DUAL N-CHANNEL ENHANCEMENT MODE MOSFET
POWERDI®

NEW PRODUCT

Product Summary

$V_{(BR)DSS}$	$R_{DS(ON)}$ max	I_D max T_A = +25°C
20V	10.8mΩ @ V_{GS} = 4.5V	10.7A
	14.5mΩ @ V_{GS} = 2.5V	9.3A
	17.0mΩ @ V_{GS} = 1.8V	8.6A

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

- Power Management Functions
- Load Switch

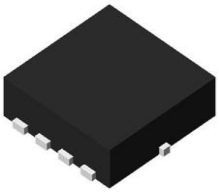
Features

- Low On-Resistance
- Low Input Capacitance
- Fast Switching Speed
- Low Input/Output Leakage
- Complementary Pair MOSFET
- **ESD Protected Up to 2kV**
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**

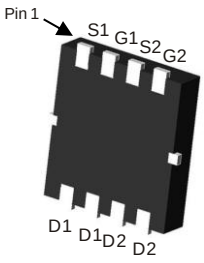
Mechanical Data

- 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
- Terminals: Finish — Matte Tin Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208 e3
- Weight: 0.0065 grams (Approximate)

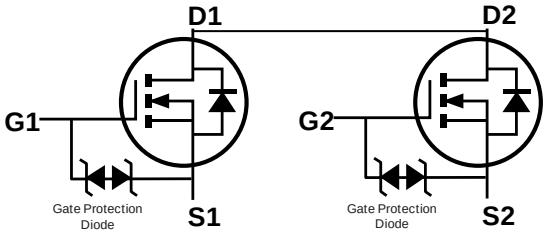
POWERDI®3333-8



Top View



Bottom View



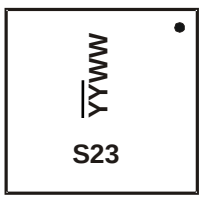
Internal Schematic

Ordering Information (Note 4)

Part Number	Case	Packaging
DMN2022UNS-7	POWERDI®3333-8	2000/Tape & Reel
DMN2022UNS-13	POWERDI®3333-8	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 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/products/packages.html.

Marking Information



S23 = Product Type Marking Code
YYWW = Date Code Marking
YY = Last Digit of Year (ex: 15 = 2015)
WW = Week Code (01 to 53)

NEW PRODUCT

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

Characteristic			Symbol	Value	Units
Drain-Source Voltage			V_{DSS}	20	V
Gate-Source Voltage			V_{GSS}	±10	V
Continuous Drain Current (Note 6) V_{GS} = 10V	Steady State	T_A = +25°C T_A = +70°C	I_D	10.7 8.6	A
	t<10s	T_A = +25°C T_A = +70°C	I_D	13.9 11.1	A
Maximum Body Diode Forward Current (Note 6)			I_S	2	A
Pulsed Drain Current (10µs pulse, Duty cycle = 1%)			I_{DM}	60	A
Avalanche Current (Note 7) L = 0.1mH			I_{AS}	17.1	A
Avalanche Energy (Note 7) L = 0.1mH			E_{AS}	14.7	mJ

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

Characteristic		Symbol	Value	Units
Total Power Dissipation (Note 5)		P_D	1.2	W
Thermal Resistance, Junction to Ambient (Note 5)	Steady State	$R_{\theta JA}$	107	°C/W
	t<10s		64	
Total Power Dissipation (Note 6)		P_D	1.9	W
Thermal Resistance, Junction to Ambient (Note 6)	Steady State	$R_{\theta JA}$	67	°C/W
	t<10s		40	
Operating and Storage Temperature Range		T_J, T_{STG}	-55 to +150	°C

