Product Summary

$V_{(BR)DSS}$	$R_{DS(ON)}$ Max	I_D Max T_A = +25°C
-30V	13mΩ @ V_{GS} = -10V	-9.8A
	25mΩ @ V_{GS} = -4.5V	-7.0A

Description

This MOSFET is 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
- Power Management Functions
- DC-DC Converters

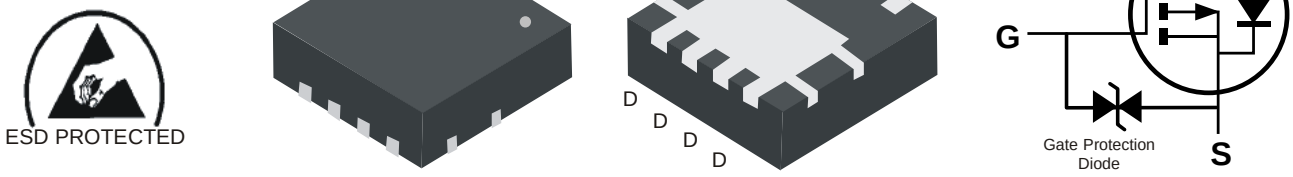
Features and Benefits

- 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
- **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)**

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: 0.0174 grams (Approximate)

POWERDI3333-8



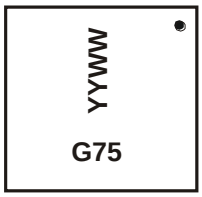
Top View | Bottom View | Equivalent Circuit

Ordering Information (Note 5)

Part Number	Case	Packaging
DMG7401SFGQ-7	POWERDI3333-8	2,000/Tape & Reel
DMG7401SFGQ-13	POWERDI3333-8	3,000/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. Automotive, AEC-Q101 and standard products are electrically and thermally the same, except where specified. For more information, please refer to http://www.diodes.com/quality/product_compliance_definitions/.
5. For packaging details, go to our website at http://www.diodes.com/products/packages.html.

Marking Information



G75 = Product Marking Code
YYWW = Date Code Marking
YY = Last Digit of Year (ex: 10 for 2010)
WW = Week Code (01 – 53)

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

Characteristic			Symbol	Value	Units
Drain-Source Voltage			V_{DSS}	-30	V
Gate-Source Voltage			V_{GSS}	±25	V
Continuous Drain Current (Note 7) V_{GS} = -10V	Steady State	T_A = +25°C T_A = +70°C	I_D	-9.8 -7.7	A
	t<10s	T_A = +25°C T_A = +70°C	I_D	-13.5 -10.8	A
Maximum Continuous Body Diode Forward Current (Note 6)			I_S	-3.0	A
Pulsed Drain Current (10µs pulse, duty cycle = 1%)			I_{DM}	-80	A
Avalanche Current (Notes 8 & 9)			I_{AR}	14	A
Repetitive Avalanche Energy (Notes 8 & 9) L = 1mH			E_{AR}	104	mJ

