

## Product Summary

$V_{(BR)DSS}$	$R_{DS(on) \max}$	$I_D$ $T_A = 25^\circ\text{C}$
30V	13m $\Omega$ @ $V_{GS} = 10\text{V}$	10.2A
	16m $\Omega$ @ $V_{GS} = 4.5\text{V}$	9.3A

## 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

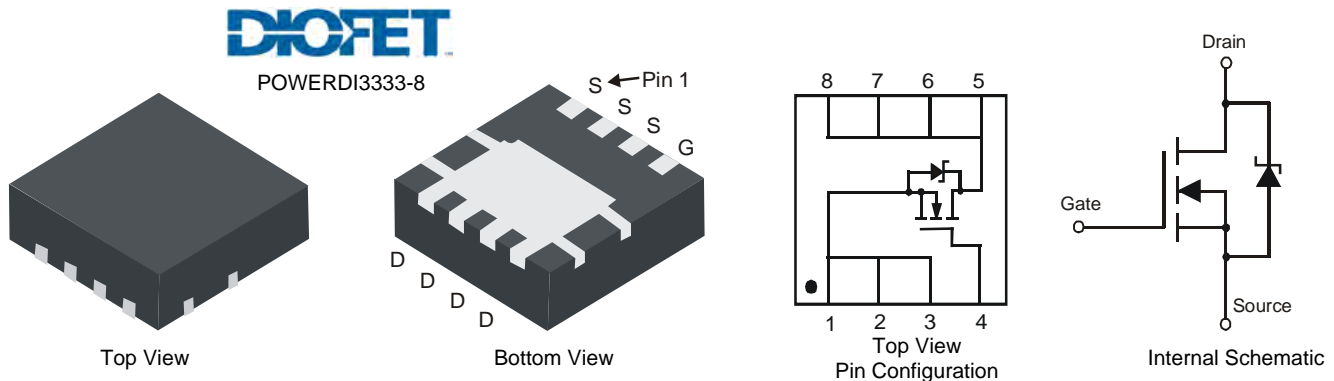
- DC-DC Converters
- Power management functions
- Analog Switch

## Features and Benefits

- DIOFET utilizes a unique patented process to monolithically integrate a MOSFET and a Schottky in a single die to deliver:
  - Low  $R_{DS(ON)}$  – minimize conduction losses
  - Low  $V_{SD}$  – reducing the losses due to body diode conduction
  - Low  $Q_{rr}$  – lower  $Q_{rr}$  of the integrated Schottky reduces body diode switching losses
  - Low gate capacitance ( $Q_g/Q_{gs}$ ) ratio – reduces risk of shoot-through or cross conduction currents at high frequencies
  - Avalanche rugged –  $I_{AR}$  and  $E_{AR}$  rated
- 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
- **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
- Terminals: Finish — Matte Tin annealed over Copper leadframe. Solderable per MIL-STD-202, Method 208 (E3)
- Weight: 0.072 grams (approximate)

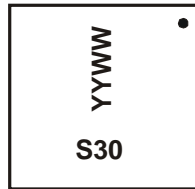


## Ordering Information (Note 4)

Part Number	Case	Packaging
DMS3016SFG-7	POWERDI3333-8	2,000/Tape & Reel
DMS3016SFG-13	POWERDI3333-8	3,000/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



S30 = Product Type Marking Code  
 YYWW = Date Code Marking  
 YY = Last digit of year (ex: 09 = 2009)  
 WW = Week code (01 ~ 53)

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

Characteristic			Symbol	Value	Units
Drain-Source Voltage			V <sub>DSS</sub>	30	V
Gate-Source Voltage			V <sub>GSS</sub>	±12	V
Continuous Drain Current (Note 5) V <sub>GS</sub> = 10V	Steady State	T <sub>A</sub> = +25°C	I <sub>D</sub>	7.0	A
		T <sub>A</sub> = +70°C		5.5	
Continuous Drain Current (Note 5) V <sub>GS</sub> = 4.5V	Steady State	T <sub>A</sub> = +25°C	I <sub>D</sub>	6.4	A
		T <sub>A</sub> = +70°C		5.1	
Continuous Drain Current (Note 6) V <sub>GS</sub> = 10V	Steady State	T <sub>A</sub> = +25°C	I <sub>D</sub>	10.2	A
		T <sub>A</sub> = +70°C		8.1	
Continuous Drain Current (Note 6) V <sub>GS</sub> = 4.5V	Steady State	T <sub>A</sub> = +25°C	I <sub>D</sub>	9.3	A
		T <sub>A</sub> = +70°C		7.4	
Pulsed Drain Current (10us pulse, duty cycle=1%)			I <sub>DM</sub>	80	A
Avalanche Current (Note 7)			I <sub>AR</sub>	13	A
Repetitive Avalanche Energy (Note 7) L = 0.3mH			E <sub>AR</sub>	24	mJ