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

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 8)						
Drain-Source Breakdown Voltage	BV_{DSS}	20	—	—	V	V_{GS} = 0V, I_D = 250µA
Zero Gate Voltage Drain Current T_J = +25°C	I_{DSS}	—	—	1	µA	V_{DS} = 20V, V_{GS} = 0V
Gate-Source Leakage	I_{GSS}	—	—	±10	µA	V_{GS} = ±10V, V_{DS} = 0V
ON CHARACTERISTICS (Note 8)						
Gate Threshold Voltage	$V_{GS(TH)}$	0.4	—	1	V	V_{DS} = V_{GS}, I_D = 250µA
Static Drain-Source On-Resistance	$R_{DS(ON)}$	—	9.0	10.8	mΩ	V_{GS} = 4.5V, I_D = 4A
		—	9.2	11.2		V_{GS} = 4.0V, I_D = 4A
		—	9.8	13.0		V_{GS} = 3.1V, I_D = 4A
		—	10.5	14.5		V_{GS} = 2.5V, I_D = 4A
		—	13.9	17.0		V_{GS} = 1.8V, I_D = 4A
Diode Forward Voltage	V_{SD}	—	0.7	1.1	V	V_{GS} = 0V, I_S = 5A
DYNAMIC CHARACTERISTICS (Note 9)						
Input Capacitance	C_{iss}	—	1870	—	pF	V_{DS} = 10V, V_{GS} = 0V, f = 1.0MHz
Output Capacitance	C_{oss}	—	320	—	pF	
Reverse Transfer Capacitance	C_{rss}	—	160	—	pF	
Gate Resistance	R_g	—	96	—	Ω	V_{DS} = 0V, V_{GS} = 0V, f = 1MHz
Total Gate Charge	Q_g	—	20.3	—	nC	V_{GS} = 4.5V, V_{DS} = 10V, I_D = 6.5A
Gate-Source Charge	Q_{gs}	—	2.8	—	nC	
Gate-Drain Charge	Q_{gd}	—	3.6	—	nC	
Turn-On Delay Time	$t_{D(ON)}$	—	62	—	ns	V_{GS} = 4.5V, V_{DS} = 10V, R_G = 6Ω, R_L = 1.0Ω
Turn-On Rise Time	t_R	—	101	—	ns	
Turn-Off Delay Time	$t_{D(OFF)}$	—	596	—	ns	
Turn-Off Fall Time	t_F	—	224	—	ns	
Reverse Recovery Time	t_{RR}	—	150	—	ns	I_F = 4A, di/dt = 100A/µs
Reverse Recovery Charge	Q_{RR}	—	135	—	nC	I_F = 4A, di/dt = 100A/µs

Notes:
5. Device mounted on FR-4 PC board, with minimum recommended pad layout, single sided.
6. Device mounted on FR-4 substrate PC board, 2oz copper, with thermal bias to bottom layer 1inch square copper plate.
7. I_{AS} and E_{AS} rating are based on low frequency and duty cycles to keep T_J = +25°C.
8. Short duration pulse test used to minimize self-heating effect.
9. Guaranteed by design. Not subject to production testing.

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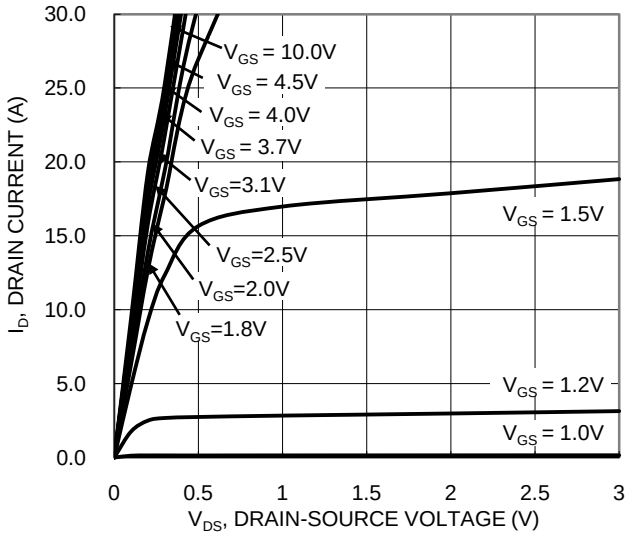

