

## Product Summary

$BV_{DSS}$	$R_{DS(ON)}$ max	$I_D$ max $T_A = +25^\circ C$
30V	13m $\Omega$ @ $V_{GS} = 10V$	9.5A
	14m $\Omega$ @ $V_{GS} = 4.5V$	9.0A

## 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
- 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%  $R_g$  Tested
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**
- **An Automotive-Compliant Part is Available Under Separate Datasheet ([DMS3014SFGQ](#))**

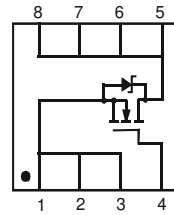
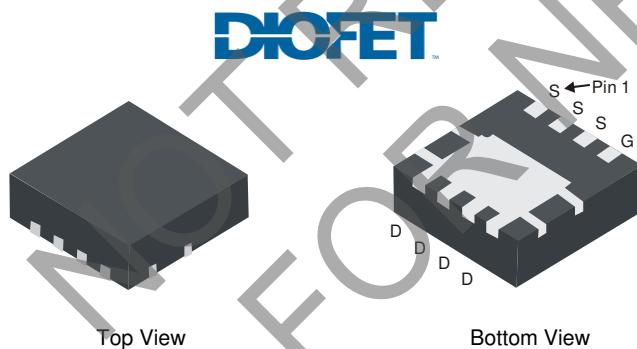
## Description and Applications

This 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.

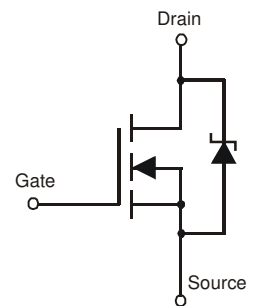
- Backlighting
- Power Management Functions
- DC-DC Converters

## 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 Indicator: See Diagram
- Terminals: Finish — Matte Tin Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208  $\text{Ⓢ}$
- Weight: 0.072 grams (Approximate)



Top View  
Pin Configuration



Internal Schematic

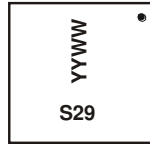
## Ordering Information (Note 4)

Part Number	Case	Packaging
DMS3014SFG-7	PowerDI3333-8	2000/Tape & Reel
DMS3014SFG-13	PowerDI3333-8	3000/Tape & Reel

- Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant.
  2. 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.
  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/>.

PowerDI is a registered trademark of Diodes Incorporated.

## Marking Information



S29 = 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 6) V <sub>GS</sub> = 10V	Steady State	T <sub>A</sub> = +25°C T <sub>A</sub> = +70°C	I <sub>D</sub>	9.5 7.6	A
	t < 10s	T <sub>A</sub> = +25°C T <sub>A</sub> = +70°C	I <sub>D</sub>	13.0 9.7	A
Continuous Drain Current (Note 6) V <sub>GS</sub> = 4.5V	Steady State	T <sub>A</sub> = +25°C T <sub>A</sub> = +70°C	I <sub>D</sub>	9.0 7.4	A
	t < 10s	T <sub>A</sub> = +25°C T <sub>A</sub> = +70°C	I <sub>D</sub>	12.2 9.3	A
Pulsed Drain Current (10µs Pulse, Duty Cycle = 1%)			I <sub>DM</sub>	80	A
Maximum Continuous Body Diode Forward Current (Note 6)			I <sub>S</sub>	3.0	A
Avalanche Current (Note 7) L = 0.1mH			I <sub>AR</sub>	30	A
Repetitive Avalanche Energy (Note 7) L = 0.1mH			E <sub>AR</sub>	45	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>	1	W
Thermal Resistance, Junction to Ambient (Note 5)	Steady State	R <sub>θJA</sub>	131	°C/W
	t < 10s		72	°C/W
Total Power Dissipation (Note 6)		P <sub>D</sub>	2.1	W
Thermal Resistance, Junction to Ambient (Note 6)	Steady State	R <sub>θJA</sub>	63	°C/W
	t < 10s		35	°C/W
Thermal Resistance, Junction to Case (Note 6)		R <sub>θJC</sub>	7.1	°C/W
Operating and Storage Temperature Range		T <sub>J</sub> , T <sub>STG</sub>	-55 to +150	°C

- Notes:
5. Device mounted on FR-4 substrate PC board, 2oz copper, with minimum recommended pad layout.
  6. Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper plate.
  7. 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.

