

## Product Summary

$V_{(BR)DSS}$	$R_{DS(ON)}$	$I_D$ $T_A = 25^\circ C$
30V	18.6m $\Omega$ @ $V_{GS} = 10V$	8.0A
	26.5m $\Omega$ @ $V_{GS} = 4.5V$	6.5A

## Description

This new generation MOSFET has been designed to minimize the on-state resistance ( $R_{DS(on)}$ ) and yet maintain superior switching performance, making it ideal for high efficiency power management applications.


## Applications

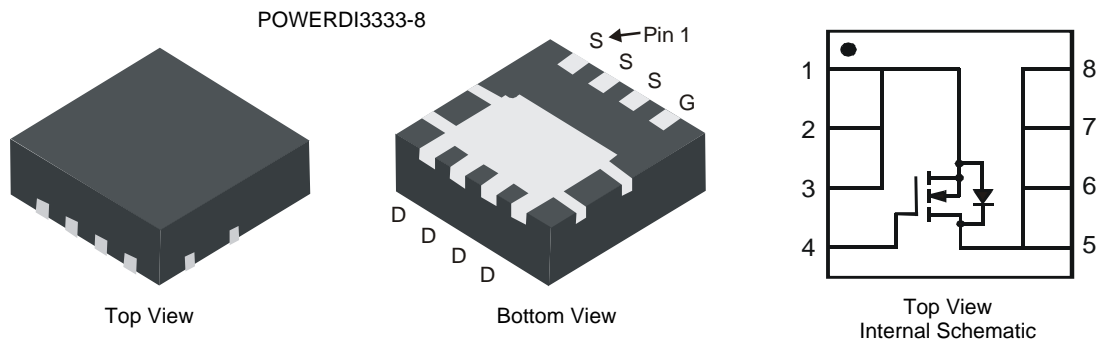
- Backlighting
- DC-DC Converters
- Power management functions

## Features

- 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
- 100% UIS (Avalanche) rated
- 100% Rg tested
- **Lead-Free Finish; RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**

## Mechanical Data

- Case: POWERDI3333-8
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Connections: See Diagram Below
- Terminals: Finish — Matte Tin annealed over Copper leadframe. Solderable per MIL-STD-202, Method 208 
- Weight: 0.072 grams (approximate)

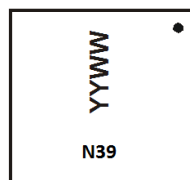


## Ordering Information (Note 4)

Part Number	Case	Packaging
DMN3029LFG-7	POWERDI3333-8	2000 / Tape & Reel
DMN3029LFG-13	POWERDI3333-8	3000 / Tape & Reel

- Notes:
1. EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant. All applicable RoHS exemptions applied.
  2. See <http://www.diodes.com> 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 <http://www.diodes.com>.

## Marking Information



N39 = Product marking code  
YYWW = Date code marking  
YY = Last digit of year (ex: 10 for 2010)  
WW = Week code (01 – 53)

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

Characteristic			Symbol	Value	Unit
Drain-Source Voltage			V <sub>DSS</sub>	30	V
Gate-Source Voltage			V <sub>GSS</sub>	±25	V
Continuous Drain Current (Note 5) V <sub>GS</sub> = 10V	Steady State	T <sub>A</sub> = +25°C	I <sub>D</sub>	5.3	A
		T <sub>A</sub> = +70°C		4.2	
Continuous Drain Current (Note 6) V <sub>GS</sub> = 10V	Steady State	T <sub>A</sub> = +25°C	I <sub>D</sub>	8.0	A
		T <sub>A</sub> = +70°C		6.3	
Continuous Drain Current (Note 6) V <sub>GS</sub> = 10V	t ≤ 10s	T <sub>A</sub> = +25°C	I <sub>D</sub>	9.5	A
		T <sub>A</sub> = +70°C		7.7	
Continuous Drain Current (Note 6) V <sub>GS</sub> = 4.5V	Steady State	T <sub>A</sub> = +25°C	I <sub>D</sub>	6.5	A
		T <sub>A</sub> = +70°C		4.9	
Continuous Drain Current (Note 6) V <sub>GS</sub> = 4.5V	t ≤ 10s	T <sub>A</sub> = +25°C	I <sub>D</sub>	7.8	A
		T <sub>A</sub> = +70°C		6.2	
Pulsed Drain Current (Note 7)			I <sub>DM</sub>	70	A
Avalanche Current (Notes 7 & 8)			I <sub>AR</sub>	18	A
Repetitive Avalanche Energy (Notes 7 & 8) L = 0.1mH			E <sub>AR</sub>	16	mJ

