30V N-CHANNEL ENHANCEMENT MODE MOSFET
PowerDI3333-8

Product Summary

BV_{DSS}	$R_{DS(ON)}$ max	I_D max T_A = +25°C
30V	14.5mΩ @ V_{GS} = 10V	9.5A
	15.5mΩ @ 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**
- **PPAP Capable (Note 4)**

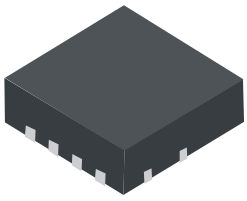
Description and Applications

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:

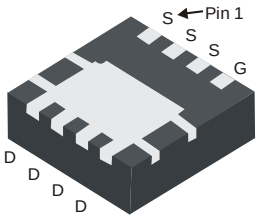
- Backlighting
- Power Management Functions
- DC-DC Converters

Mechanical Data

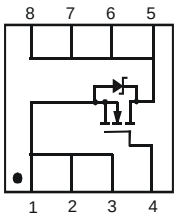
- Case: PowerDI®3333-8
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Connections Indicator: See Diagram
- Terminals: Finish — Matte Tin Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208 e3
- Weight: 0.072 grams (Approximate)



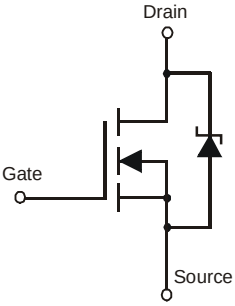
Top View



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 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.
5. For packaging details, go to our website at https://www.diodes.com/design/support/packaging/diodes-packaging/.

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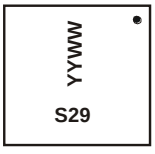


S29 = Product Type Marking Code
YYWW = Date Code Marking
YY = Last Two Digits of Year (ex: 17 = 2017)
WW = Week Code (01 to 53)

PowerDI is a registered trademark of Diodes Incorporated.

Maximum Ratings (@T_A = +25°C, unless otherwise specified.)

Characteristic			Symbol	Value	Unit
Drain-Source Voltage			V_{DSS}	30	V
Gate-Source Voltage			V_{GSS}	±12	V
Continuous Drain Current (Note 7) V_{GS} = 10V	Steady State	T_A = +25°C T_A = +70°C	I_D	9.5 7.6	A
	t<10s	T_A = +25°C T_A = +70°C	I_D	13.0 9.7	A
Continuous Drain Current (Note 7) V_{GS} = 4.5V	Steady State	T_A = +25°C T_A = +70°C	I_D	9.0 7.4	A
	t<10s	T_A = +25°C T_A = +70°C	I_D	12.2 9.3	A
Pulsed Drain Current (10µs Pulse, Duty Cycle = 1%)			I_{DM}	80	A
Maximum Continuous Body Diode Forward Current (Note 7)			I_S	3.0	A
Avalanche Current (Note 8) L = 0.1mH			I_{AR}	30	A
Repetitive Avalanche Energy (Note 8) L = 0.1mH			E_{AR}	45	mJ

Thermal Characteristics (@T_A = +25°C, unless otherwise specified.)

Characteristic		Symbol	Value	Unit
Total Power Dissipation (Note 6)		P_D	1	W
Thermal Resistance, Junction to Ambient (Note 6)	Steady State	$R_{\theta JA}$	131	°C/W
	t<10s		72	°C/W
Total Power Dissipation (Note 7)		P_D	2.1	W
Thermal Resistance, Junction to Ambient (Note 7)	Steady State	$R_{\theta JA}$	63	°C/W
	t<10s		35	°C/W
Thermal Resistance, Junction to Case (Note 7)		$R_{\theta JC}$	7.1	°C/W
Operating and Storage Temperature Range		T_J, T_{STG}	-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_{AR} and E_{AR} ratings are based on low frequency and duty cycles to keep T_J = +25°C.

