

### Product Summary

$V_{(BR)DSS}$	$R_{DS(ON)}$	$I_D$ $T_A = 25^\circ C$
30V	20mΩ @ $V_{GS} = 10V$	8.0 A
	27mΩ @ $V_{GS} = 4.5V$	6.5 A

### 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

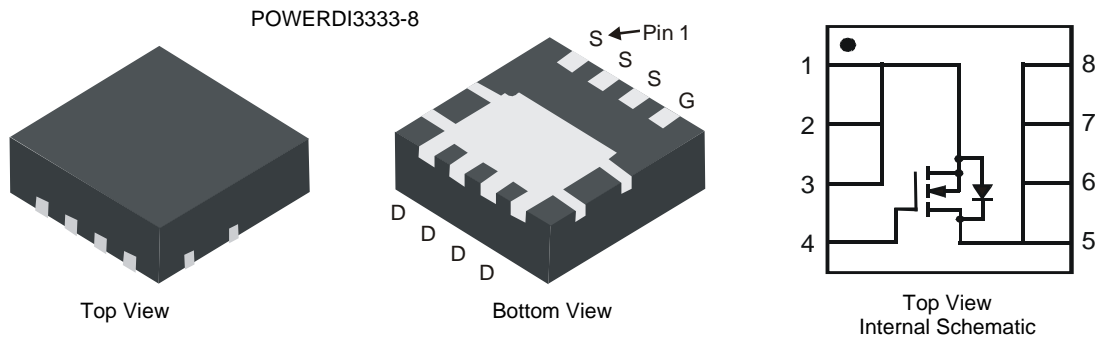
- Backlighting
- DC-DC Converters
- Power management functions

### 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)

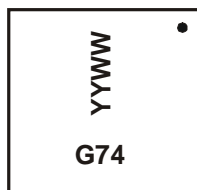


### Ordering Information (Note 4)

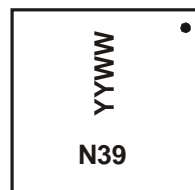
Part Number	Case	Packaging
DMG7410SFG-7	POWERDI3333-8	2000 / Tape & Reel
DMG7410SFG-13	POWERDI3333-8	3000 / Tape & Reel

- 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



G74 = Product marking code  
YYWW = Date code marking  
YY = Last digit of year (ex: 10 for 2010)  
WW = Week code (01 – 53)



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.