## Thermal Characteristics

Characteristic	Symbol	Max	Unit
Power Dissipation (Note 5)	P <sub>D</sub>	1.0	W
Thermal Resistance, Junction to Ambient @T <sub>A</sub> = +25°C (Note 5)	R <sub>θJA</sub>	130.6	°C/W
Power Dissipation (Note 6)	P <sub>D</sub>	2.07	W
Thermal Resistance, Junction to Ambient @T <sub>A</sub> = +25°C (Note 6)	R <sub>θJA</sub>	62.5	°C/W
Power Dissipation (Note 6) t ≤ 10s	P <sub>D</sub>	3.0	W
Thermal Resistance, Junction to Ambient @T <sub>A</sub> = +25°C (Note 6) t ≤ 10s	R <sub>θJA</sub>	43.8	°C/W
Operating and Storage Temperature Range	T <sub>J</sub> , T <sub>STG</sub>	-55 to +150	°C

- Notes:
- Device mounted on FR-4 PCB with minimum recommended pad layout, single sided.
  - Device mounted on 2" x 2" FR-4 PCB with high coverage 2 oz. Copper, single sided.
  - Repetitive rating, pulse width limited by junction temperature.
  - I<sub>AR</sub> and E<sub>AR</sub> rating are based on low frequency and duty cycles to keep T<sub>J</sub> = +25°C.

