

## Product Summary

$V_{(BR)DSS}$	$R_{DS(ON)}$ max	$I_D$ max $T_A = 25^\circ\text{C}$
-30V	13m $\Omega$ @ $V_{GS} = -10\text{V}$	-9.8A
	25m $\Omega$ @ $V_{GS} = -4.5\text{V}$	-7.0A

## Description and Applications

This 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.

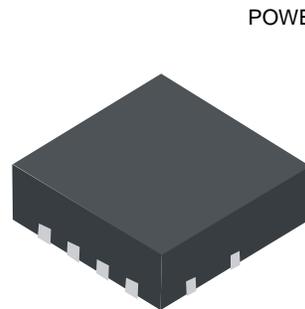
- Backlighting
- Power Management Functions
- DC-DC Converters

## 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**

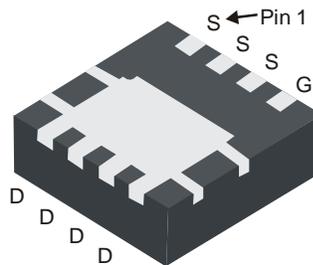
## Mechanical Data

- Case: POWERDI3333
- 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
- Weight: 0.072 grams (approximate)

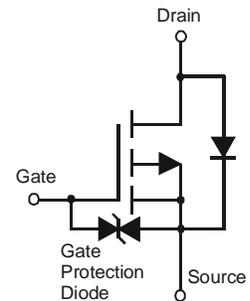


Top View

POWERDI3333



Bottom View



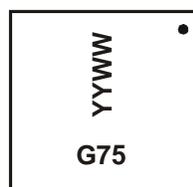
Equivalent Circuit

## Ordering Information (Note 4)

Part Number	Case	Packaging
DMG7401SFG-7	POWERDI3333	2000/Tape & Reel
DMG7401SFG-13	POWERDI3333	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>.

## 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<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic		Symbol	Value	Units
Drain-Source Voltage		V <sub>DSS</sub>	-30	V
Gate-Source Voltage		V <sub>GSS</sub>	±25	V
Continuous Drain Current (Note 6) V <sub>GS</sub> = -10V	Steady State	I <sub>D</sub>	-9.8 -7.7	A
	t < 10s	I <sub>D</sub>	-13.5 -10.8	A
Maximum Continuous Body Diode Forward Current (Note 5)		I <sub>S</sub>	-3.0	A
Pulsed Drain Current (10µs pulse, duty cycle = 1%)		I <sub>DM</sub>	-80	A