Thermal Characteristics

Characteristic		Symbol	Value	Units
Total Power Dissipation (Note 6)	T_A = +25°C	P_D	0.94	W
	T_A = +70°C		0.6	
Thermal Resistance, Junction to Ambient (Note 6)	Steady State	$R_{\theta JA}$	137	°C/W
	t<10s		82	°C/W
Total Power Dissipation (Note 7)	T_A = +25°C	P_D	2.2	W
	T_A = +70°C		1.3	
Thermal Resistance, Junction to Ambient (Note 7)	Steady State	$R_{\theta JA}$	60	°C/W
	t<10s		36	°C/W
Thermal Resistance, Junction to Case (Note 7)		$R_{\theta JC}$	3.0	°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 1-inch square copper plate.
8. I_{AR} and E_{AR} rating 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}	—	—	-1	μA	V_{DS} = -30V, V_{GS} = 0V
Gate-Source Leakage	I_{GSS}	—	—	±10	μA	V_{GS} = ±20V, V_{DS} = 0V
ON CHARACTERISTICS (Note 9)						
Gate Threshold Voltage	$V_{GS(th)}$	-1.7	—	-3.0	V	V_{DS} = V_{GS}, I_D = -250μA
Static Drain-Source On-Resistance	$R_{DS(ON)}$	—	9	11	mΩ	V_{GS} = -20V, I_D = -12A
		—	10	13		V_{GS} = -10V, I_D = -9A
		—	17	25		V_{GS} = -4.5V, I_D = -5A
Forward Transfer Admittance	$\|Y_{fs}\|$	—	21	—	S	V_{DS} = -5V, I_D = -10A
DYNAMIC CHARACTERISTICS (Note 10)						
Input Capacitance	C_{iss}	—	2,246	2,987	pF	V_{DS} = -15V, V_{GS} = 0V, f = 1.0MHz
Output Capacitance	C_{oss}	—	352	468	pF	
Reverse Transfer Capacitance	C_{rss}	—	294	391	pF	
Gate resistance	R_g	—	5.1	10	Ω	V_{DS} = 0V, V_{GS} = 0V, f = 1.0MHz
Total Gate Charge (V_{GS} = 4.5V)	Q_g	—	20.5	30	nC	V_{DS} = -15V, I_D = -12A
Total Gate Charge (V_{GS} = 10V)	Q_g	—	41	58	nC	
Gate-Source Charge	Q_{gs}	—	7.6	—	nC	
Gate-Drain Charge	Q_{gd}	—	8.0	—	nC	
Turn-On Delay Time	$t_{D(on)}$	—	11.3	23	nS	V_{DD} = -15V, V_{GS} = -10V, R_L = 1.25Ω, R_G = 3Ω,
Turn-On Rise Time	t_r	—	15.4	31	nS	
Turn-Off Delay Time	$t_{D(off)}$	—	38.0	61	nS	
Turn-Off Fall Time	t_f	—	22.0	38	nS	
BODY DIODE CHARACTERISTICS						
Diode Forward Voltage	V_{SD}	—	-0.7	-1.0	V	V_{GS} = 0V, I_S = -1A
Reverse Recovery Time (Note 10)	t_{rr}	—	20	31	nS	I_S = -9.5A, dI/dt = 100A/μs
Reverse Recovery Charge (Note 10)	Q_{rr}	—	9.5	18	nC	

