40V N-CHANNEL ENHANCEMENT MODE MOSFET
POWERDI®

Product Summary

$V_{(BR)DSS}$	$R_{DS(ON)}$ max	I_D max T_A = +25°C
40V	12mΩ @ V_{GS} = 10V	11.5A
	15mΩ @ V_{GS} = 4.5V	10.3A

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**

Description and Applications

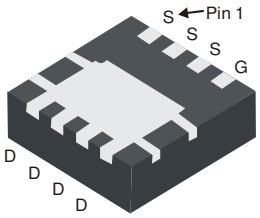
This MOSFET is designed to minimize the on-state resistance ($R_{DS(ON)}$) and yet maintain superior switching performance, making it ideal for high-efficiency power management applications such as:

- Backlighting
- Power Management Functions
- DC-DC Converters

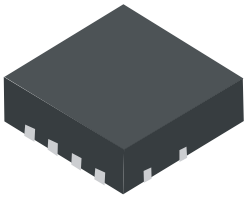
Mechanical Data

- 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: 0.072 grams (Approximate)

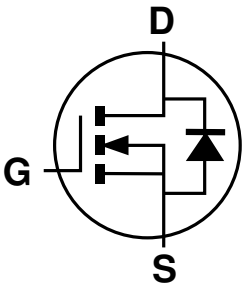
POWERDI 3333-8



Bottom View



Top View



Equivalent Circuit

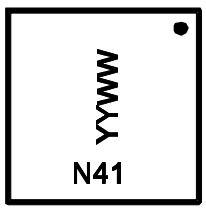
Ordering Information (Note 4)

Part Number	Case	Packaging
DMN4010LFG-7	POWERDI 3333-8	2,000/Tape & Reel
DMN4010LFG-13	POWERDI 3333-8	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. For packaging details, go to our website at http"//www.diodes.com/products/packages.html.

Marking Information

POWERDI 3333-8



N41= Product Type Marking Code
YYWW = Date Code Marking
YY = Last Digit of Year (ex: 13 = 2013)
WW = Week Code (01 ~ 53)

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

Characteristic			Symbol	Value	Units
Drain-Source Voltage			V_{DSS}	40	V
Gate-Source Voltage			V_{GSS}	±20	V
Continuous Drain Current (Note 6) V_{GS} = 10V	Steady State	T_A = +25°C T_A = +70°C	I_D	11.5 9.2	A
	t<10s	T_A = +25°C T_A = +70°C	I_D	14.2 11.4	A
Pulsed Drain Current (10µs pulse, duty cycle = 1%)			I_{DM}	80	A
Maximum Continuous Body Diode Forward Current (Note 6)			I_S	2	A
Avalanche Current (Note 7) L = 0.1mH			I_{AS}	27	A
Avalanche Energy (Note 7) L = 0.1mH			E_{AS}	37	mJ

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

Characteristic		Symbol	Value	Units
Total Power Dissipation (Note 5)		P_D	0.93	W
Thermal Resistance, Junction to Ambient (Note 5)	Steady state	$R_{\theta JA}$	137	°C/W
	t<10s		89	
Total Power Dissipation (Note 6)		P_D	2.45	W
Thermal Resistance, Junction to Ambient (Note 6)	Steady state	$R_{\theta JA}$	52	°C/W
	t<10s		34	
Thermal Resistance, Junction to Case (Note 6)		$R_{\theta JC}$	3	
Operating and Storage Temperature Range		T_J, T_{STG}	-55 to +150	°C

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.

