

## Product Summary

BV <sub>DSS</sub>	R <sub>DS(ON)</sub> max	I <sub>D</sub> max T <sub>A</sub> = +25°C
30V	14.5mΩ @ V <sub>GS</sub> = 10V	9.5A
	15.5mΩ @ V <sub>GS</sub> = 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<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
- 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<sub>g</sub> 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**
- **PPAP Capable (Note 4)**

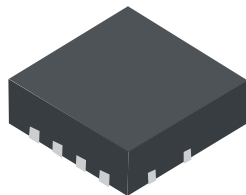
## Description and Applications

This MOSFET is designed to meet the stringent requirements of Automotive applications. It is qualified to AEC-Q101, supported by a PPAP and is ideal for use in:

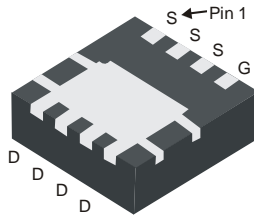
- Backlighting
- Power Management Functions
- DC-DC Converters

## Mechanical Data

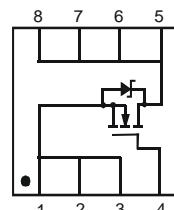
- Case: PowerDI<sup>®</sup> 3333-8
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Connections Indicator: See Diagram
- Terminals: Finish — Matte Tin Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208
- Weight: 0.072 grams (Approximate)



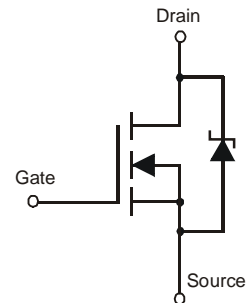
Top View



Bottom View



Top View  
Pin Configuration



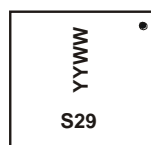
Internal Schematic

## Ordering Information (Note 5)

Part Number	Case	Packaging
DMS3014SFGQ-7	PowerDI3333-8	2000/Tape & Reel
DMS3014SFGQ-13	PowerDI3333-8	3000/Tape & Reel

- Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant.
  2. See [http://www.diodes.com/quality/lead\\_free.html](http://www.diodes.com/quality/lead_free.html) 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. Automotive products are AEC-Q101 qualified and are PPAP capable. Refer to [http://www.diodes.com/product\\_compliance\\_definitions.html](http://www.diodes.com/product_compliance_definitions.html).
  5. For packaging details, go to our website at <https://www.diodes.com/design/support/packaging/diodes-packaging/>.

## Marking Information



S29 = Product Type Marking Code  
 YYWW = Date Code Marking  
 YY = Last Two Digits of Year (ex: 17 = 2017)  
 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 7) 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 7) 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 7)			I <sub>S</sub>	3.0	A
Avalanche Current (Note 8) L = 0.1mH			I <sub>AR</sub>	30	A
Repetitive Avalanche Energy (Note 8) 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 6)			P <sub>D</sub>	1	W
Thermal Resistance, Junction to Ambient (Note 6)	Steady State		R <sub>θJA</sub>	131	°C/W
	t < 10s			72	°C/W
Total Power Dissipation (Note 7)			P <sub>D</sub>	2.1	W
Thermal Resistance, Junction to Ambient (Note 7)	Steady State		R <sub>θJA</sub>	63	°C/W
	t < 10s			35	°C/W
Thermal Resistance, Junction to Case (Note 7)			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:
6. Device mounted on FR-4 substrate PC board, 2oz copper, with minimum recommended pad layout.
  7. Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper plate.
  8. 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.

