Product Type Marking Code  
 YYWW = Date Code Marking  
 YY = Last Two Digits of Year (ex: 18 = 2018)  
 WW = Week Code (01 to 53)

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

Characteristic	Symbol	Value	Unit
Drain-Source Voltage	V <sub>DSS</sub>	60	V
Gate-Source Voltage	V <sub>GSS</sub>	±20	V
Continuous Drain Current (Note 6) V <sub>GS</sub> = 10V	I <sub>D</sub>	T <sub>C</sub> = +25°C 54.1	A
		T <sub>C</sub> = +70°C 43.3	
Pulsed Drain Current (10µs Pulse, Duty Cycle = 1%)	I <sub>DM</sub>	210	A
Maximum Continuous Body Diode Forward Current (Note 6)	I <sub>S</sub>	50	A
Pulsed Body Diode Forward Current (10µs Pulse, Duty Cycle = 1%)	I <sub>SM</sub>	210	A
Avalanche Current, L = 0.1mH	I <sub>AS</sub>	28	A
Avalanche Energy, L = 0.1mH	E <sub>AS</sub>	39	mJ

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

Characteristic	Symbol	Value	Unit
Total Power Dissipation (Note 5)	P <sub>D</sub>	T <sub>A</sub> = +25°C 2.7	W
Thermal Resistance, Junction to Ambient (Note 5)		R <sub>θJA</sub> 47	
Total Power Dissipation (Note 6)	P <sub>D</sub>	T <sub>C</sub> = +25°C 41.7	W
Thermal Resistance, Junction to Case (Note 6)		R <sub>θJC</sub> 3	
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 7)</b>						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	60	—	—	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> = 48V, V <sub>GS</sub> = 0V
Gate-Source Leakage	I <sub>GSS</sub>	—	—	±10	µA	V <sub>GS</sub> = ±20V, V <sub>DS</sub> = 0V
<b>ON CHARACTERISTICS (Note 7)</b>						
Gate Threshold Voltage	V <sub>GS(TH)</sub>	1	—	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>	—	6.6	9.5	mΩ	V <sub>GS</sub> = 10V, I <sub>D</sub> = 13.5A
		—	9.1	13.3		V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 11.5A
Diode Forward Voltage	V <sub>SD</sub>	—	0.8	1.2	V	V <sub>GS</sub> = 0V, I <sub>S</sub> = 13.5A
<b>DYNAMIC CHARACTERISTICS (Note 8)</b>						
Input Capacitance	C <sub>iss</sub>	—	2078	—	pF	V <sub>DS</sub> = 30V, V <sub>GS</sub> = 0V, f = 1MHz
Output Capacitance	C <sub>oss</sub>	—	605	—	pF	
Reverse Transfer Capacitance	C <sub>rss</sub>	—	44	—	pF	
Gate Resistance	R <sub>g</sub>	—	1.71	—	Ω	V <sub>DS</sub> = 0V, V <sub>GS</sub> = 0V, f = 1MHz
Total Gate Charge (V <sub>GS</sub> = 10V)	Q <sub>g</sub>	—	30	—	nC	V <sub>DD</sub> = 30V, I <sub>D</sub> = 20A
Total Gate Charge (V <sub>GS</sub> = 4.5V)	Q <sub>g</sub>	—	14.4	—	nC	
Gate-Source Charge	Q <sub>gs</sub>	—	4.1	—	nC	
Gate-Drain Charge	Q <sub>gd</sub>	—	6.7	—	nC	
Turn-On Delay Time	t <sub>D(ON)</sub>	—	5.2	—	ns	V <sub>DD</sub> = 30V, V <sub>GS</sub> = 10V, I <sub>D</sub> = 20A, R <sub>g</sub> = 3.3Ω
Turn-On Rise Time	t <sub>r</sub>	—	9.6	—	ns	
Turn-Off Delay Time	t <sub>D(OFF)</sub>	—	20.5	—	ns	
Turn-Off Fall Time	t <sub>f</sub>	—	8.9	—	ns	
Body Diode Reverse Recovery Time	t <sub>RR</sub>	—	32.5	—	ns	I <sub>f</sub> = 20A, di/dt = 100A/µs
Body Diode Reverse Recovery Charge	Q <sub>RR</sub>	—	22.8	—	nC	