Electrical Characteristics (T_A = +25°C, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 9)						
Drain-Source Breakdown Voltage	BV_{DSS}	30	—	—	V	V_{GS} = 0V, I_D = 250μA
Zero Gate Voltage Drain Current	I_{DSS}	—	—	100	μA	V_{DS} = 30V, V_{GS} = 0V
Gate-Source Leakage	I_{GSS}	—	—	±100	nA	V_{GS} = ±12V, V_{DS} = 0V
ON CHARACTERISTICS (Note 9)						
Gate Threshold Voltage	$V_{GS(TH)}$	1.0	—	2.2	V	V_{DS} = V_{GS}, I_D = 250μA
Static Drain-Source On-Resistance	$R_{DS(ON)}$	—	9	14.5	mΩ	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
DYNAMIC CHARACTERISTICS (Note 10)						
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	Ω	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 = 3Ω, R_L = 1.2Ω
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	I_F = 13A, di/dt = 500A/μs
Reverse Recovery Charge	Q_{RR}	—	8.0	—	nC	I_F = 13A, di/dt = 500A/μs

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

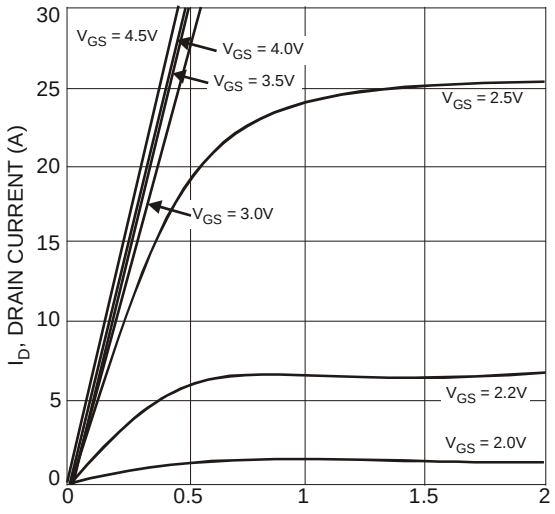


Fig. 1 Typical Output Characteristics

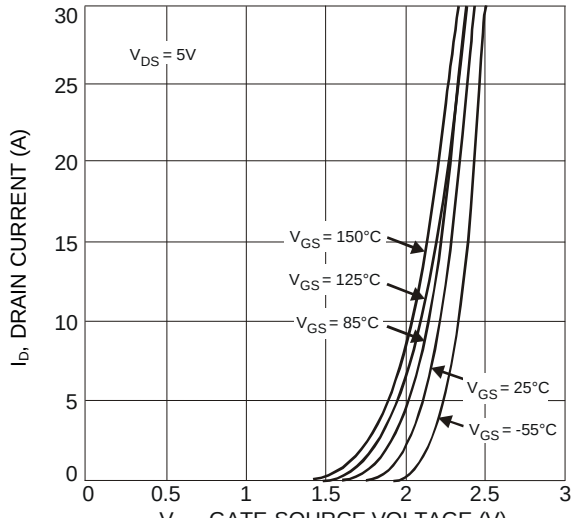


Fig. 2 Typical Transfer Characteristic

