

Product Summary

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

Description

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.

Applications

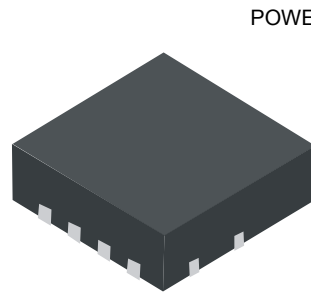
- Backlighting
- Power Management Functions
- DC-DC Converters

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**

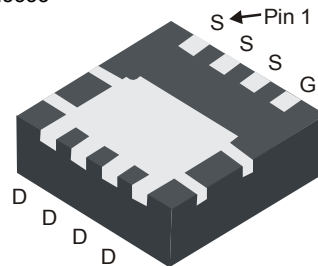
Mechanical Data

- 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 $\text{\textcircled{E3}}$
- Weight: 0.0174 grams (approximate)

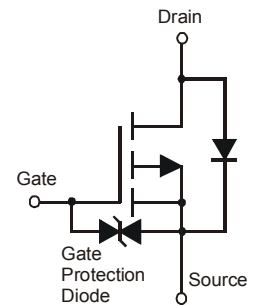


Top View

POWERDI3333



Bottom View



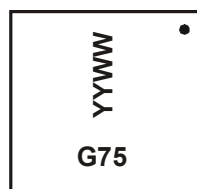
Equivalent Circuit

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/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. 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 6) V _{GS} = -10V	I _D	T _A = +25°C T _A = +70°C	-9.8 -7.7	A
		t < 10s	T _A = +25°C T _A = +70°C	-13.5 -10.8
Maximum Continuous Body Diode Forward Current (Note 5)	I _S	-3.0	A	
Pulsed Drain Current (10µs pulse, duty cycle = 1%)	I _{DM}	-80	A	
Avalanche Current (Notes 7 & 8)	I _{AR}	14	A	
Repetitive Avalanche Energy (Notes 7 & 8) L = 1mH	E _{AR}	104	mJ	

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

Characteristic	Symbol	Value	Units	
Total Power Dissipation (Note 5)	P _D	T _A = +25°C	0.94	W
		T _A = +70°C	0.6	
Thermal Resistance, Junction to Ambient (Note 5)	R _{θJA}	Steady State	137	°C/W
		t < 10s	82	°C/W
Total Power Dissipation (Note 6)	P _D	T _A = +25°C	2.2	W
		T _A = +70°C	1.3	
Thermal Resistance, Junction to Ambient (Note 6)	R _{θJA}	Steady State	60	°C/W
		t < 10s	36	°C/W
Thermal Resistance, Junction to Case (Note 6)	R _{θJC}	3.0	°C/W	
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}	-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 8)						
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
		—	—	—		V _{DS} = -5V, I _D = -10A
Forward Transfer Admittance	Y _{fs}	—	21	—	S	V _{DS} = -5V, I _D = -10A
DYNAMIC CHARACTERISTICS (Note 9)						
Input Capacitance	C _{iss}	—	2246	2987	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	
Turn-On Rise Time	t _r	—	15.4	31	ns	V _{DD} = -15V, V _{GS} = -10V, R _L = 1.25Ω, R _G = 3Ω,
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 9)	t _{rr}	—	20	31	ns	I _S = -9.5A, dI/dt = 100A/µs
Reverse Recovery Charge (Note 9)	Q _{rr}	—	9.5	18	nC	

