

## Product Summary

BV <sub>DSS</sub>	R <sub>DS(ON)</sub> MAX	I <sub>D</sub> MAX T <sub>A</sub> = +25°C
30V	13mΩ @ V <sub>GS</sub> = 10V	10.2A
	16mΩ @ V <sub>GS</sub> = 4.5V	9.3A

## Description

This new generation 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.

## Applications

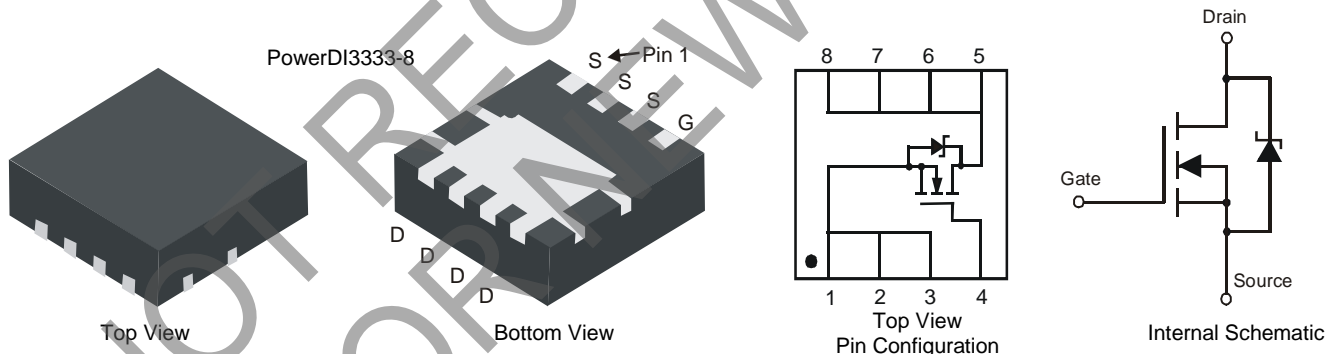
- DC-DC Converters
- Power Management Functions
- Analog Switch

## 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<sub>DS(ON)</sub> – Minimize Conduction Losses
  - Low V<sub>SD</sub> – Reducing the Losses due to Body Diode Conduction
  - Low Q<sub>rr</sub> – Lower Q<sub>rr</sub> of the Integrated Schottky Reduces Body Diode Switching Losses
  - Low Gate Capacitance (Q<sub>g</sub>/Q<sub>gs</sub>) Ratio – Reduces Risk of Shoot-Through or Cross Conduction Currents at High Frequencies
  - Avalanche Rugged – I<sub>AR</sub> and E<sub>AR</sub> 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: 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 Connections: See Diagram
- Terminals: Finish — Matte Tin Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208 (E3)
- Weight: 0.072 grams (Approximate)

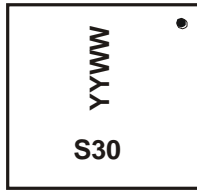


## Ordering Information (Note 4)

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) & 2015/863/EU (RoHS 3) compliant. All applicable RoHS exemptions applied.
  2. See [http://www.diodes.com/quality/lead\\_free/](http://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



S30 = 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>	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 (10μs 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	Unit
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> ratings are based on low frequency and duty cycles to keep T<sub>J</sub> = +25°C.

