

## Product Summary

$BV_{DSS}$	$R_{DS(ON)}$ Max	$I_D$ Max (Note 10) $T_C = +25^\circ C$
40V	3.0m $\Omega$ @ $V_{GS} = 10V$	100A
	5.0m $\Omega$ @ $V_{GS} = 5V$	93A

## Features and Benefits

- Rated to +175°C – Ideal for High Ambient Temperature Environments
- 100% Unclamped Inductive Switching, Test in Production – Ensures More Reliable and Robust End Application
- Low  $R_{DS(ON)}$  – Ensures On-State Losses are Minimized
- Excellent  $Q_{GD} \times R_{DS(ON)}$  Product (FOM)
- Lead-Free Finish; 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)**

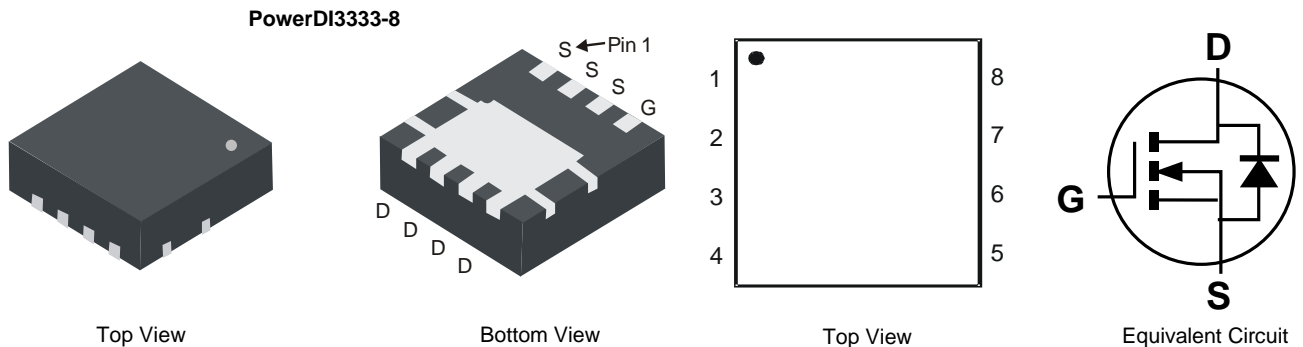
## Description and Applications

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
- DC-DC Converters
- Power Management

## 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 Finish – Matte Tin Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208 <sup>(e3)</sup>
- Weight: 0.008 grams (Approximate)

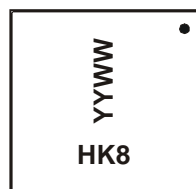


## Ordering Information (Note 5)

Part Number	Case	Packaging
DMTH43M8LFGQ-7	PowerDI3333-8	2,000/Tape & Reel
DMTH43M8LFGQ-13	PowerDI3333-8	3,000/Tape & Reel

- Notes:
- EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant. All applicable RoHS exemptions applied.
  - 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.
  - Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
  - Automotive products are AEC-Q101 qualified and are PPAP capable. Refer to <https://www.diodes.com/quality/>.
  - For packaging details, go to our website at <https://www.diodes.com/design/support/packaging/diodes-packaging/>.

## Marking Information



HK8 = 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>C</sub> = +25°C, unless otherwise specified.)

Characteristic	Symbol	Value	Unit
Drain-Source Voltage	V <sub>DSS</sub>	40	V
Gate-Source Voltage	V <sub>GSS</sub>	±20	V
Continuous Drain Current (Note 7) (Note10) V <sub>GS</sub> = 10V	I <sub>D</sub>	T <sub>C</sub> = +25°C	100
		T <sub>C</sub> = +100°C	85
Continuous Drain Current (Note 6) V <sub>GS</sub> = 10V	I <sub>D</sub>	T <sub>A</sub> = +25°C	24.0
		T <sub>A</sub> = +100°C	16.9
Pulsed Drain Current (10µs Pulse, Duty Cycle = 1%)	I <sub>DM</sub>	400	A
Maximum Continuous Body Diode Forward Current (Note 7)	I <sub>S</sub>	3.05	A
Pulsed Body Diode Forward Current (10µs Pulse, Duty Cycle = 1%)	I <sub>SM</sub>	400	A
Avalanche Current, L = 1mH	I <sub>AS</sub>	18.2	A
Avalanche Energy, L = 1mH	E <sub>AS</sub>	165	mJ

