40V P-CHANNEL ENHANCEMENT MODE MOSFET
PowerDI3333-8

Product Summary

BV_{DSS}	$R_{DS(ON)}$ Max	I_D Max T_A = +25°C (Note 6)
-40V	25mΩ @ V_{GS} = -10V	- 7.2A
	45mΩ @ V_{GS} = -4.5V	- 5.4A

Description and Application

This MOSFET has been designed to minimize the on-state resistance yet maintain superior switching performance, making it ideal for high efficiency power management applications.

- Motor controls
- Backlighting
- DC-DC converters
- Printer equipment

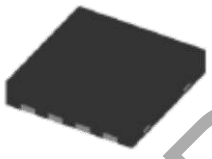
Features and Benefits

- Low $R_{DS(ON)}$ – Minimizes Conduction Losses
- Fast Switching Speed – Minimizes Switching Losses
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **This part is qualified to JEDEC standards (as references in AEC-Q) for High Reliability.**
  https://www.diodes.com/quality/product-definitions/
- **An Automotive-Compliant Part is Available Under Separate Datasheet (DMP4025SFGQ)**

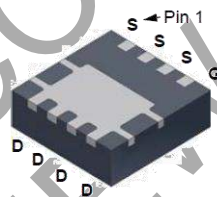
Mechanical Data

- Package: PowerDI®3333-8
- Package Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals Connections: See Diagram Below
- Terminals: Finish - Matte Tin Annealed over Copper Lead Frame. Solderable per MIL-STD-202, Method 208 e3
- Weight: 0.0172 grams (Approximate)

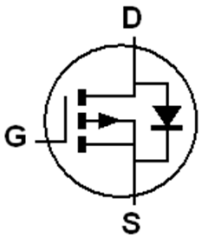
PowerDI3333-8



Top View



Bottom View



Device Symbol

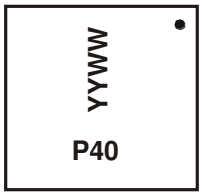
Ordering Information (Note 4)

Part Number	Package	Packing	
		Qty.	Carrier
DMP4025SFG-7	PowerDI3333-8	2,000	Reel
DMP4025SFG-13	PowerDI3333-8	3,000	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/.

Marking Information

Site 1



P40 = Product Type Marking Code
YYWW = Date Code Marking
YY = Year (ex: 23 = 2023)
WW = Week (01 to 53)

Site 2

P40 = Product Type Marking Code
YWX = Date Code Marking
Y = Year (ex: 3 = 2023)
W = Week (ex: a = Week 27; z Represents Week 52 and 53)
X = Internal Code (ex: U = Monday)

Date Code Key

Year	2012	…	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Code	2	…	3	4	5	6	7	8	9	0	1	2

Week	1-26	27-52	53
Code	A-Z	a-z	z

Internal Code	Sun	Mon	Tue	Wed	Thu	Fri	Sat
Code	T	U	V	W	X	Y	Z

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

Characteristic		Symbol	Value	Unit
Drain-Source Voltage		V_{DSS}	-40	V
Gate-Source Voltage		V_{GSS}	±20	
Continuous Drain Current, V_{GS} = -10V	(Note 6)	I_D	-7.2	A
	T_A = +70°C (Note 6)		-5.77	
	(Note 5)		-4.65	
Maximum Body Diode Forward Current	(Note 6)	I_S	-7.2	
Pulsed Drain Current	(Note 7)	I_{DM}	-80	
Pulsed Source Current	(Note 7)	I_{SM}	-80	

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

Characteristic		Symbol	Value	Unit
Power Dissipation	(Note 5)	P_D	0.81	W
Linear Derating Factor	(Note 6)		1.95	
Thermal Resistance, Junction to Ambient	(Note 5)	$R_{\theta JA}$	155	°C/W
	(Note 6)		64	
Operating and Storage Temperature Range		T_J, T_{STG}	-55 to +150	°C

Notes: 5. Device mounted on FR-4 substrate PC board, 2oz copper, with minimum recommended pad layout.
6. For a device surface mounted on 25mm x 25mm FR-4 PCB with 2oz copper, in still air conditions.
7. Same as note (6), except the device is pulsed with D= 0.02 and pulse width 300µs.

