N-CHANNEL ENHANCEMENT MODE MOSFET
POWERDI®

Product Summary

$V_{(BR)DSS}$	$R_{DS(ON)}$	I_D T_A = 25°C
30V	18.6mΩ @ V_{GS} = 10V	8.0A
	26.5mΩ @ V_{GS} = 4.5V	6.5A

Description

This new generation 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.

Applications

- Backlighting
- DC-DC Converters
- Power management functions

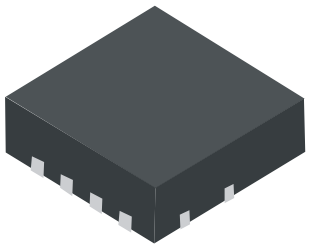
Features

- Low $R_{DS(ON)}$ – ensures on state losses are minimized
- 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% Rg tested
- **Lead-Free Finish; RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**

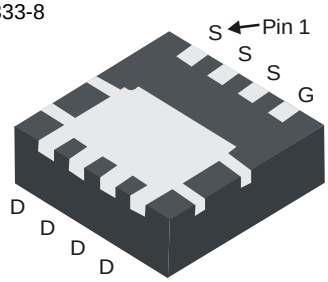
Mechanical Data

- Case: POWERDI3333-8
- 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 Below
- Terminals: Finish — Matte Tin annealed over Copper leadframe. Solderable per MIL-STD-202, Method 208 e3
- Weight: 0.072 grams (approximate)

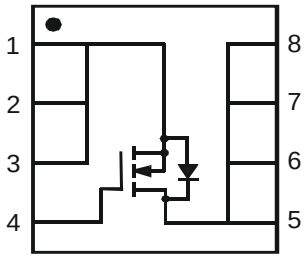
POWERDI3333-8



Top View



Bottom View



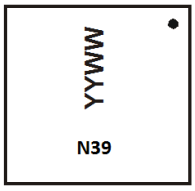
Top View
Internal Schematic

Ordering Information (Note 4)

Part Number	Case	Packaging
DMN3029LFG-7	POWERDI3333-8	2000 / Tape & Reel
DMN3029LFG-13	POWERDI3333-8	3000 / Tape & Reel

Notes:
1. EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant. All applicable RoHS exemptions applied.
2. See http://www.diodes.com 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 http://www.diodes.com.

Marking Information



N39 = Product marking code
YYWW = Date code marking
YY = Last digit of year (ex: 10 for 2010)
WW = Week code (01 – 53)

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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}	±25	V
Continuous Drain Current (Note 5) V_{GS} = 10V	Steady State	T_A = +25°C T_A = +70°C	I_D	5.3 4.2	A
Continuous Drain Current (Note 6) V_{GS} = 10V	Steady State	T_A = +25°C T_A = +70°C	I_D	8.0 6.3	A
Continuous Drain Current (Note 6) V_{GS} = 10V	t ≤ 10s	T_A = +25°C T_A = +70°C	I_D	9.5 7.7	A
Continuous Drain Current (Note 6) V_{GS} = 4.5V	Steady State	T_A = +25°C T_A = +70°C	I_D	6.5 4.9	A
Continuous Drain Current (Note 6) V_{GS} = 4.5V	t ≤ 10s	T_A = +25°C T_A = +70°C	I_D	7.8 6.2	A
Pulsed Drain Current (Note 7)			I_{DM}	70	A
Avalanche Current (Notes 7 & 8)			I_{AR}	18	A
Repetitive Avalanche Energy (Notes 7 & 8) L = 0.1mH			E_{AR}	16	mJ

Thermal Characteristics

Characteristic	Symbol	Max	Unit
Power Dissipation (Note 5)	P_D	1.0	W
Thermal Resistance, Junction to Ambient @T_A = +25°C (Note 5)	$R_{\theta JA}$	130.6	°C/W
Power Dissipation (Note 6)	P_D	2.07	W
Thermal Resistance, Junction to Ambient @T_A = +25°C (Note 6)	$R_{\theta JA}$	62.5	°C/W
Power Dissipation (Note 6) t ≤ 10s	P_D	3.0	W
Thermal Resistance, Junction to Ambient @T_A = +25°C (Note 6) t ≤ 10s	$R_{\theta JA}$	43.8	°C/W
Operating and Storage Temperature Range	T_J, T_{STG}	-55 to +150	°C