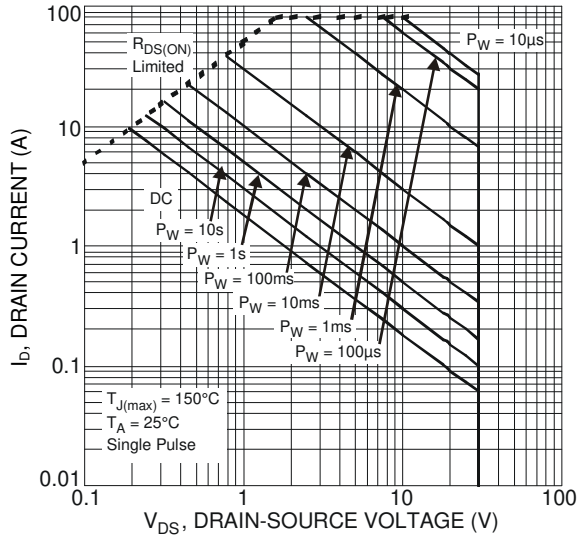


Fig. 1 SOA, Safe Operation Area

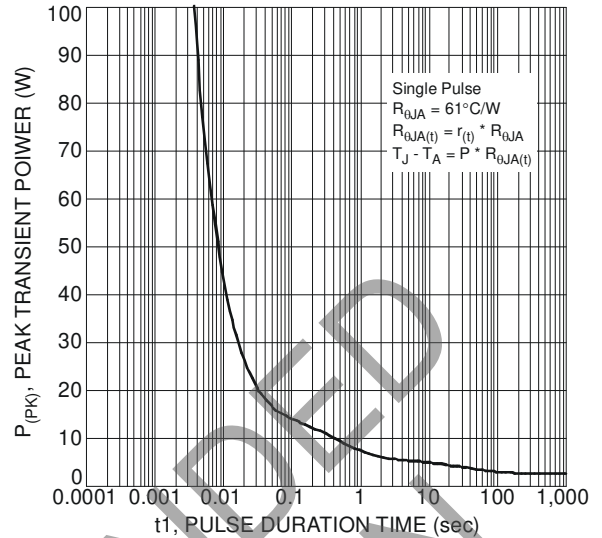


Fig. 2 Single Pulse Maximum Power Dissipation

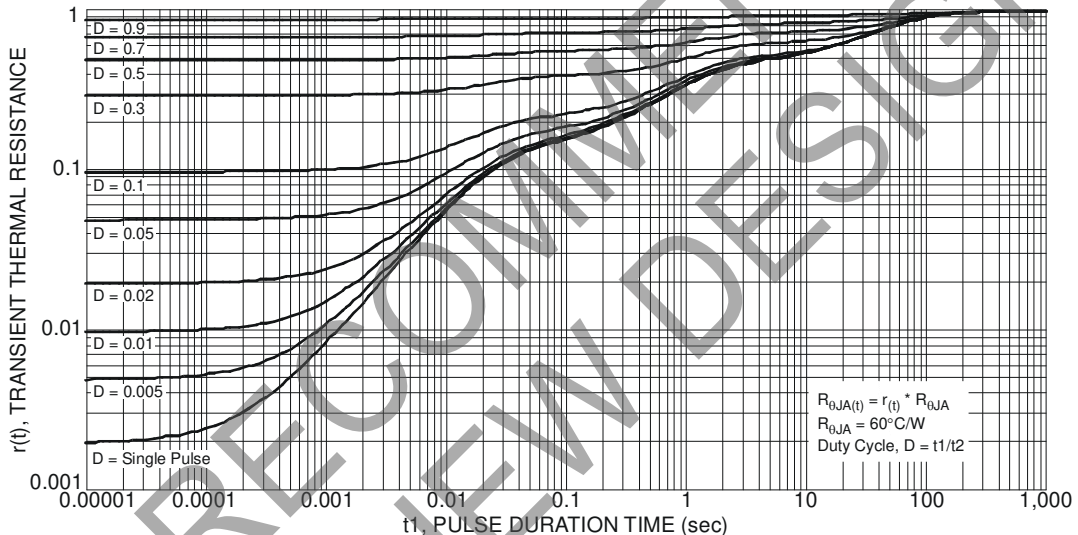


Fig. 3 Transient Thermal Resistance

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**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> = 250μA
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>	—	9	13	mΩ	V <sub>GS</sub> = 10V, I <sub>D</sub> = 10.4A
		—	10	14		V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 10.4A
Forward Transfer Admittance	Y <sub>fs</sub>	—	23	—	S	V <sub>DS</sub> = 5V, I <sub>D</sub> = 10.4A
Diode Forward Voltage	V <sub>SD</sub>	—	0.4	0.55	V	V <sub>GS</sub> = 0V, I <sub>S</sub> = 1A
<b>DYNAMIC CHARACTERISTICS (Note 9)</b>						
Input Capacitance	C <sub>iss</sub>	—	2296	4310	pF	V <sub>DS</sub> = 15V, V <sub>GS</sub> = 0V, f = 1.0MHz