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

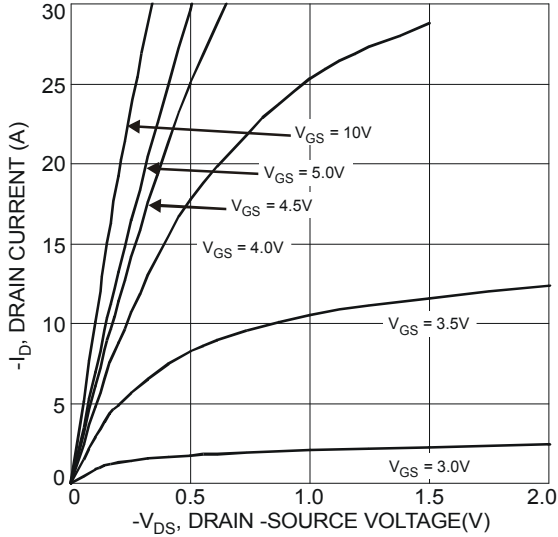


Fig. 1 Typical Output Characteristics

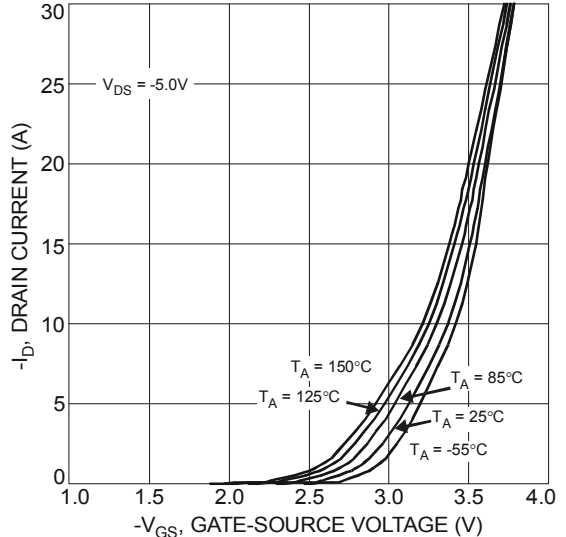


Fig. 2 Typical Transfer Characteristics

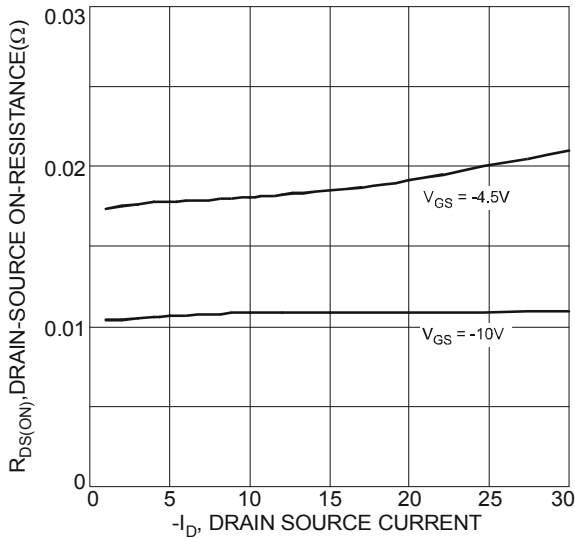


Fig. 3 Typical On-Resistance vs. Drain Current and Gate Voltage

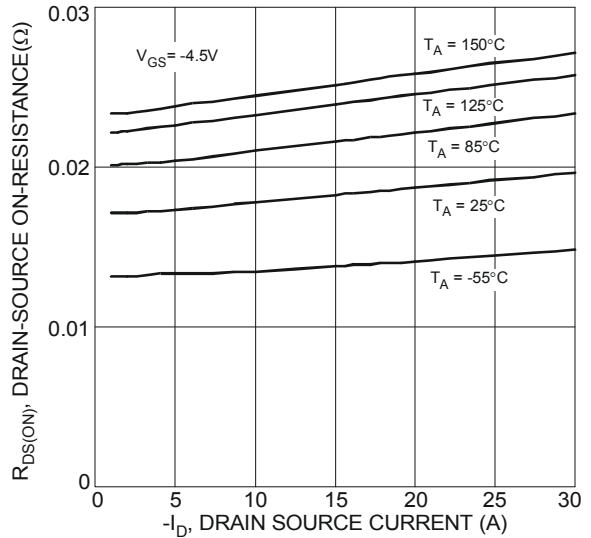