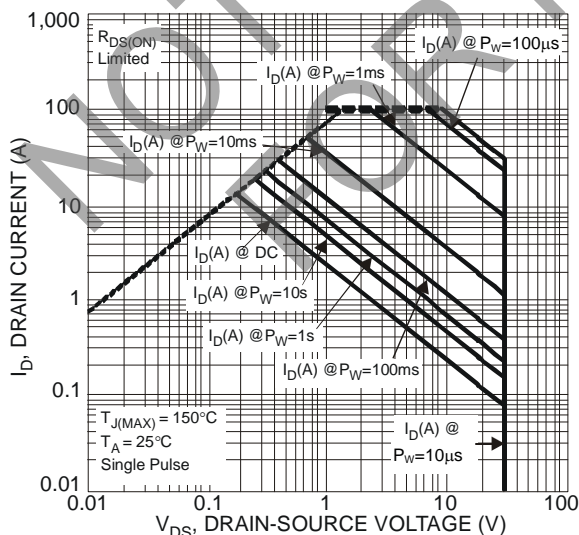


Fig. 1 SOA, Safe Operation Area

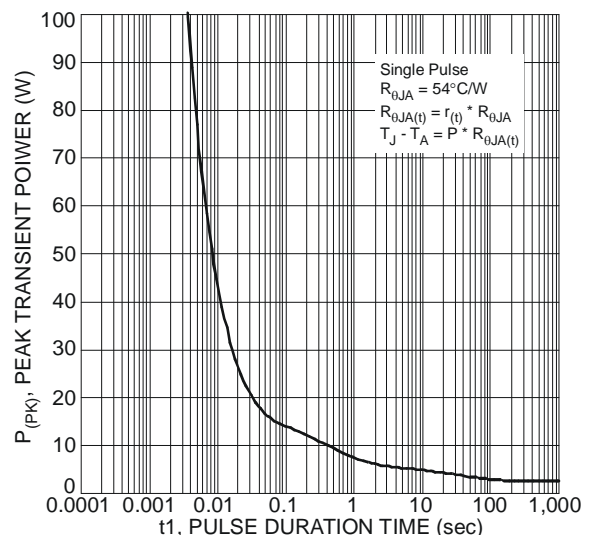
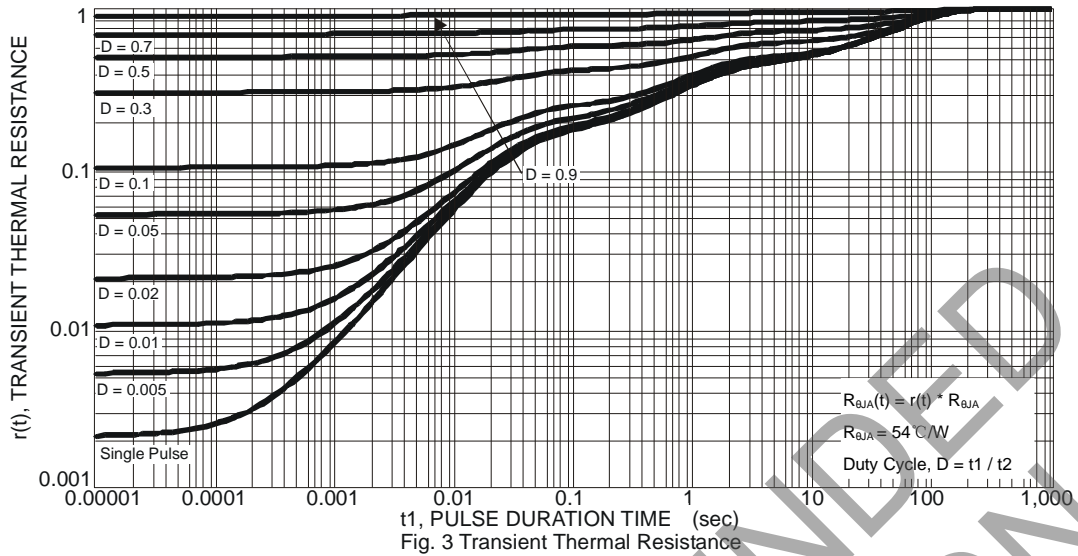


