N-CHANNEL ENHANCEMENT MODE MOSFET

Product Summary

$V_{(BR)DSS}$	$R_{DS(ON)}$	I_D T_A = +25°C
30V	20mΩ @ V_{GS} = 10V	18.4A
	30mΩ @ V_{GS} = 4.5V	15.0A

Description

This new generation 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
- DC-DC Converters
- Power Management Functions

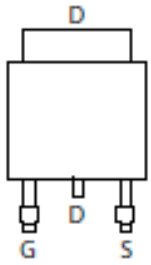
Features

- Low $R_{DS(ON)}$ – Ensures on State Losses Are Minimized
- Small Form Factor Thermally Efficient Package Enables Higher Density End Products
- **Lead-Free Finish; RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**

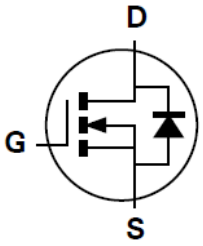
Mechanical Data

- Case: TO252
- Case Material: Molded Plastic, "Green" Molding Compound.
- UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Connections: See Diagram
- Weight: 0.33 grams (approximate)

Top View



Pin Out Top View



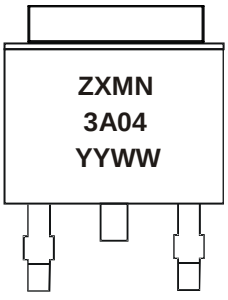
Equivalent Circuit

Ordering Information (Note 4)

Part Number	Case	Packaging
ZXMN3A04KTC	TO252	2500/Tape & Reel

Notes:
1. EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant. All applicable RoHS exemptions applied.
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



ZXMN3A04 = Product Type Marking Code
YYWW = Date Code Marking
YY = Last Digit of Year (ex: 14 = 2014)
WW = Week Code (01 to 53)

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

Characteristic			Symbol	Value	Unit
Drain-Source Voltage			V_{DSS}	30	V
Gate-Source Voltage			V_{GSS}	±20	V
Continuous Drain Current V_{GS} = 10V	Steady State	T_A = +25°C (Note 5) T_A = +70°C (Note 5) T_A = +25°C (Note 6)	I_D	18.4 14.7 12.0	A
Pulsed Drain Current (Note 7)			I_{DM}	66	A
Continuous Source Current (Body Diode) (Note 5)			I_S	11.5	A
Pulsed Source Current (Body Diode) (Note 7)			I_{SM}	66	A