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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}	40	—	—	V	V_{GS} = 0V, I_D = 250μA
Zero Gate Voltage Drain Current T_J = +25°C	I_{DSS}	—	—	1	μA	V_{DS} = 32V, V_{GS} = 0V
Gate-Source Leakage	I_{GSS}	—	—	±100	nA	V_{GS} = ±20V, V_{DS} = 0V
ON CHARACTERISTICS (Note 8)						
Gate Threshold Voltage	$V_{GS(th)}$	1.0	—	3.0	V	V_{DS} = V_{GS}, I_D = 250μA
Static Drain-Source On-Resistance	$R_{DS\ (ON)}$	—	—	12	mΩ	V_{GS} = 10V, I_D = 14A
			—	15		V_{GS} = 4.5V, I_D = 11A
Diode Forward Voltage	V_{SD}	—	0.72	—	V	V_{GS} = 0V, I_S = 14A
DYNAMIC CHARACTERISTICS (Note 9)						
Input Capacitance	C_{iss}	—	1,810	—	pF	V_{DS} = 20V, V_{GS} = 0V, f = 1.0MHz
Output Capacitance	C_{oss}	—	135	—	pF	
Reverse Transfer Capacitance	C_{rss}	—	112	—	pF	
Gate Resistance	R_g	—	1.7	—	Ω	V_{DS} = 0V, V_{GS} = 0V, f = 1MHz
Total Gate Charge (V_{GS} = 4.5V)	Q_g	—	17	—	nC	V_{DS} = 20V, I_D = 14A
Total Gate Charge (V_{GS} = 10V)	Q_g	—	37	—	nC	
Gate-Source Charge	Q_{gs}	—	5.6	—	nC	
Gate-Drain Charge	Q_{gd}	—	7.1	—	nC	
Turn-On Delay Time	$t_{D(on)}$	—	5.1	—	ns	V_{GS} = 10V, V_{DS} = 20V, R_G = 6Ω, I_D = 14A
Turn-On Rise Time	t_r	—	13	—	ns	
Turn-Off Delay Time	$t_{D(off)}$	—	36	—	ns	
Turn-Off Fall Time	t_f	—	13	—	ns	
Body Diode Reverse Recovery Time	t_{rr}	—	12.2	—	nS	I_F = 3A, di/dt = 100A/μs
Body Diode Reverse Recovery Charge	Q_{rr}	—	5.4	—	nC	I_F = 3A, di/dt = 100A/μs

Notes: 8. Short duration pulse test used to minimize self-heating effect.
9. Guaranteed by design. Not subject to product testing.

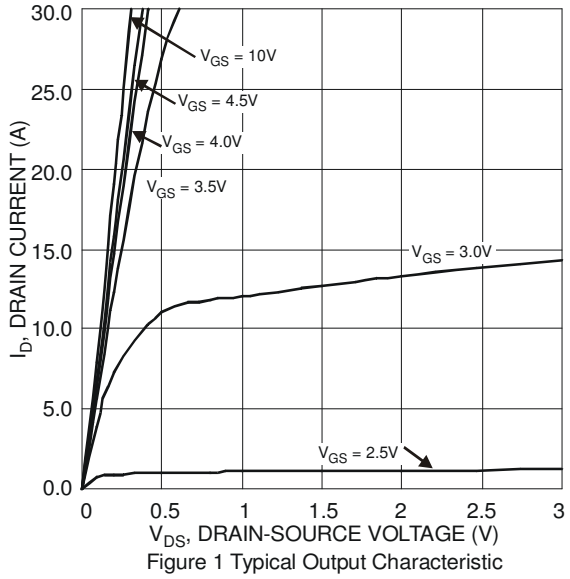


Figure 1 Typical Output Characteristic

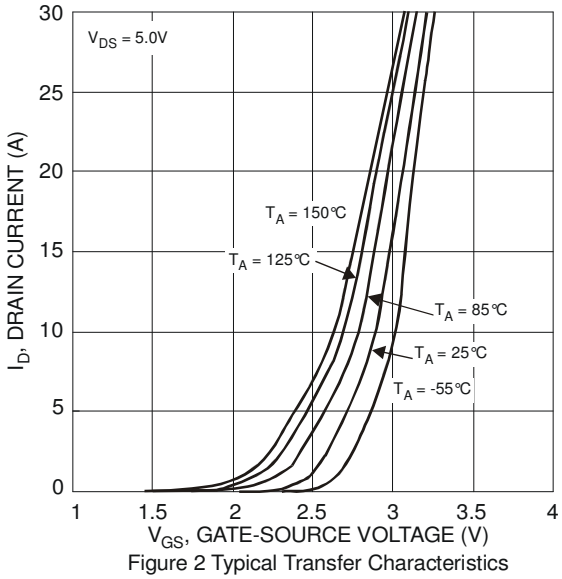


Figure 2 Typical Transfer Characteristics

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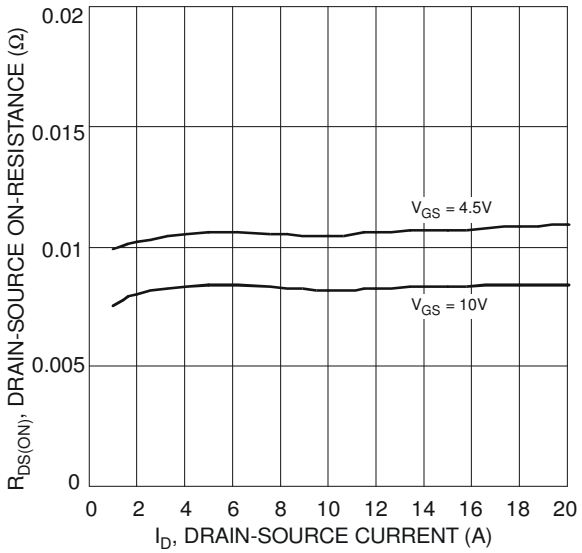