Thermal Characteristics

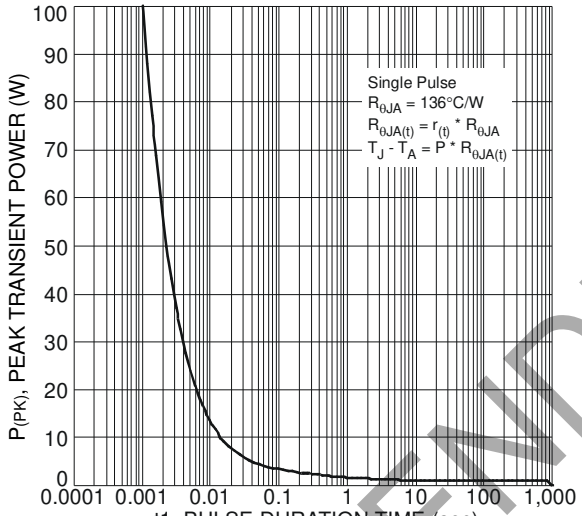


Figure 1 Single Pulse Maximum Power Dissipation

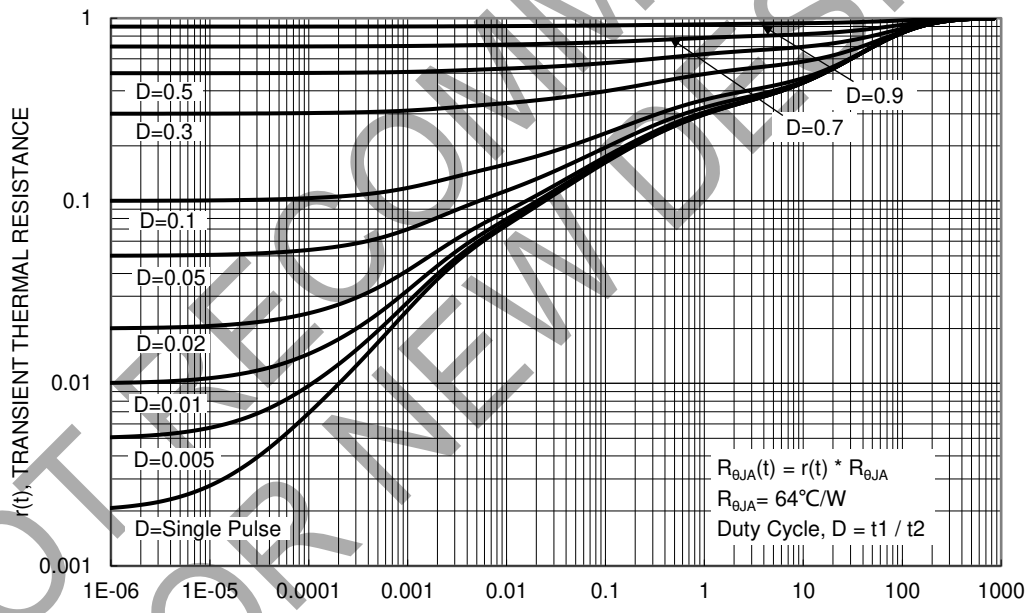


Figure 2. Transient Thermal Resistance

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

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV_{DSS}	-40	—	—	V	I_D = -250µA, V_{GS} = 0V
Zero Gate Voltage Drain Current	I_{DSS}	—	—	-1.0	µA	V_{DS} = -40V, V_{GS} = 0V
Gate-Source Leakage	I_{GSS}	—	—	±100	nA	V_{GS} = ±20V, V_{DS} = 0V
ON CHARACTERISTICS						
Gate Threshold Voltage	$V_{GS(TH)}$	-0.8	-1.3	-1.8	V	I_D = -250µA, V_{DS} = V_{GS}
Static Drain-Source On-Resistance (Note 8)	$R_{DS(ON)}$	—	18	25	mΩ	V_{GS} = -10V, I_D = -3A
			30	45		V_{GS} = -4.5V, I_D = -3A
Forward Transconductance (Notes 8 & 9)	g_{fs}	—	16.6	—	S	V_{DS} = -5V, I_D = -3A
Diode Forward Voltage (Note 8)	V_{SD}	—	-0.7	-1.0	V	I_S = -1A, V_{GS} = 0V
DYNAMIC CHARACTERISTICS (Note 9)						
Input Capacitance	C_{iss}	—	1643	—	pF	V_{DS} = -20V, V_{GS} = 0V f = 1MHz
Output Capacitance	C_{oss}	—	179	—		
Reverse Transfer Capacitance	C_{rss}	—	128	—		
Gate Resistance	R_g	—	6.43	—	Ω	V_{DS} = 0V, V_{GS} = 0V, f = 1MHz
Total Gate Charge (Note 10)	Q_g	—	14.0	—	nC	V_{GS} = -4.5V V_{DS} = -20V I_D = -3A
Total Gate Charge (Note 10)	Q_g	—	33.7	—		V_{GS} = -10V
Gate-Source Charge (Note 10)	Q_{gs}	—	5.5	—		
Gate-Drain Charge (Note 10)	Q_{gd}	—	7.3	—		
Turn-On Delay Time (Note 10)	$t_{D(ON)}$	—	6.9	—	ns	V_{DD} = -20V, V_{GS} = -10V I_D = -3A
Turn-On Rise Time (Note 10)	t_R	—	14.7	—		
Turn-Off Delay Time (Note 10)	$t_{D(OFF)}$	—	53.7	—		
Turn-Off Fall Time (Note 10)	t_F	—	30.9	—		