Figure 1. Typical Output Characteristic

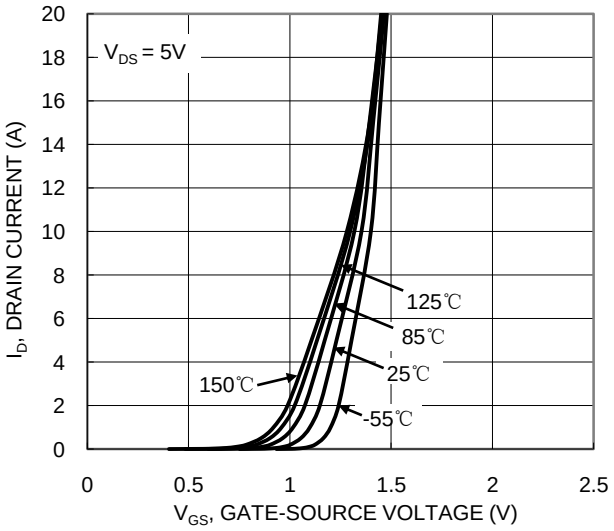

Figure 2. Typical Transfer Characteristic

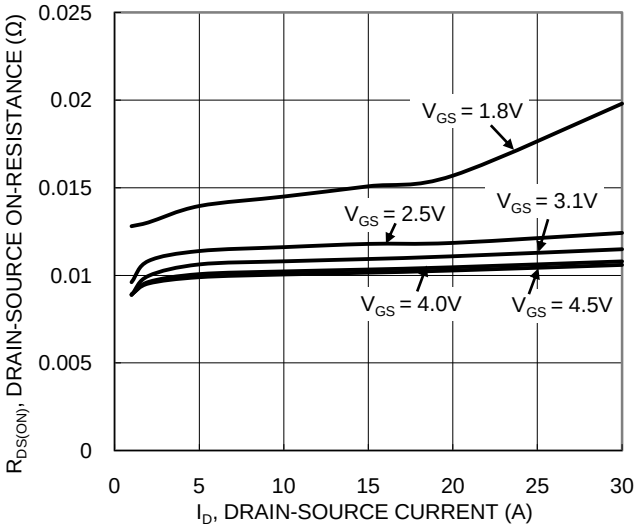

Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

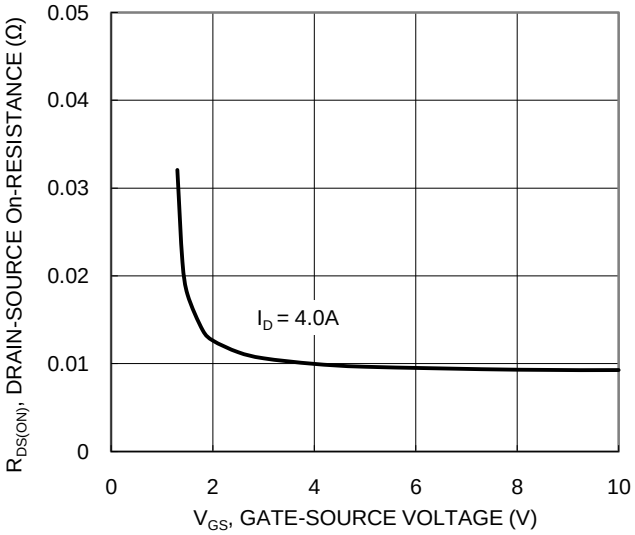

Figure 4. Typical Transfer Characteristic

