30V N-CHANNEL ENHANCEMENT MODE MOSFET

NEW PRODUCT

Product Summary

$V_{(BR)DSS}$	$R_{DS(on)}$	I_D T_C = +25°C
30V	12mΩ @ V_{GS} = 10V	37.8A
	16mΩ @ V_{GS} = 4.5V	32.8A

Features

- 100% Unclamped Inductive Switch (UIS) Test in Production
- Low On-Resistance
- Fast Switching Speed
- **Totally Lead-Free & Fully RoHS Compliant (Note 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**

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.

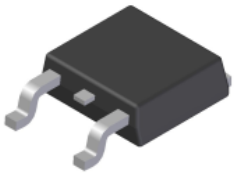
Mechanical Data

- Case: TO252
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Matte Tin Finish Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208 e3
- Weight: 0.33 grams (Approximate)

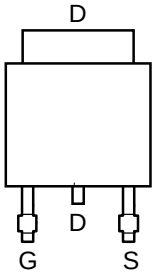
Applications

- Backlighting
- DC-DC Converters
- Power Management Functions

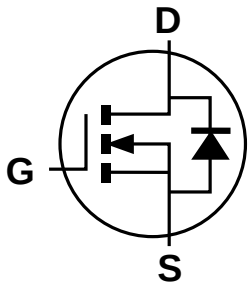
TO252



Top View



Top View
Pin-Out



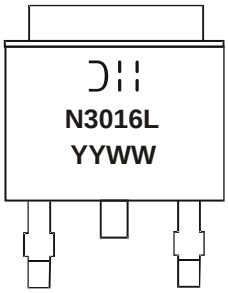
Equivalent Circuit

Ordering Information (Notes 4)

Product	Case	Packaging
DMN3016LK3-13	TO252	2,500/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



= Manufacturer's Marking
N3016L= Product Type Marking Code
YYWW = Date Code Marking
YY = Year (ex: 14 = 2014)
WW = Week (01 - 53)

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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}	±20	V
Continuous Drain Current (Note 6) V_{GS} = 10V	Steady State	T_A = +25°C T_A = +70°C	I_D	12.4 10	A
	Steady State	T_C = +25°C T_C = +70°C	I_D	37.8 30.3	A
	t<10s	T_A = +25°C T_A = +70°C	I_D	17 13.6	A
Maximum Body Diode Continuous Current			I_S	2	A
Pulsed Drain Current (10µs pulse, duty cycle = 1%)			I_{DM}	90	A
Avalanche Current (Note 7) L = 0.1mH			I_{AS}	22	A
Avalanche Energy (Note 7) L = 0.1mH			E_{AS}	24	mJ