Notes:
5. Device mounted on FR-4 PCB with minimum recommended pad layout, single sided.
6. Device mounted on 2" x 2" FR-4 PCB with high coverage 2 oz. Copper, single sided.
7. Repetitive rating, pulse width limited by junction temperature.
8. I_{AR} and E_{AR} rating are based on low frequency and duty cycles to keep T_J = +25°C.

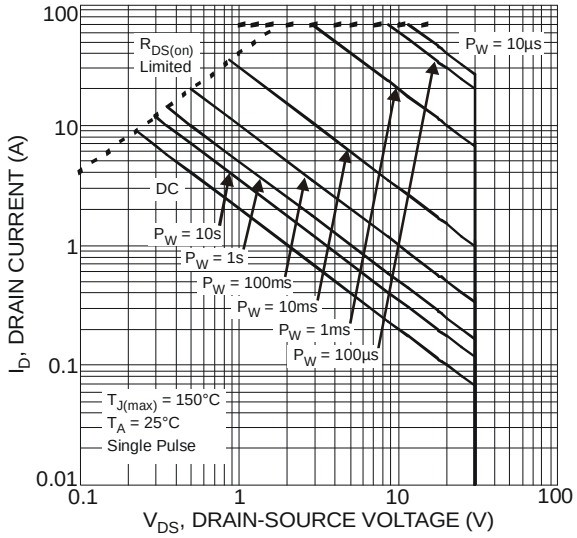


Fig. 1 SOA, Safe Operation Area

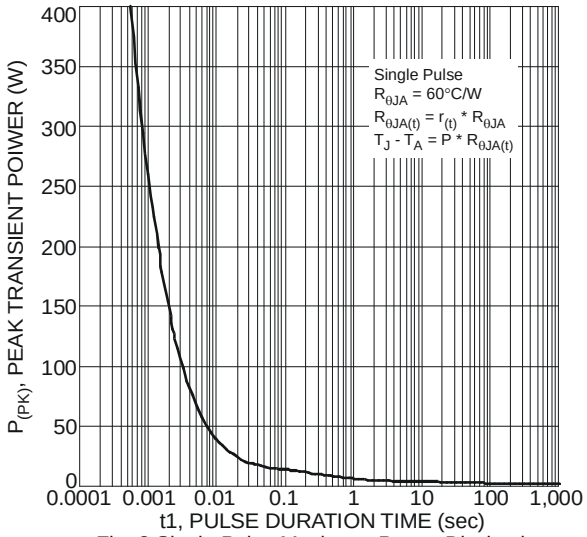


Fig. 2 Single Pulse Maximum Power Dissipation

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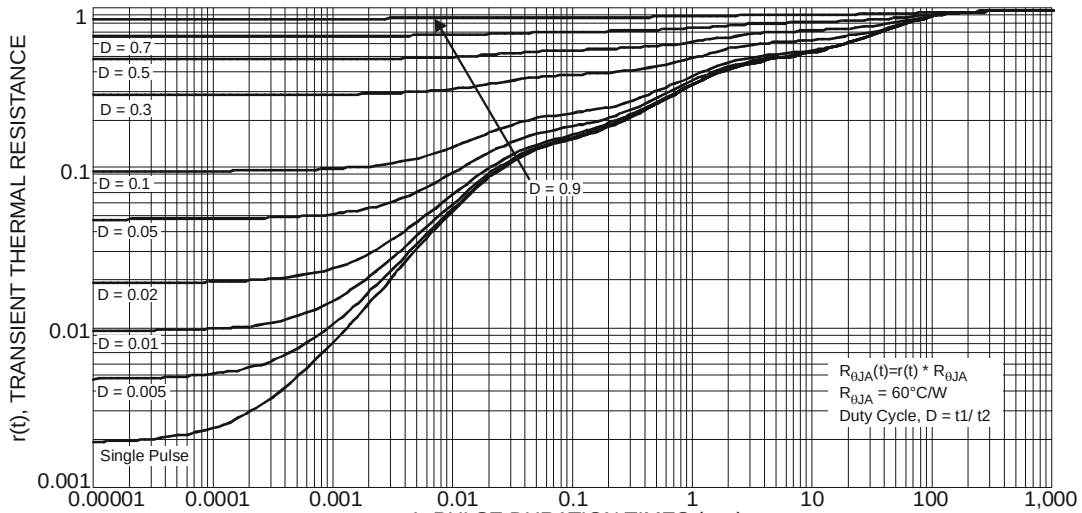