- Note:
5. Device mounted on FR-4 substrate PC board, 2oz copper, with thermal bias to bottom layer 1inch square copper plate.
  6. Thermal resistance from junction to soldering point (on the exposed drain pad)
  7. Short duration pulse test used to minimize self-heating effect.
  8. Guaranteed by design. Not subject to product testing.

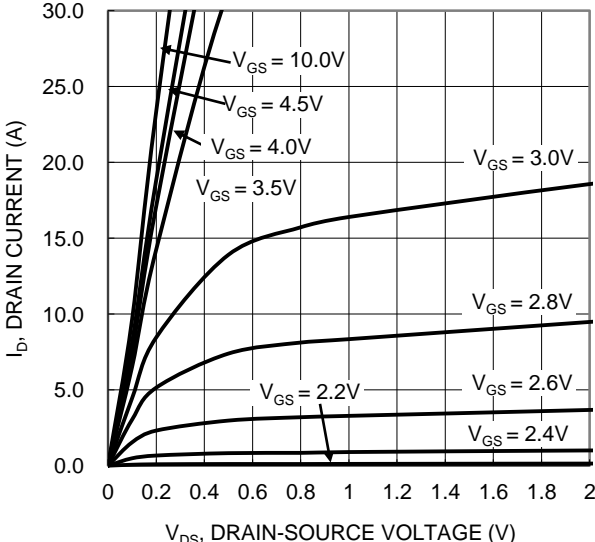


Figure 1. Typical Output Characteristic

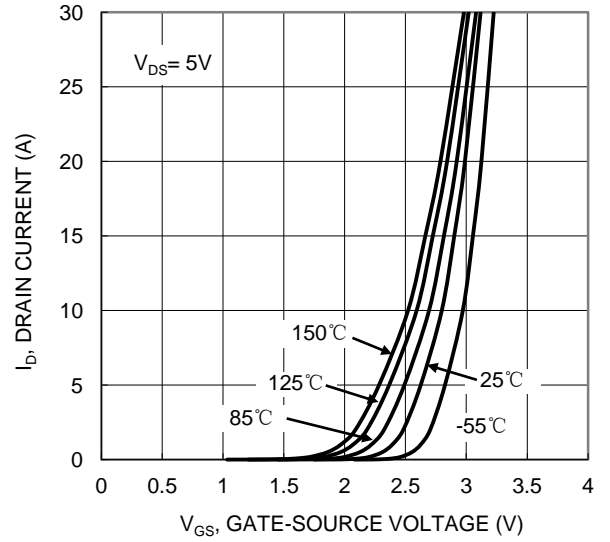


Figure 2. Typical Transfer Characteristic

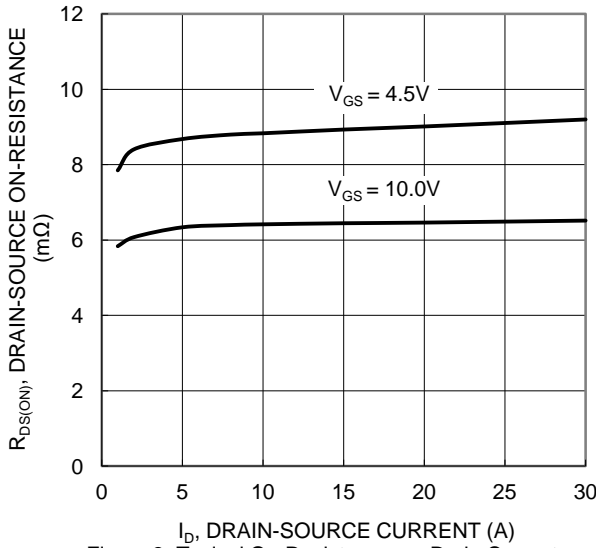


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