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

Characteristic		Symbol	Value	Units
Total Power Dissipation (Note 5)	T_A = +25°C	P_D	1.6	W
	T_A = +70°C		1.0	
Thermal Resistance, Junction to Ambient (Note 5)	Steady State	$R_{\theta JA}$	75	°C/W
	t<10s		34	
Total Power Dissipation (Note 6)	T_A = +25°C	P_D	2.8	W
	T_A = +70°C		1.8	
Thermal Resistance, Junction to Ambient (Note 6)	Steady State	$R_{\theta JA}$	46	°C/W
	t<10s		24	
Thermal Resistance, Junction to Case (Note 6)		$R_{\theta JC}$	3.1	
Operating and Storage Temperature Range		T_J, T_{STG}	-55 to +150	°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}	30	—	—	V	V_{GS} = 0V, I_D = 250μA
Zero Gate Voltage Drain Current T_J = +25°C	I_{DSS}	—	—	1	μA	V_{DS} = 30V, V_{GS} = 0V
Gate-Source Leakage	I_{GSS}	—	—	±100	nA	V_{GS} = ±20V, V_{DS} = 0V
ON CHARACTERISTICS (Note 8)						
Gate Threshold Voltage	$V_{GS(th)}$	1.3	—	2.3	V	V_{DS} = V_{GS}, I_D = 250μA
Static Drain-Source On-Resistance	$R_{DS(ON)}$	—	8	12	mΩ	V_{GS} = 10V, I_D = 11A
		—	12	16		V_{GS} = 4.5V, I_D = 9A
Diode Forward Voltage	V_{SD}	—	0.70	1.0	V	V_{GS} = 0V, I_S = 1A
DYNAMIC CHARACTERISTICS (Note 9)						
Input Capacitance	Ciss	—	1415	—	pF	V_{DS} = 15V, V_{GS} = 0V, f = 1.0MHz
Output Capacitance	Coss	—	119	—	pF	
Reverse Transfer Capacitance	Crss	—	82	—	pF	
Gate Resistance	R_G	—	2.2	—	Ω	V_{DS} = 0V, V_{GS} = 0V, f = 1.0MHz
Total Gate Charge (V_{GS} = -10V)	Q_g	—	25.1	—	nC	V_{DS} = 15V, I_D = 12A
Total Gate Charge (V_{GS} = -4.5V)	Q_g	—	11.3	—	nC	
Gate-Source Charge	Q_{gs}	—	3.5	—	nC	
Gate-Drain Charge	Q_{gd}	—	3.6	—	nC	
Turn-On Delay Time	$t_{D(on)}$	—	4.8	—	ns	V_{DD} = 15V, V_{GS} = 10V, R_L = 1.25Ω, R_G = 3Ω,
Turn-On Rise Time	t_r	—	16.5	—	ns	
Turn-Off Delay Time	$t_{D(off)}$	—	26.1	—	ns	
Turn-Off Fall Time	t_f	—	5.6	—	ns	
Body Diode Reverse Recovery Time	t_{rr}	—	12.3	—	ns	I_F = 12A, di/dt = 500A/μs
Body Diode Reverse Recovery Charge	Q_{rr}	—	10.4	—	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. UIS in production with L = 0.1mH, starting T_A = +25°C.
8. Short duration pulse test used to minimize self-heating effect.
9. Guaranteed by design. Not subject to product testing.