Fig. 3 Transient Thermal Resistance

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 T_J = +25°C	I_{DSS}	-	-	0.1	µA	V_{DS} = 30V, V_{GS} = 0V
Gate-Source Leakage	I_{GSS}	-	-	±100	nA	V_{GS} = ±25V, V_{DS} = 0V
ON CHARACTERISTICS (Note 9)						
Gate Threshold Voltage	$V_{GS(th)}$	0.9	1.2	1.8	V	V_{DS} = V_{GS}, I_D = 250µA
Static Drain-Source On-Resistance	$R_{DS\ (ON)}$	-	13,5	18.6	mΩ	V_{GS} = 10V, I_D = 10A
		-	22	26.5		V_{GS} = 4.5V, I_D = 7.5A
Forward Transfer Admittance	$\|Y_{fs}\|$	-	13.0	-	S	V_{DS} = 5V, I_D = 10A
Diode Forward Voltage	V_{SD}	-	0.7	1.0	V	V_{GS} = 0V, I_S = 1A
DYNAMIC CHARACTERISTICS (Note 10)						
Input Capacitance	C_{iss}	-	580	-	pF	V_{DS} = 15V, V_{GS} = 0V, f = 1.0MHz
Output Capacitance	C_{oss}	-	110	-		
Reverse Transfer Capacitance	C_{rss}	-	70	-		
Gate Resistance	R_g	-	2.0	3.0	Ω	V_{DS} = 0V, V_{GS} = 0V, f = 1MHz
Total Gate Charge V_{GS} = 4.5V	Q_g	-	5.3	-	nC	V_{GS} = 4.5V, V_{DS} = 15V, I_D = 10A
Total Gate Charge V_{GS} = 10V	Q_g	-	11.3	-		V_{GS} = 10V, V_{DS} = 15V, I_D = 10A
Gate-Source Charge	Q_{gs}	-	1.9	-		
Gate-Drain Charge	Q_{gd}	-	1.9	-		
Turn-On Delay Time	$t_{D(on)}$	-	4.4	-	ns	V_{GS} = 10V, V_{DS} = 15V, R_L = 15Ω, R_G = 6Ω
Turn-On Rise Time	t_r	-	4.6	-	ns	
Turn-Off Delay Time	$t_{D(off)}$	-	19.5	-	ns	
Turn-Off Fall Time	t_f	-	5.8	-	ns	

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

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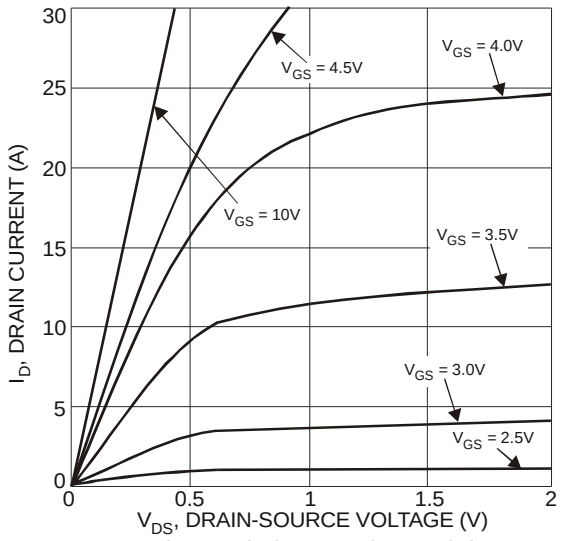