Output Capacitance	C <sub>oss</sub>	—	164	—	pF	
Reverse Transfer Capacitance	C <sub>rss</sub>	—	120	—	pF	
Gate Resistance	R <sub>g</sub>	0.26	1.3	2.34	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>	—	19.3	—	nC	V <sub>DS</sub> = 15V, V <sub>GS</sub> = 10V, I <sub>D</sub> = 10.4A
Total Gate Charge V <sub>GS</sub> = 10V	Q <sub>g</sub>	—	45.7	—	nC	
Gate-Source Charge	Q <sub>gs</sub>	—	5.0	—	nC	
Gate-Drain Charge	Q <sub>gd</sub>	—	2.9	—	nC	
Turn-On Delay Time	t <sub>D(ON)</sub>	—	5.5	—	ns	
Turn-On Rise Time	t <sub>R</sub>	—	24.4	—	ns	V <sub>GS</sub> = 10V, V <sub>DS</sub> = 15V, R <sub>G</sub> = 3Ω, R <sub>L</sub> = 1.2Ω
Turn-Off Delay Time	t <sub>D(OFF)</sub>	—	33.1	—	ns	
Turn-Off Fall Time	t <sub>F</sub>	—	6.6	—	ns	
Reverse Recovery Time	t <sub>RR</sub>	—	12.9	—	ns	I <sub>F</sub> = 13A, di/dt = 500A/μs
Reverse Recovery Charge	Q <sub>RR</sub>	—	8.0	—	nC	I <sub>F</sub> = 13A, di/dt = 500A/μs