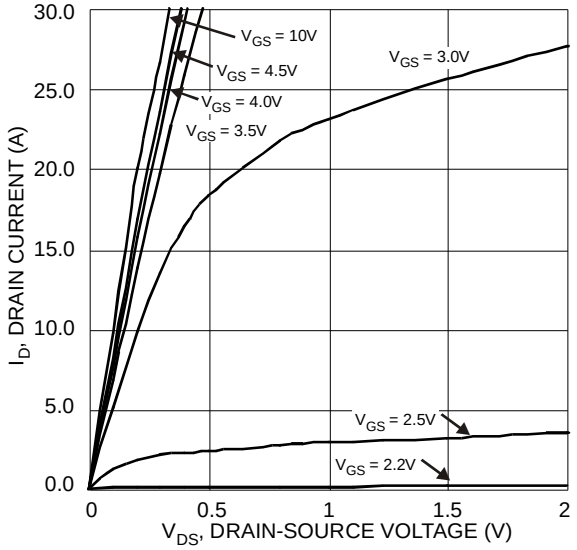


Figure 1 Typical Output Characteristic

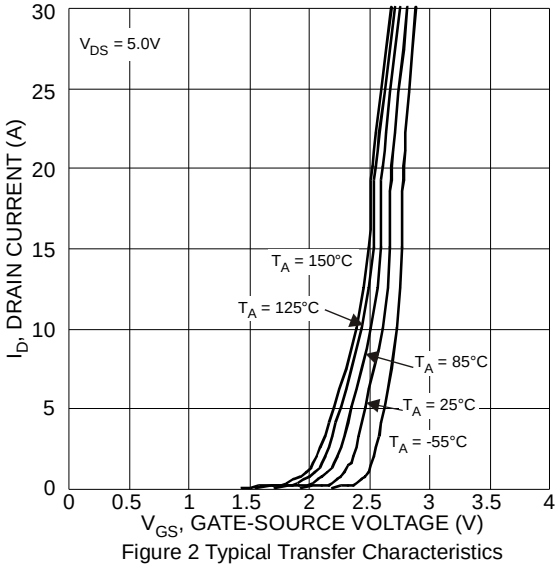


Figure 2 Typical Transfer Characteristics

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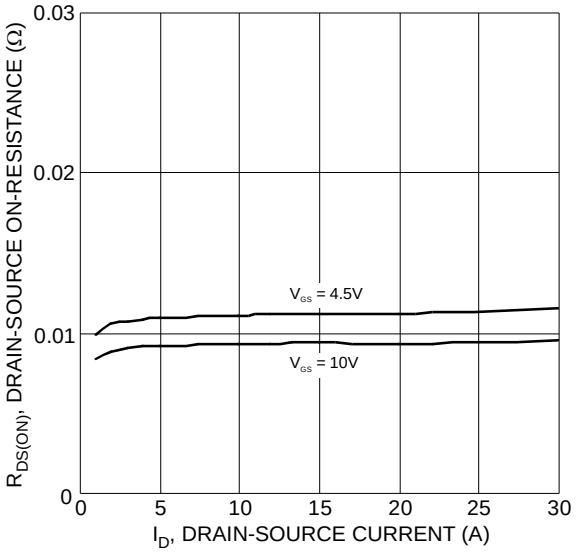