**Electrical Characteristics** ( $T_A = +25^\circ\text{C}$ , unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS (Note 9)</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	30	—	—	V	$V_{GS} = 0V, I_D = 250\mu A$
Zero Gate Voltage Drain Current	$I_{DSS}$	—	—	100	$\mu A$	$V_{DS} = 30V, V_{GS} = 0V$
Gate-Source Leakage	$I_{GSS}$	—	—	$\pm 100$	nA	$V_{GS} = \pm 12V, V_{DS} = 0V$
<b>ON CHARACTERISTICS (Note 9)</b>						
Gate Threshold Voltage	$V_{GS(TH)}$	1.0	—	2.2	V	$V_{DS} = V_{GS}, I_D = 250\mu A$
Static Drain-Source On-Resistance	$R_{DS(ON)}$	—	9	14.5	m $\Omega$	$V_{GS} = 10V, I_D = 10.4A$
		—	10	15.5		$V_{GS} = 4.5V, I_D = 10.4A$
Forward Transfer Admittance	$ Y_{fs} $	—	23	—	S	$V_{DS} = 5V, I_D = 10.4A$
Diode Forward Voltage	$V_{SD}$	—	0.4	0.55	V	$V_{GS} = 0V, I_S = 1A$
<b>DYNAMIC CHARACTERISTICS (Note 10)</b>						
Input Capacitance	$C_{iss}$	—	2296	4310	pF	$V_{DS} = 15V, V_{GS} = 0V,$ $f = 1.0MHz$
Output Capacitance	$C_{oss}$	—	164	—	pF	
Reverse Transfer Capacitance	$C_{rss}$	—	120	—	pF	
Gate Resistance	$R_g$	0.26	1.3	2.34	$\Omega$	$V_{DS} = 0V, V_{GS} = 0V, f = 1MHz$
Total Gate Charge $V_{GS} = 4.5V$	$Q_g$	—	19.3	—	nC	$V_{DS} = 15V, V_{GS} = 10V, I_D = 10.4A$
Total Gate Charge $V_{GS} = 10V$	$Q_g$	—	45.7	—	nC	
Gate-Source Charge	$Q_{gs}$	—	5.0	—	nC	
Gate-Drain Charge	$Q_{gd}$	—	2.9	—	nC	
Turn-On Delay Time	$t_{D(ON)}$	—	5.5	—	ns	$V_{GS} = 10V, V_{DS} = 15V,$ $R_G = 3\Omega, R_L = 1.2\Omega$
Turn-On Rise Time	$t_R$	—	24.4	—	ns	
Turn-Off Delay Time	$t_{D(OFF)}$	—	33.1	—	ns	
Turn-Off Fall Time	$t_F$	—	6.6	—	ns	
Reverse Recovery Time	$t_{RR}$	—	12.9	—	ns	
Reverse Recovery Charge	$Q_{RR}$	—	8.0	—	nC	$I_F = 13A, di/dt = 500A/\mu s$