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

Characteristic		Symbol	Value	Units
Total Power Dissipation	(Note 5)	P <sub>D</sub>	0.98	W
	(Note 6)		2.08	
Thermal Resistance, Junction to Ambient	(Note 5)	R <sub>θJA</sub>	127	°C/W
	(Note 6)		60	
Thermal Resistance, Junction to Case	(Note 6)	R <sub>θJC</sub>	3.42	°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 PC board, with minimum recommended pad layout, single sided.
  - Device mounted on FR-4 substrate PC board, 2oz copper, with thermal vias to bottom layer 1inch square copper plate
  - 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

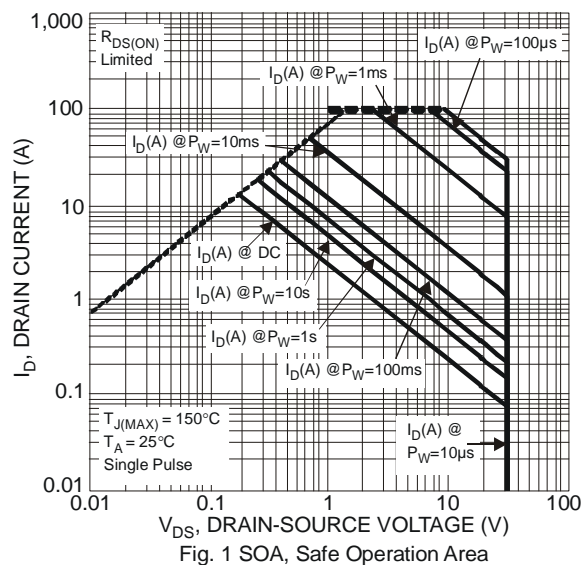


Fig. 1 SOA, Safe Operation Area

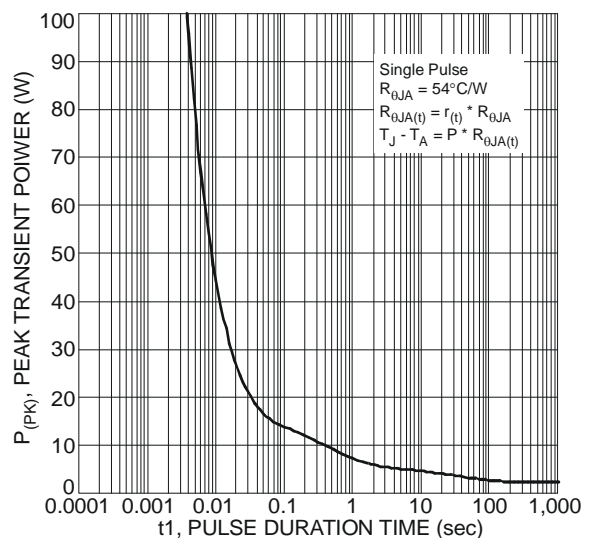
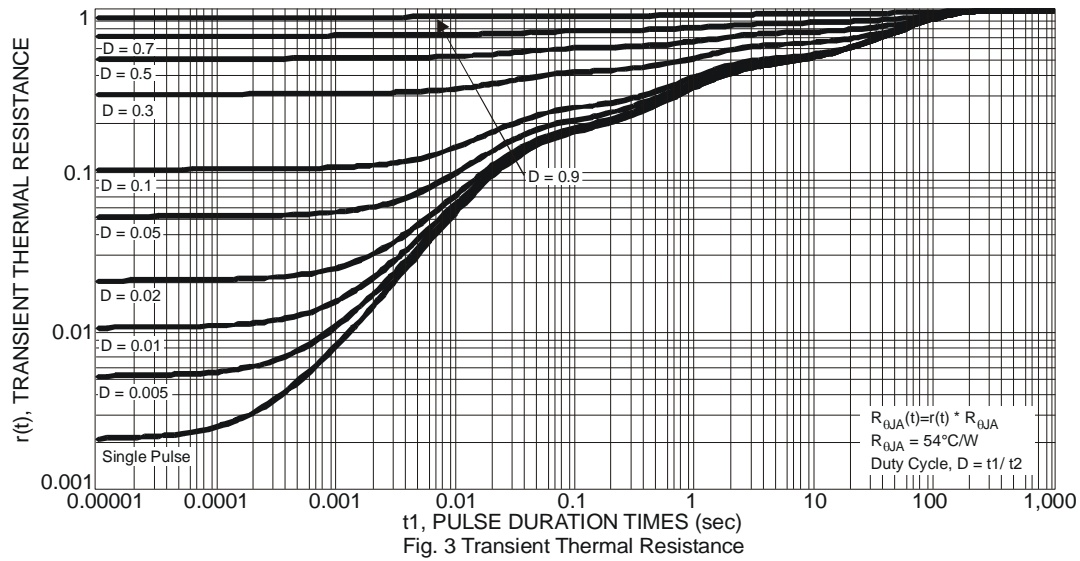