Figure 3 Typical On-Resistance vs. Drain Current and Gate Voltage

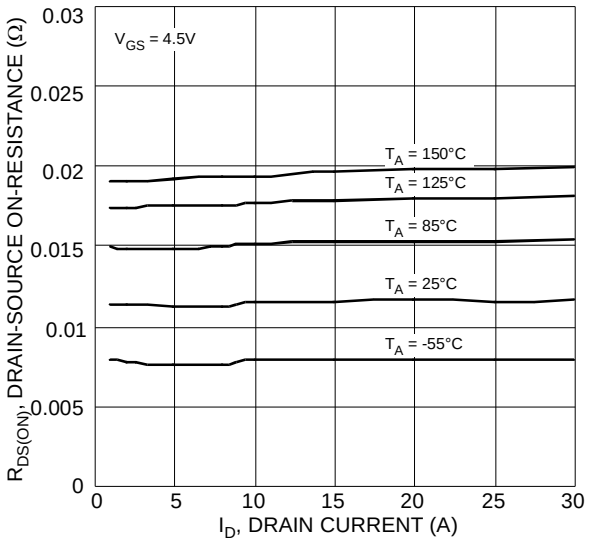


Figure 4 Typical On-Resistance vs. Drain Current and Temperature

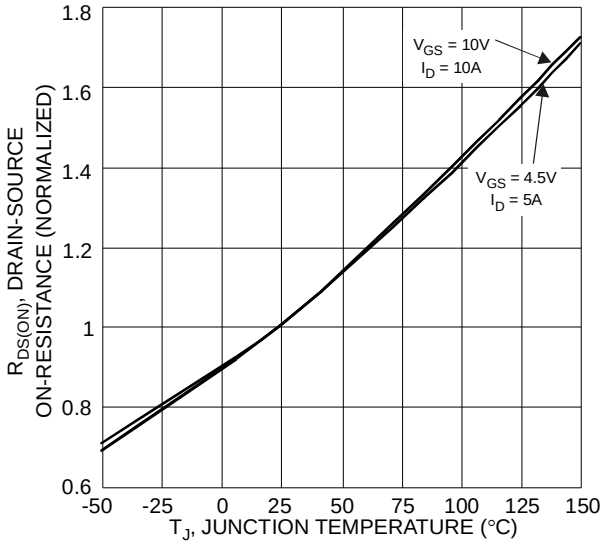


Figure 5 On-Resistance Variation with Temperature

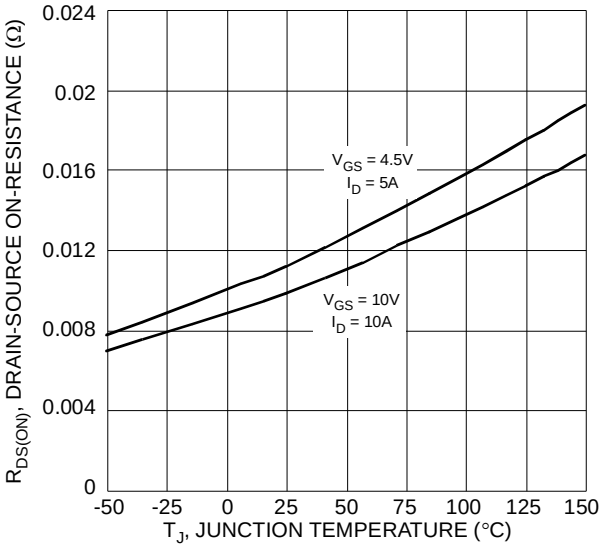


Figure 6 On-Resistance Variation with Temperature

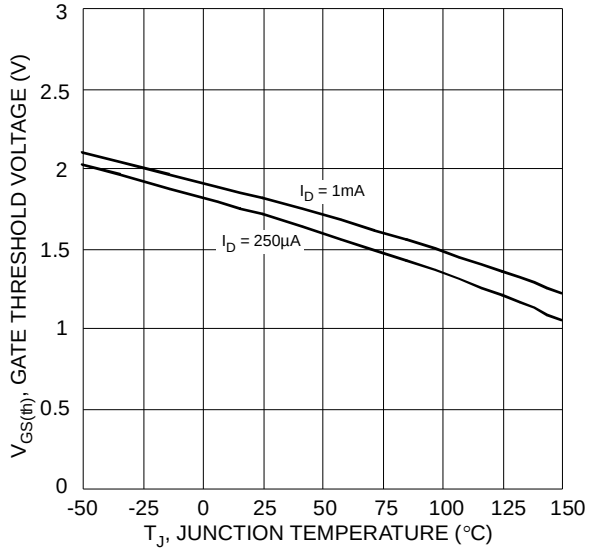


Figure 7 Gate Threshold Variation vs. Ambient Temperature

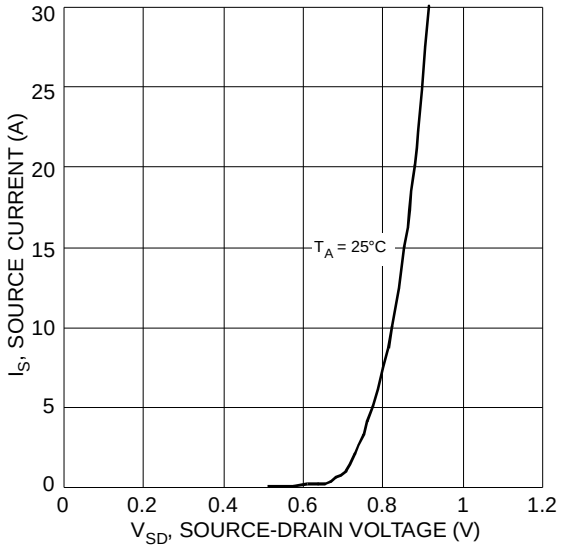


Figure 8 Diode Forward Voltage vs. Current

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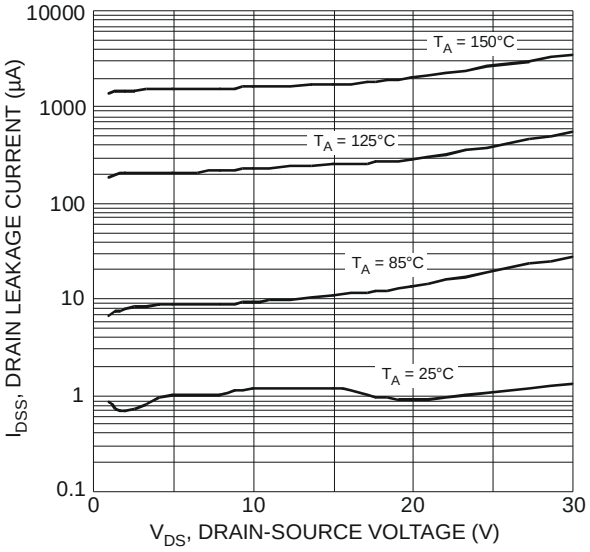