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

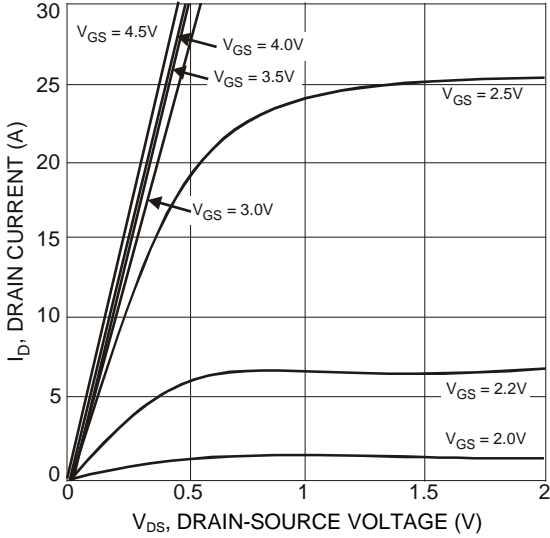


Fig. 1 Typical Output Characteristics

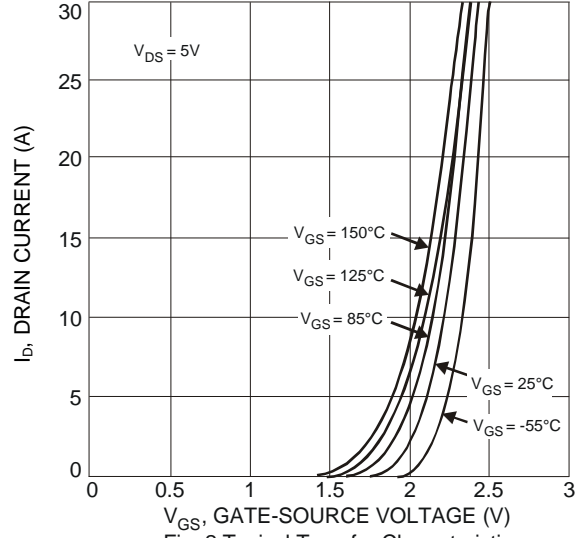


Fig. 2 Typical Transfer Characteristic

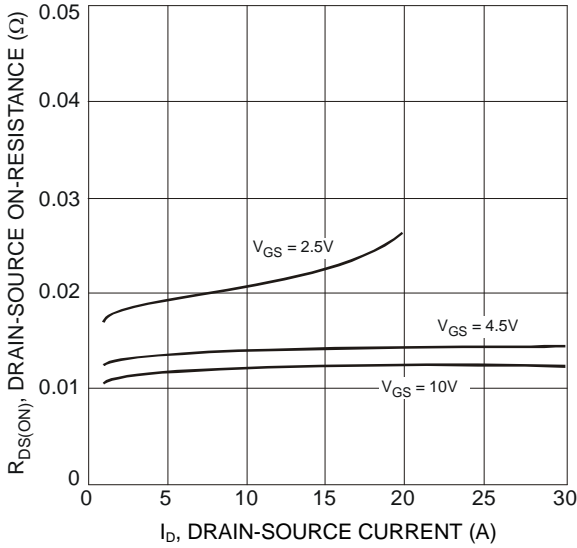


Fig. 3 Typical On-Resistance vs. Drain Current and Gate Voltage

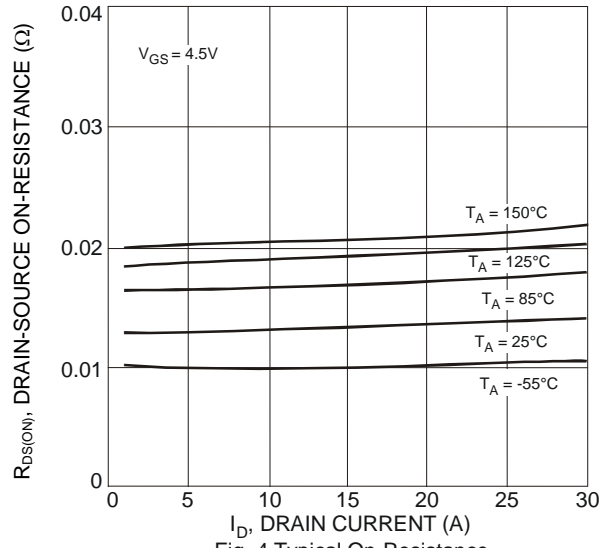


Fig. 4 Typical On-Resistance vs. Drain Current and Temperature

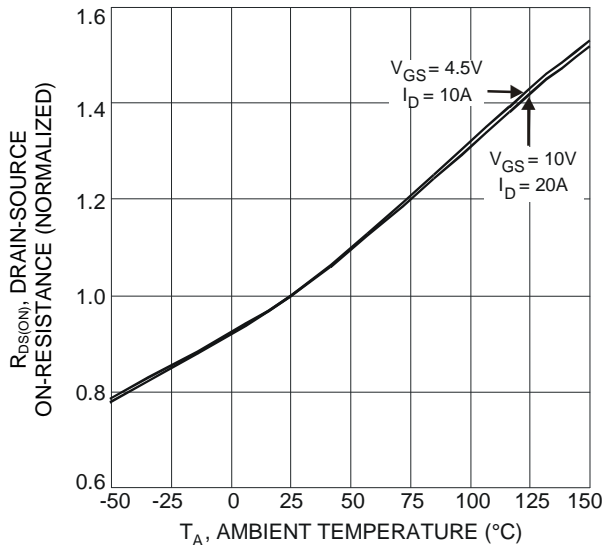