Figure 3 Typical On-Resistance vs. Drain Current and Gate Voltage

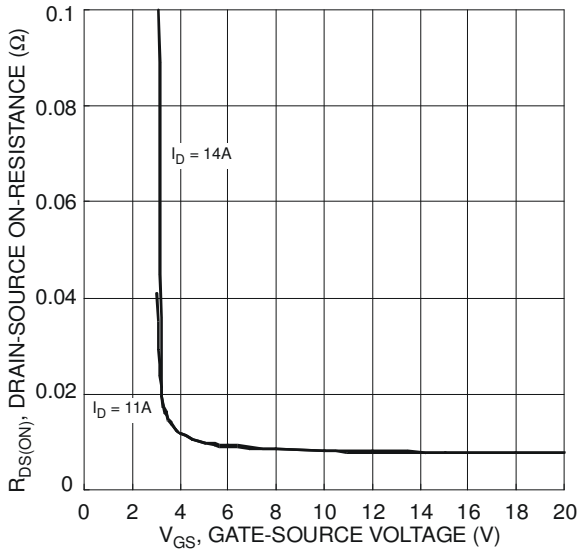


Figure 4 Typical Transfer Characteristic

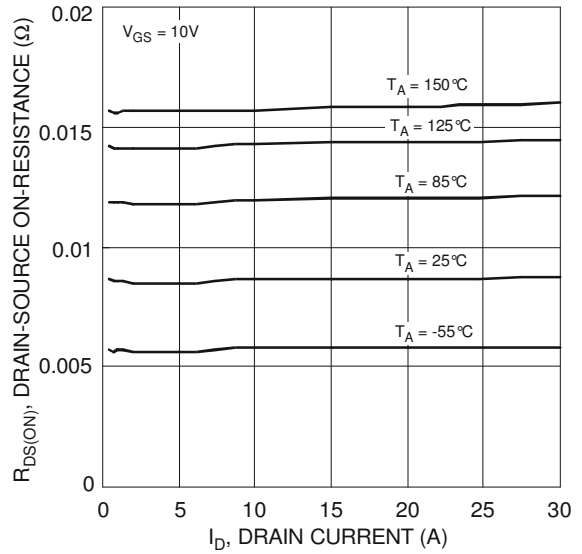


Figure 5 Typical On-Resistance vs. Drain Current and Temperature

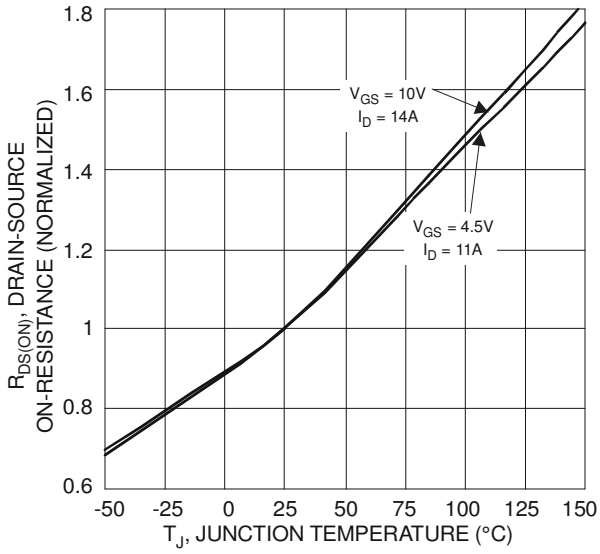