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

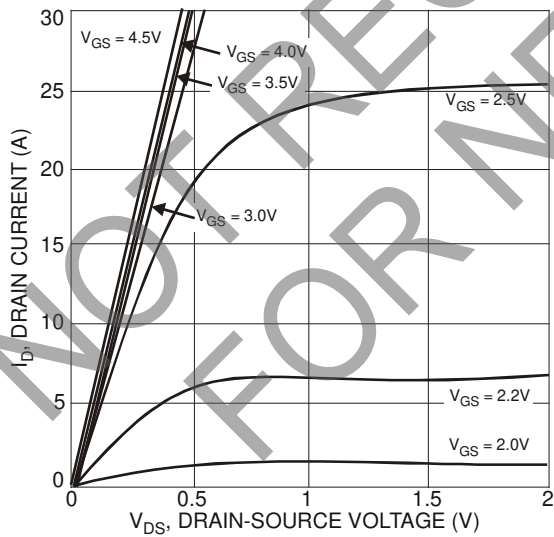


Fig. 4 Typical Output Characteristic

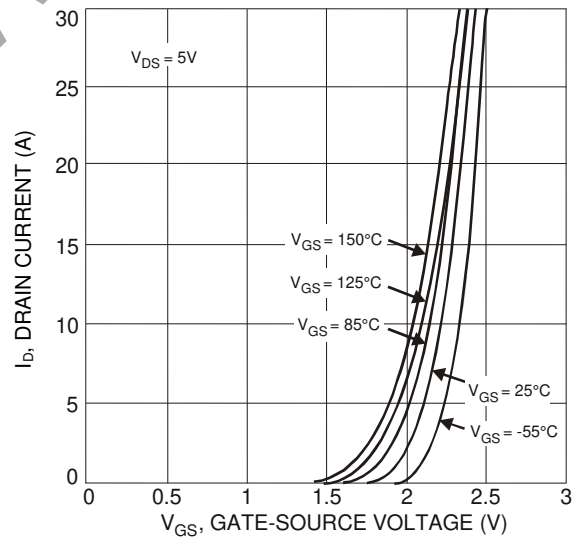
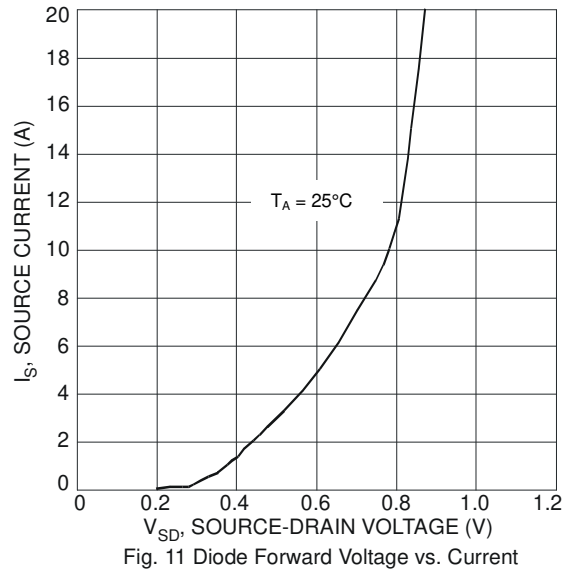