Fig. 5 On-Resistance Variation with Temperature

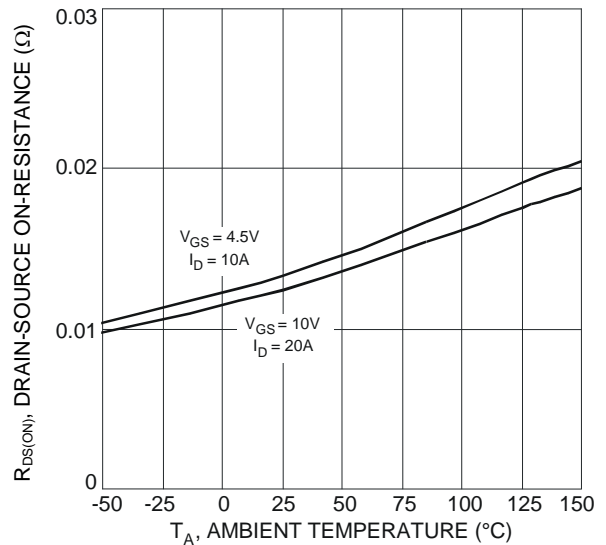


Fig. 6 On-Resistance Variation with Temperature

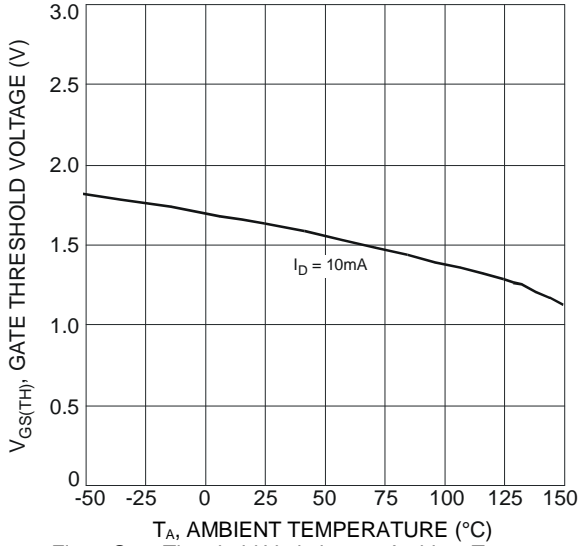


Fig. 7 Gate Threshold Variation vs. Ambient Temperature

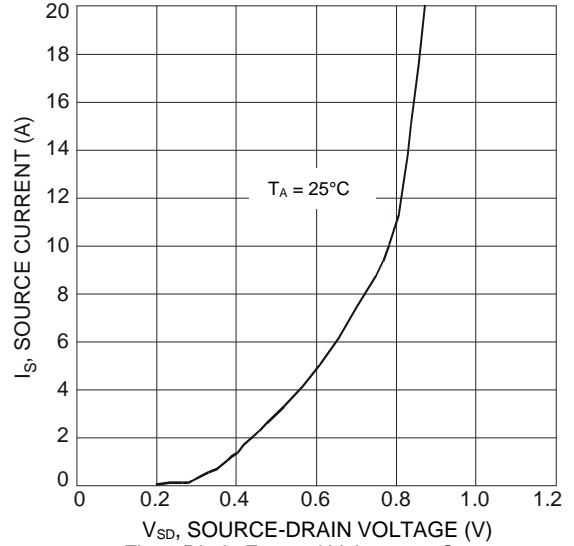


Fig. 8 Diode Forward Voltage vs. Current

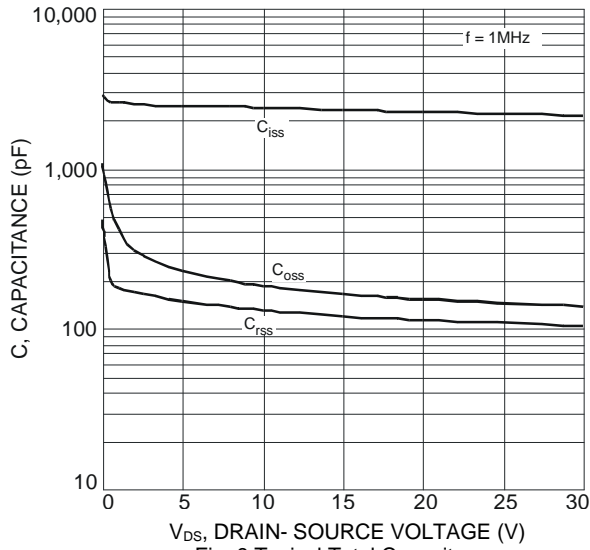


Fig. 9 Typical Total Capacitance

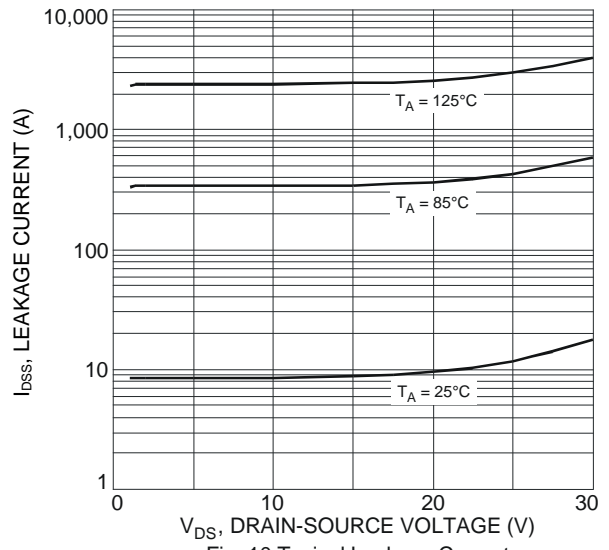


Fig. 10 Typical Leakage Current vs. Drain-Source Voltage