Fig. 4 Typical Output Characteristic

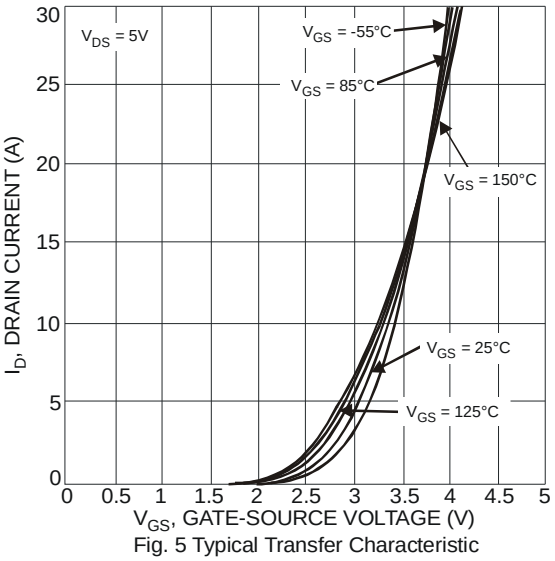


Fig. 5 Typical Transfer Characteristic

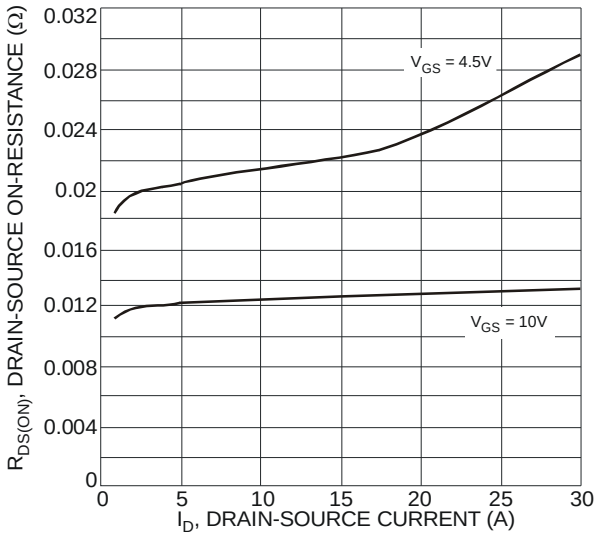


Fig. 6 Typical On-Resistance
vs. Drain Current and Gate Voltage

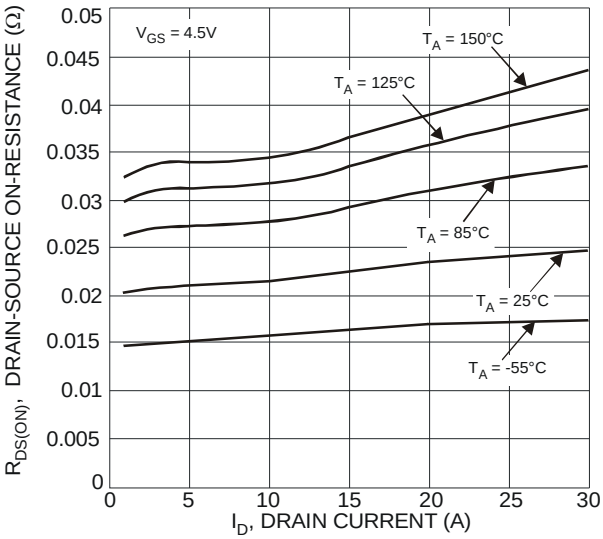


Fig. 7 Typical On-Resistance