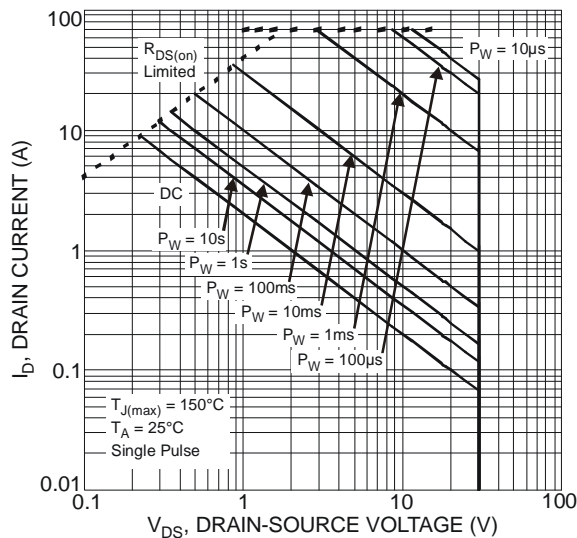


Fig. 1 SOA, Safe Operation Area

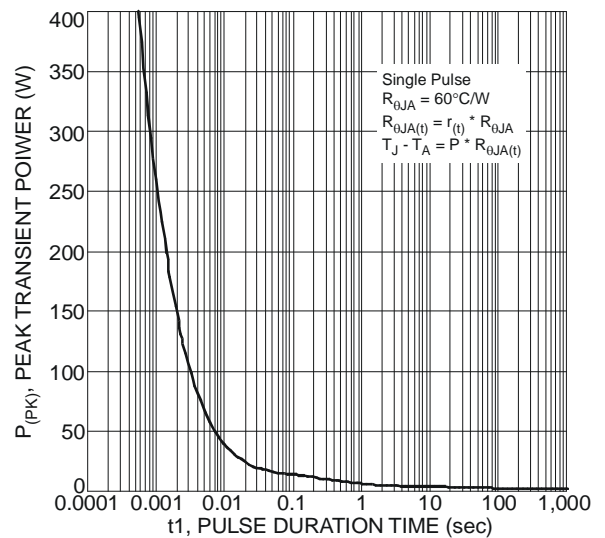


Fig. 2 Single Pulse Maximum Power Dissipation

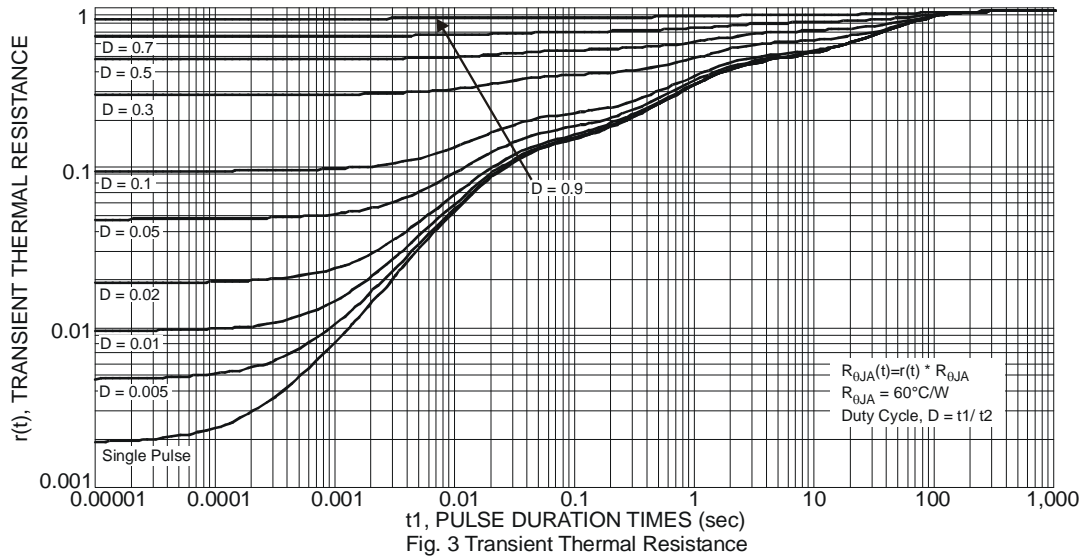


Fig. 3 Transient Thermal Resistance

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

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS (Note 9)</b>						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	30	-	-	V	V <sub>GS</sub> = 0V, I <sub>D</sub> = 250μA
Zero Gate Voltage Drain Current T <sub>J</sub> = +25°C	I <sub>DSS</sub>	-	-	0.1	μA	V <sub>DS</sub> = 30V, V <sub>GS</sub> = 0V
Gate-Source Leakage	I <sub>GSS</sub>	-	-	±100	nA	V <sub>GS</sub> = ±25V, V <sub>DS</sub> = 0V
<b>ON CHARACTERISTICS (Note 9)</b>						
Gate Threshold Voltage	V <sub>GS(th)</sub>	0.9	1.2	1.8	V	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250μA
Static Drain-Source On-Resistance	R <sub>DS(ON)</sub>	-	13.5	18.6	mΩ	V <sub>GS</sub> = 10V, I <sub>D</sub> = 10A
		-	22	26.5		V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 7.5A
Forward Transfer Admittance	Y <sub>fs</sub>	-	13.0	-	S	V <sub>DS</sub> = 5V, I <sub>D</sub> = 10A
Diode Forward Voltage	V <sub>SD</sub>	-	0.7	1.0	V	V <sub>GS</sub> = 0V, I <sub>S</sub> = 1A
<b>DYNAMIC CHARACTERISTICS (Note 10)</b>						
Input Capacitance	C <sub>iss</sub>	-	580	-	pF	V <sub>DS</sub> = 15V, V <sub>GS</sub> = 0V, f = 1.0MHz
Output Capacitance	C <sub>oss</sub>	-	110	-		
Reverse Transfer Capacitance	C <sub>rss</sub>	-	70	-		
Gate Resistance	R <sub>g</sub>	-	2.0	3.0	Ω	V <sub>DS</sub> = 0V, V <sub>GS</sub> = 0V, f = 1MHz
Total Gate Charge V <sub>GS</sub> = 4.5V	Q <sub>g</sub>	-	5.3	-	nC	V <sub>GS</sub> = 4.5V, V <sub>DS</sub> = 15V, I <sub>D</sub> = 10A
Total Gate Charge V <sub>GS</sub> = 10V	Q <sub>g</sub>	-	11.3	-		
Gate-Source Charge	Q <sub>gs</sub>	-	1.9	-		
Gate-Drain Charge	Q <sub>gd</sub>	-	1.9	-		
Turn-On Delay Time	t <sub>D(on)</sub>	-	4.4	-	ns	V <sub>GS</sub> = 10V, V <sub>DS</sub> = 15V, R <sub>L</sub> = 15Ω, R <sub>G</sub> = 6Ω
Turn-On Rise Time	t <sub>r</sub>	-	4.6	-	ns	
Turn-Off Delay Time	t <sub>D(off)</sub>	-	19.5	-	ns	
Turn-Off Fall Time	t <sub>f</sub>	-	5.8	-	ns	

Notes: 9. Short duration pulse test used to minimize self-heating effect.  
10. Guaranteed by design. Not subject to production testing.