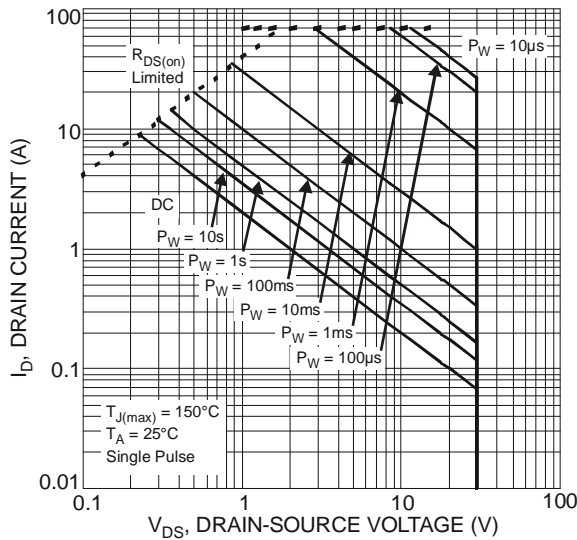


Fig. 1 SOA, Safe Operation Area

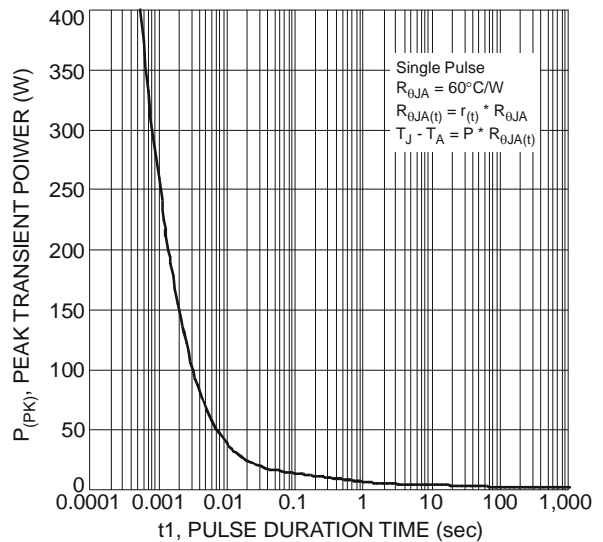
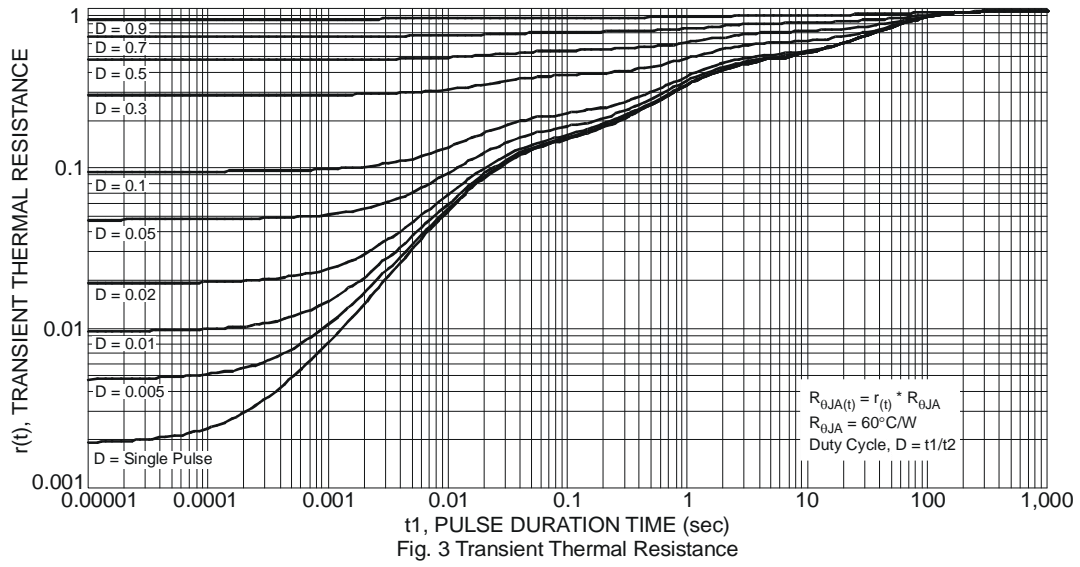


Fig. 2 Single Pulse Maximum Power Dissipation



**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>	0.8	1.2	2.0	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	20	mΩ	V <sub>GS</sub> = 10V, I <sub>D</sub> = 10A
		-	22	27		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.