Fig. 4 Typical On-Resistance vs. Drain Current and Temperature

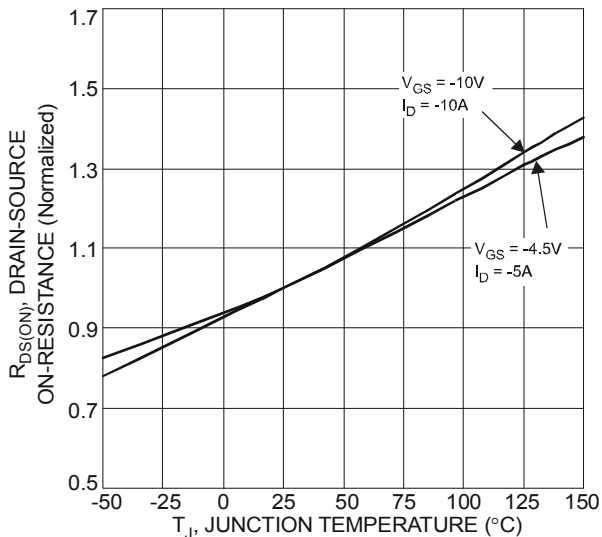


Fig. 5 On-Resistance Variation with Temperature

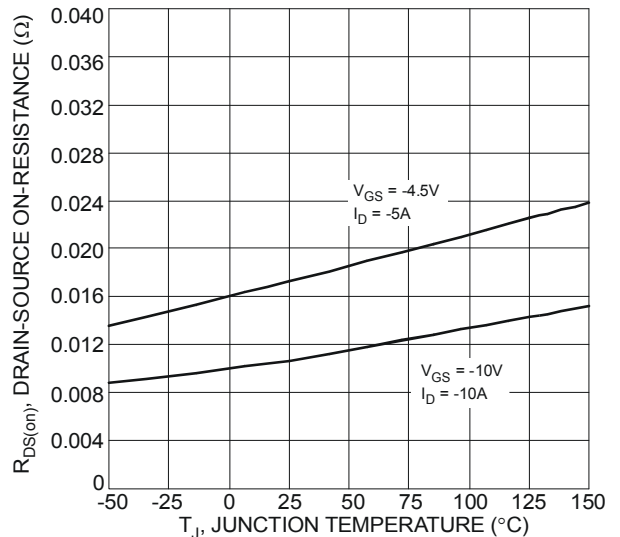


Fig. 6 On-Resistance Variation with Temperature

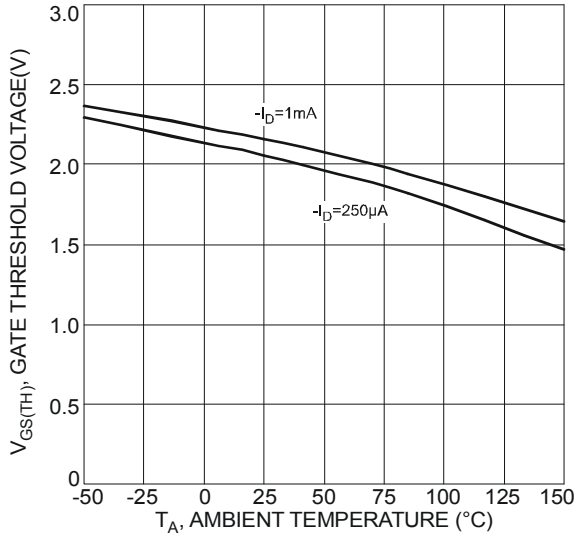


Fig. 7 Gate Threshold Variation vs. Ambient Temperature