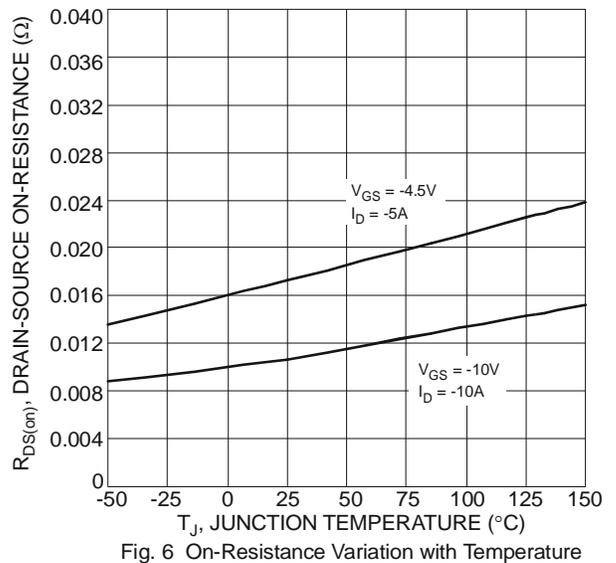
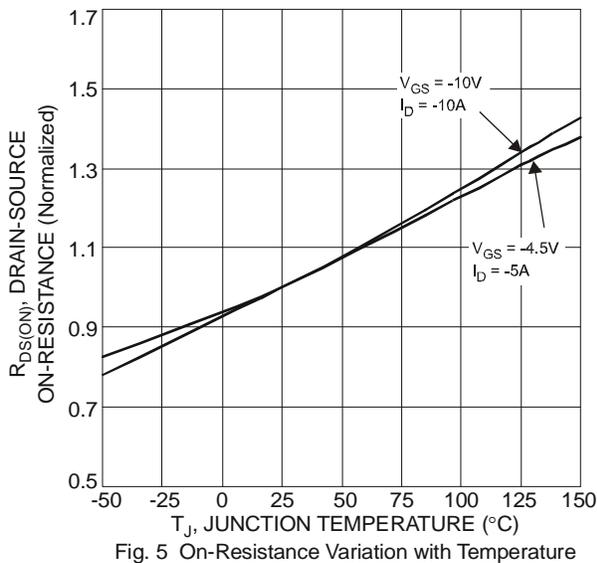
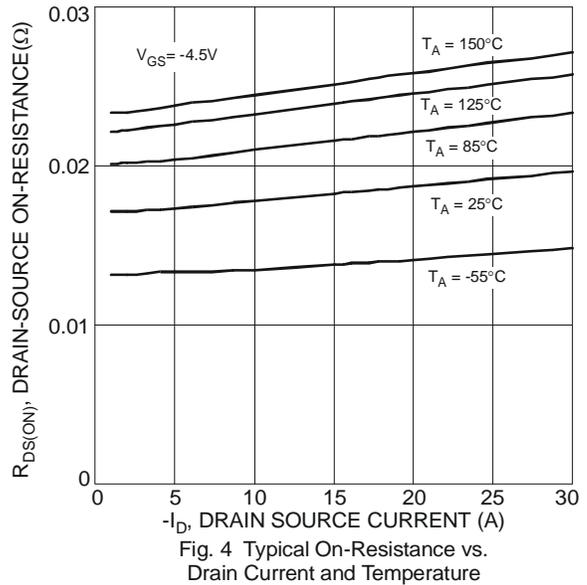
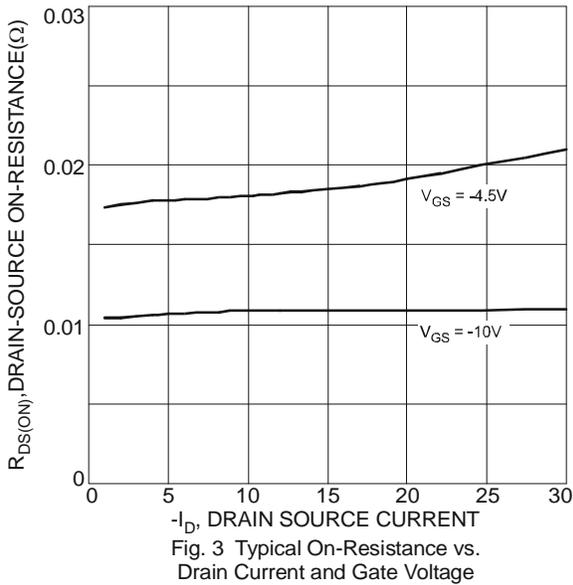
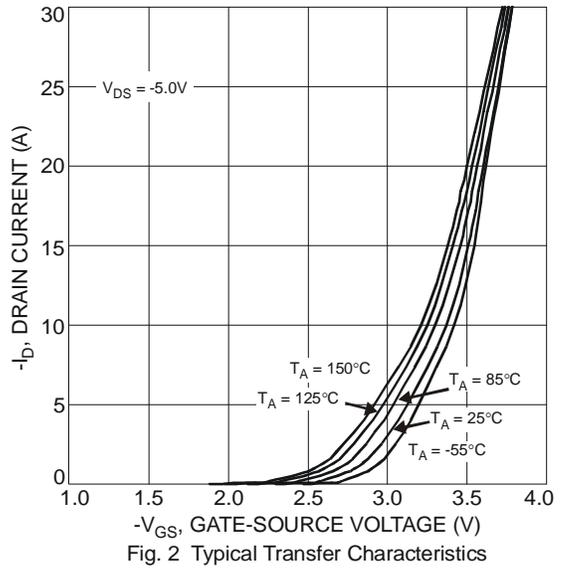
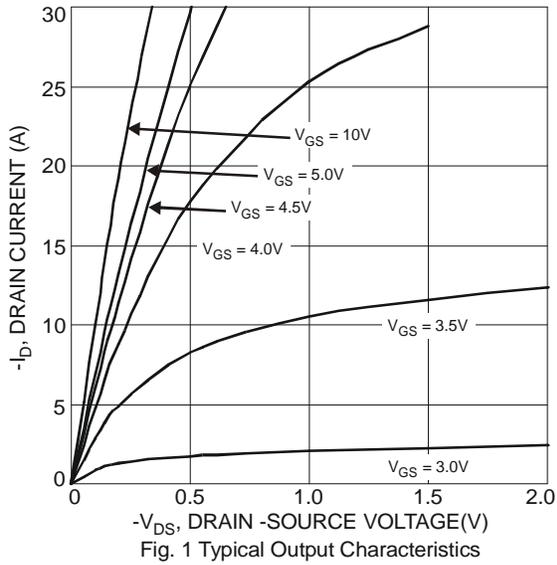
**Thermal Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic		Symbol	Value	Units
Total Power Dissipation (Note 5)	T <sub>A</sub> = 25°C	P <sub>D</sub>	0.94	W
	T <sub>A</sub> = 70°C		0.6	
Thermal Resistance, Junction to Ambient (Note 5)	Steady State	R <sub>θJA</sub>	137	°C/W
	t < 10s		82	°C/W
Total Power Dissipation (Note 6)	T <sub>A</sub> = 25°C	P <sub>D</sub>	2.2	W
	T <sub>A</sub> = 70°C		1.3	
Thermal Resistance, Junction to Ambient (Note 6)	Steady State	R <sub>θJA</sub>	60	°C/W
	t < 10s		36	°C/W
Thermal Resistance, Junction to Case (Note 6)		R <sub>θJC</sub>	3.0	°C/W
Operating and Storage Temperature Range		T <sub>J</sub> , T <sub>STG</sub>	-55 to 150	°C