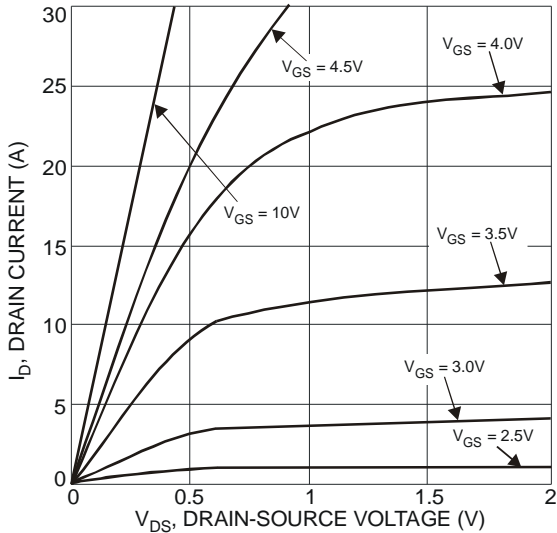


Fig. 4 Typical Output Characteristic

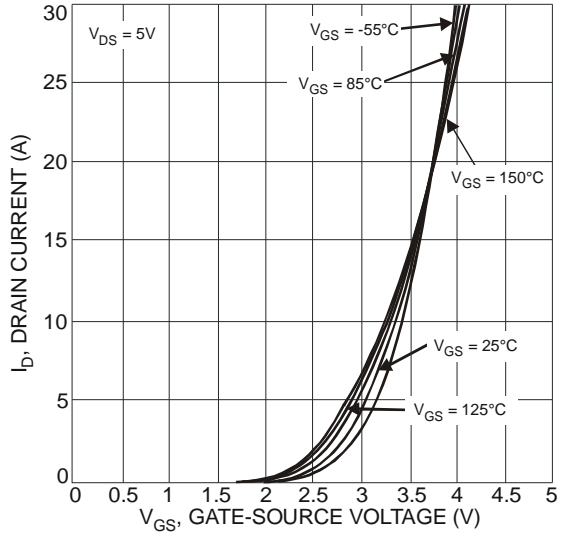


Fig. 5 Typical Transfer Characteristic

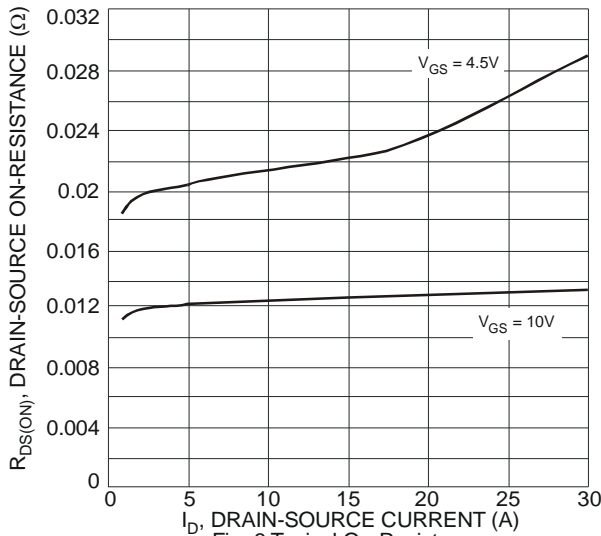


Fig. 6 Typical On-Resistance vs. Drain Current and Gate Voltage

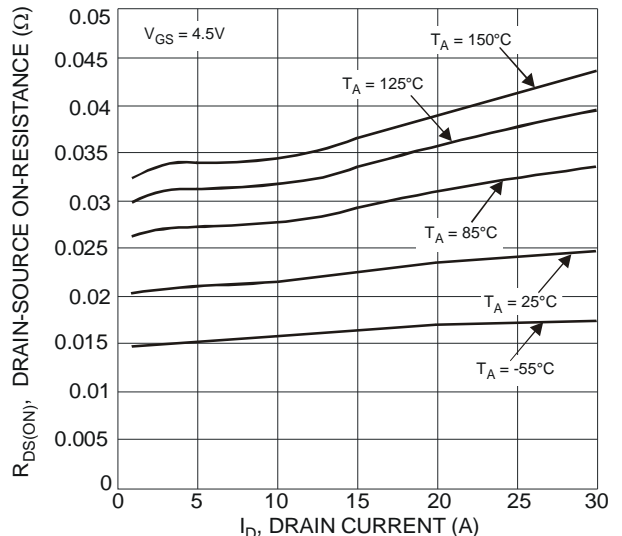


Fig. 7 Typical On-Resistance vs. Drain Current and Temperature

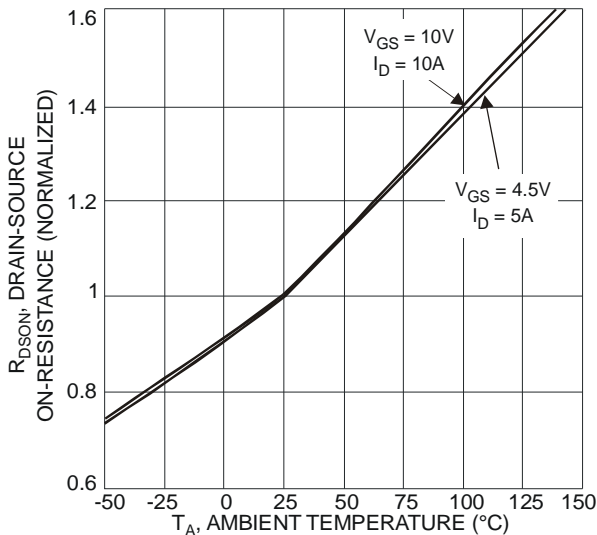