Fig. 2 Single Pulse Maximum Power Dissipation



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

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS (Note 8)</b>						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	30	—	—	V	V <sub>GS</sub> = 0V, I <sub>D</sub> = 1mA
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	—	—	100	μA	V <sub>DS</sub> = 30V, V <sub>GS</sub> = 0V
Gate-Source Leakage	I <sub>GSS</sub>	—	—	±100	nA	V <sub>GS</sub> = ±12V, V <sub>DS</sub> = 0V
<b>ON CHARACTERISTICS (Note 8)</b>						
Gate Threshold Voltage	V <sub>GS(th)</sub>	1.0	—	2.2	V	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250μA
Static Drain-Source On-Resistance	R <sub>DS(on)</sub>	—	10	13	mΩ	V <sub>GS</sub> = 10V, I <sub>D</sub> = 11.2A
		—	12	16		V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 10A
Forward Transfer Admittance	Y <sub>fs</sub>	—	25	—	S	V <sub>DS</sub> = 5V, I <sub>D</sub> = 11.2A
Diode Forward Voltage	V <sub>SD</sub>	—	0.37	0.6	V	V <sub>GS</sub> = 0V, I <sub>S</sub> = 1A
Maximum Body-Diode + Schottky Continuous Current	I <sub>S</sub>	—	—	5	A	
<b>DYNAMIC CHARACTERISTICS (Note 9)</b>						
Input Capacitance	C <sub>iss</sub>	—	1886	—	pF	V <sub>DS</sub> = 15V, V <sub>GS</sub> = 0V f = 1.0MHz
Output Capacitance	C <sub>oss</sub>	—	372	—		
Reverse Transfer Capacitance	C <sub>rss</sub>	—	128	—		
Gate Resistance	R <sub>G</sub>	—	2.0	—	Ω	V <sub>DS</sub> = 0V, V <sub>GS</sub> = 0V, f = 1.0MHz
Total Gate Charge (V <sub>GS</sub> = 4.5V)	Q <sub>g</sub>	—	19.5	—	nC	V <sub>DS</sub> = 15V, V <sub>GS</sub> = 10V I <sub>D</sub> = 11.2A
Total Gate Charge (V <sub>GS</sub> = 10V)	Q <sub>g</sub>	—	44.6	—		
Gate-Source Charge	Q <sub>gs</sub>	—	4.8	—		
Gate-Drain Charge	Q <sub>gd</sub>	—	4.6	—		
Turn-On Delay Time	t <sub>D(on)</sub>	—	5.8	—	ns	V <sub>GS</sub> = 10V, V <sub>DD</sub> = 15V, R <sub>G</sub> = 3Ω, R <sub>L</sub> = 1.2Ω
Turn-On Rise Time	t <sub>r</sub>	—	23.7	—		
Turn-Off Delay Time	t <sub>D(off)</sub>	—	35.4	—		
Turn-Off Fall Time	t <sub>f</sub>	—	7.7	—		

Notes: 8. Short duration pulse test used to minimize self-heating effect.  
 9. Guaranteed by design. Not subject to production testing.