Fig. 2 Single Pulse Maximum Power Dissipation



**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> = 10.A
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.

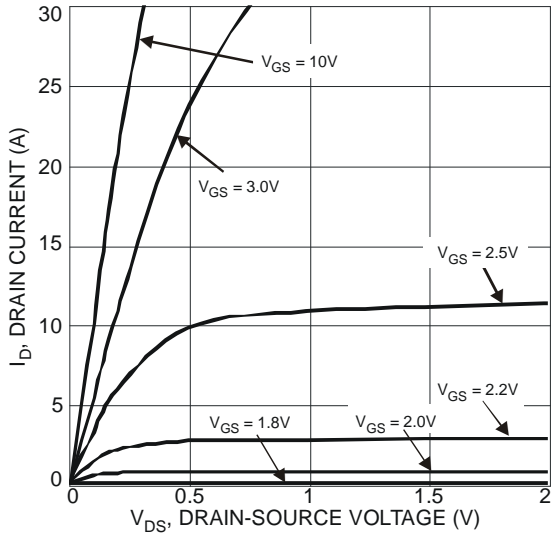


Fig. 4 Typical Output Characteristics

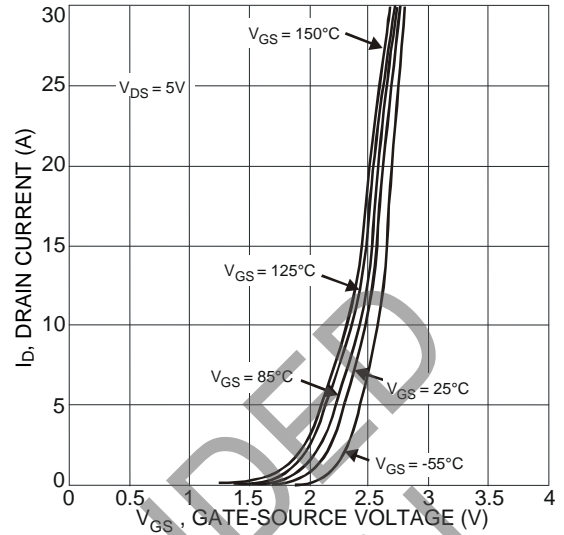


Fig. 5 Typical Transfer Characteristic

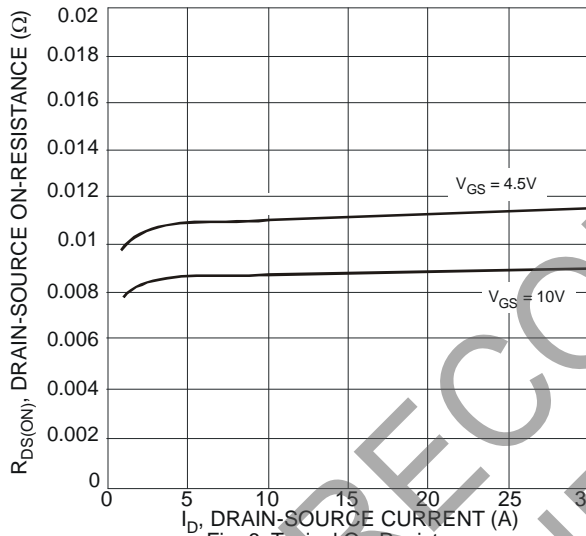


Fig. 6 Typical On-Resistance vs. Drain Current and Gate Voltage

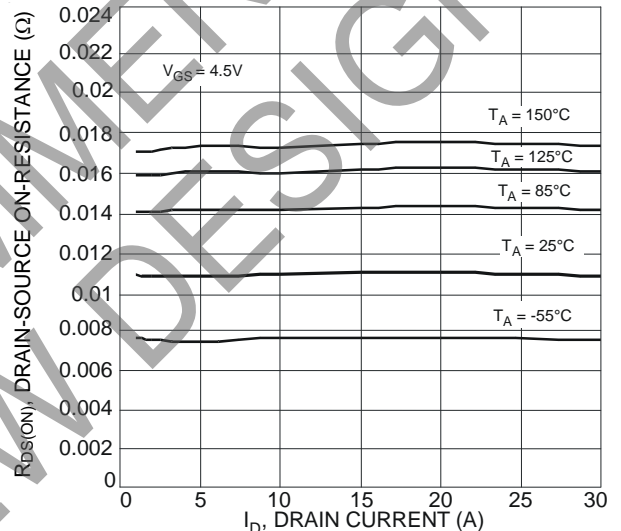


Fig. 7 Typical On-Resistance vs. Drain Current and Temperature

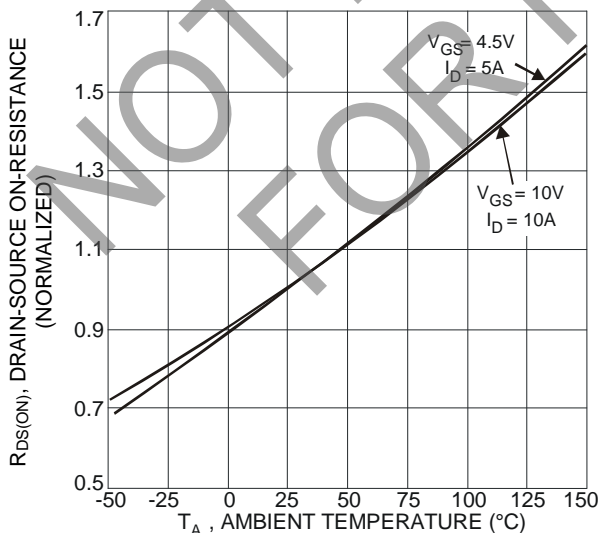