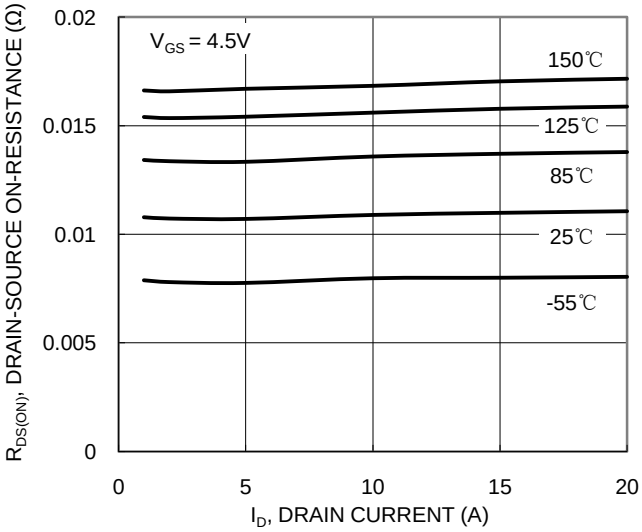

Figure 5. Typical On-Resistance vs. Drain Current and Junction Temperature

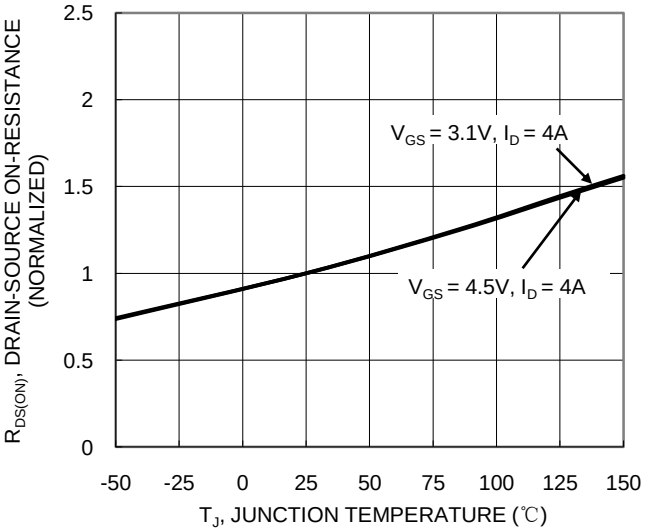

Figure 6. On-Resistance Variation with Junction Temperature

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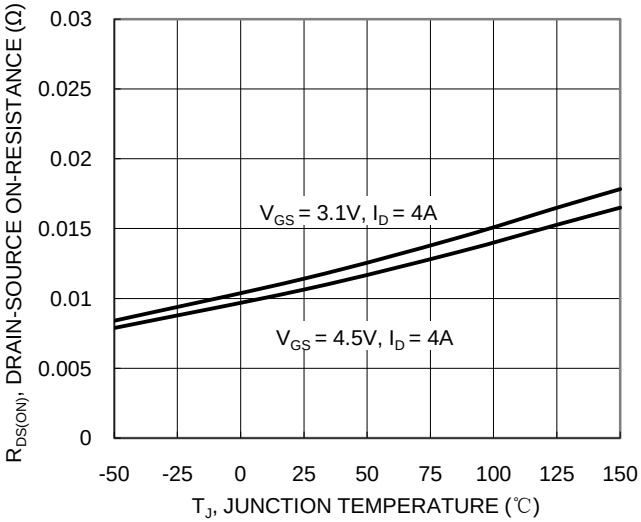