Notes: 8. Measured under pulsed conditions. Pulse width ≤ 300µs; duty cycle ≤ 2%.
9. For design aid only, not subject to production testing.
10. Switching characteristics are independent of operating junction temperatures.

Typical Characteristics

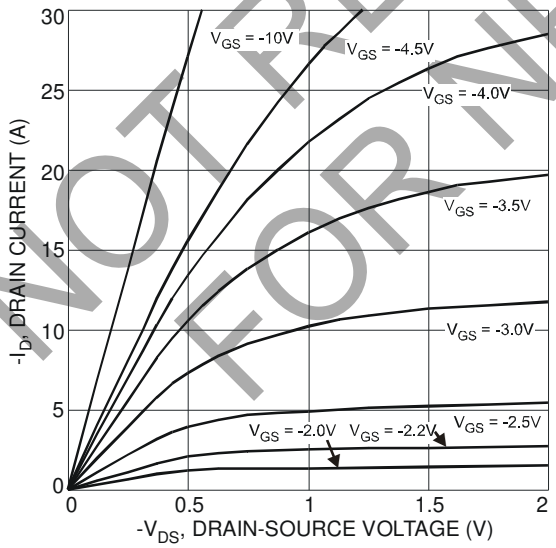


Figure 3 Typical Output Characteristic

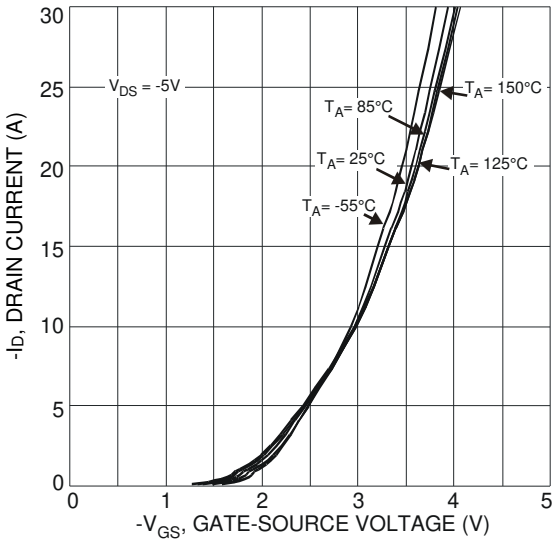


Figure 4 Typical Transfer Characteristic

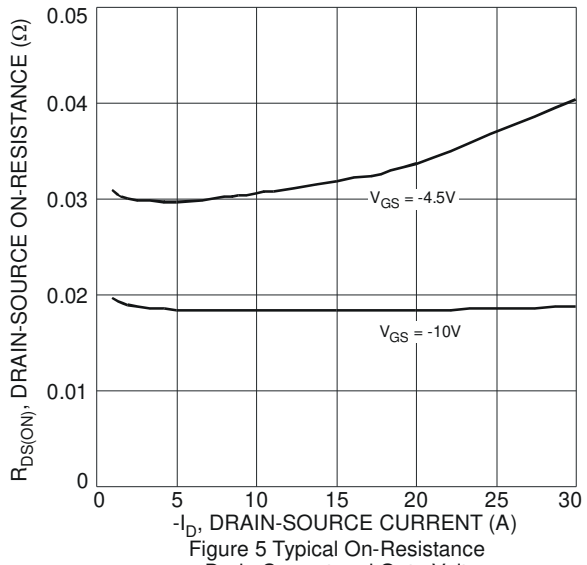