Figure 6 On-Resistance Variation with Temperature

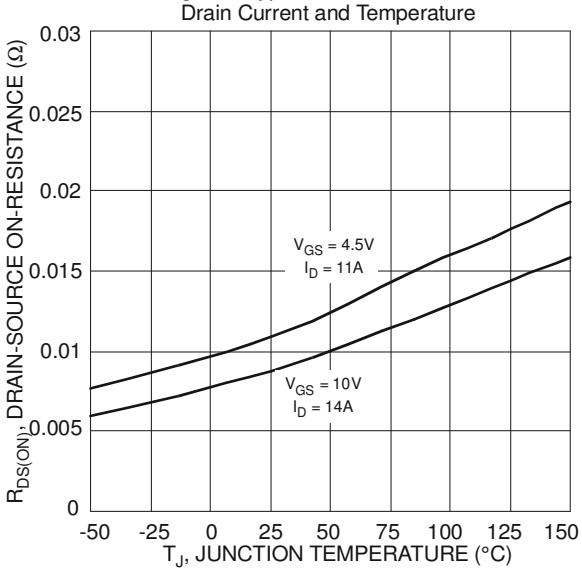


Figure 7 On-Resistance Variation with Temperature

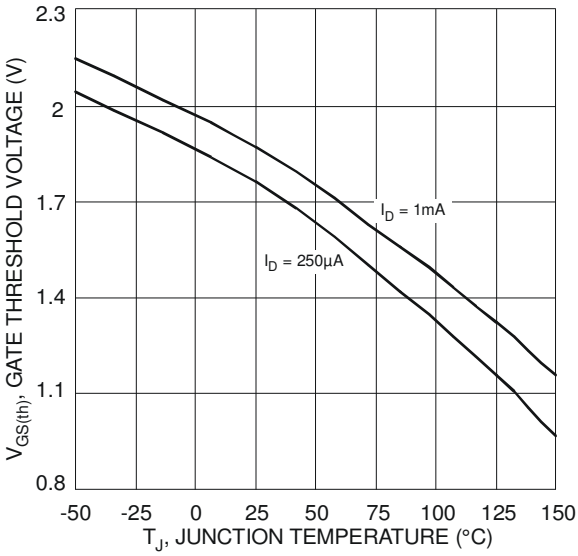


Figure 8 Gate Threshold Variation vs. Ambient Temperature

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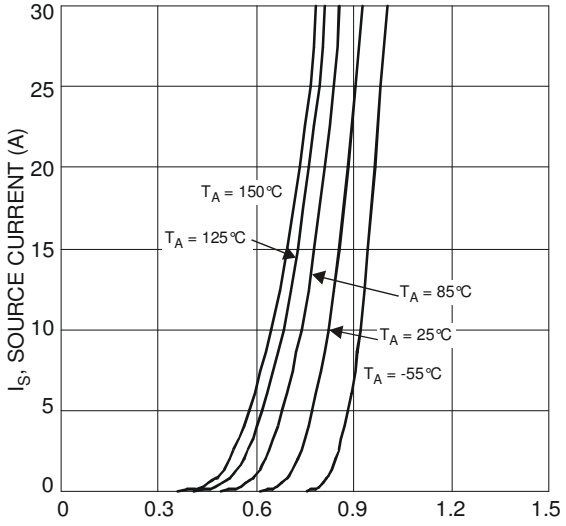