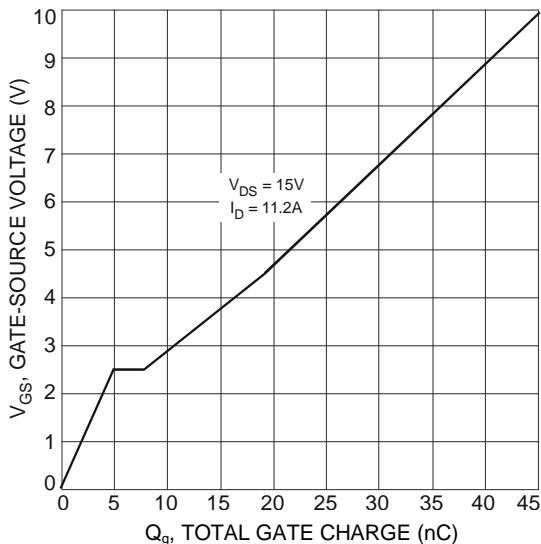


Fig. 11 Gate-Source Voltage vs. Total Gate Charge

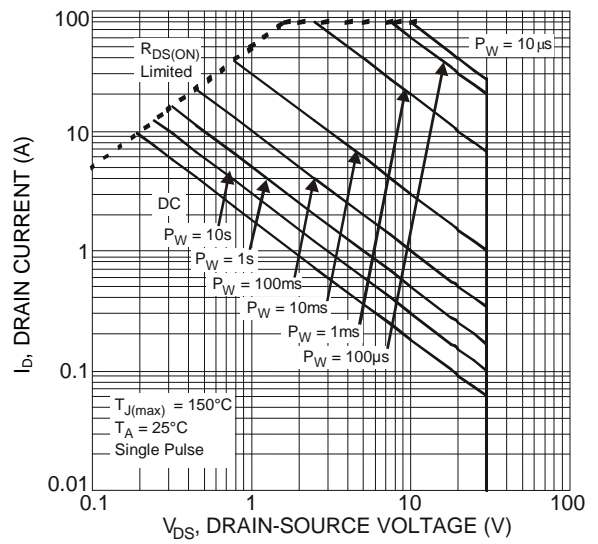


Fig. 12 SOA, Safe Operation Area

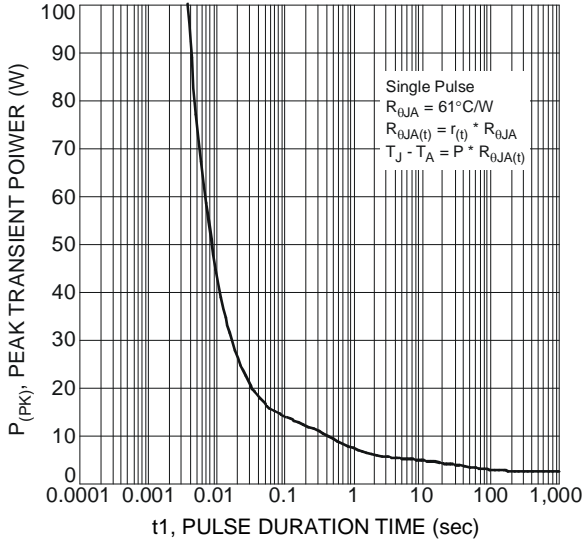


Fig. 13 Single Pulse Maximum Power Dissipation

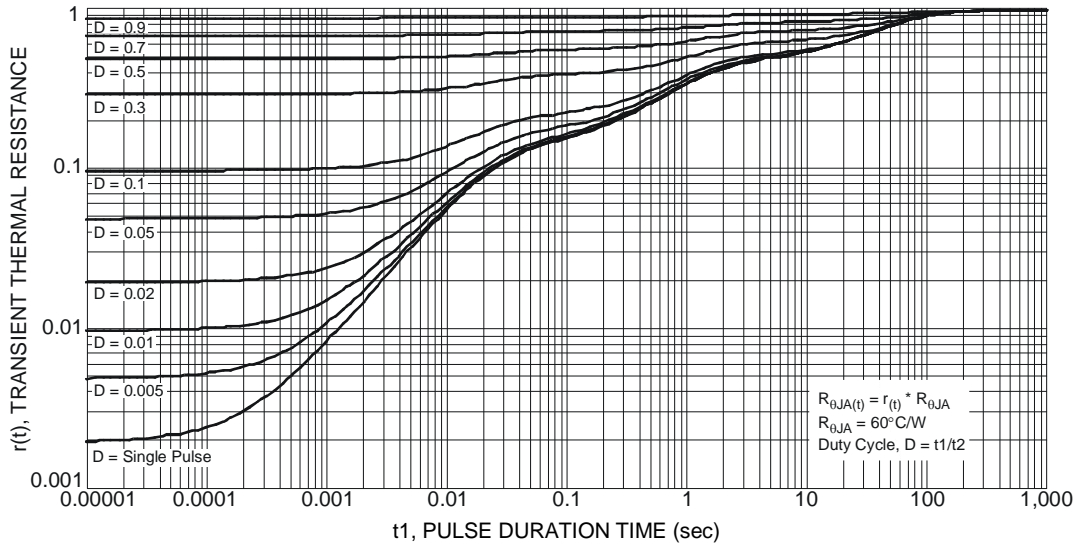
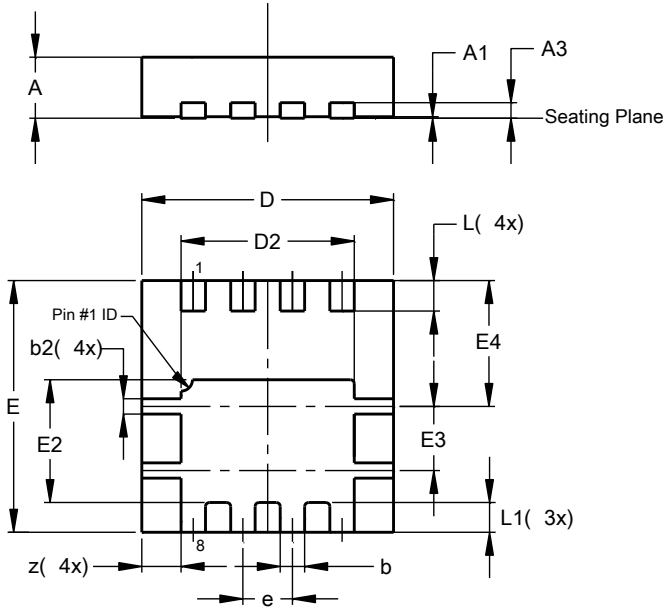


Fig. 14 Transient Thermal Resistance

**Package Outline Dimensions**

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

**PowerDI3333-8**

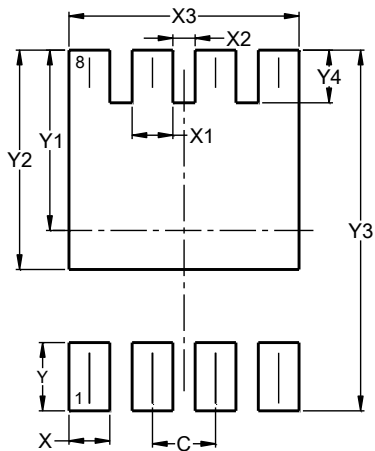


PowerDI3333-8			
Dim	Min	Max	Typ
A	0.75	0.85	0.80
A1	0.00	0.05	0.02
A3	-	-	0.203
b	0.27	0.37	0.32
b2	0.15	0.25	0.20
D	3.25	3.35	3.30
D2	2.22	2.32	2.27
E	3.25	3.35	3.30
E2	1.56	1.66	1.61
E3	0.79	0.89	0.84
E4	1.60	1.70	1.65
e	-	-	0.65
L	0.35	0.45	0.40
L1	-	-	0.39
z	-	-	0.515
All Dimensions in mm			

**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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