Thermal Characteristics

Characteristic	Symbol	Value	Units
Power Dissipation at T_A = +25°C (Note 6) Linear Derating Factor	P_D	4.3 34.4	W mW/°C
Power Dissipation at T_A = +25°C (Note 5) Linear Derating Factor	P_D	10.1 80.8	W mW/°C
Power Dissipation at T_A = +25°C (Note 8) Linear Derating Factor	P_D	2.15 17.2	W mW/°C
Thermal Resistance, Junction to Ambient (Note 6)	$R_{\theta JA}$	29	°C/W
Thermal Resistance, Junction to Ambient (Note 5)	$R_{\theta JA}$	12.3	°C/W
Thermal Resistance, Junction to Ambient (Note 8)	$R_{\theta JA}$	58	°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						
Drain-Source Breakdown Voltage	BV_{DSS}	30	—	—	V	V_{GS} = 0V, I_D = 250µA
Zero Gate Voltage Drain Current	I_{DSS}	—	—	0.5	µA	V_{DS} = 30V, V_{GS} = 0V
Gate-Source Leakage	I_{GSS}	—	—	±100	nA	V_{GS} = ±20V, V_{DS} = 0V
ON CHARACTERISTICS						
Gate Threshold Voltage	$V_{GS(th)}$	1.0	—	—	V	V_{DS} = V_{GS}, I_D = 250mA
Static Drain-Source On-Resistance (Note 9)	$R_{DS(ON)}$	—	—	20	mΩ	V_{GS} = 10V, I_D = 12A
		—	—	30		V_{GS} = 4.5V, I_D = 9.8A
Diode Forward Voltage (Note 9)	V_{SD}	—	0.85	0.95	V	T_J = +25°C, I_S = 6.8A, V_{GS} = 0V
Forward Transconductance (Notes 9 & 11)	g_{fs}	—	22.1	—	S	V_{DS} = 15V, I_D = 12.6A
DYNAMIC CHARACTERISTICS (Notes 10 & 11)						
Input Capacitance	C_{iss}	—	1890	—	pF	V_{DS} = 15V, V_{GS} = 0V, f = 1.0MHz
Output Capacitance	C_{oss}	—	349	—		
Reverse Transfer Capacitance	C_{rss}	—	218	—		
Total Gate Charge (V_{GS} = 5V)	Q_g	—	19.9	—	nC	V_{DS} = 15V, I_D = 6.5A
Total Gate Charge (V_{GS} = 10V)	Q_g	—	36.8	—		
Gate-Source Charge	Q_{gs}	—	5.8	—		
Gate-Drain Charge	Q_{gd}	—	7.1	—		
Turn-On Delay Time	$t_{D(ON)}$	—	5.2	—	ns	V_{DS} = 15V, V_{GS} = 10V, I_D = 1A, R_{GEN} = 6Ω
Turn-On Rise Time	t_R	—	6.1	—		
Turn-Off Delay Time	$t_{D(OFF)}$	—	38.1	—		
Turn-Off Fall Time	t_F	—	20.2	—		
Reverse Recovery Time	t_{RR}	—	18.4	—	ns	I_S = 2.3A, di/dt = 100A/µs
Reverse Recovery Charge	Q_{RR}	—	11	—	nC	

Notes:
5. For a device surface mounted on FR4 PCB measured at ≤ 10 sec.
6. For a device surface mounted on 50mm x 50mm x 1.6mm FR4 PCB with high coverage of single sided 2oz copper, in still air conditions.
7. Repetitive rating 50mm x 50mm x 1.6mm FR4 PCB, D=0.02 pulse width=300µs - pulse width limited by maximum junction temperature.
8. For a device surface mounted on 50mm x 50mm x 1.6mm FR4 PCB with high coverage of single sided 1oz copper, in still air conditions.
9. Measured under pulsed conditions. Pulse width ≤ 300µs; duty cycle ≤ 2%.
10. Switching characteristics are independent of operating junction temperature.
11. For design aid only, not subject to production testing.