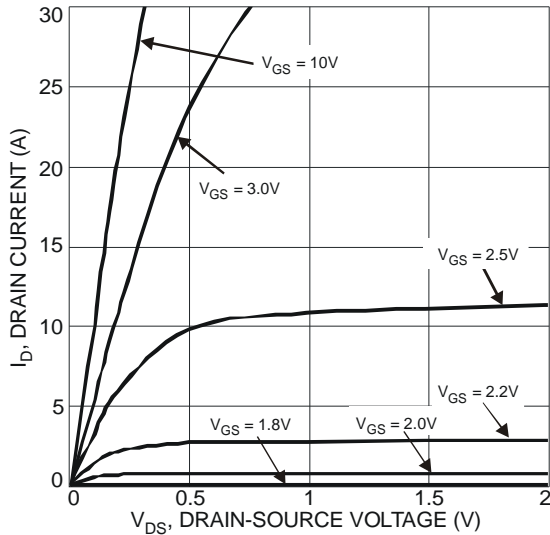


Fig. 4 Typical Output Characteristics

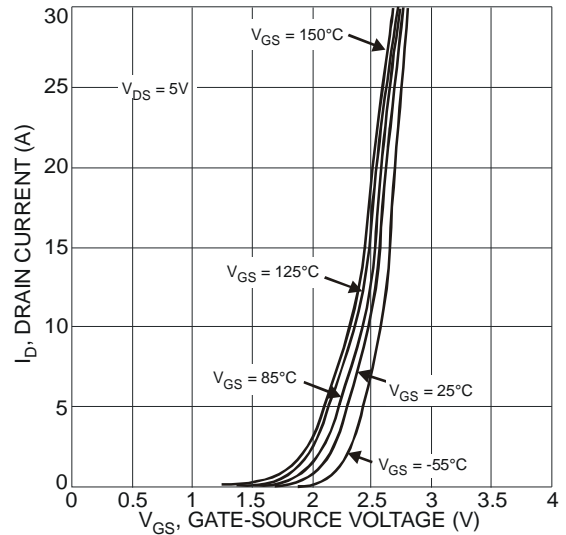


Fig. 5 Typical Transfer Characteristic

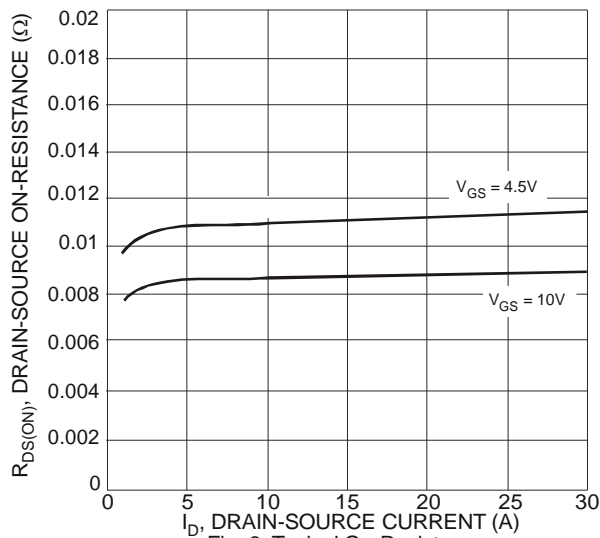


Fig. 6 Typical On-Resistance vs. Drain Current and Gate Voltage

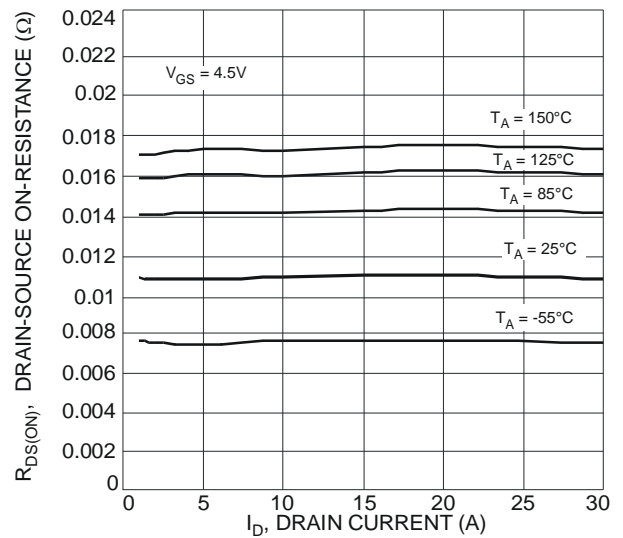


Fig. 7 Typical On-Resistance vs. Drain Current and Temperature

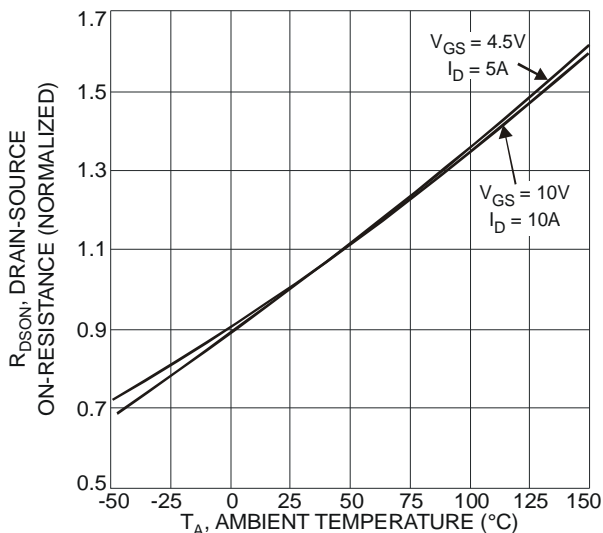