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

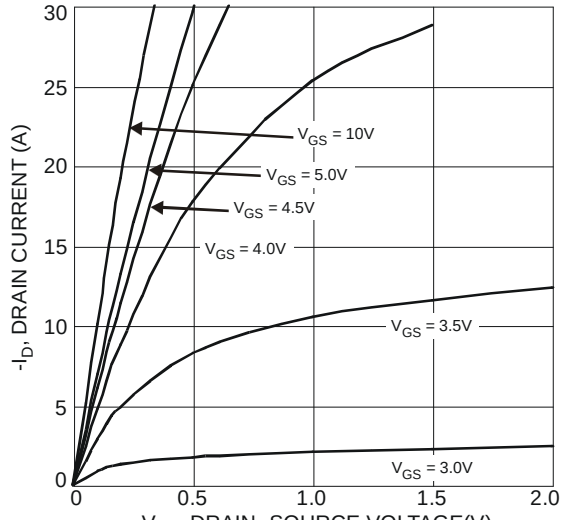


Fig. 1 Typical Output Characteristics

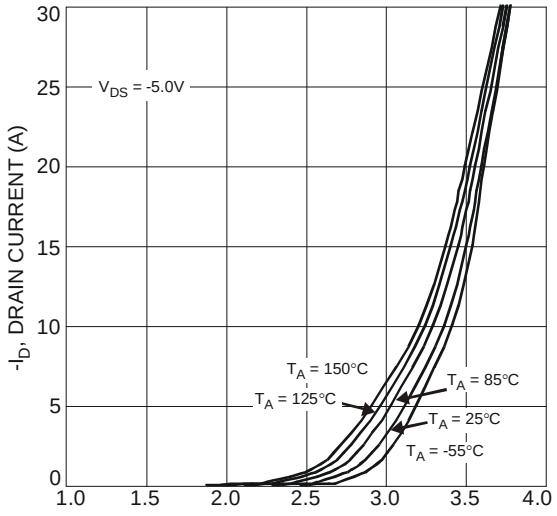


Fig. 2 Typical Transfer Characteristics

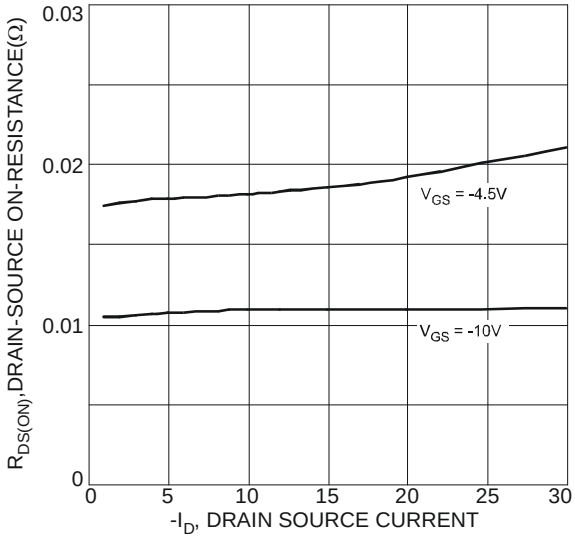


Fig. 3 Typical On-Resistance vs. Drain Current and Gate Voltage

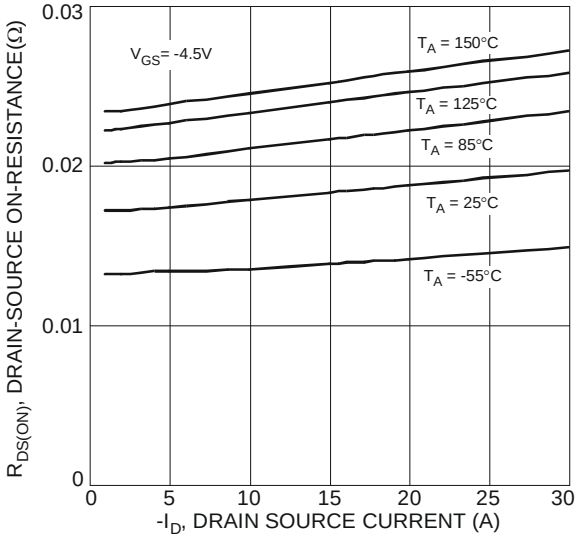


Fig. 4 Typical On-Resistance vs. Drain Current and Temperature

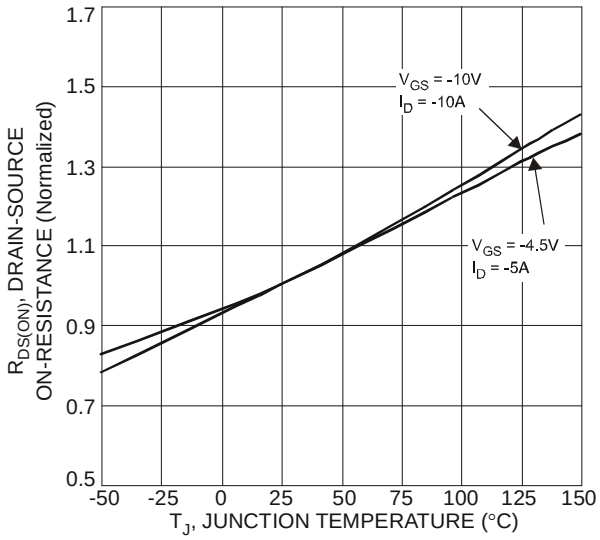