**Thermal Characteristics**

Characteristic	Symbol	Value	Unit
Total Power Dissipation (Note 6)	P <sub>D</sub>	2.62	W
Thermal Resistance, Junction to Ambient (Note 6)	R <sub>θJA</sub>	57.8	°C/W
Total Power Dissipation (Note 7)	P <sub>D</sub>	65.2	W
Thermal Resistance, Junction to Case (Note 7)	R <sub>θJC</sub>	2.3	°C/W
Operating and Storage Temperature Range	T <sub>J</sub> , T <sub>STG</sub>	-55 to +175	°C

**Electrical Characteristics** (@T<sub>J</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>	40	—	—	V	V <sub>GS</sub> = 0V, I <sub>D</sub> = 1mA
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	—	—	1	µA	V <sub>DS</sub> = 32V, 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	1.5	2.5	V	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250µA
Static Drain-Source On-Resistance	R <sub>DS(ON)</sub>	—	2.3	3.0	mΩ	V <sub>GS</sub> = 10V, I <sub>D</sub> = 20A
		—	3.4	5.0		V <sub>GS</sub> = 5V, I <sub>D</sub> = 15A
Static Drain-Source On-Resistance (T <sub>J</sub> = +175°C) (Note 9)	R <sub>DS(ON)</sub>	—	—	6.0	mΩ	V <sub>GS</sub> = 10V, I <sub>D</sub> = 20A
		—	—	9.0		V <sub>GS</sub> = 5V, I <sub>D</sub> = 15A
Diode Forward Voltage	V <sub>SD</sub>	—	0.8	1.0	V	V <sub>GS</sub> = 0V, I <sub>S</sub> = 20A
<b>DYNAMIC CHARACTERISTICS</b> (Note 9)						
Input Capacitance	C <sub>ISS</sub>	—	2798	—	pF	V <sub>DS</sub> = 20V, V <sub>GS</sub> = 0V, f = 1MHz
Output Capacitance	C <sub>OSS</sub>	—	904	—		
Reverse Transfer Capacitance	C <sub>RSS</sub>	—	88	—		
Gate Resistance	R <sub>G</sub>	—	2.44	—	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>	—	40.1	—	nC	V <sub>DS</sub> = 20V, I <sub>D</sub> = 20A, V <sub>GS</sub> = 10V
Gate-Source Charge	Q <sub>GS</sub>	—	5.2	—		
Gate-Drain Charge	Q <sub>GD</sub>	—	8.8	—		
Turn-On Delay Time	t <sub>D(ON)</sub>	—	5.16	—	ns	V <sub>DD</sub> = 20V, V <sub>GS</sub> = 10V, R <sub>G</sub> = 1.6Ω, I <sub>D</sub> = 20A
Turn-On Rise Time	t <sub>R</sub>	—	10.7	—		
Turn-Off Delay Time	t <sub>D(OFF)</sub>	—	24.6	—		
Turn-Off Fall Time	t <sub>F</sub>	—	12.4	—		
Body Diode Reverse Recovery Time	t <sub>RR</sub>	—	32.6	—	ns	I <sub>F</sub> = 15A, di/dt = 100A/µs
Body Diode Reverse Recovery Charge	Q <sub>RR</sub>	—	26.6	—	nC	