**Electrical Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS (Note 7)</b>						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	-30	-	-	V	V <sub>GS</sub> = 0V, I <sub>D</sub> = -250µA
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	-	-	-1	µA	V <sub>DS</sub> = -30V, V <sub>GS</sub> = 0V
Gate-Source Leakage	I <sub>GSS</sub>	-	-	±10	µA	V <sub>GS</sub> = ±20V, V <sub>DS</sub> = 0V
<b>ON CHARACTERISTICS (Note 7)</b>						
Gate Threshold Voltage	V <sub>GS(th)</sub>	-1.7	-	-3.0	V	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = -250µA
Static Drain-Source On-Resistance	R <sub>DS(on)</sub>	-	9	11	mΩ	V <sub>GS</sub> = -20V, I <sub>D</sub> = -12A
		-	10	13		V <sub>GS</sub> = -10V, I <sub>D</sub> = -9A
		-	17	25		V <sub>GS</sub> = -4.5V, I <sub>D</sub> = -5A
Forward Transfer Admittance	Y <sub>fs</sub>	-	21	-	S	V <sub>DS</sub> = -5V, I <sub>D</sub> = -10A
<b>DYNAMIC CHARACTERISTICS (Note 8)</b>						
Input Capacitance	C <sub>iss</sub>	-	2246	2987	pF	V <sub>DS</sub> = -15V, V <sub>GS</sub> = 0V, f = 1.0MHz
Output Capacitance	C <sub>oss</sub>	-	352	468	pF	
Reverse Transfer Capacitance	C <sub>riss</sub>	-	294	391	pF	
Gate resistance	R <sub>g</sub>	-	5.1	-	Ω	V <sub>DS</sub> = 0V, V <sub>GS</sub> = 0V, f = 1.0MHz
Total Gate Charge (V <sub>GS</sub> = 4.5V)	Q <sub>g</sub>	-	20.5	30	nC	V <sub>DS</sub> = -15V, I <sub>D</sub> = -12A
Total Gate Charge (V <sub>GS</sub> = 10V)	Q <sub>g</sub>	-	41	58	nC	
Gate-Source Charge	Q <sub>gs</sub>	-	7.6	-	nC	
Gate-Drain Charge	Q <sub>gd</sub>	-	8.0	-	nC	
Turn-On Delay Time	t <sub>D(on)</sub>	-	11.3	23	ns	
Turn-On Rise Time	t <sub>r</sub>	-	15.4	31	ns	V <sub>DD</sub> = -15V, V <sub>GS</sub> = -10V, R <sub>L</sub> = 1.25Ω, R <sub>G</sub> = 3Ω,
Turn-Off Delay Time	t <sub>D(off)</sub>	-	38.0	61	ns	
Turn-Off Fall Time	t <sub>f</sub>	-	22.0	38	ns	
<b>BODY DIODE CHARACTERISTICS</b>						
Diode Forward Voltage	V <sub>SD</sub>	-	-0.7	-1.0	V	V <sub>GS</sub> = 0V, I <sub>S</sub> = -1A
Reverse Recovery Time (Note 8)	t <sub>rr</sub>	-	20	31	ns	I <sub>S</sub> = -9.5A, dI/dt = 100A/µs
Reverse Recovery Charge (Note 8)	Q <sub>rr</sub>	-	9.5	18	nC	