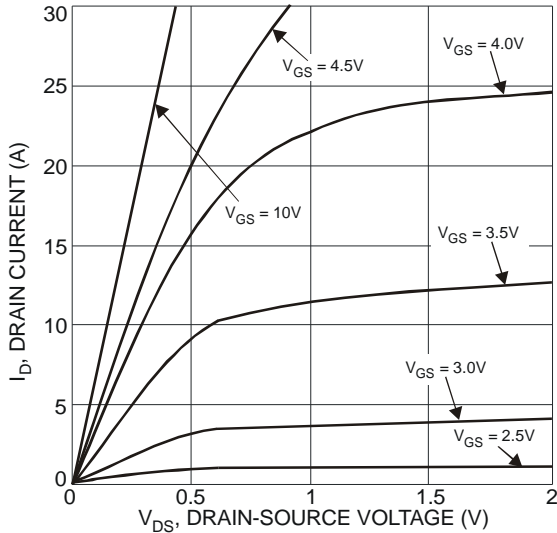


Fig. 4 Typical Output Characteristic

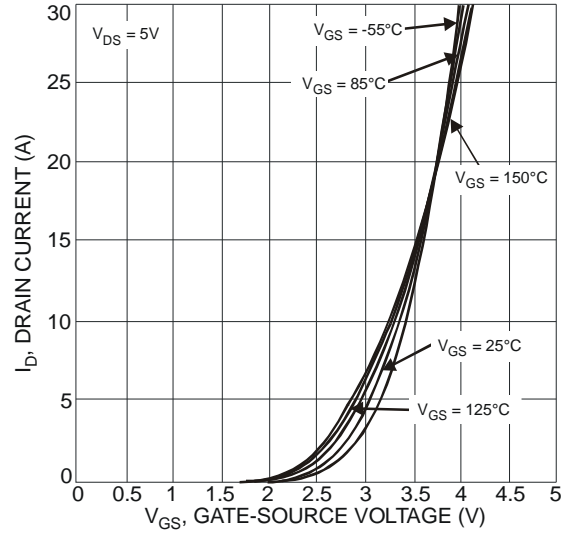


Fig. 5 Typical Transfer Characteristic

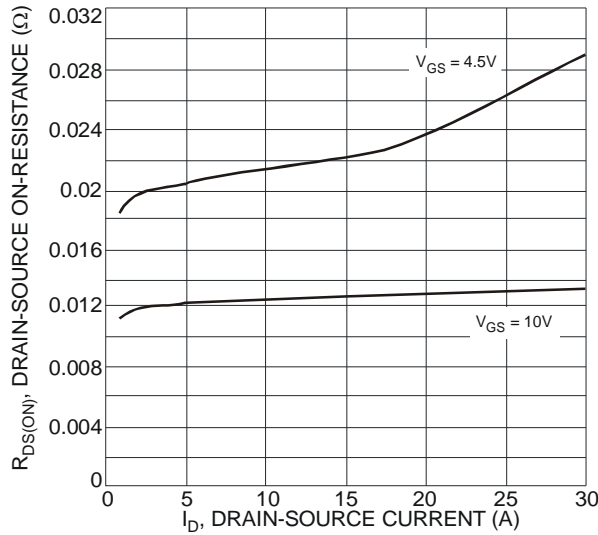


Fig. 6 Typical On-Resistance vs. Drain Current and Gate Voltage

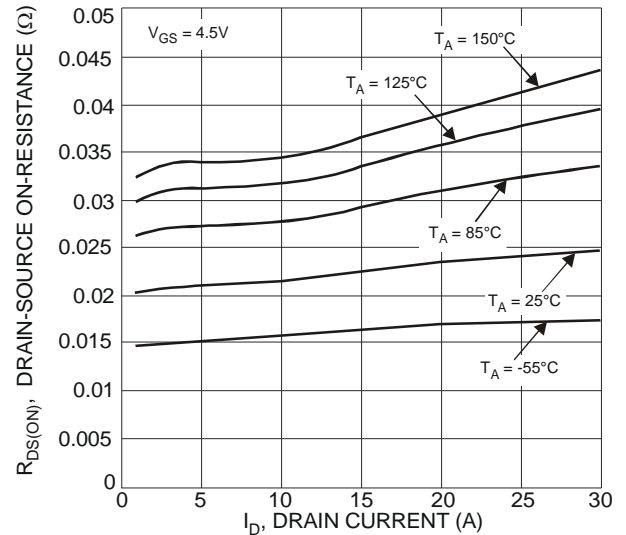


Fig. 7 Typical On-Resistance vs. Drain Current and Temperature

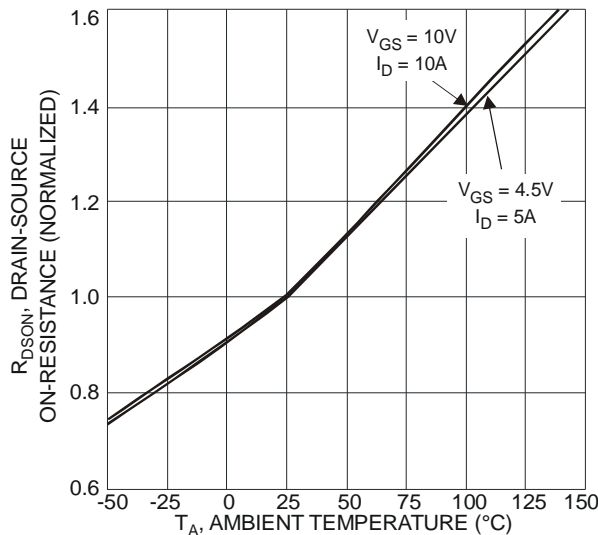


Fig. 8 On-Resistance Variation with Temperature