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

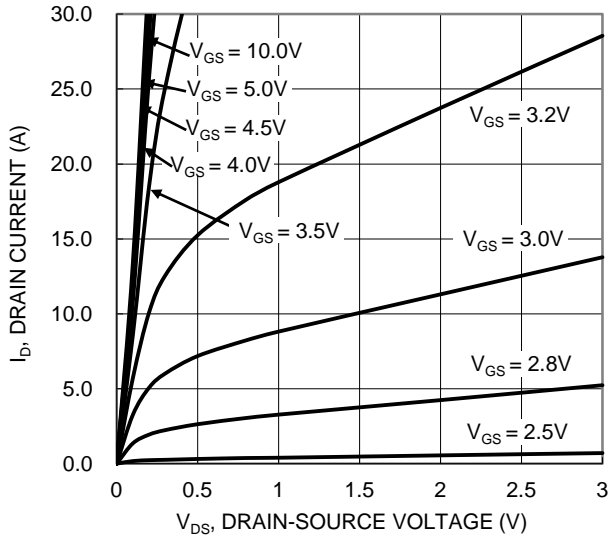


Figure 1. Typical Output Characteristic

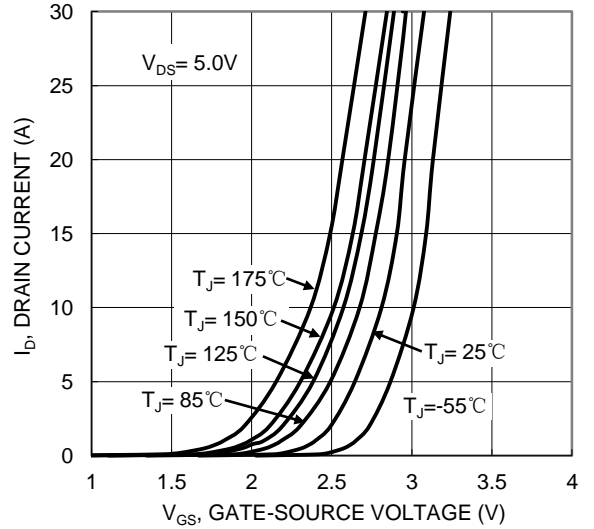


Figure 2. Typical Transfer Characteristic

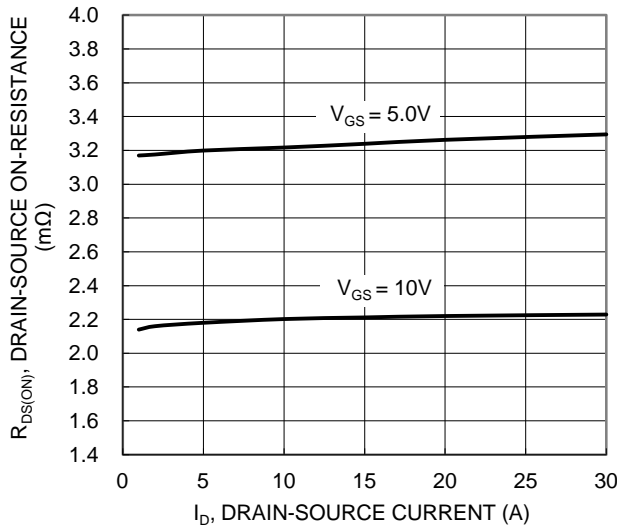


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

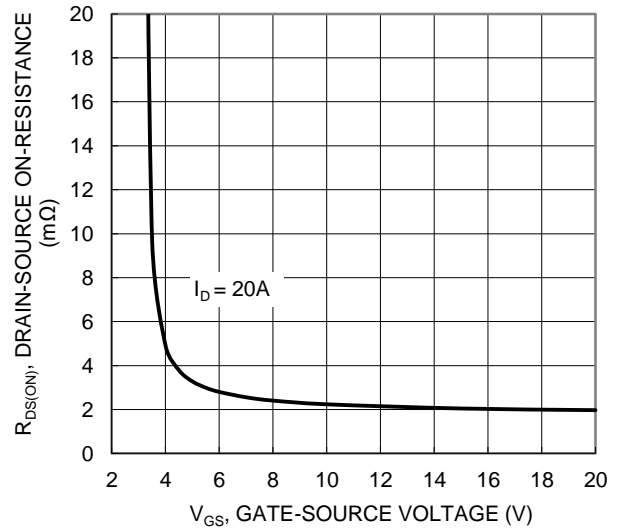


Figure 4. Typical Transfer Characteristic