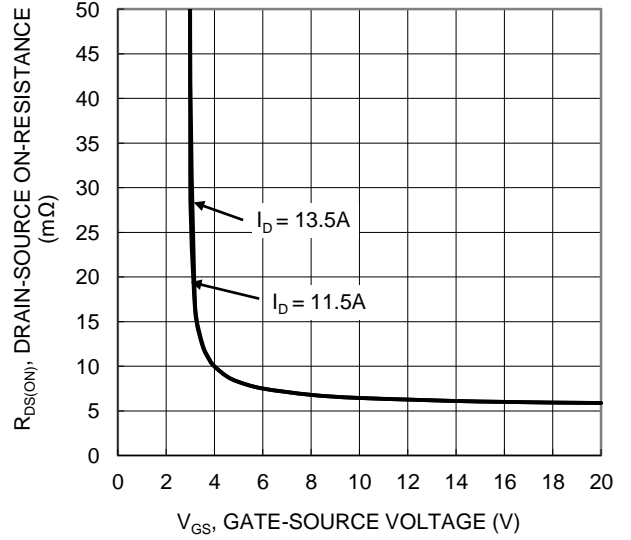


Figure 4. Typical Transfer Characteristic

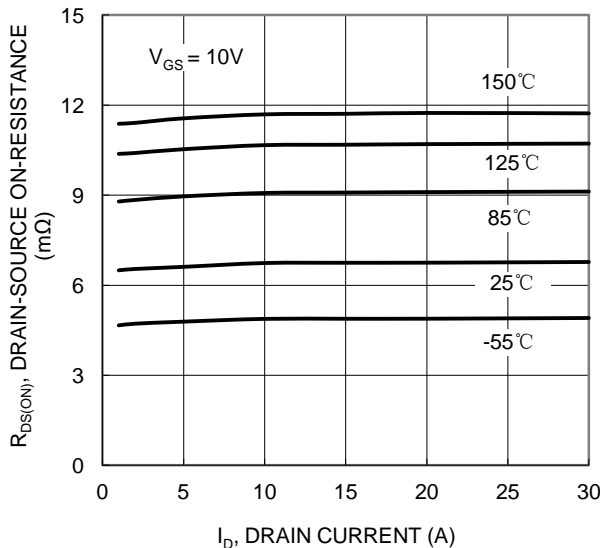


Figure 5. Typical On-Resistance vs. Drain Current and Temperature

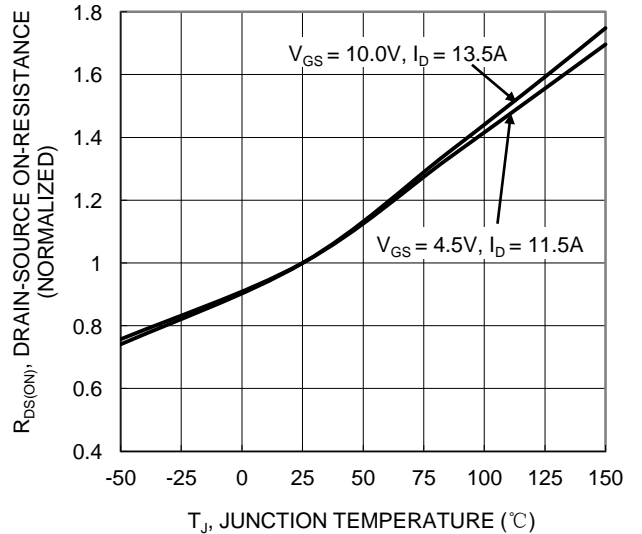
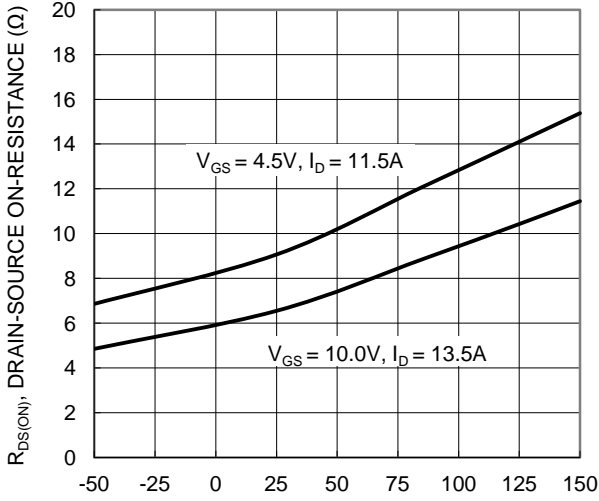
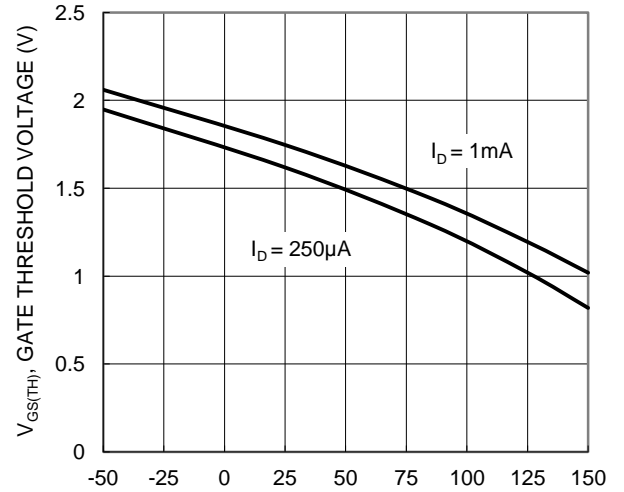


Figure 6. On-Resistance Variation with Temperature



$T_J$ , JUNCTION TEMPERATURE ( $^{\circ}\text{C}$ )  
Figure 7. On-Resistance Variation with Temperature



$T_J$ , JUNCTION TEMPERATURE ( $^{\circ}\text{C}$ )  
Figure 8. Gate Threshold Variation vs. Junction Temperature