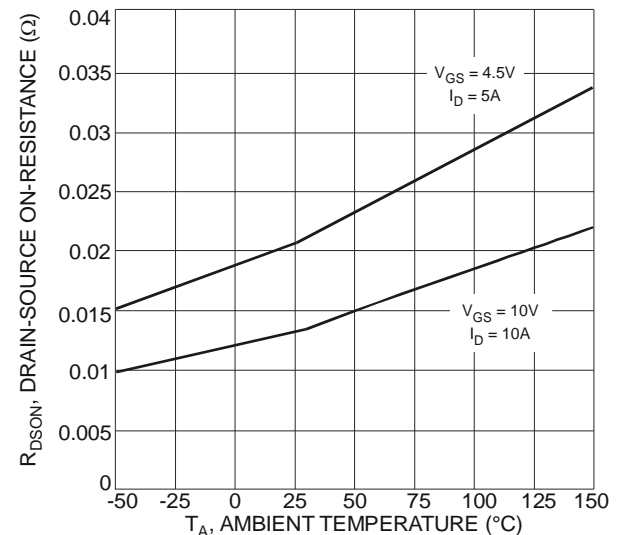
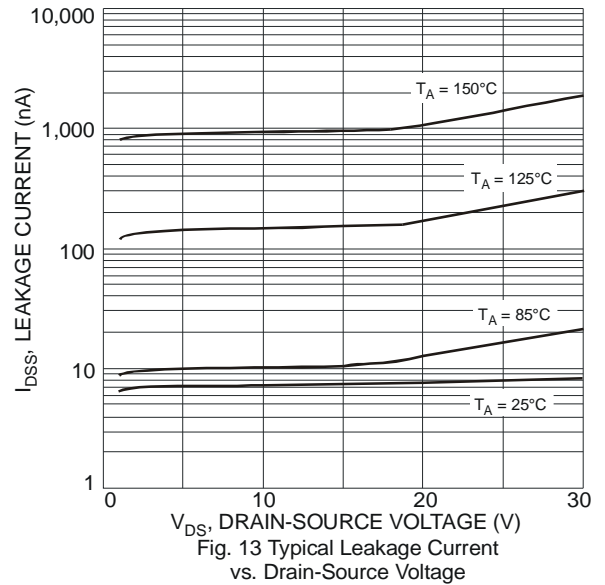
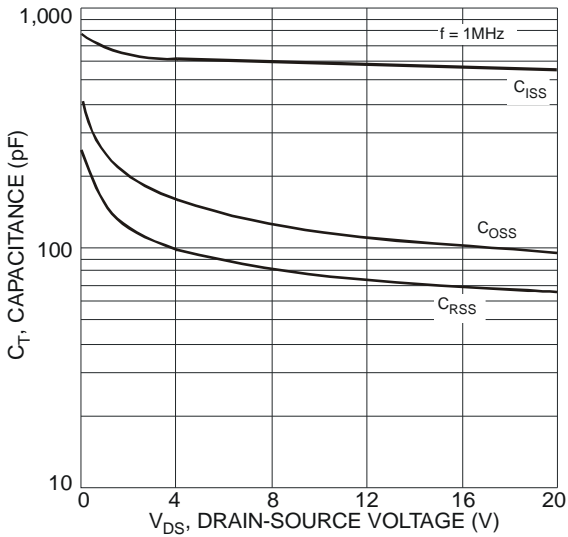
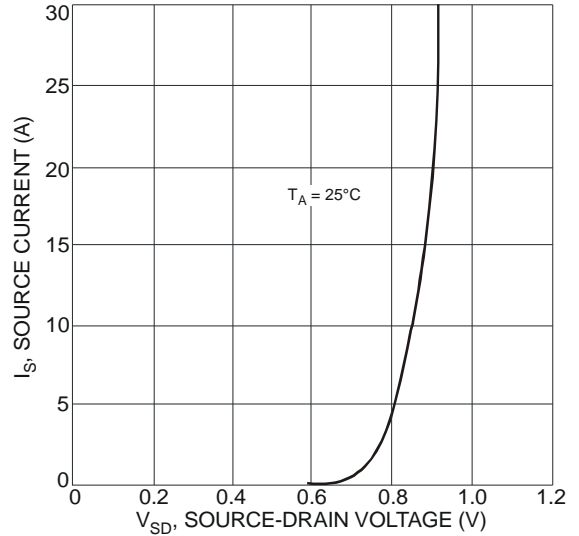
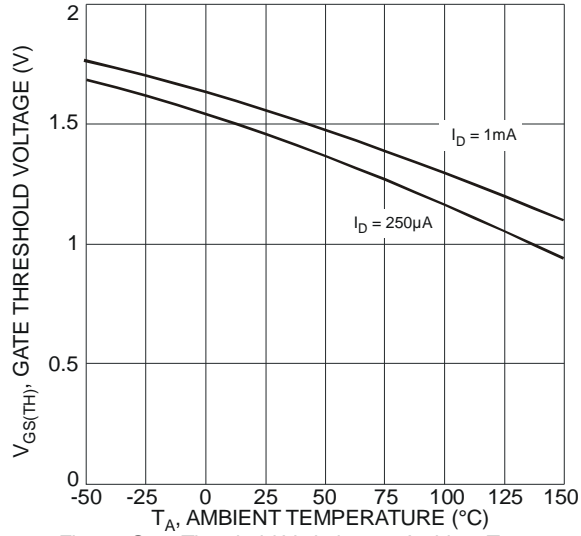
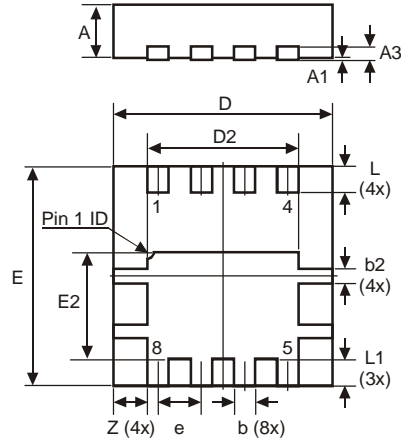


Fig. 9 On-Resistance Variation with Temperature



## Package Outline Dimensions

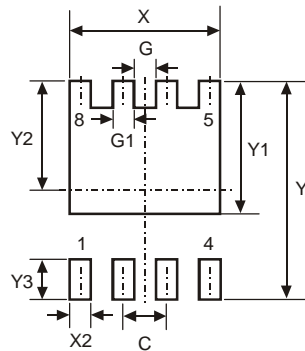
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for latest version.



POWERDI3333-8			
Dim	Min	Max	Typ
D	3.25	3.35	3.30
E	3.25	3.35	3.30
D2	2.22	2.32	2.27
E2	1.56	1.66	1.61
A	0.75	0.85	0.80
A1	0	0.05	0.02
A3	—	—	0.203
b	0.27	0.37	0.32
b2	—	—	0.20
L	0.35	0.45	0.40
L1	—	—	0.39
e	—	—	0.65
Z	—	—	0.515
All Dimensions in mm			

## Suggested Pad Layout

Please see AP02001 at <http://www.diodes.com/datasheets/ap02001.pdf> for the latest version.



Dimensions	Value (in mm)
C	0.650
G	0.230
G1	0.420
Y	3.700
Y1	2.250
Y2	1.850
Y3	0.700
X	2.370
X2	0.420

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