Figure 5 Typical On-Resistance vs. Drain Current and Gate Voltage

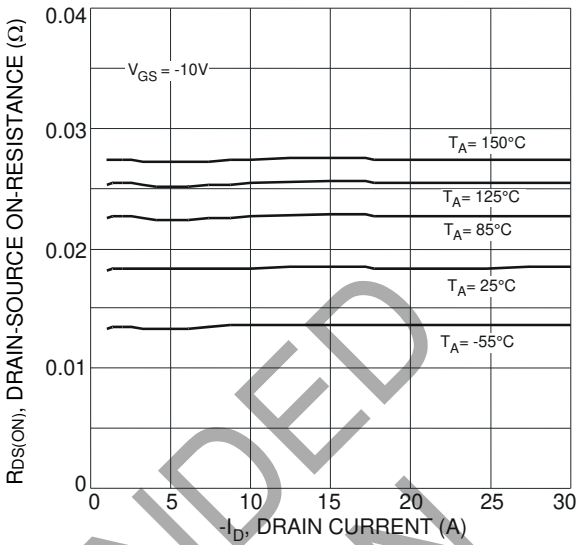


Figure 6 Typical On-Resistance vs. Drain Current and Temperature

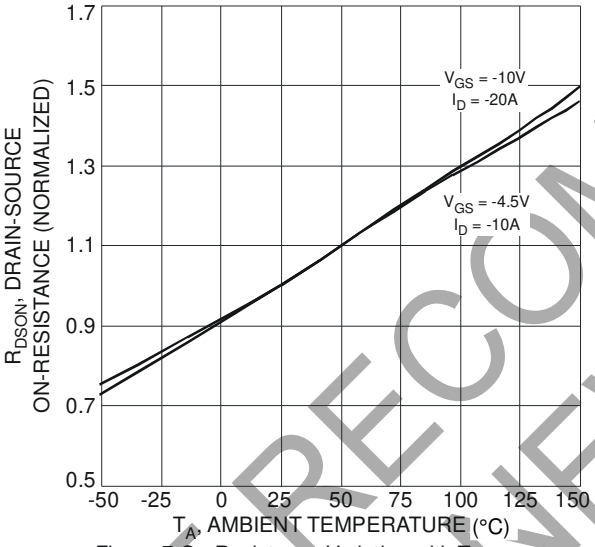


Figure 7 On-Resistance Variation with Temperature

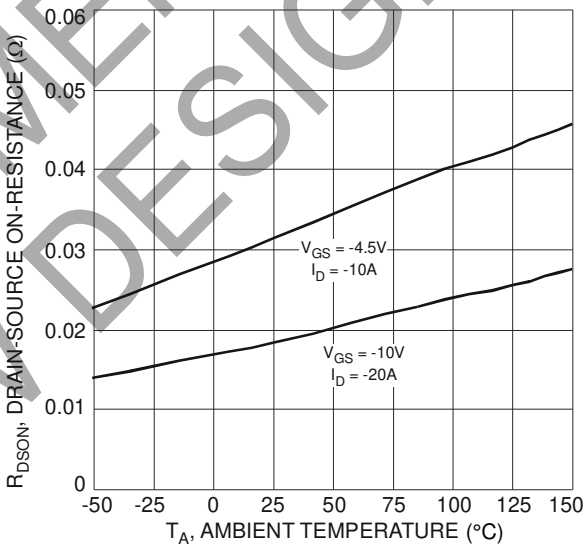


Figure 8 On-Resistance Variation with Temperature

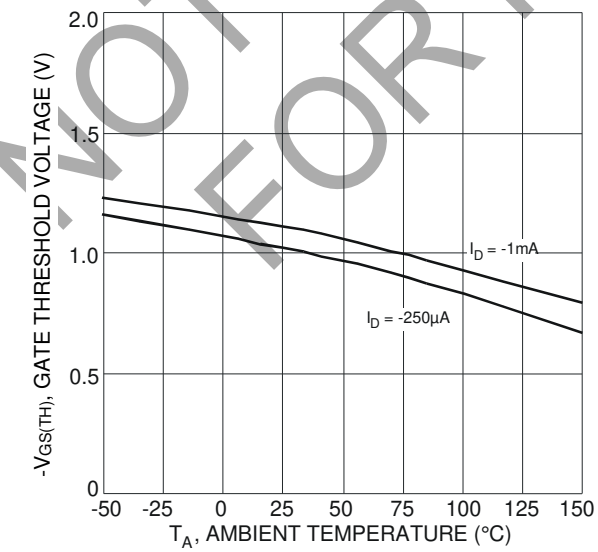


Figure 9 Gate Threshold Variation vs. Ambient Temperature

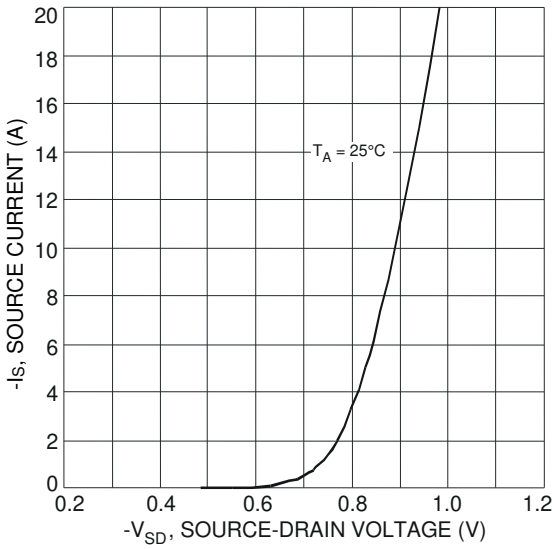