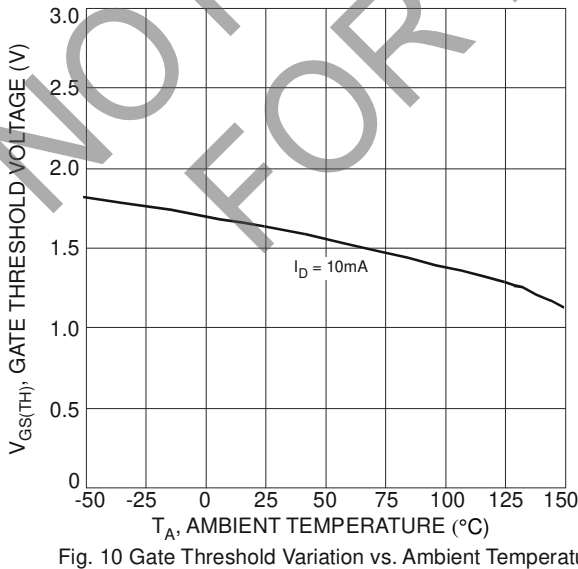
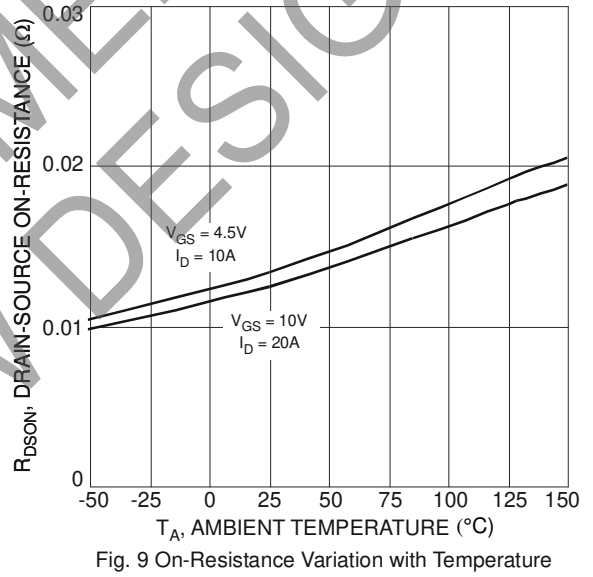
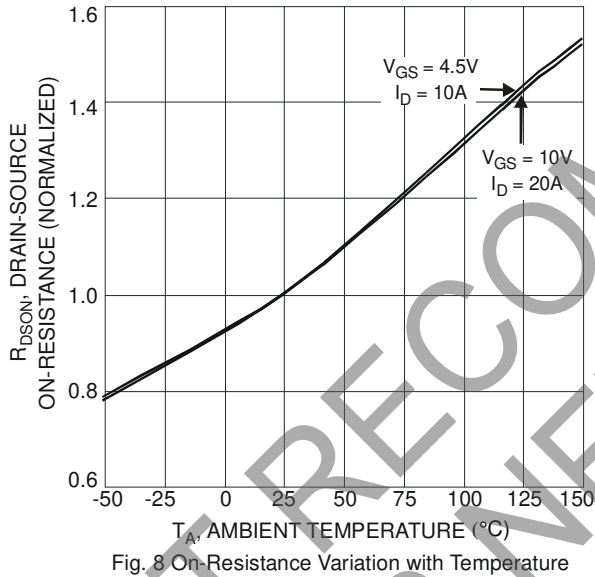
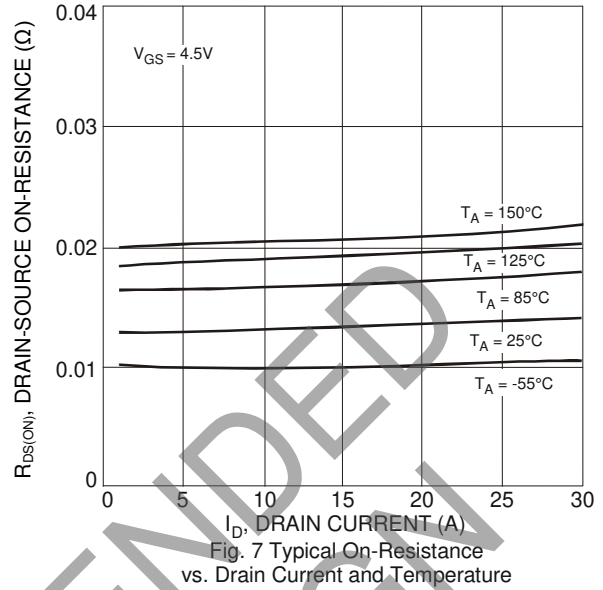
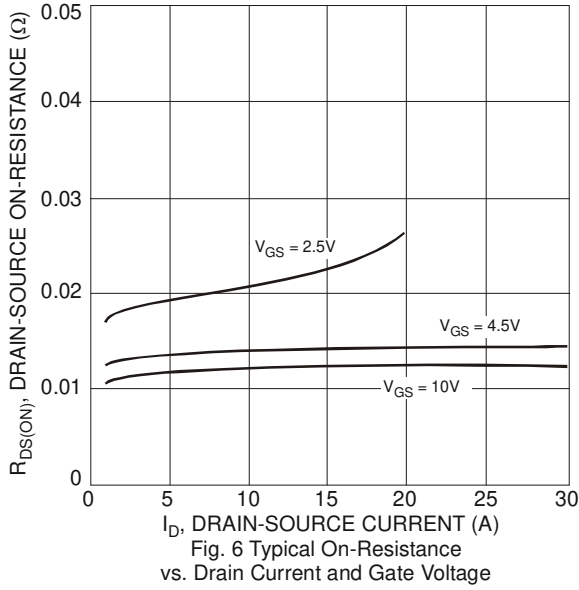