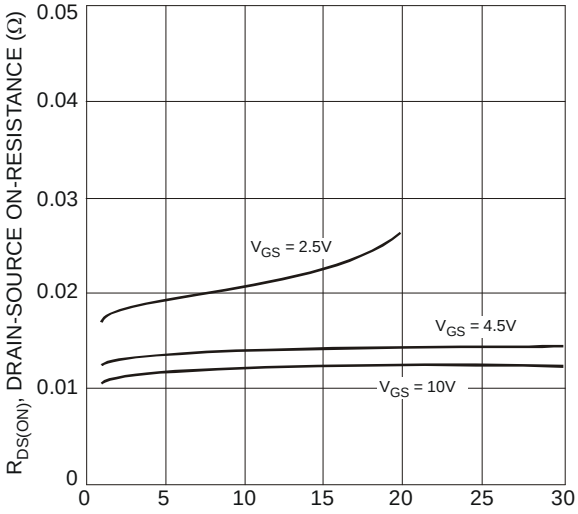


Fig. 3 Typical On-Resistance
vs. Drain Current and Gate Voltage

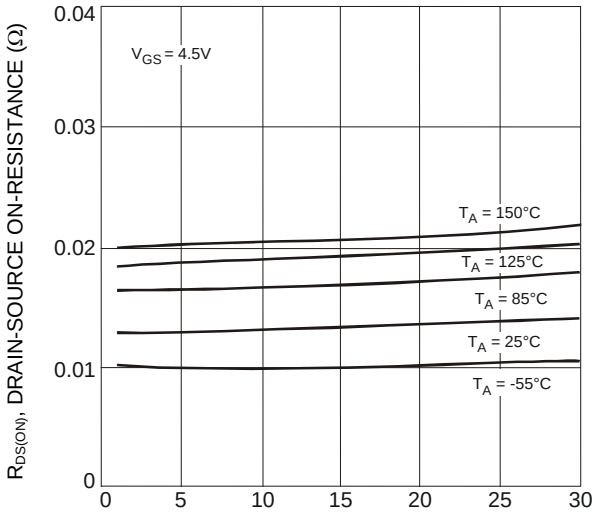


Fig. 4 Typical On-Resistance
vs. Drain Current and Temperature

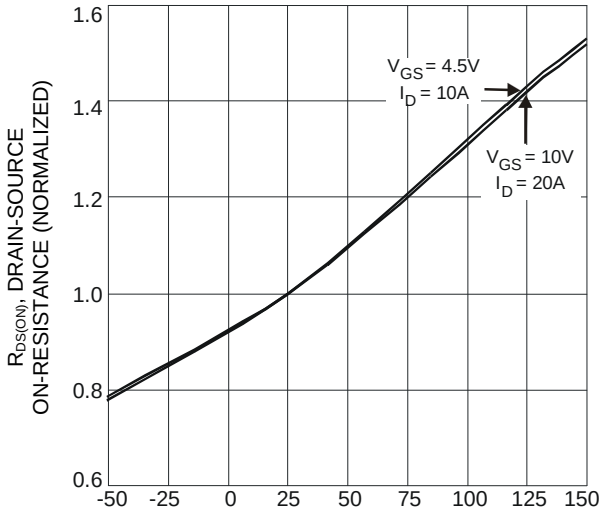


Fig. 5 On-Resistance Variation with Temperature

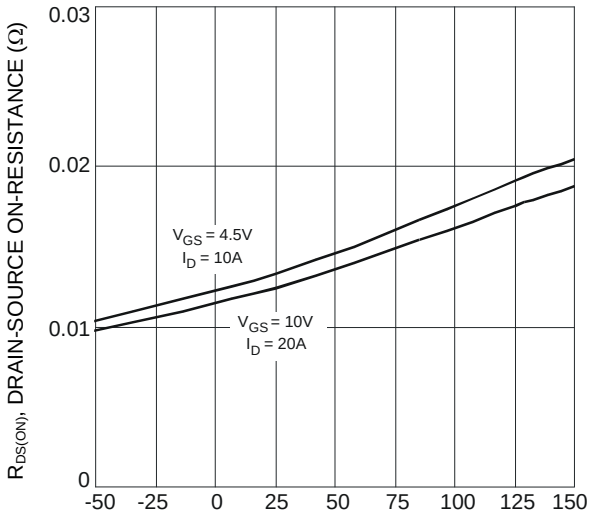


Fig. 6 On-Resistance Variation with Temperature

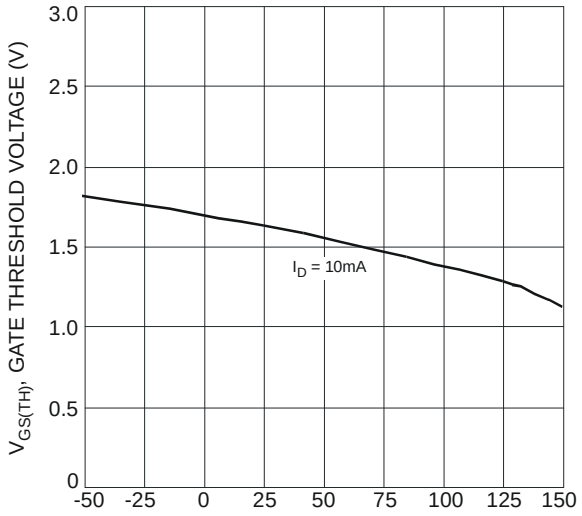


Fig. 7 Gate Threshold Variation vs. Ambient Temperature

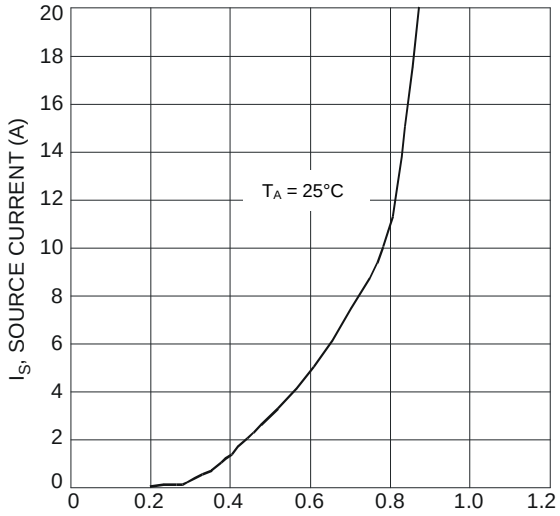