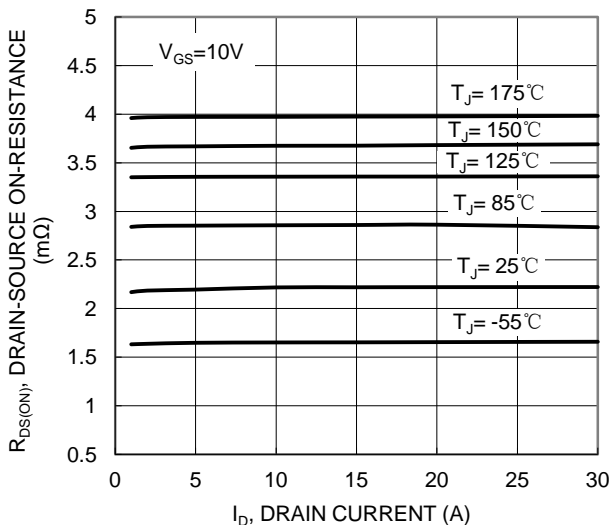


Figure 5. Typical On-Resistance vs. Drain Current and Temperature

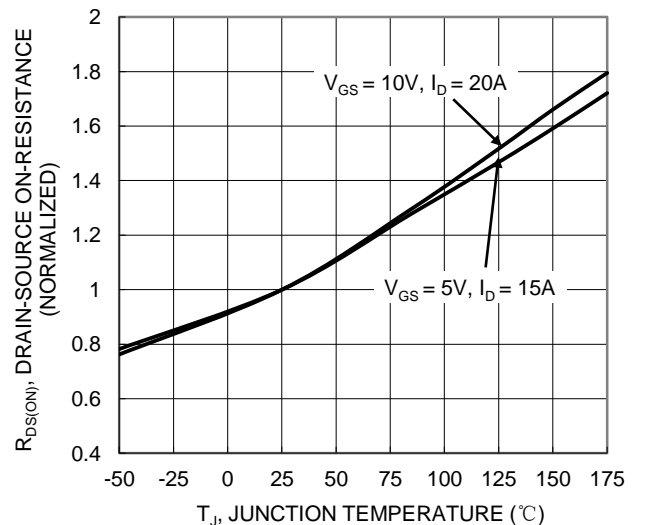


Figure 6. On-Resistance Variation with Temperature

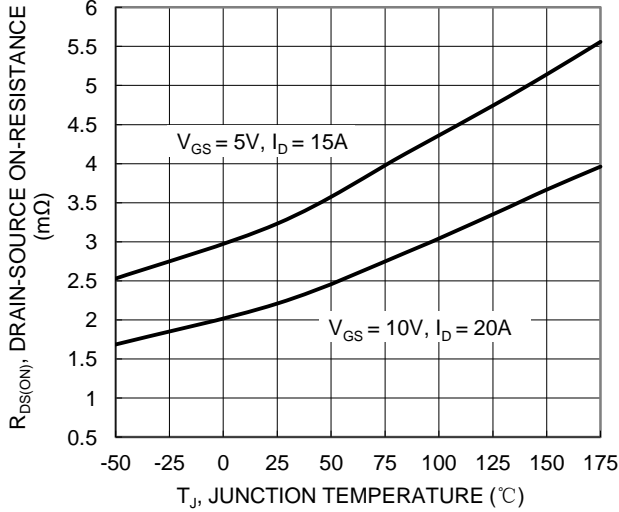


Figure 7. On-Resistance Variation with Temperature

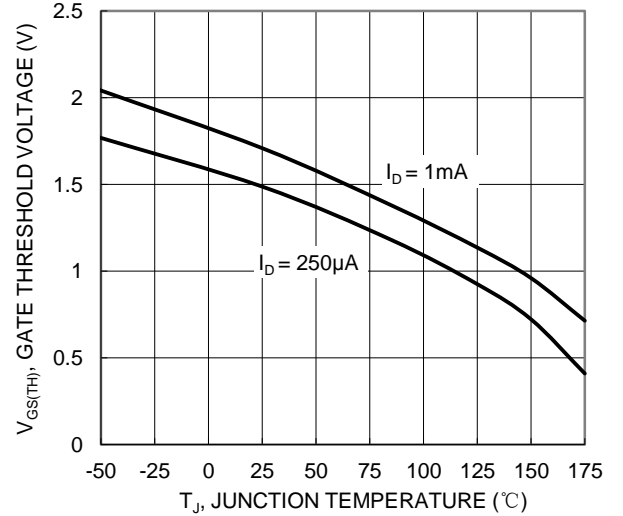


Figure 8. Gate Threshold Variation vs. Junction Temperature