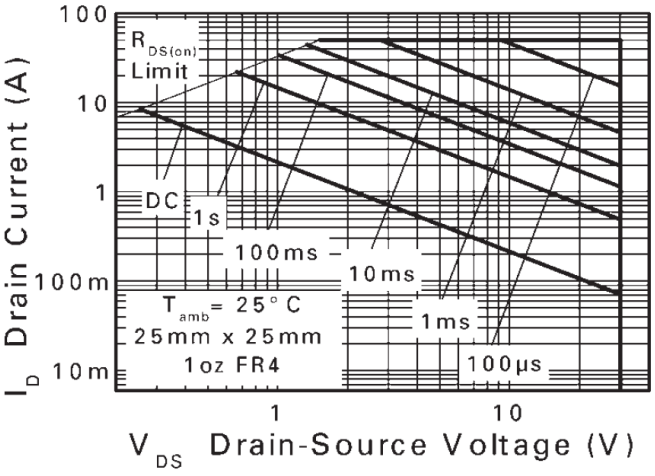


Figure 1. Safe Operating Area

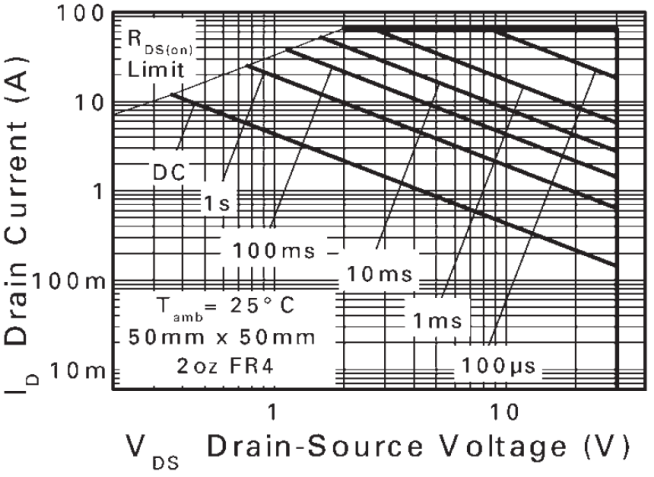


Figure 2. Safe Operating Area

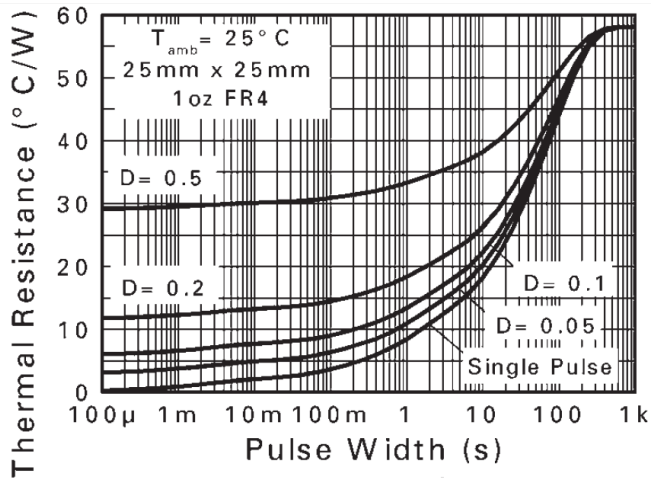


Figure 3. Transient Thermal Impedance

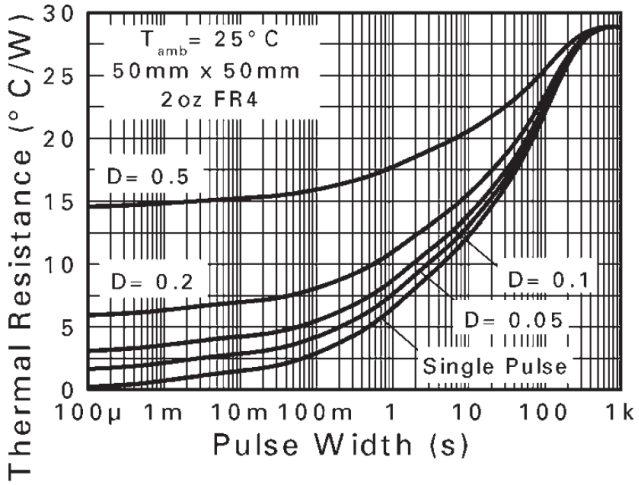


Figure 4. Transient Thermal Impedance

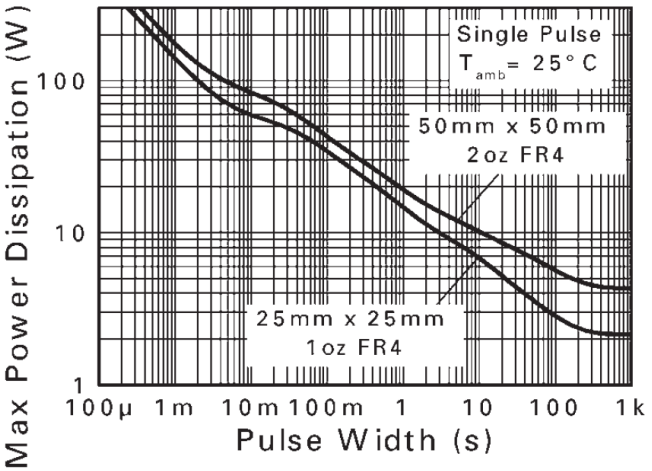


Figure 5. Pulse Power Dissipation