Fig. 5 On-Resistance Variation with Temperature

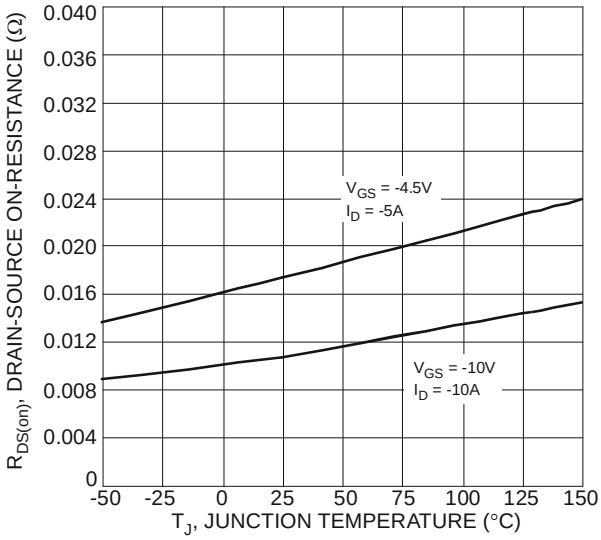


Fig. 6 On-Resistance Variation with Temperature

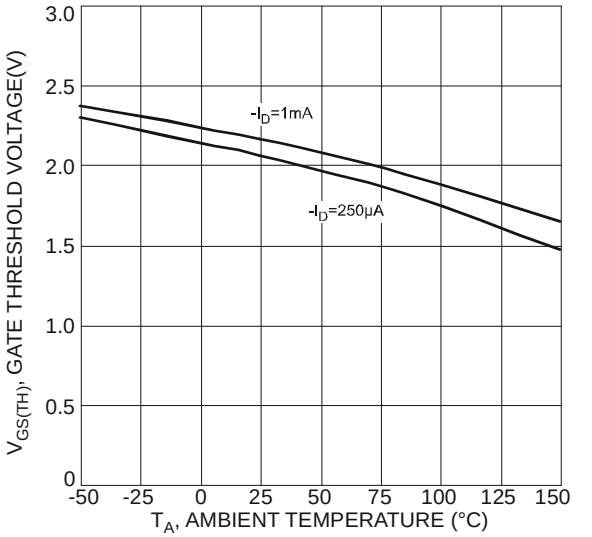


Fig. 7 Gate Threshold Variation vs. Ambient Temperature

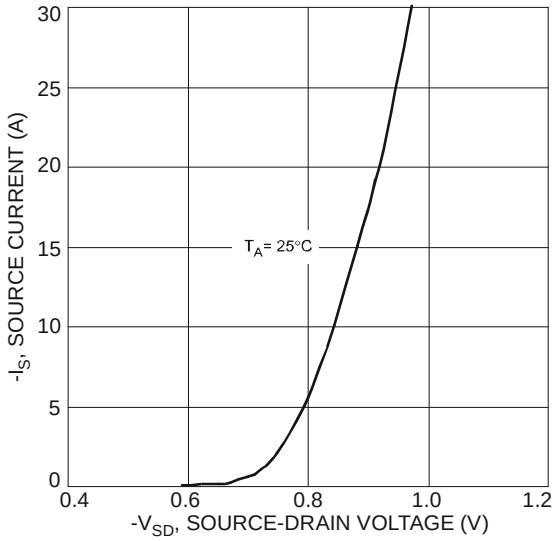


Fig. 8 Diode Forward Voltage vs. Current

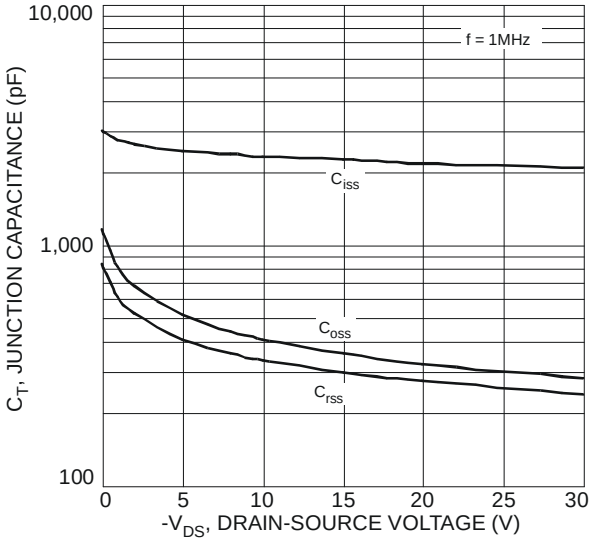


Fig. 9 Typical Junction Capacitance

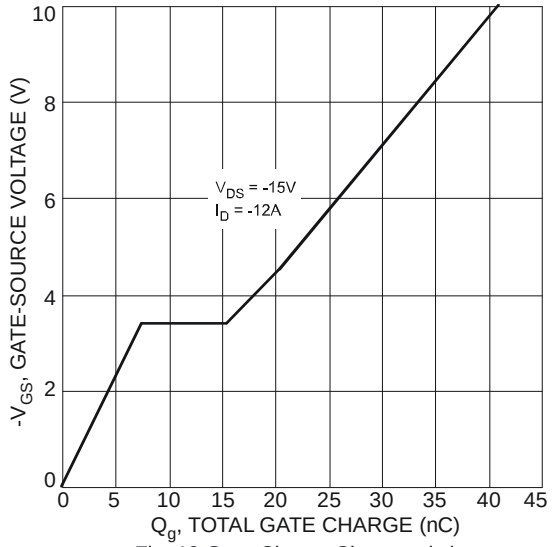