Fig. 8 Diode Forward Voltage vs. Current

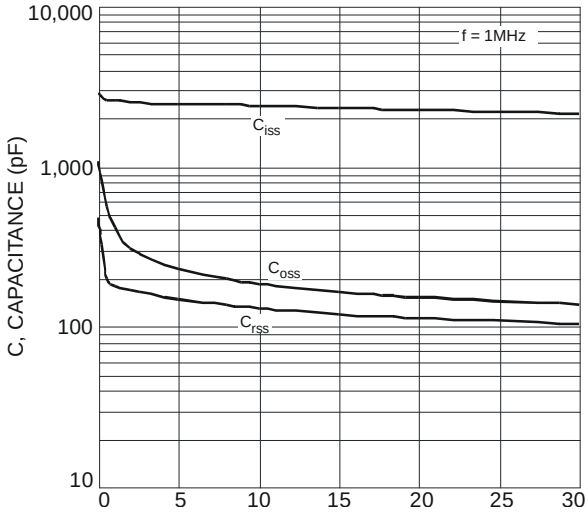


Fig. 9 Typical Total Capacitance

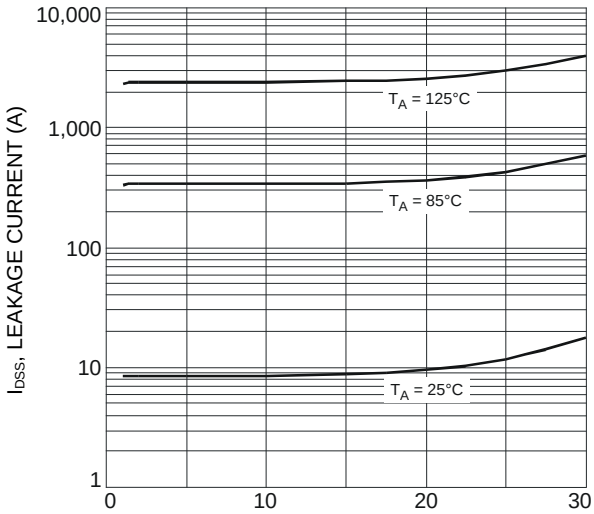


Fig. 10 Typical Leakage Current vs. Drain-Source Voltage

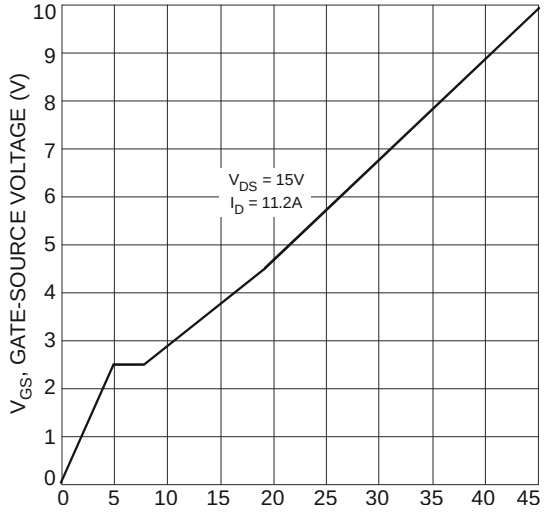


Fig. 11 Gate-Source Voltage vs. Total Gate Charge

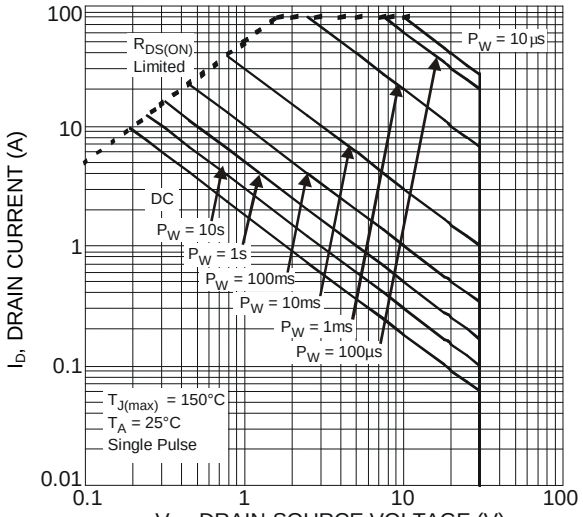


Fig. 12 SOA, Safe Operation Area

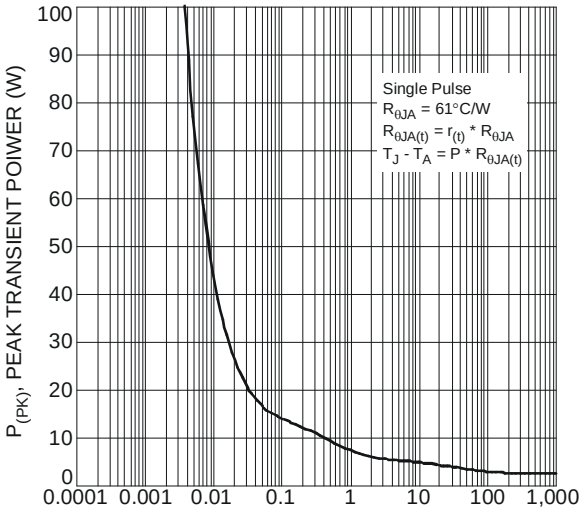


Fig. 13 Single Pulse Maximum Power Dissipation

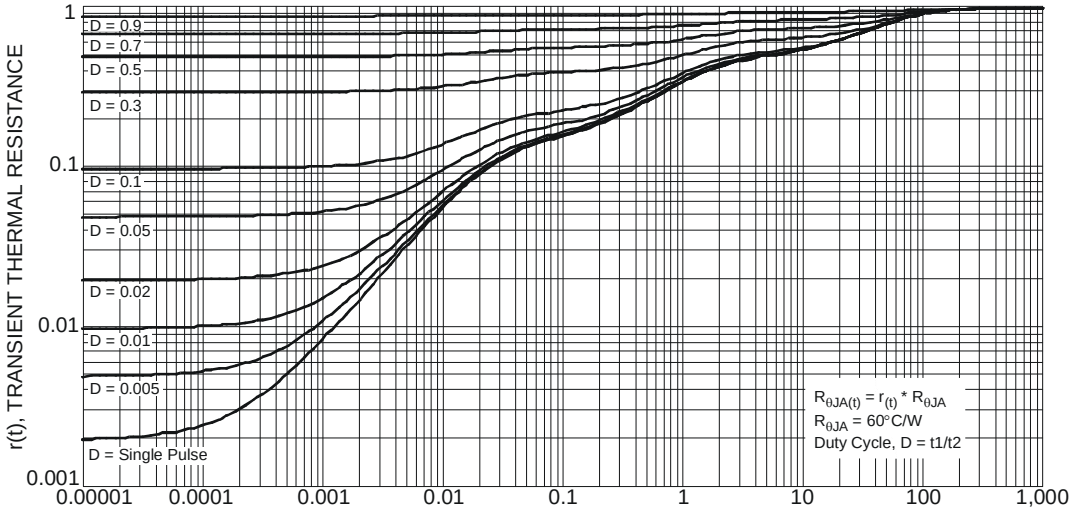
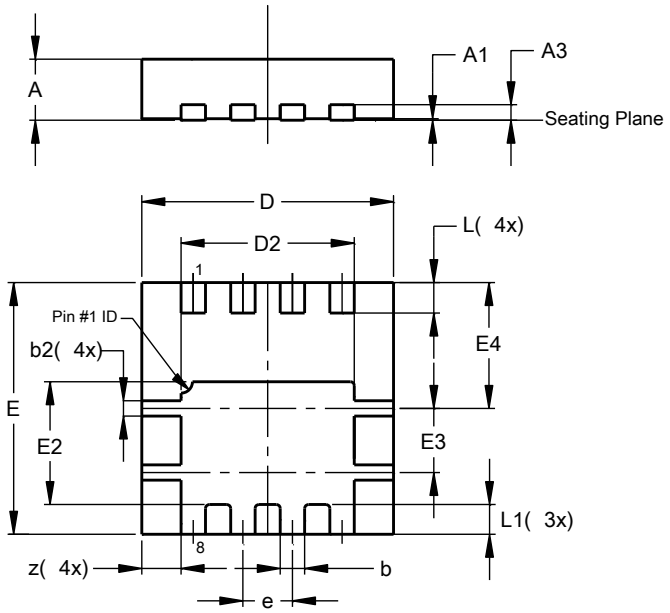