Figure 10 Diode Forward Voltage vs. Current

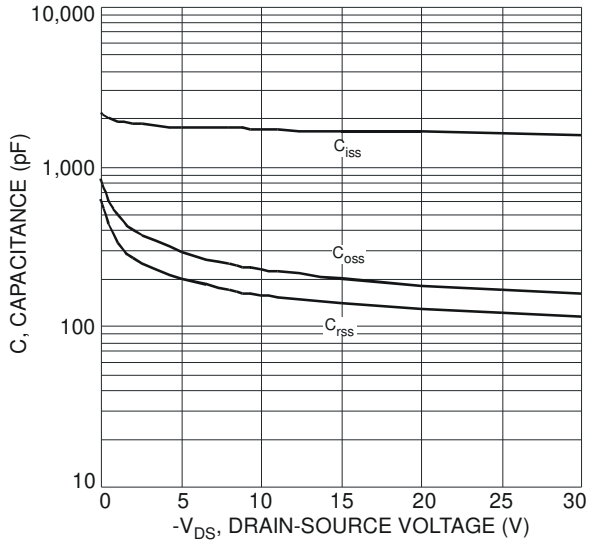


Figure 11 Typical Total Capacitance

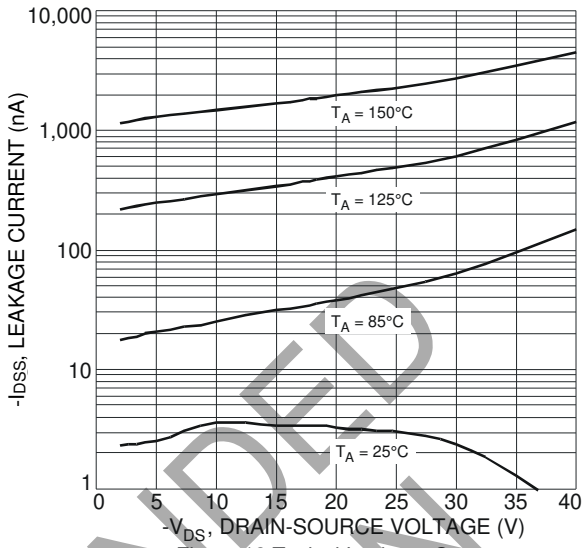


Figure 12 Typical Leakage Current vs. Drain-Source Voltage

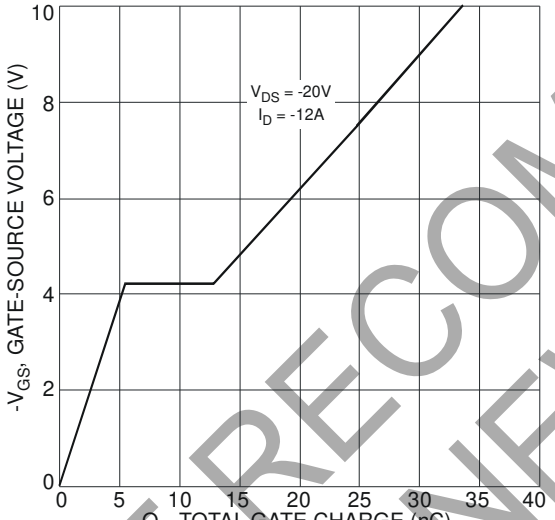


Figure 13 Gate-Charge Characteristics

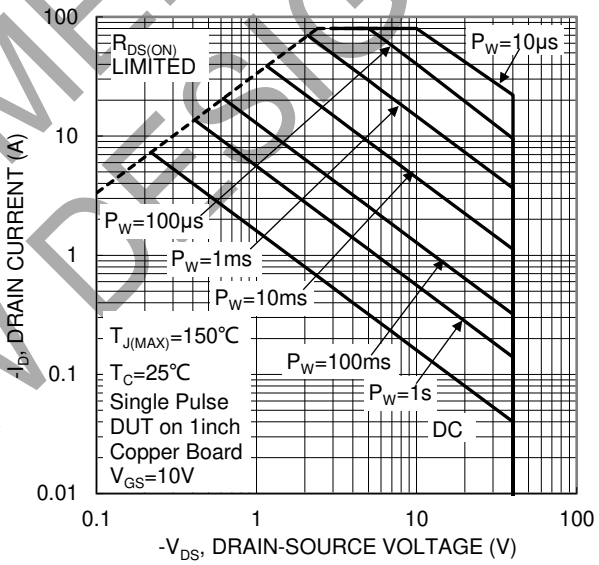
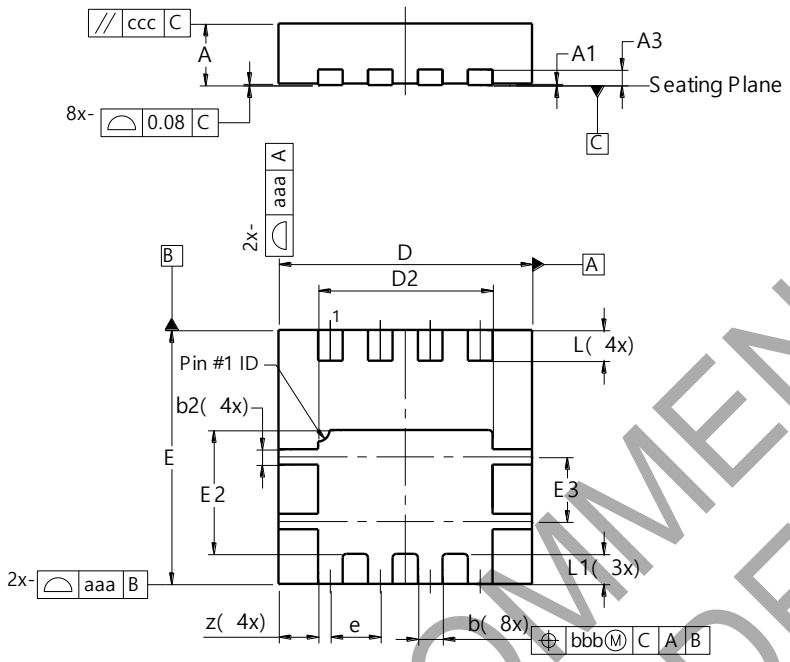


Figure 14. SOA, Safe Operation Area

Package Outline Dimensions

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

PowerDI3333-8

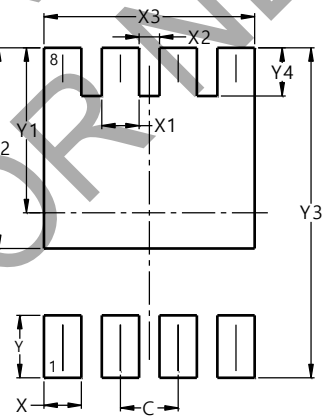


PowerDI3333-8			
Dim	**Min**	**Max**	**Typ**
A	0.75	0.85	0.80
A1	0.00	0.05	0.02
A3	–	–	0.203
b	0.27	0.37	0.32
b2	–	–	0.20
D	3.25	3.35	3.30
D2	2.22	2.32	2.27
E	3.25	3.35	3.30
E2	1.56	1.66	1.61
E3	0.79	0.89	0.84
e	–	–	0.65
L	0.35	0.45	0.40
L1	–	–	0.39
z	–	–	0.515
aaa	0.25		
bbb	0.10		
ccc	0.10		
All Dimensions 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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