N-CHANNEL ENHANCEMENT MODE MOSFET

Product Summary

$V_{(BR)DSS}$	$R_{DS(ON)}$	I_D T_A = +25°C
250V	8.5Ω @ V_{GS} = 10V	240mA

Description

This new generation 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.

Applications

- Power Management Functions
- Battery Operated Systems and Solid-State Relays
- Drivers: Relays, Solenoids, Lamps, Hammers, Displays, Memories, Transistors, etc

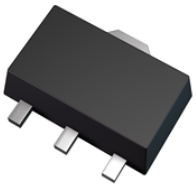
Features

- Low Gate Threshold Voltage
- Low Input Capacitance
- Fast Switching Speed
- **Lead-Free Finish; RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**

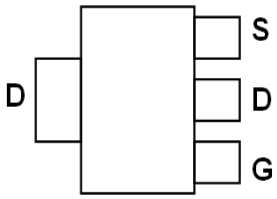
Mechanical Data

- Case: SOT89
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish – Matte Tin Finish Annealed over Copper Lead frame. Solderable per MIL-STD-202, Method 208 e3
- Weight: 0.052 grams (Approximate)

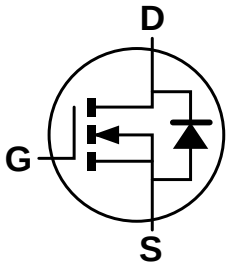
SOT89



Top View



Pin-out
Top View



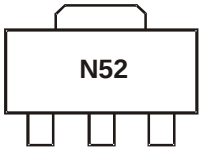
Equivalent Circuit

Ordering Information (Note 4)

Part Number	Compliance	Case	Quantity per Reel
ZVN4525ZTA	Standard	SOT89	1,000

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



N52 = Marking Code

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

Characteristic			Symbol	Value	Unit
Drain-Source Voltage			V_{DSS}	250	V
Gate-Source Voltage			V_{GSS}	±40	V
Continuous Drain Current, V_{GS} = 10V	Steady State	T_A = +25°C (Note 5) T_A = +70°C (Note 5)	I_D	240 192	mA
Maximum Body Diode Forward Current			I_S	1.1	A
Pulsed Drain Current (Note 7)			I_{DM}	1.44	A
Pulsed Source Current (Note 7)			I_{SM}	1.44	A

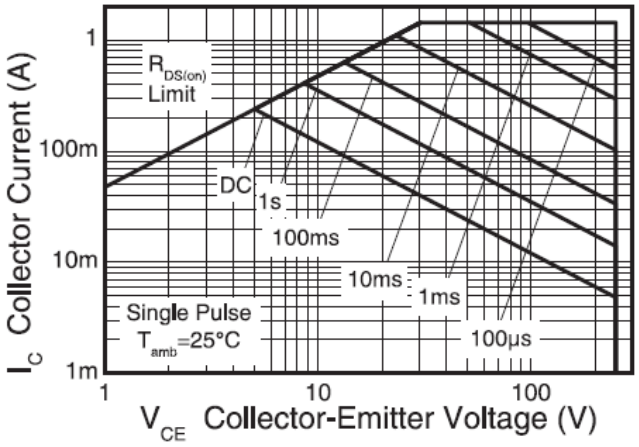
Thermal Characteristics

Characteristic		Symbol	Value	Unit
Total Power Dissipation Linear Derating Factor	T_A = +25°C (Note 5)	P_D	1.2 9.6	W mW/°C
Thermal Resistance, Junction to Ambient	Steady State (Note 5)	$R_{\theta JA}$	103	°C/W
	Steady State (Note 6)		50	°C/W
Operating and Storage Temperature Range		T_J, T_{STG}	-55 to +150	°C