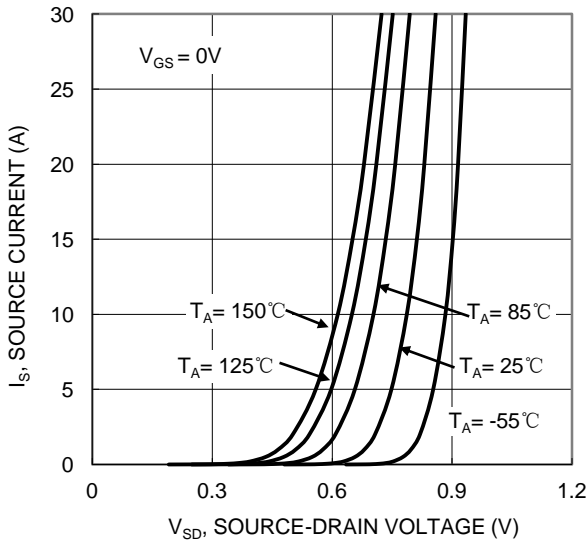


Figure 9. Diode Forward Voltage vs. Current

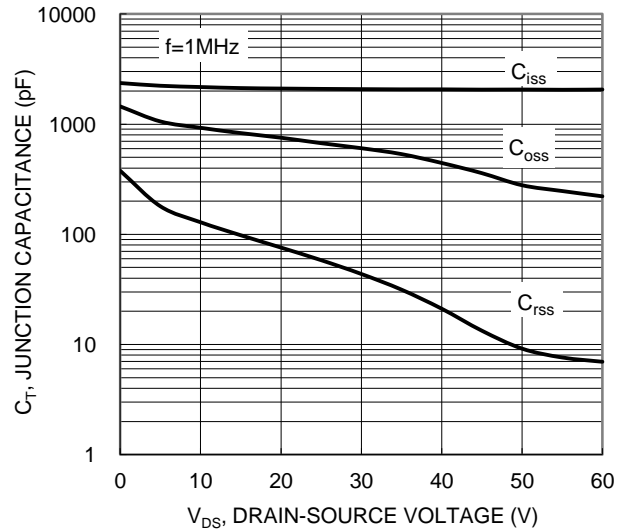


Figure 10. Typical Junction Capacitance

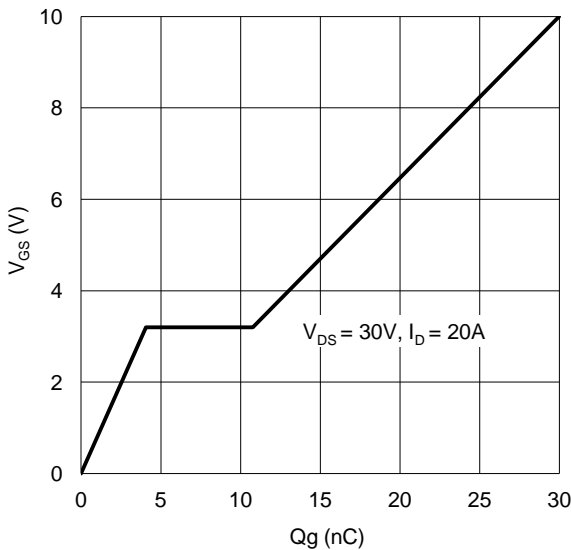


Figure 11. Gate Charge

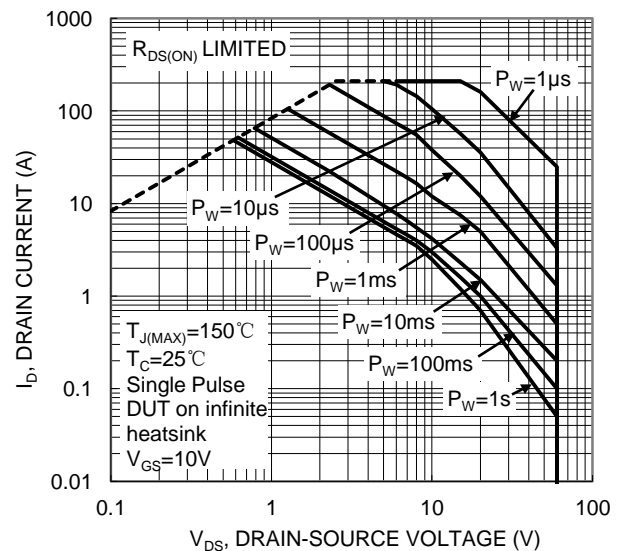


Figure 12. SOA, Safe Operation Area

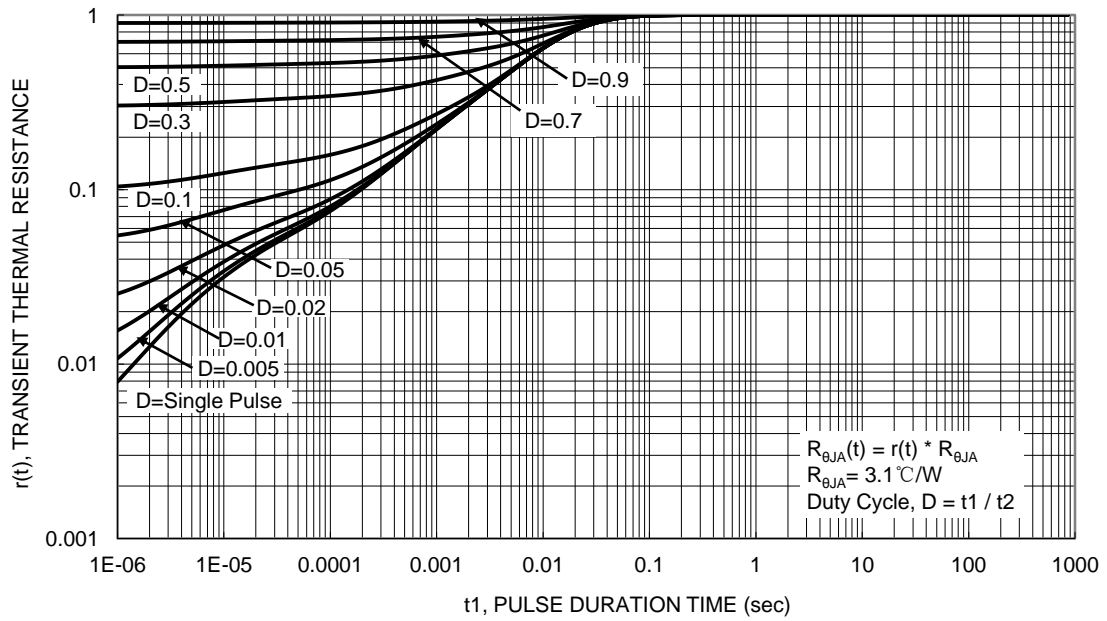
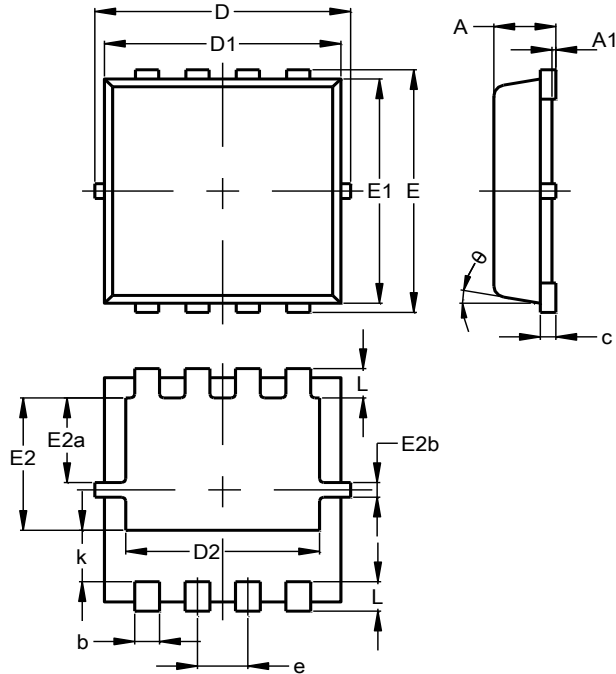