Fig. 10 Gate-Charge Characteristics

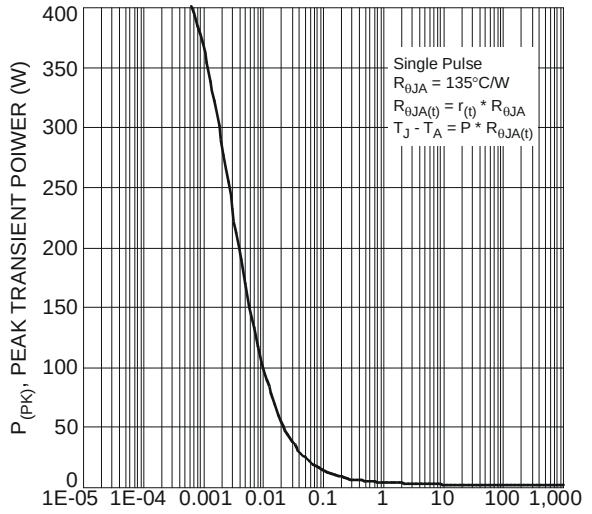


Fig. 11 Single Pulse Maximum Power Dissipation

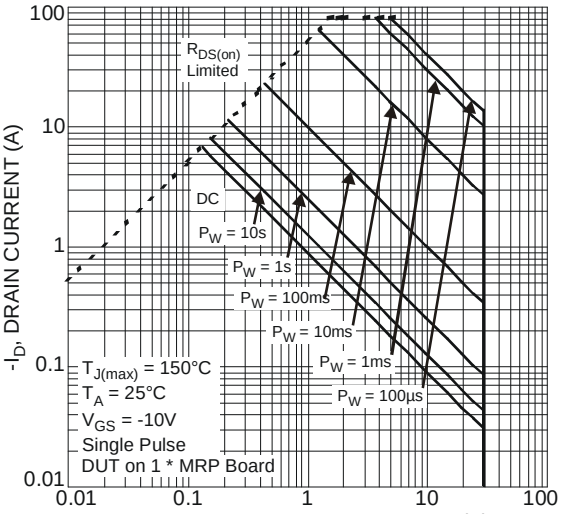


Fig. 12 SOA, Safe Operation Area

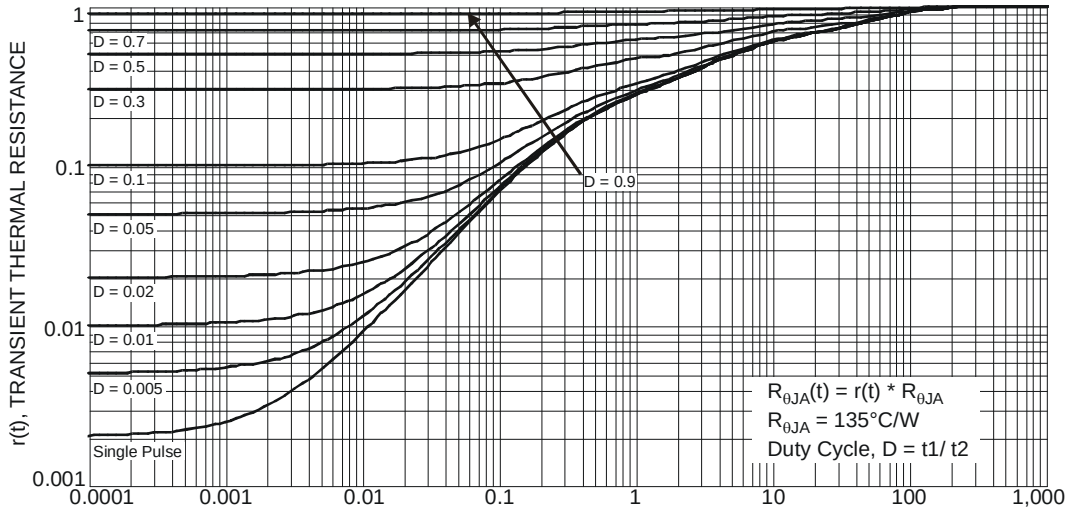
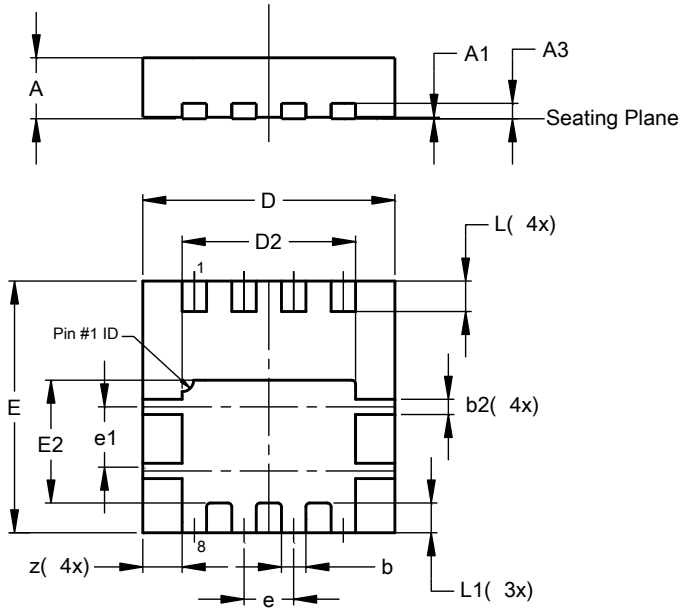


Fig. 13 Transient Thermal Resistance

Package Outline Dimensions

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

POWERDI3333-8

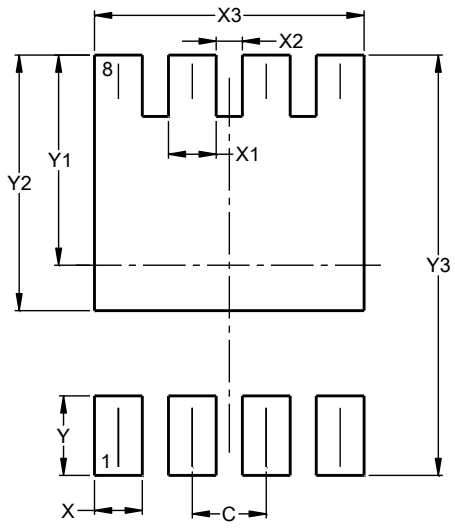


POWERDI3333-8			
Dim	**Min**	**Max**	**Typ**
A	0.75	0.85	0.80
A1	0.00	0.05	0.02
A3	–	–	0.203
b	0.27	0.37	0.32
b2	–	–	0.20
D	3.25	3.35	3.30
D2	2.22	2.32	2.27
E	3.25	3.35	3.30
E2	1.56	1.66	1.61
e	–	–	0.65
e1	0.79	0.89	0.84
L	0.35	0.45	0.40
L1	–	–	0.39
z	–	–	0.515
All Dimensions in mm			

Suggested Pad Layout

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

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

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