vs. Drain Current and Temperature

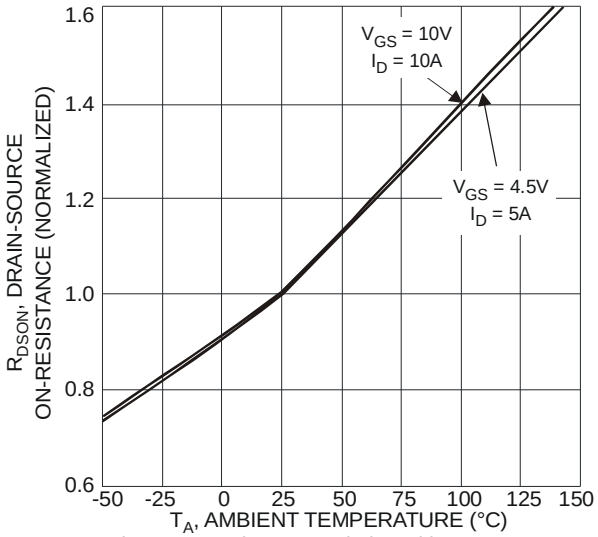


Fig. 8 On-Resistance Variation with Temperature

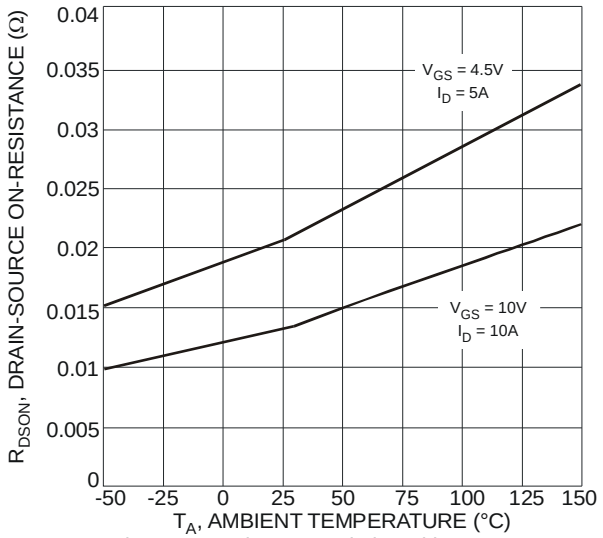


Fig. 9 On-Resistance Variation with Temperature

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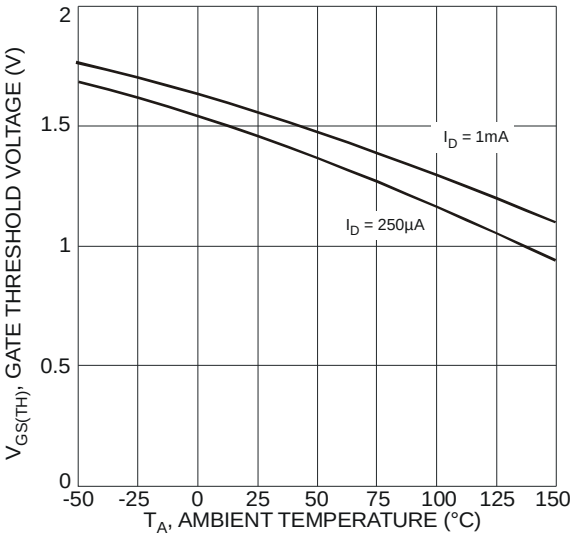