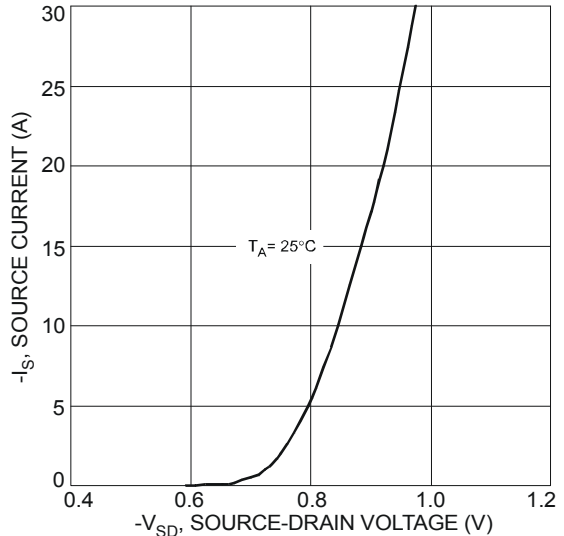


Fig. 8 Diode Forward Voltage vs. Current

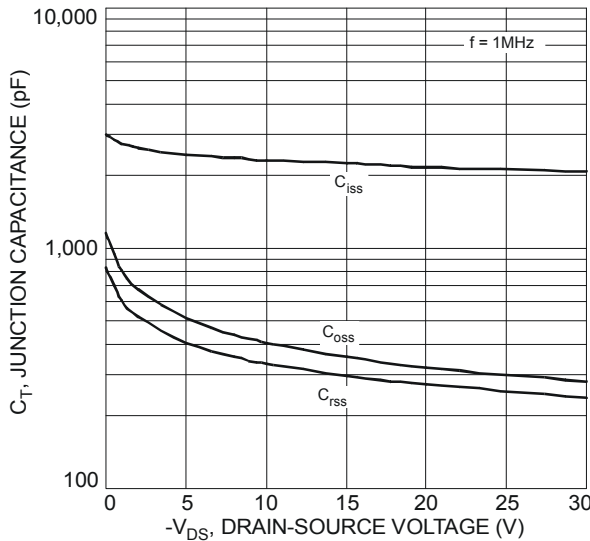


Fig. 9 Typical Junction Capacitance

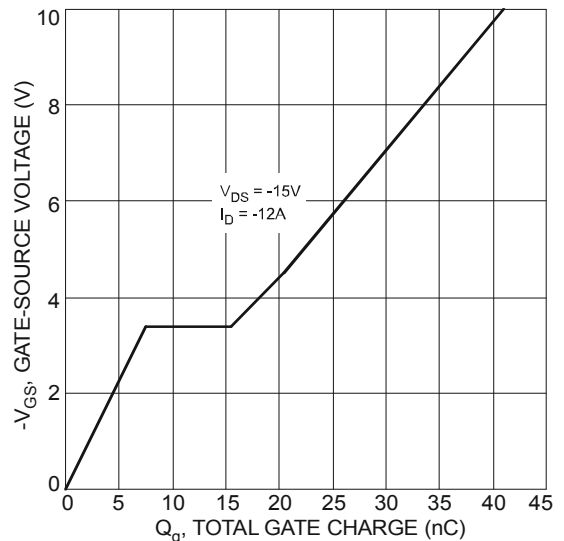


Fig. 10 Gate-Charge Characteristics

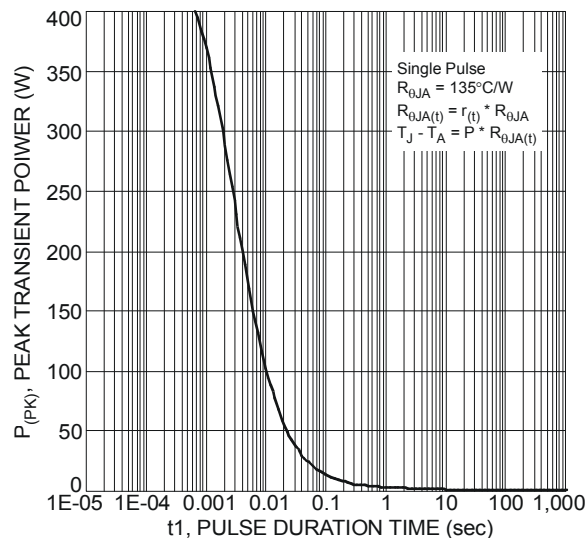


Fig. 11 Single Pulse Maximum Power Dissipation

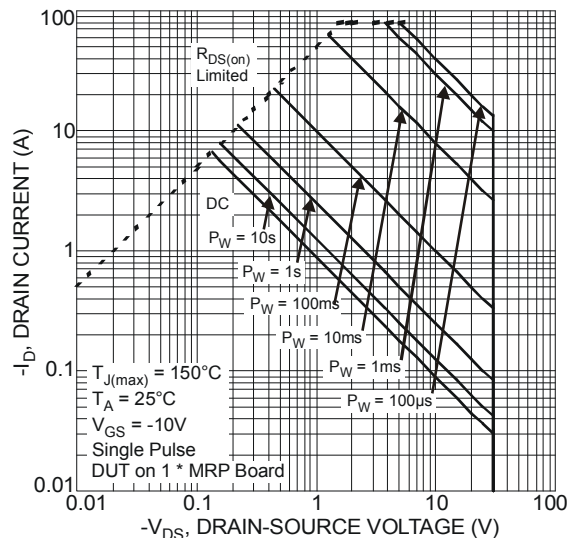