- Notes:
5. Device mounted on FR-4 substrate PC board, 2oz copper, with minimum recommended pad layout.
  6. Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper plate.
  7. Short duration pulse test used to minimize self-heating effect
  8. Guaranteed by design. Not subject to product testing



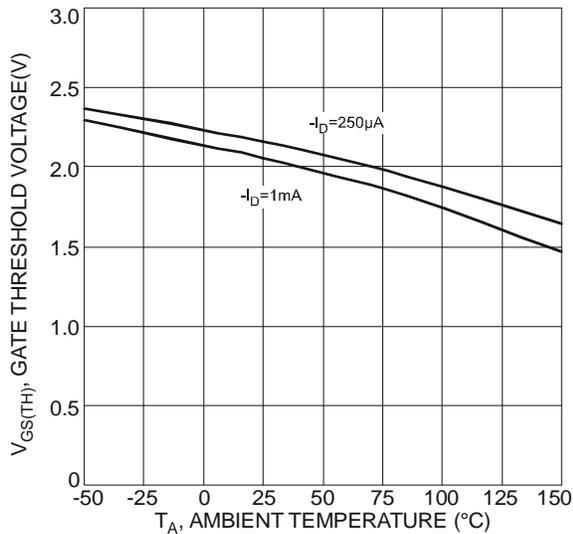


Fig. 7 Gate Threshold Variation vs. Ambient Temperature

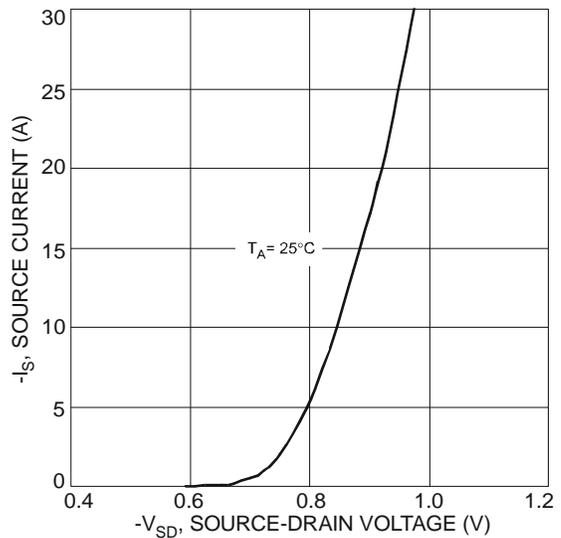


Fig. 8 Diode Forward Voltage vs. Current

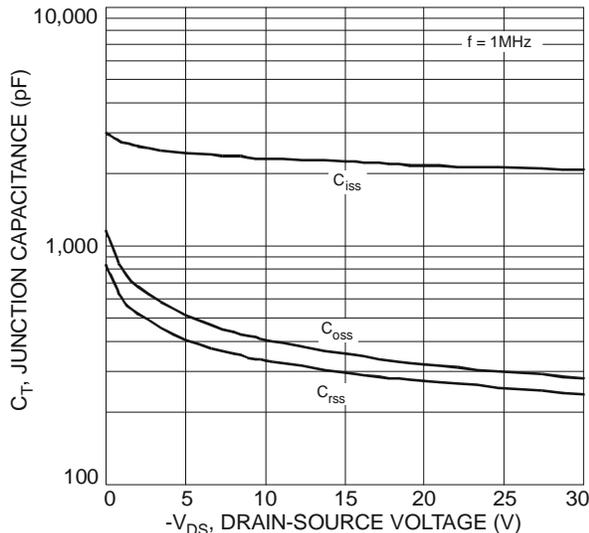


Fig. 9 Typical Junction Capacitance

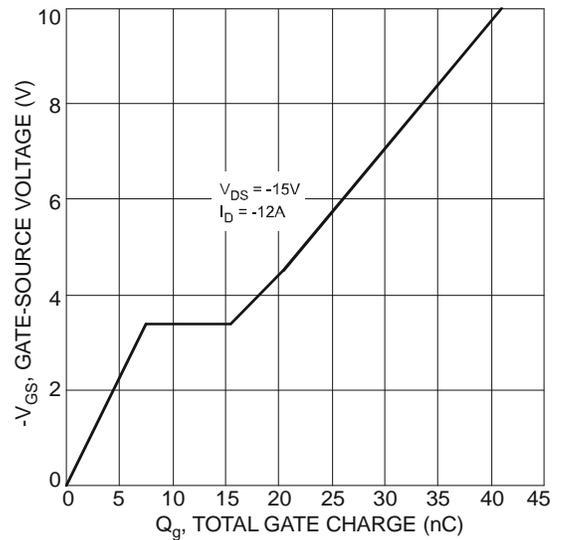