Figure 9 Typical Drain-Source Leakage Current vs. Voltage

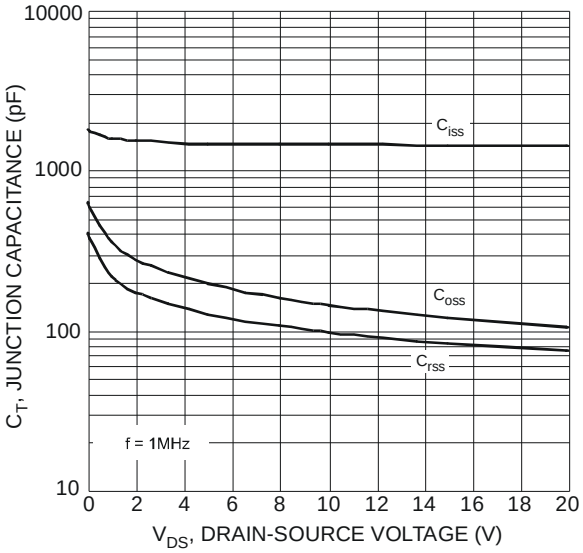


Figure 10 Typical Junction Capacitance

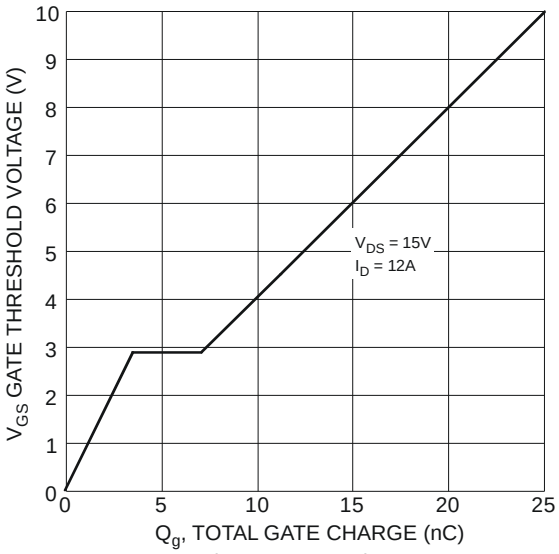


Figure 11 Gate Charge

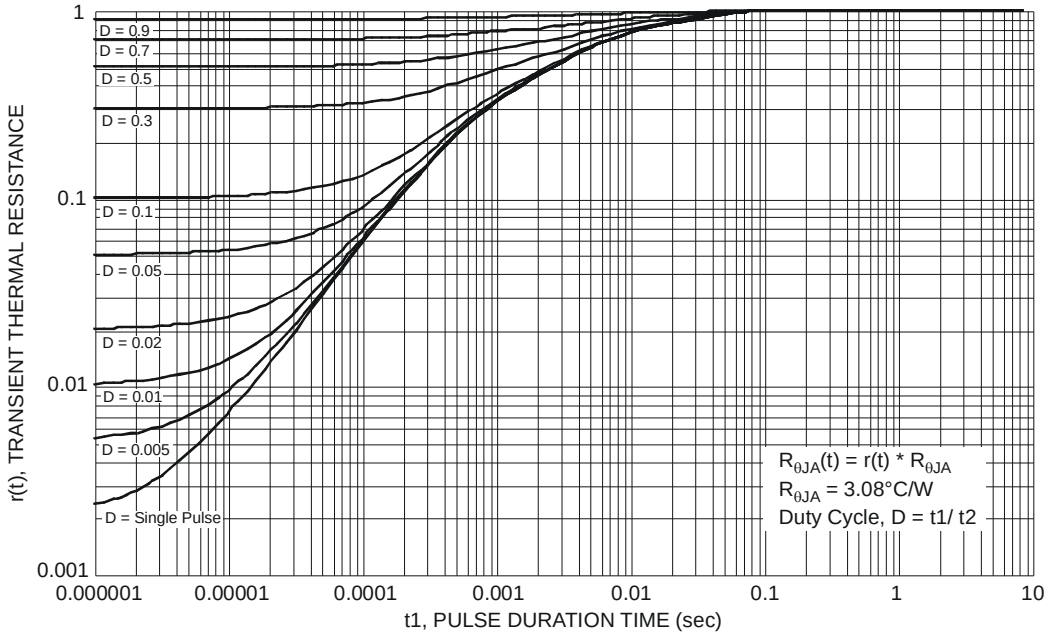


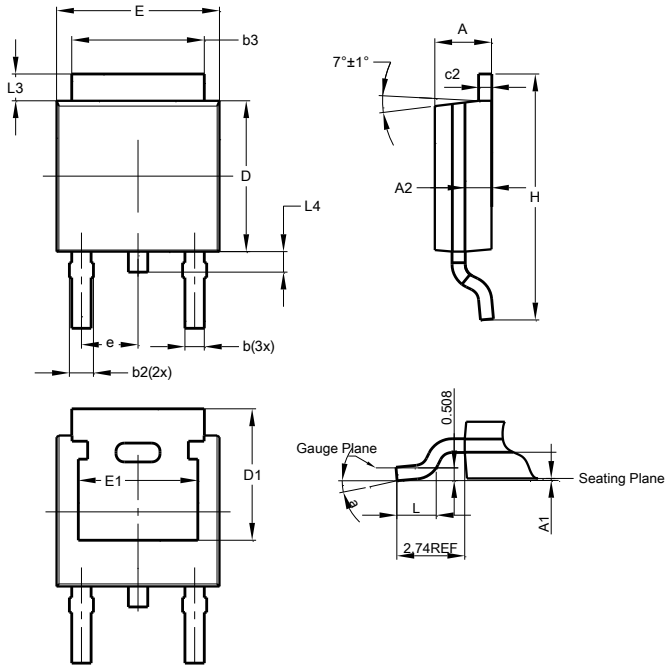
Figure 12 Transient Thermal Resistance

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Package Outline Dimensions

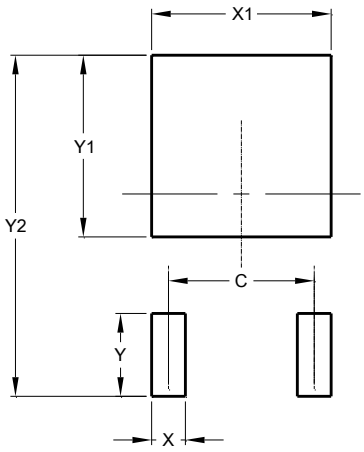
Please see AP02002 at http://www.diodes.com/datasheets/ap02002.pdf for the latest version.



TO252			
Dim	**Min**	**Max**	**Typ**
A	2.19	2.39	2.29
A1	0.00	0.13	0.08
A2	0.97	1.17	1.07
b	0.64	0.88	0.783
b2	0.76	1.14	0.95
b3	5.21	5.46	5.33
c2	0.45	0.58	0.531
D	6.00	6.20	6.10
D1	5.21	—	—
e	—	—	2.286
E	6.45	6.70	6.58
E1	4.32	—	—
H	9.40	10.41	9.91
L	1.40	1.78	1.59
L3	0.88	1.27	1.08
L4	0.64	1.02	0.83
a	0°	10°	—
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	4.572
X	1.060
X1	5.632
Y	2.600
Y1	5.700
Y2	10.700

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