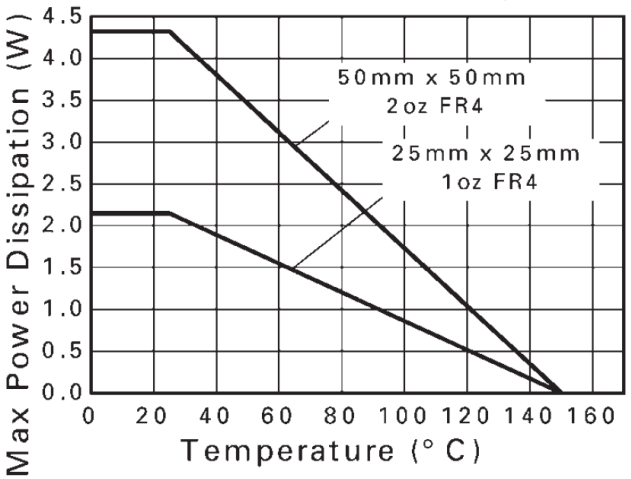


Figure 6. Derating Curve

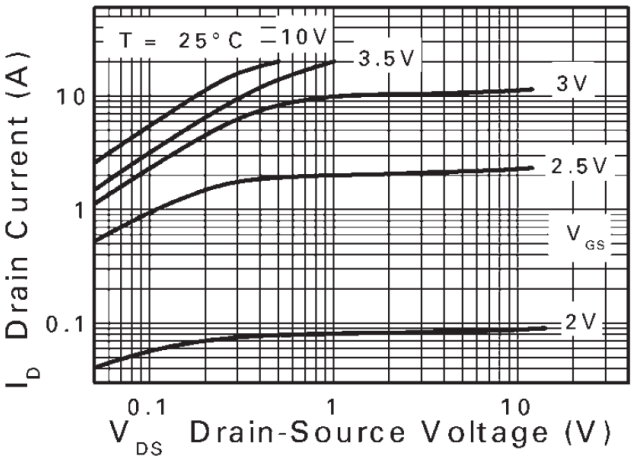


Figure 7. Output Characteristics

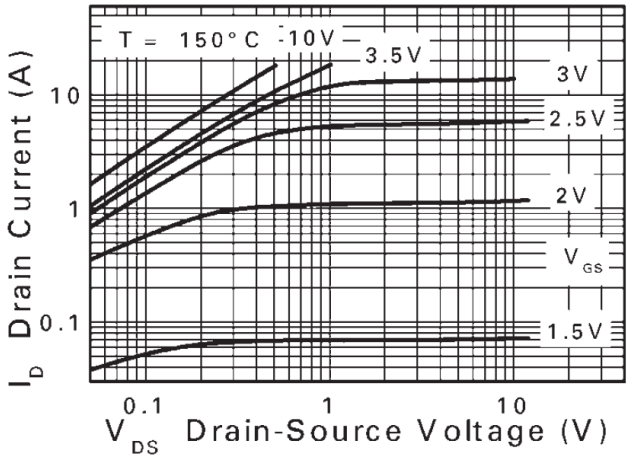


Figure 8. Output Characteristics

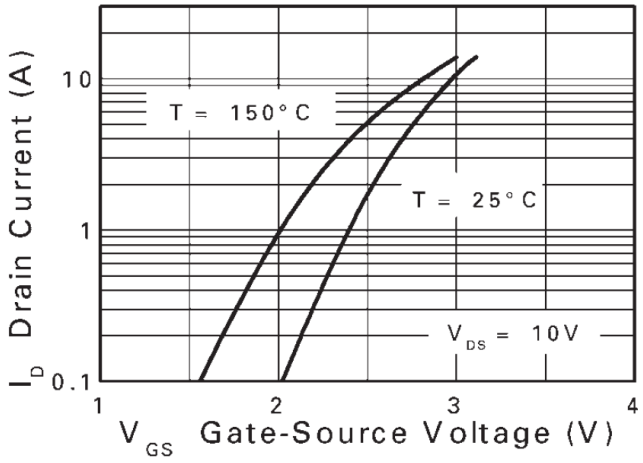


Figure 9. Typical Transfer Characteristics

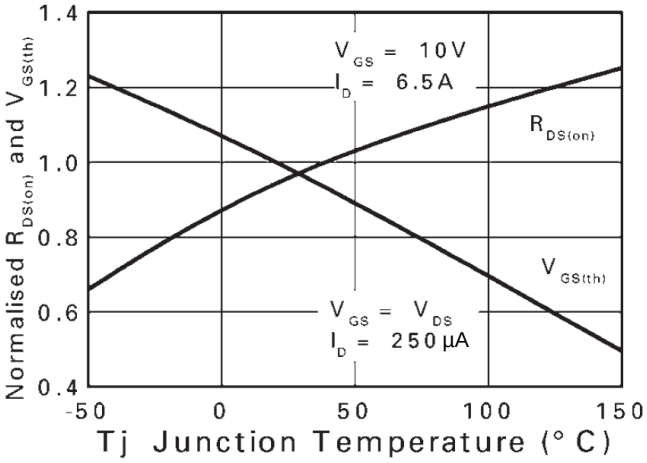