Fig. 8 On-Resistance Variation with Temperature

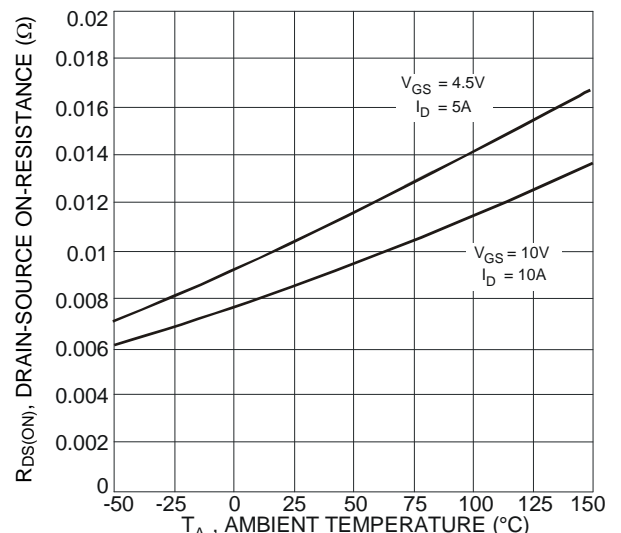


Fig. 9 On-Resistance Variation with Temperature

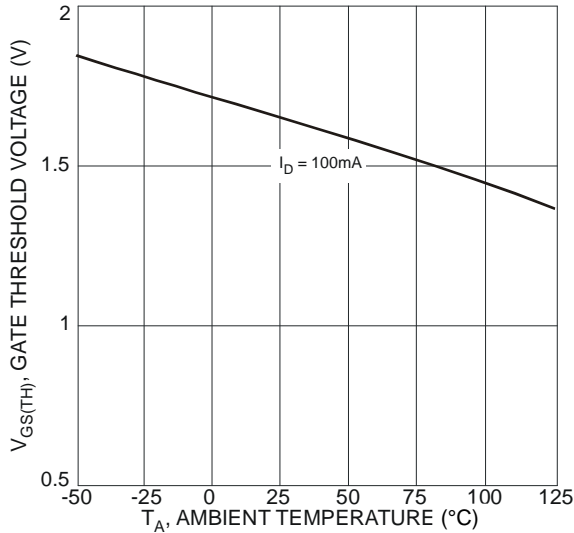


Fig. 10 Gate Threshold Variation vs. Ambient Temperature

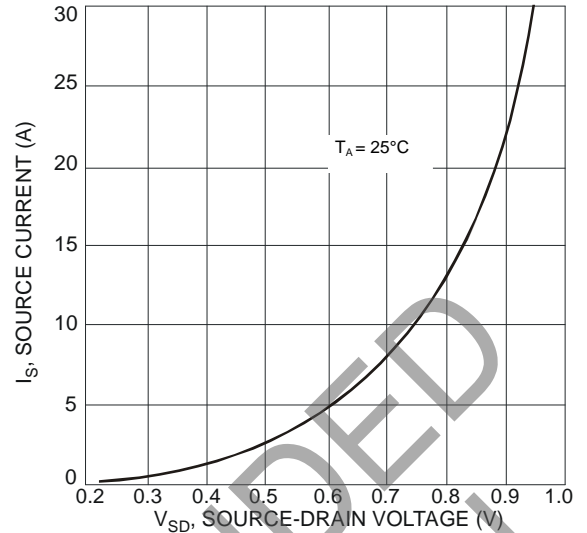


Fig. 11 Diode Forward Voltage vs. Current

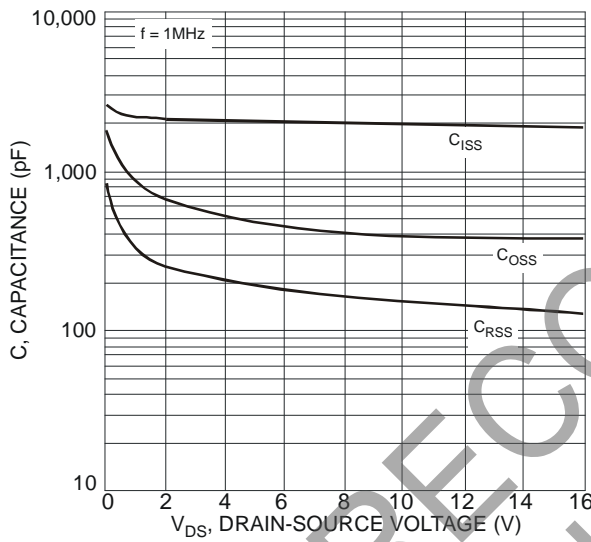


Fig. 12 Typical Total Capacitance

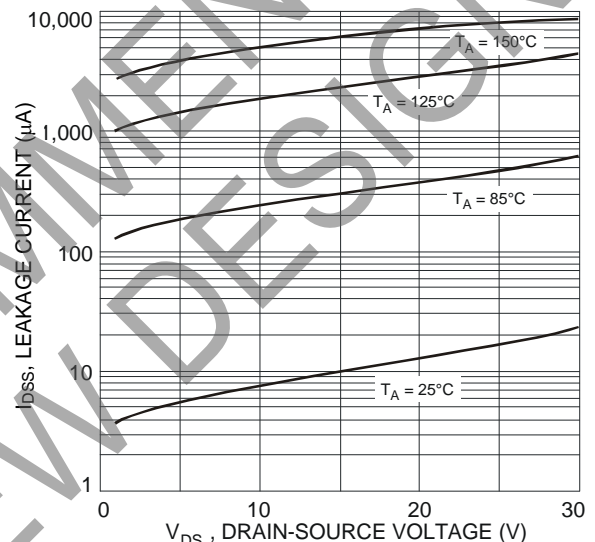


Fig. 13 Typical Drain-Source Leakage Current vs. Voltage

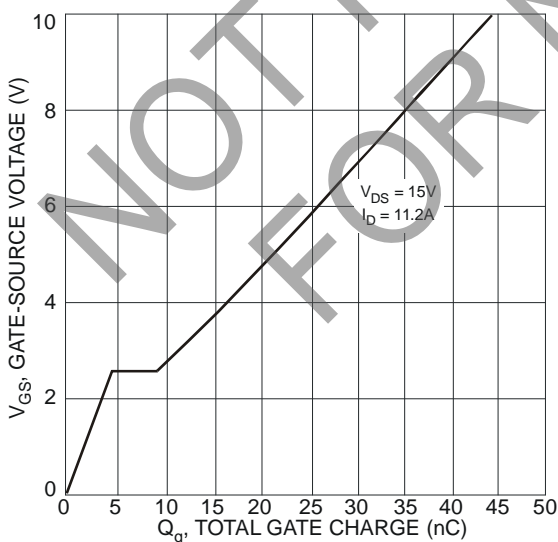
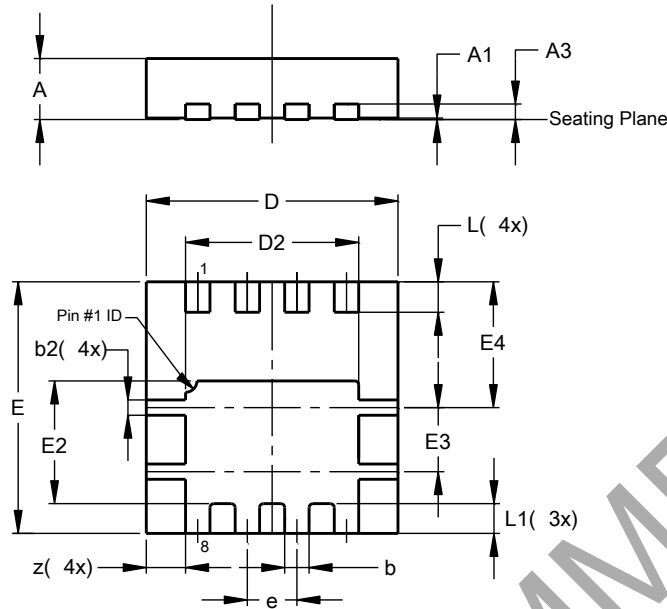