Fig. 8 On-Resistance Variation with Temperature

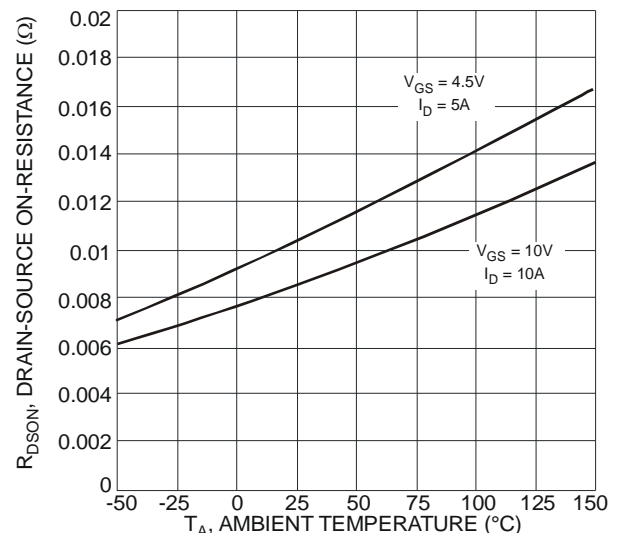


Fig. 9 On-Resistance Variation with Temperature

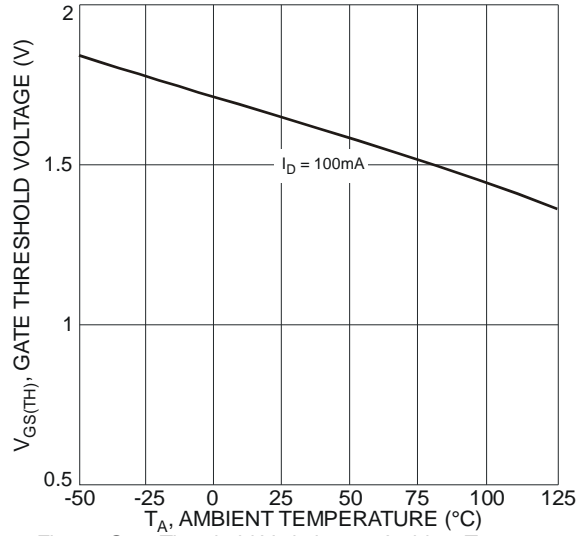


Fig. 10 Gate Threshold Variation vs. Ambient Temperature

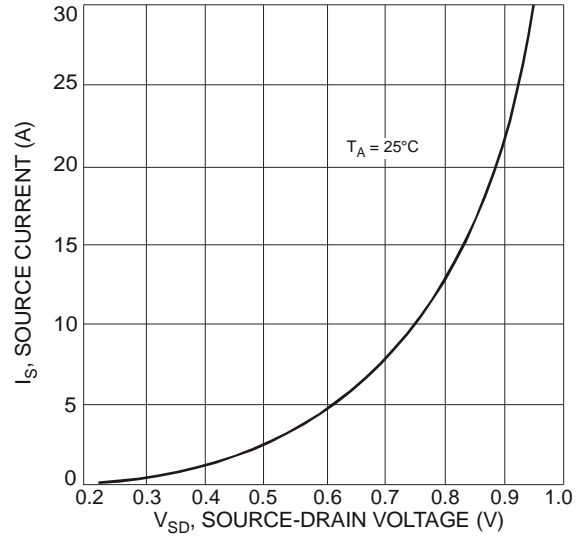


Fig. 11 Diode Forward Voltage vs. Current

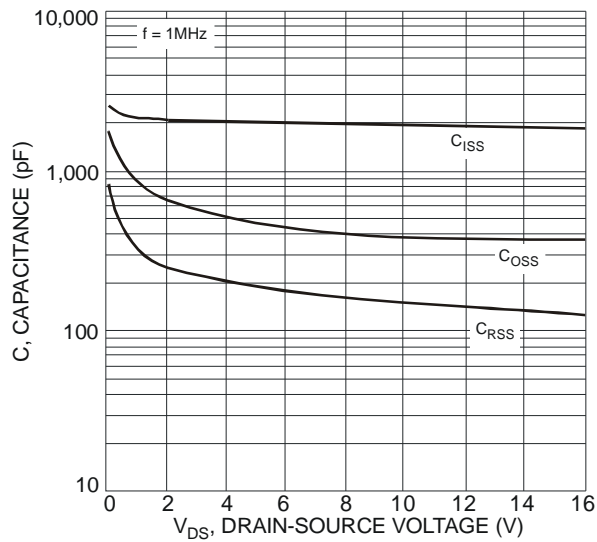


Fig. 12 Typical Total Capacitance

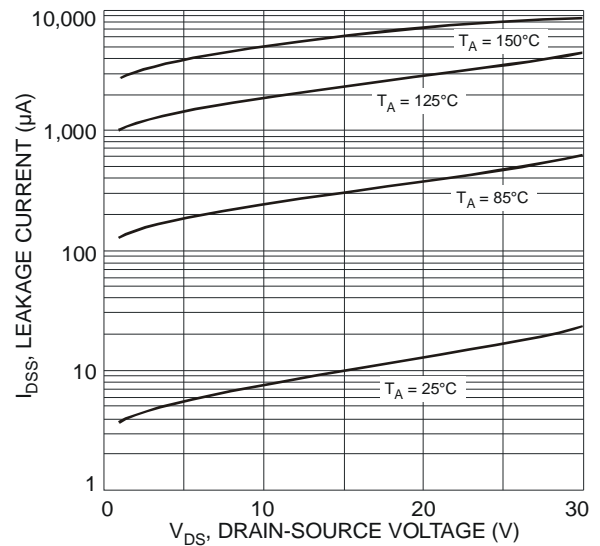