Figure 10. Normalised Curves vs. Temperature

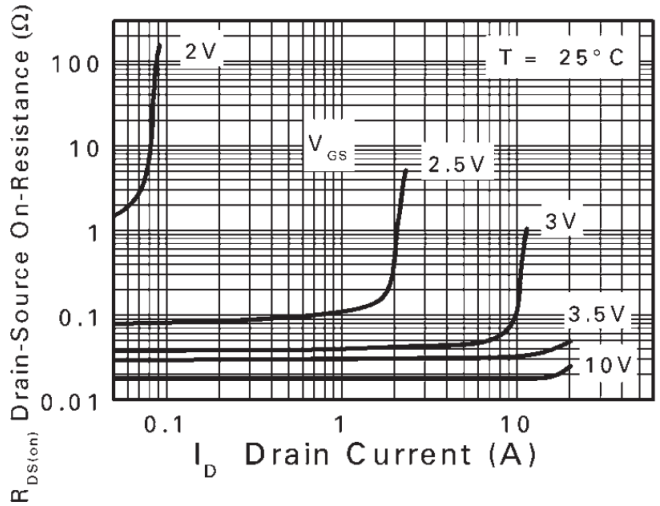


Figure 11. On-Resistance vs. Drain Current

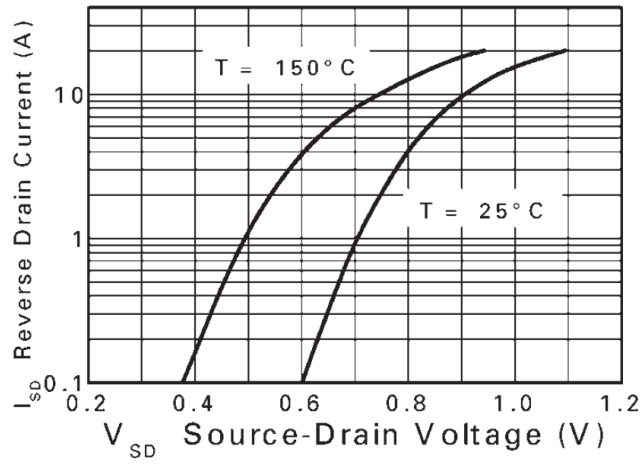


Figure 12. Source-Drain Diode Forward Voltage

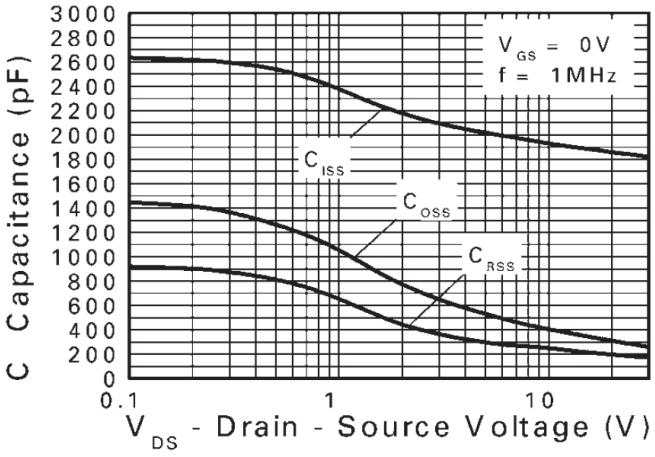


Figure 13. Capacitance vs. Drain-Source Voltage

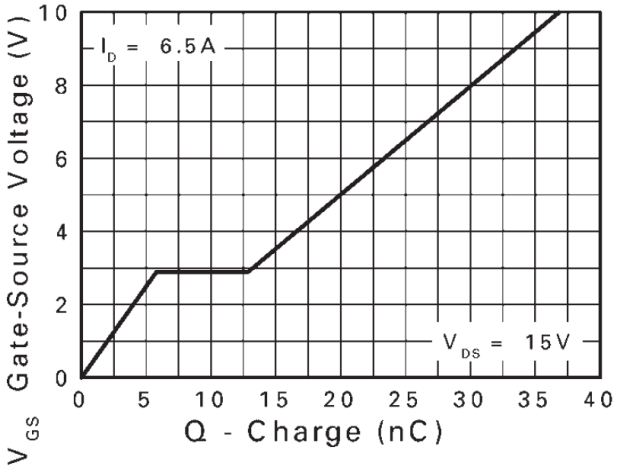
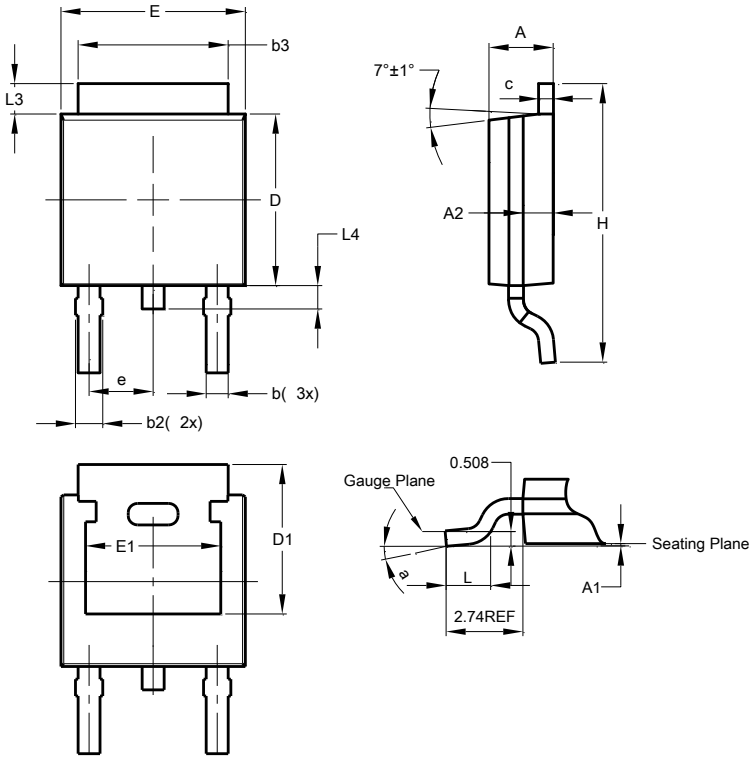


Figure 14. Gate-Source Voltage vs. Gate Charge

Package Outline Dimensions

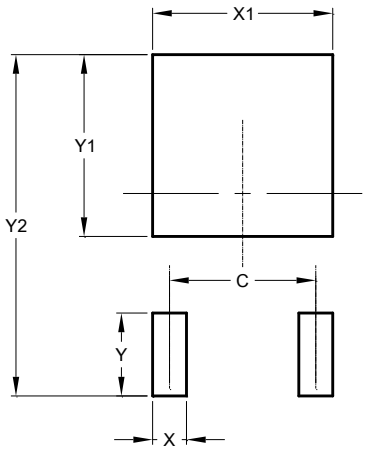
Please see AP02002 at http://www.diodes.com/datasheets/ap02002.pdf for latest version.



TO252 (DPAK)			
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
c	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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