Fig. 14 Gate-Charge Characteristics

## Package Outline Dimensions

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

**PowerDI3333-8**

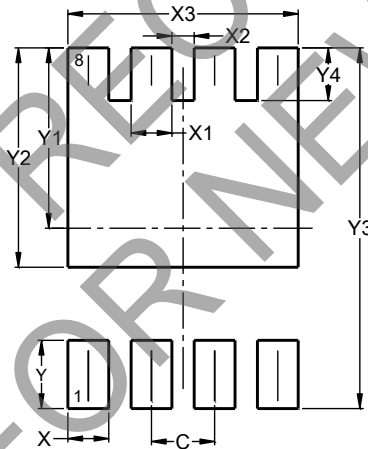


PowerDI3333-8			
Dim	Min	Max	Typ
A	0.75	0.85	0.80
A1	0.00	0.05	0.02
A3	-	-	0.203
b	0.27	0.37	0.32
b2	0.15	0.25	0.20
D	3.25	3.35	3.30
D2	2.22	2.32	2.27
E	3.25	3.35	3.30
E2	1.56	1.66	1.61
E3	0.79	0.89	0.84
E4	1.60	1.70	1.65
e	-	-	0.65
L	0.35	0.45	0.40
L1	-	-	0.39
z	-	-	0.515
<b>All Dimensions in mm</b>			

## 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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