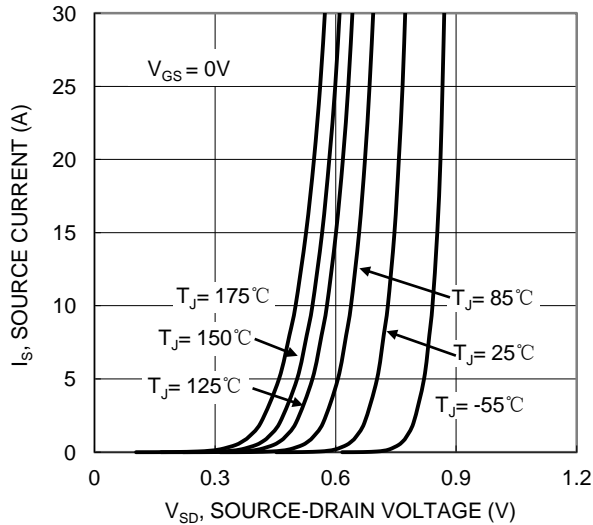


Figure 9. Diode Forward Voltage vs. Current

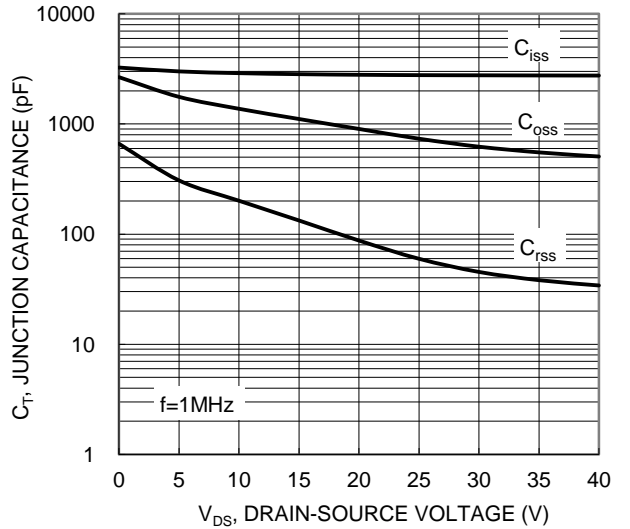


Figure 10. Typical Junction Capacitance

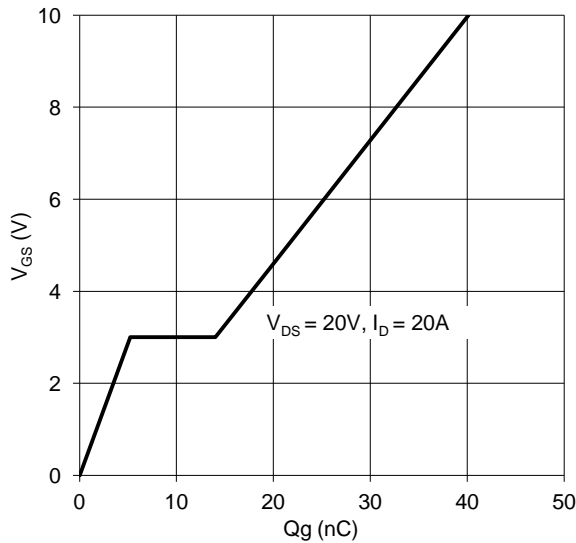


Figure 11. Gate Charge

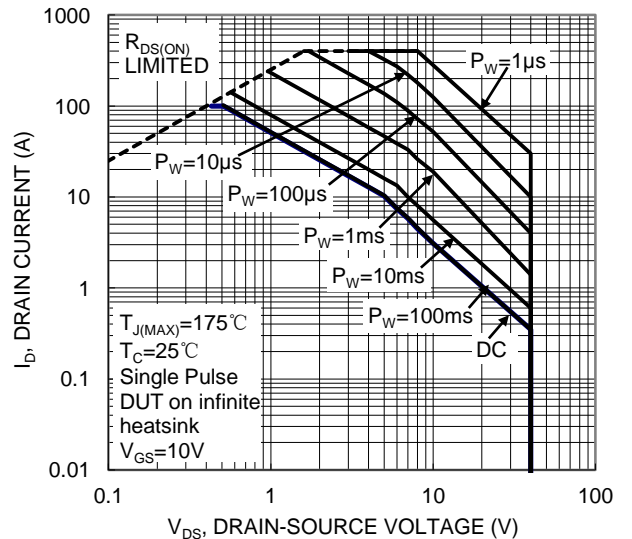


Figure 12. SOA, Safe Operation Area

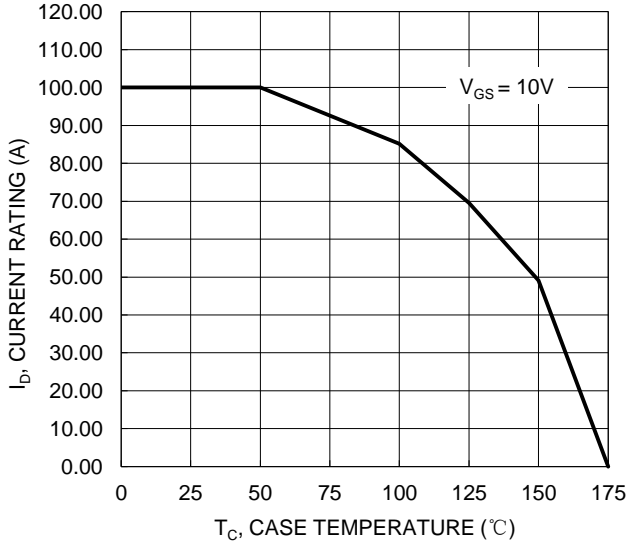