Fig. 8 On-Resistance Variation with Temperature

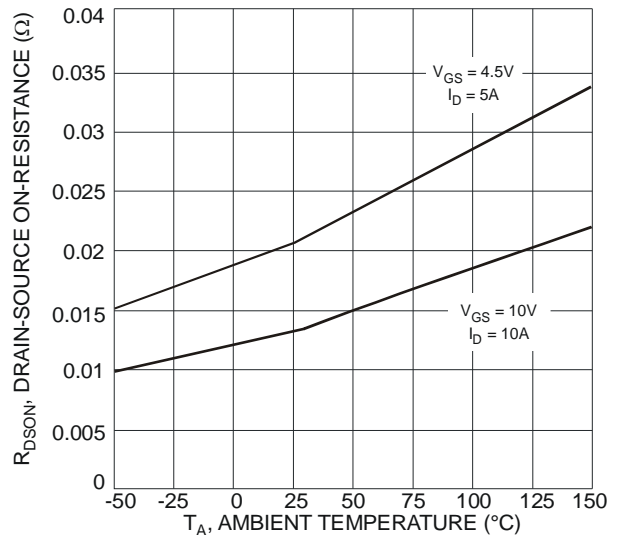


Fig. 9 On-Resistance Variation with Temperature

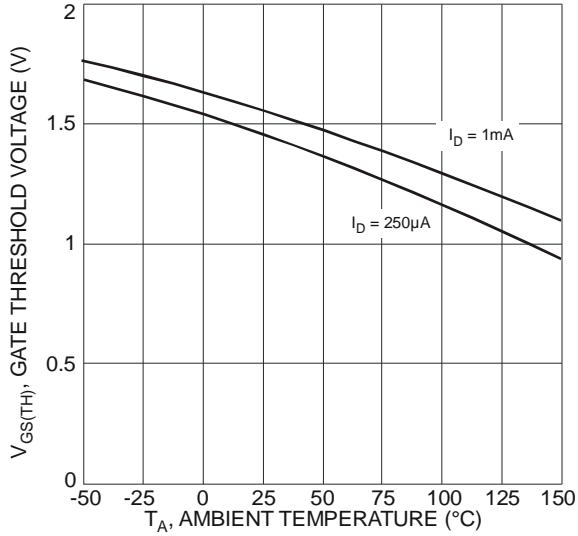


Fig. 10 Gate Threshold Variation vs. Ambient Temperature

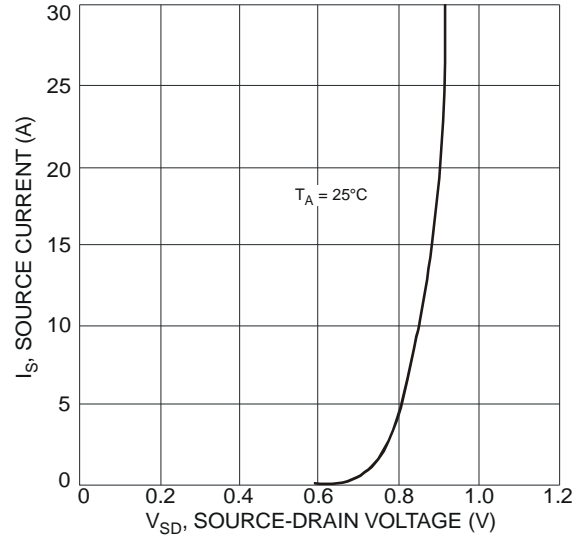


Fig. 11 Diode Forward Voltage vs. Current

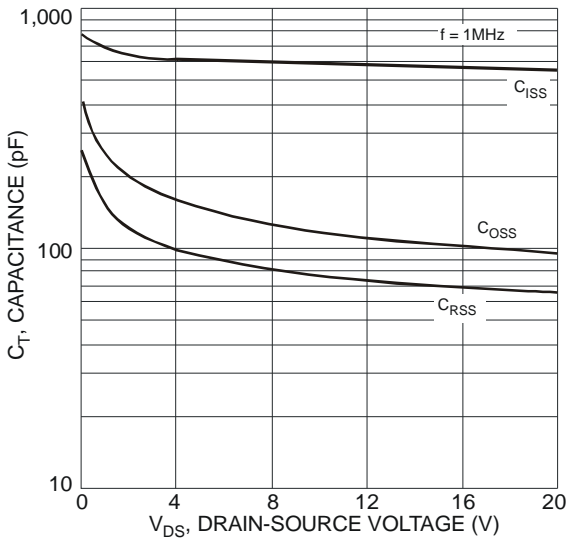


Fig. 12 Typical Total Capacitance