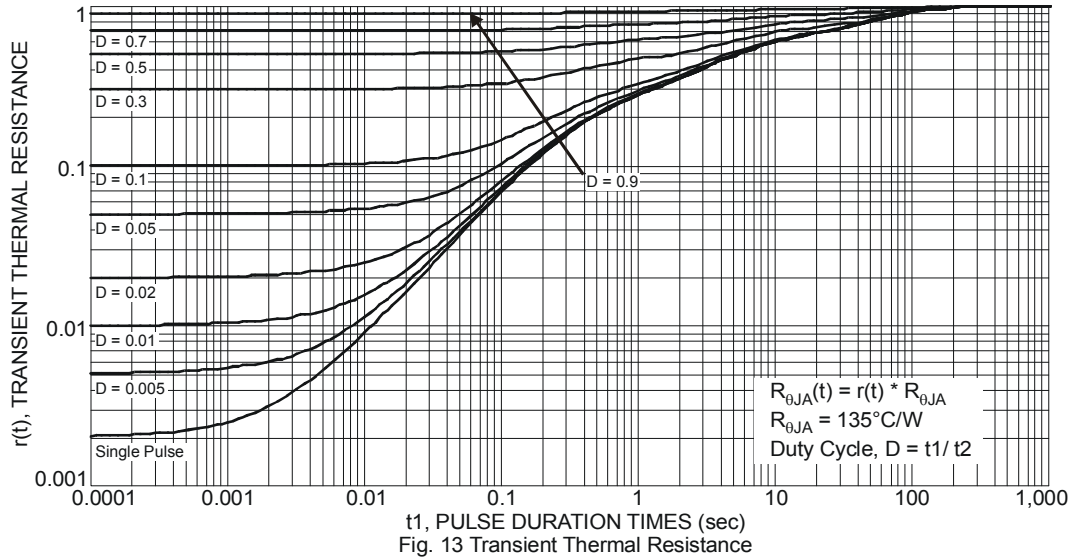
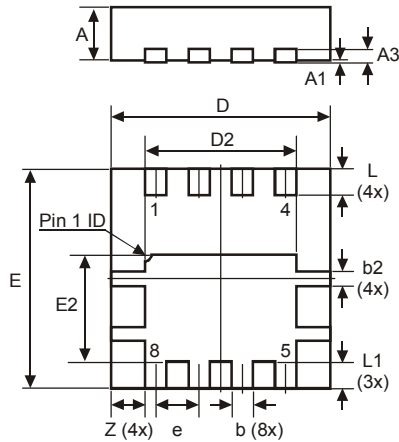


Fig. 12 SOA, Safe Operation Area



Package Outline Dimensions

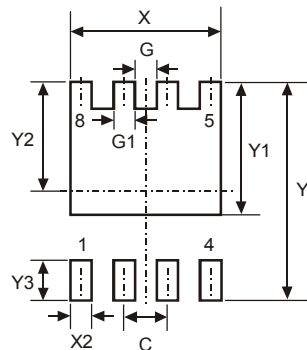
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for latest version.



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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