Figure 13. Current Function of  $T_C$

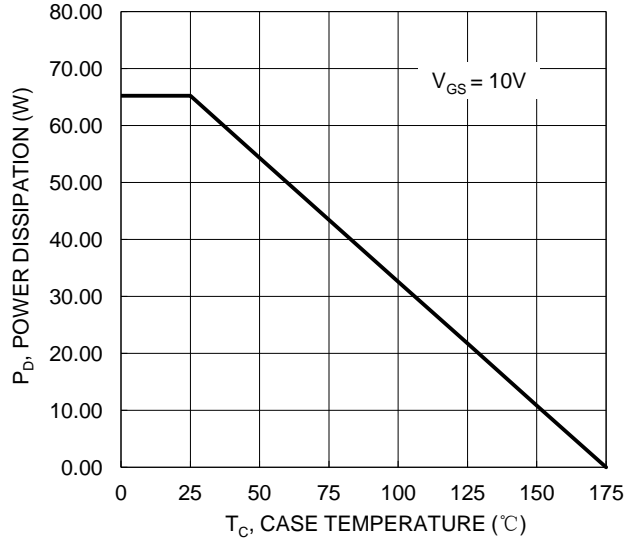


Figure 14. Power Dissipation Function of  $T_C$

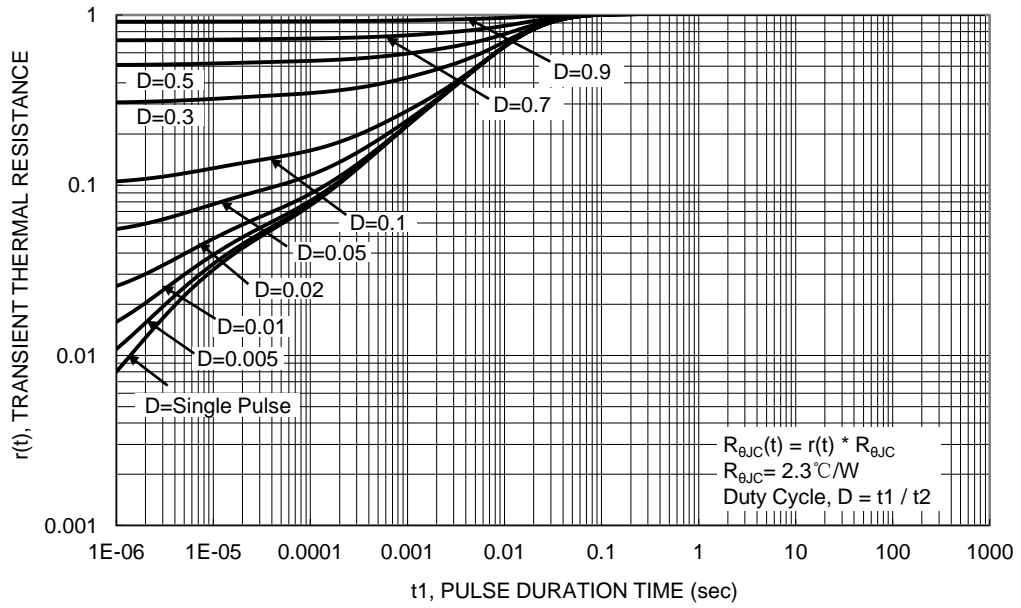
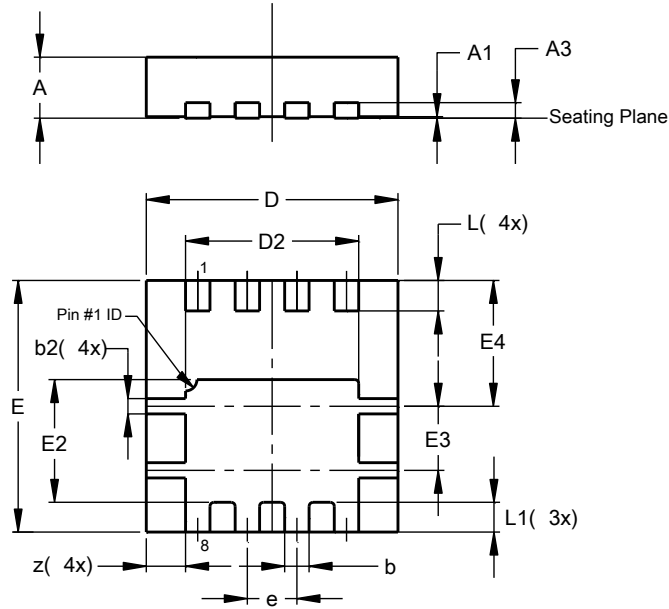


Figure 15. Transient Thermal Resistance

**Package Outline Dimensions**

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

**PowerDI3333-8**

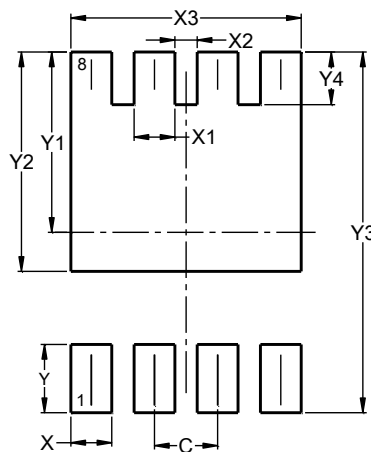


PowerDI3333-8			
Dim	Min	Max	Typ
A	0.75	0.85	0.80
A1	0.00	0.05	0.02
A3	-	-	0.203
b	0.27	0.37	0.32
b2	0.15	0.25	0.20
D	3.25	3.35	3.30
D2	2.22	2.32	2.27
E	3.25	3.35	3.30
E2	1.56	1.66	1.61
E3	0.79	0.89	0.84
E4	1.60	1.70	1.65
e	-	-	0.65
L	0.35	0.45	0.40
L1	-	-	0.39
z	-	-	0.515
All Dimensions in mm			

**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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