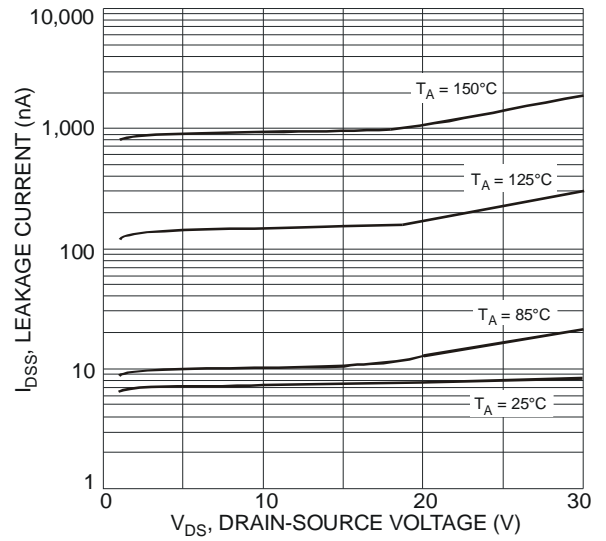
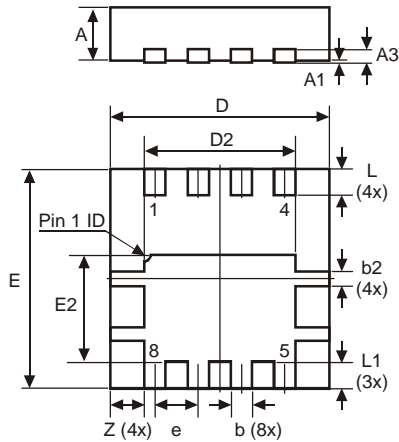


Fig. 13 Typical Leakage Current vs. Drain-Source Voltage

## Package Outline Dimensions

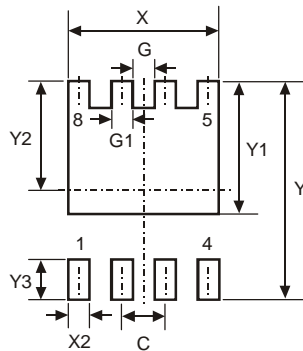
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for latest version.



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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