Fig. 10 Gate Threshold Variation vs. Ambient Temperature

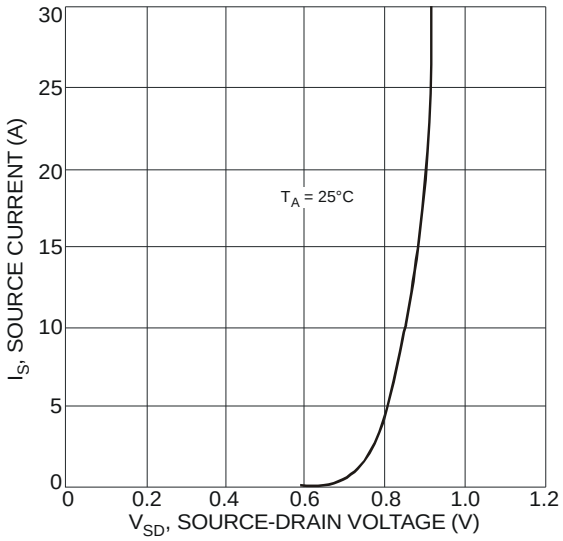


Fig. 11 Diode Forward Voltage vs. Current

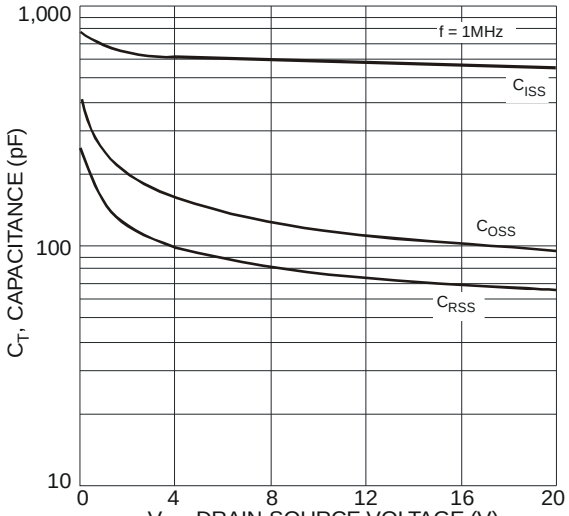


Fig. 12 Typical Total Capacitance

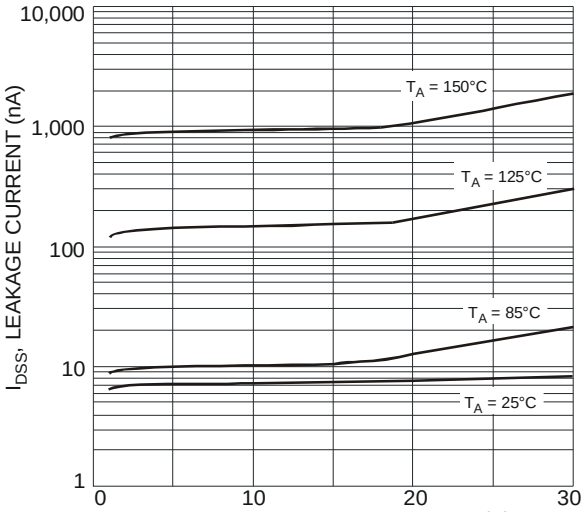
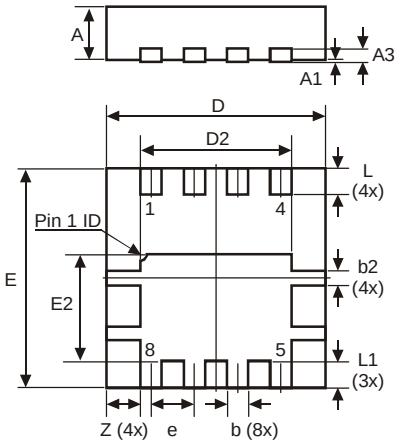


Fig. 13 Typical Leakage Current vs. Drain-Source Voltage

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Package Outline Dimensions

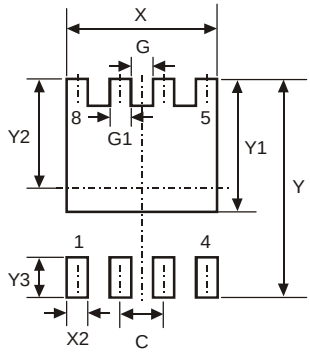
Please see AP02002 at http://www.diodes.com/datasheets/ap02002.pdf for latest version.



POWERDI3333-8			
Dim	**Min**	**Max**	**Typ**
D	3.25	3.35	3.30
E	3.25	3.35	3.30
D2	2.22	2.32	2.27
E2	1.56	1.66	1.61
A	0.75	0.85	0.80
A1	0	0.05	0.02
A3	–	–	0.203
b	0.27	0.37	0.32
b2	–	–	0.20
L	0.35	0.45	0.40
L1	–	–	0.39
e	–	–	0.65
Z	–	–	0.515
All Dimensions in mm			

Suggested Pad Layout

Please see AP02001 at http://www.diodes.com/datasheets/ap02001.pdf for the latest version.



Dimensions	Value (in mm)
C	0.650
G	0.230
G1	0.420
Y	3.700
Y1	2.250
Y2	1.850
Y3	0.700
X	2.370
X2	0.420

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