Figure 7. On-Resistance Variation with Junction Temperature

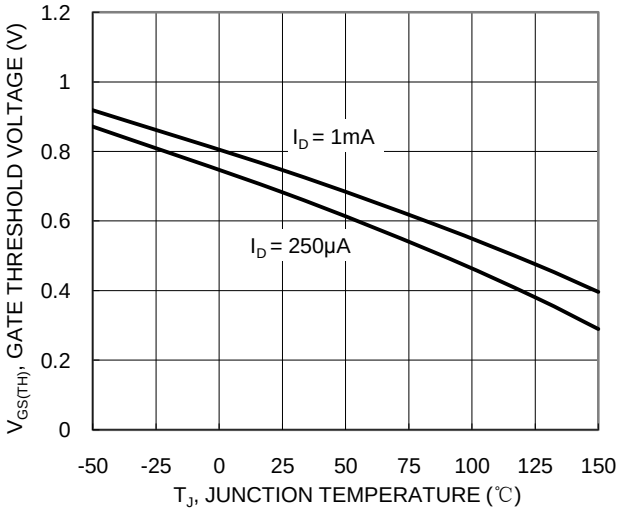

Figure 8. Gate Threshold Variation vs. Junction Temperature

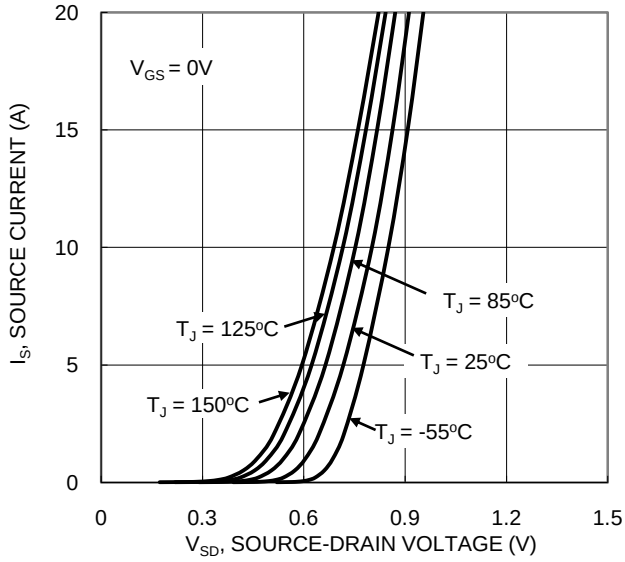

Figure 9. Diode Forward Voltage vs. Current

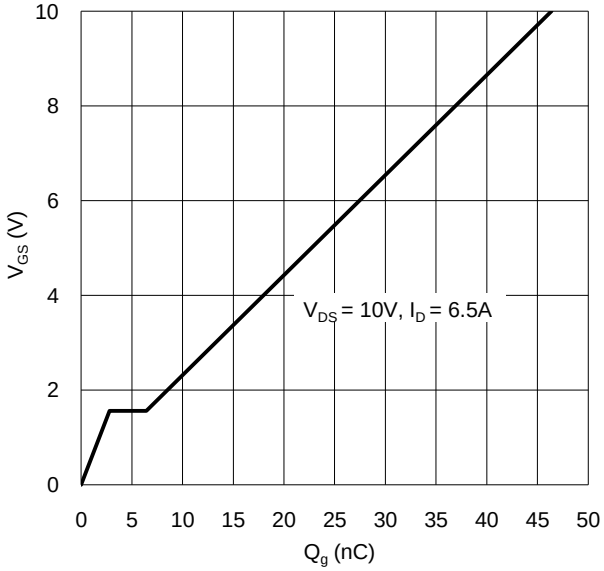

Figure 10. Gate Charge

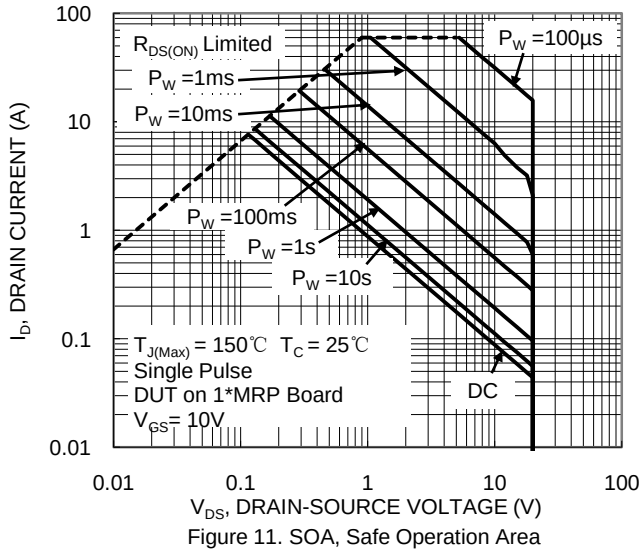

Figure 11. SOA, Safe Operation Area

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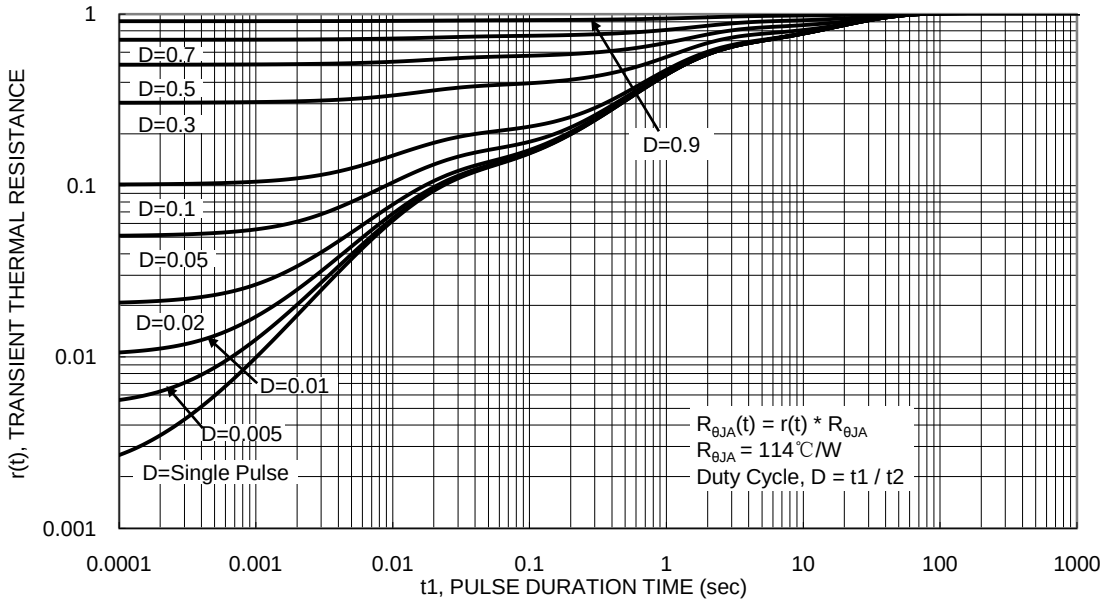

Figure 12. Transient Thermal Resistance

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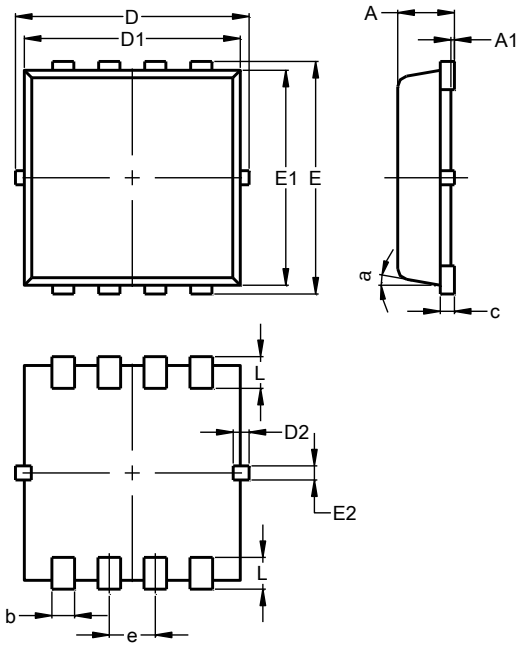
Package Outline Dimensions