Figure 9 Diode Forward Voltage vs. Current

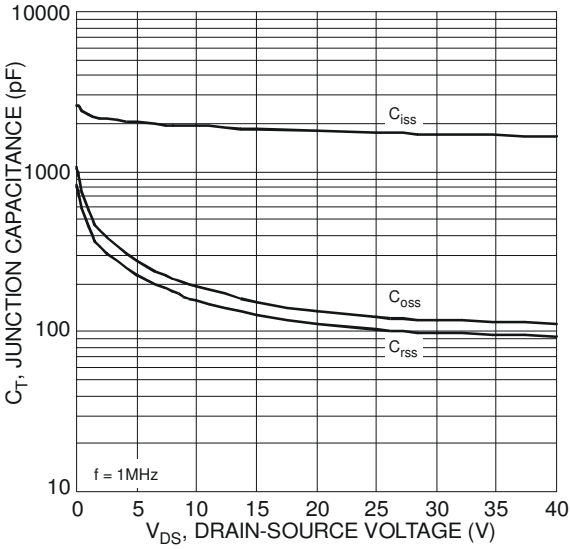


Figure 10 Typical Junction Capacitance

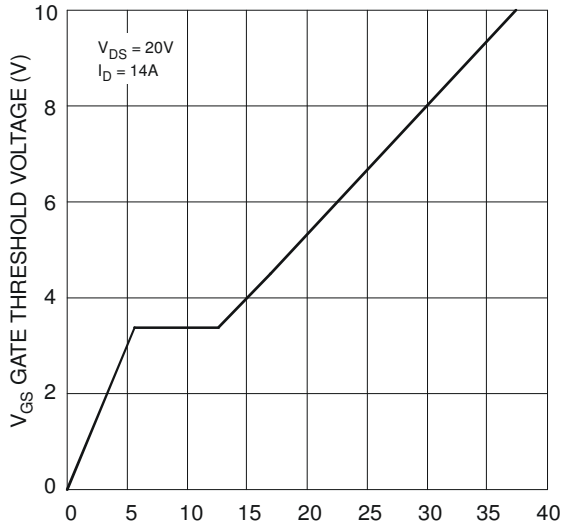


Figure 11 Gate Charge

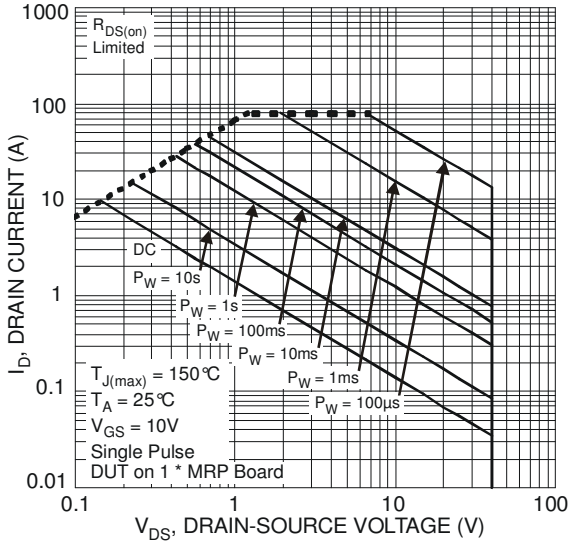


Figure 12 SOA, Safe Operation Area

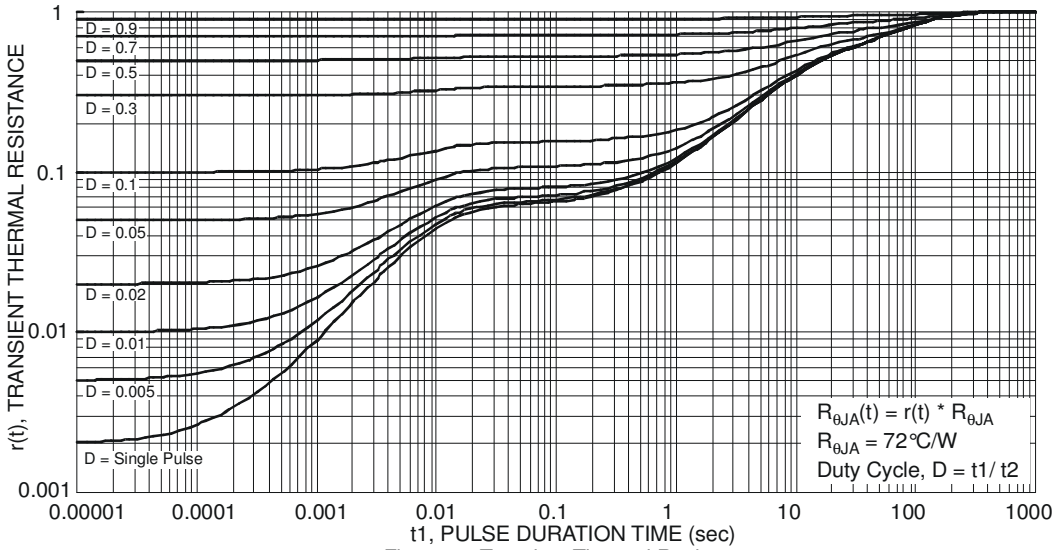
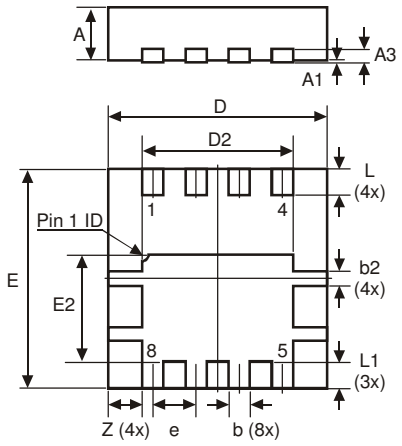


Figure 13 Transient Thermal Resistance

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Package Outline Dimensions

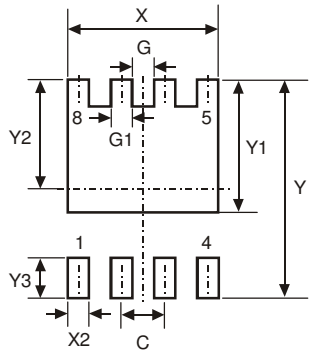
Please see AP02002 at http://www.diodes.com/datasheets/ap02002.pdf for the latest version.



POWERDI®3333-8			
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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