Fig. 14 Transient Thermal Resistance

Package Outline Dimensions

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

PowerDI3333-8

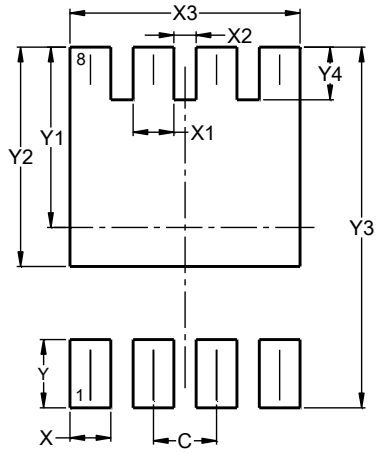


PowerDI3333-8			
Dim	**Min**	**Max**	**Typ**
A	0.75	0.85	0.80
A1	0.00	0.05	0.02
A3	–	–	0.203
b	0.27	0.37	0.32
b2	0.15	0.25	0.20
D	3.25	3.35	3.30
D2	2.22	2.32	2.27
E	3.25	3.35	3.30
E2	1.56	1.66	1.61
E3	0.79	0.89	0.84
E4	1.60	1.70	1.65
e	–	–	0.65
L	0.35	0.45	0.40
L1	–	–	0.39
z	–	–	0.515
All Dimensions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