Figure 13. Transient Thermal Resistance

**Package Outline Dimensions**

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

**PowerDI3333-8 (Type UX)**

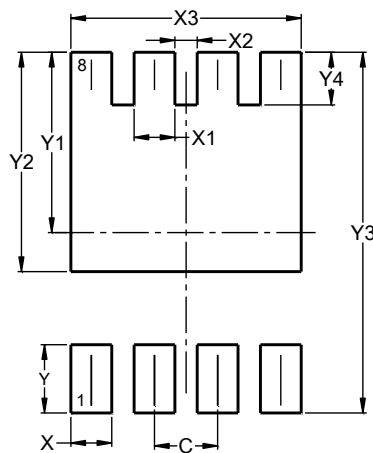


PowerDI3333-8 (Type UX)			
Dim	Min	Max	Typ
A	0.75	0.85	0.80
A1	0.00	0.05	--
b	0.25	0.40	0.32
c	0.10	0.25	0.15
D	3.20	3.40	3.30
D1	2.95	3.15	3.05
D2	2.30	2.70	2.50
E	3.20	3.40	3.30
E1	2.95	3.15	3.05
E2	1.60	2.00	1.80
E2a	0.95	1.35	1.15
E2b	0.10	0.30	0.20
e	0.65 BSC		
k	0.50	0.90	0.70
L	0.30	0.50	0.40
θ	0°	12°	10°
All Dimensions in mm			

**Suggested Pad Layout**

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

**PowerDI3333-8 (Type UX)**



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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