Fig. 10 Gate-Charge Characteristics

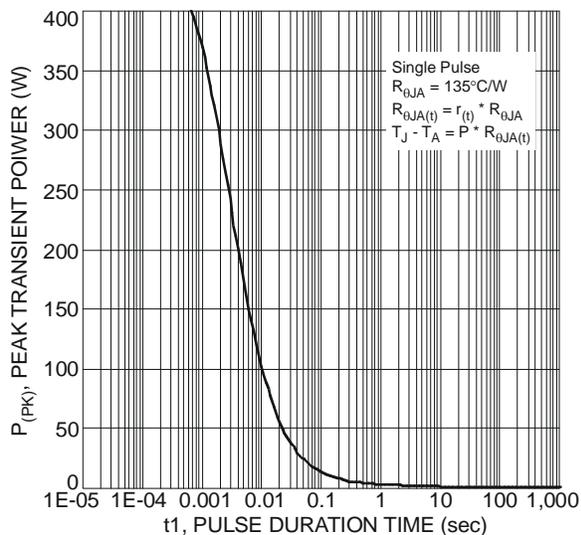


Fig. 11 Single Pulse Maximum Power Dissipation

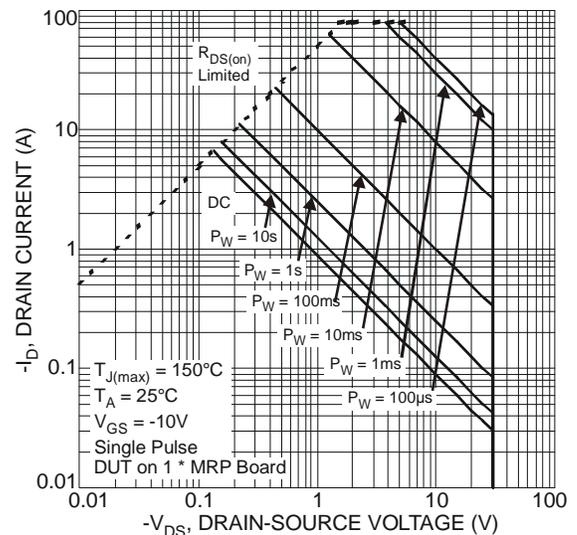
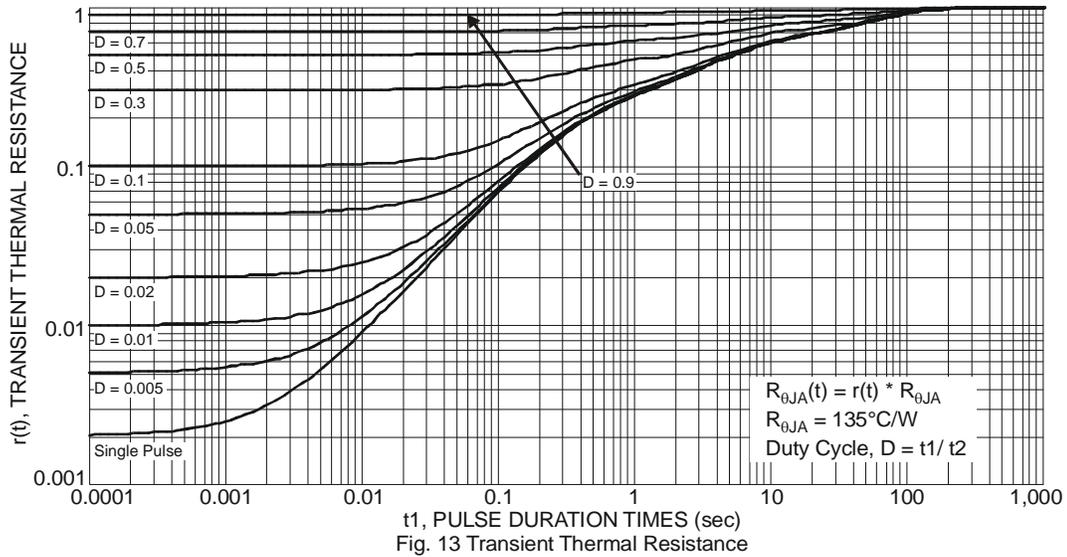
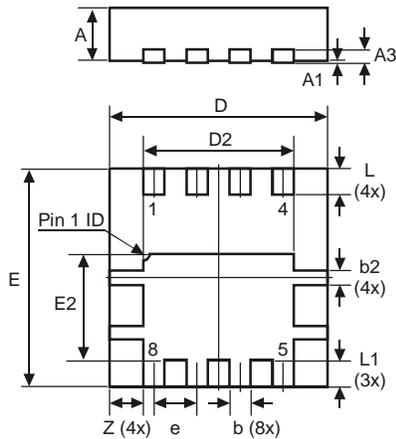


Fig. 12 SOA, Safe Operation Area



**Package Outline Dimensions**

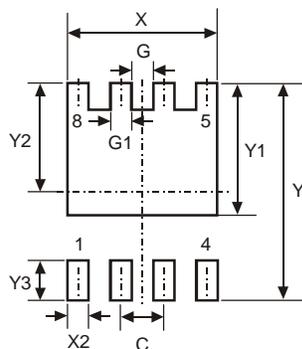
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for latest version.



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
<b>All Dimensions in mm</b>			

**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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