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

POWERDI®3333-8 (Type UXB)

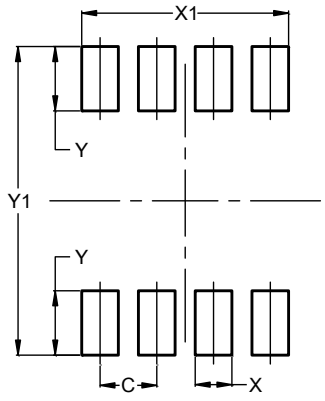


POWERDI®3333-8 (Type UXB)			
Dim	**Min**	**Max**	**Typ**
A	0.75	0.85	0.80
A1	0.00	0.05	--
b	0.25	0.40	0.32
c	0.10	0.25	0.15
D	3.20	3.40	3.30
D1	2.95	3.15	3.05
D2	0.10	0.35	0.23
E	3.20	3.40	3.30
E1	2.95	3.15	3.05
E2	0.10	0.30	0.20
e	–	–	0.65
L	0.35	0.55	0.45
a	0°	12°	10°
All Dimensions in mm			

Suggested Pad Layout

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

POWERDI®3333-8 (Type UXB)



Dimensions	Value (in mm)
C	0.650
X	0.420
X1	2.370
Y	0.730
Y1	3.500

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