Fig. 5 Typical Transfer Characteristic



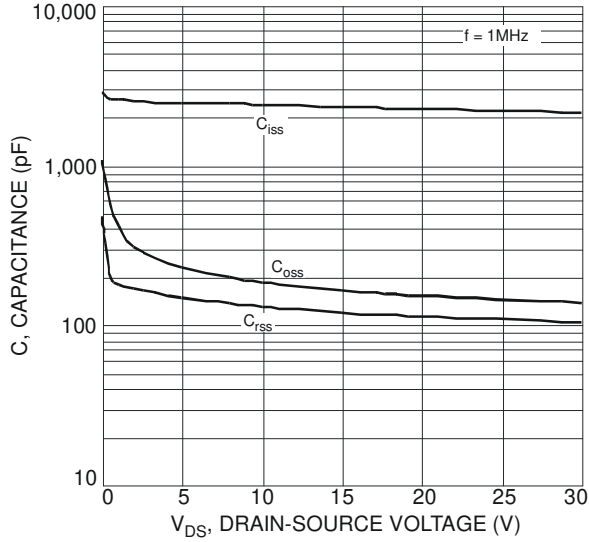


Fig. 12 Typical Total Capacitance

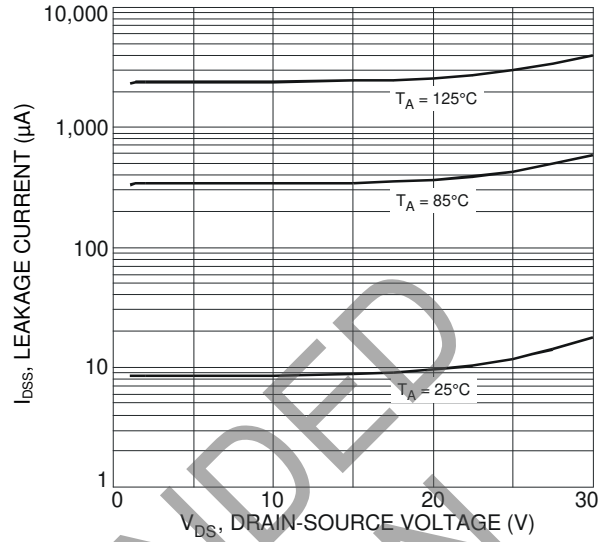


Fig. 13 Typical Leakage Current vs. Drain-Source Voltage

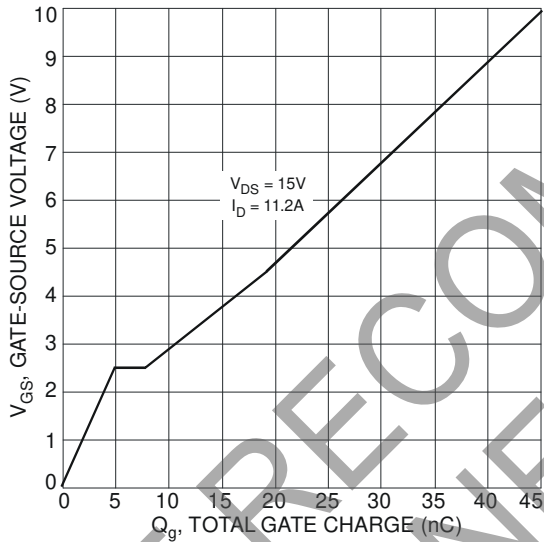


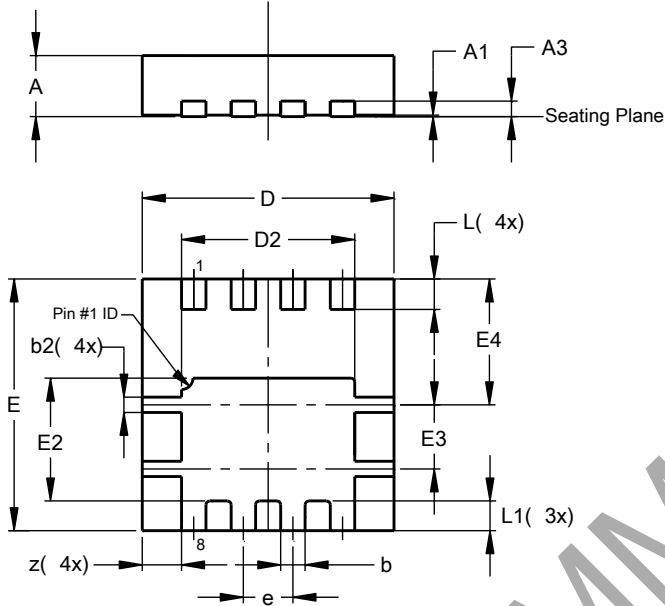
Fig. 14 Gate-Source Voltage vs. Total Gate Charge

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**Package Outline Dimensions**

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

**PowerDI3333-8**

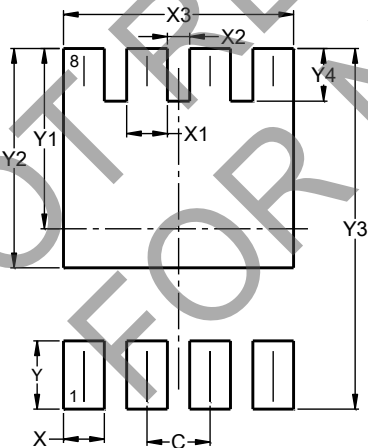


PowerDI3333-8			
Dim	Min	Max	Typ
A	0.75	0.85	0.80
A1	0.00	0.05	0.02
A3	-	-	0.203
b	0.27	0.37	0.32
b2	0.15	0.25	0.20
D	3.25	3.35	3.30
D2	2.22	2.32	2.27
E	3.25	3.35	3.30
E2	1.56	1.66	1.61
E3	0.79	0.89	0.84
E4	1.60	1.70	1.65
e	-	-	0.65
L	0.35	0.45	0.40
L1	-	-	0.39
z	-	-	0.515
All Dimensions in mm			

**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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