Fig. 13 Typical Drain-Source Leakage Current vs. Voltage

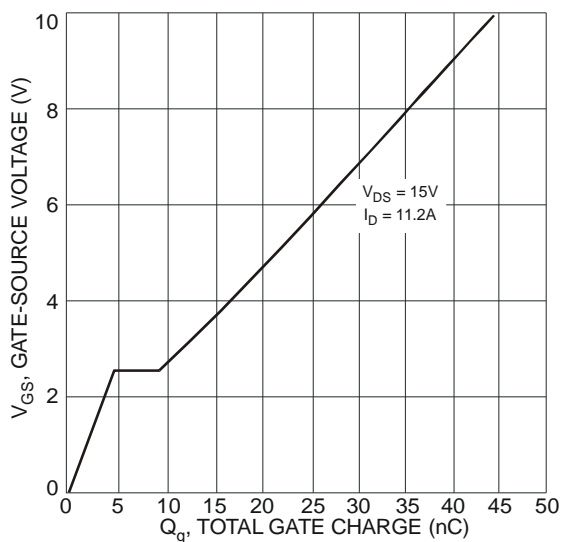
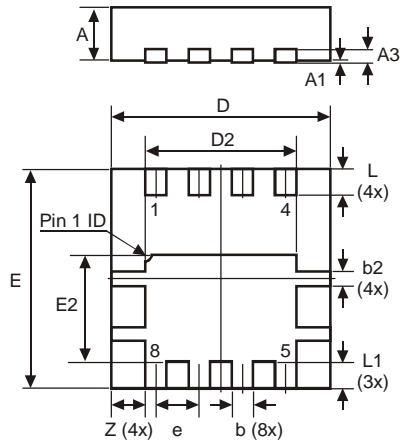


Fig. 14 Gate-Charge Characteristics

## Package Outline Dimensions

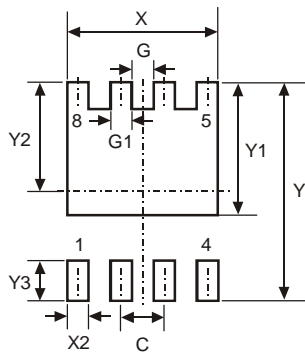
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for latest version.



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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