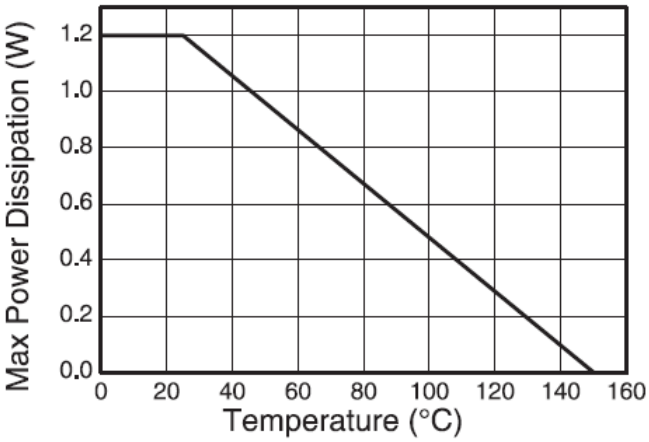
Electrical Characteristics (@T_A = +25°C, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 9)						
Drain-Source Breakdown Voltage	BV_{DSS}	250	285	—	V	V_{GS} = 0V, I_D = 1mA
Zero Gate Voltage Drain Current	I_{DSS}	—	35	500	nA	V_{DS} = 250V, V_{GS} = 0V
Gate-Source Leakage	I_{GSS}	—	±1	±100	nA	V_{GS} = ±40V, V_{DS} = 0V
ON CHARACTERISTICS (Note 9)						
Gate Threshold Voltage	$V_{GS(TH)}$	0.8	1.4	1.8	V	V_{DS} = V_{GS}, I_D = 1mA
Static Drain-Source On-Resistance (Note 8)	$R_{DS(ON)}$	—	5.6	8.5	Ω	V_{GS} = 10V, I_D = 500mA
		—	5.9	9.0		V_{GS} = 4.5V, I_D = 360mA
		—	6.4	9.5		V_{GS} = 2.4V, I_D = 20mA
Diode Forward Voltage (Note 8)	V_{SD}	—	—	0.97	V	V_{GS} = 0V, I_S = 360mA
Forward Transconductance (Note 10)	g_{fs}	0.3	475	—	S	V_{DS} = 10V, I_D = 0.3A
DYNAMIC CHARACTERISTICS (Note 10)						
Input Capacitance	C_{iss}	—	72	—	pF	V_{DS} = 25V, V_{GS} = 0V f = 1.0MHz
Output Capacitance	C_{oss}	—	11	—		
Reverse Transfer Capacitance	C_{rss}	—	3.6	—		
Total Gate Charge	Q_g	—	2.6	3.65	nC	V_{DS} = 25V, I_D = 360mA, V_{GS} = 10V
Gate-Source Charge	Q_{gs}	—	0.2	0.28		
Gate-Drain Charge	Q_{gd}	—	0.5	0.70		
Turn-On Delay Time	$t_{D(ON)}$	—	1.25	—	ns	V_{DD} = 50V, R_G = 6.0Ω, I_D= 200mA, R_D = 4.4Ω
Turn-On Rise Time	t_R	—	1.70	—		
Turn-Off Delay Time	$t_{D(OFF)}$	—	11.40	—		
Turn-Off Fall Time	t_F	—	3.50	—		
Body Diode Reverse Recovery Time	t_{RR}	—	186	260	ns	I_F = 360mA, dI/dt = 100A/µs
Body Diode Reverse Recovery Charge	Q_{RR}	—	34	48	nC	

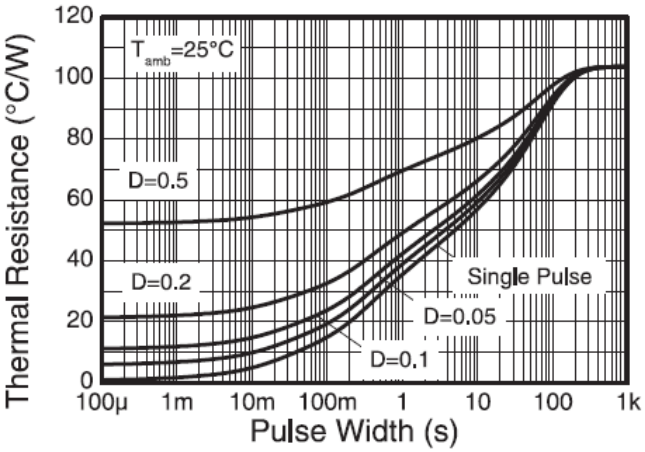
Notes:
5. For a device surface mounted on 25mm X 25mm FR-4 PCB with high coverage of single sided 1oz copper, in still air condition.
6. For a device surface mounted on FR4 PCB measured at t ≤5 secs.
7. Repetitive rating - pulse width limited by maximum junction temperature. Refer to Transient Thermal.
8. Measured under pulsed conditions. Width=300µs. Duty cycle ≤ 2%.
9. Short duration pulse test used to minimize self-heating effect.
10. Guaranteed by design. Not subject to product testing.



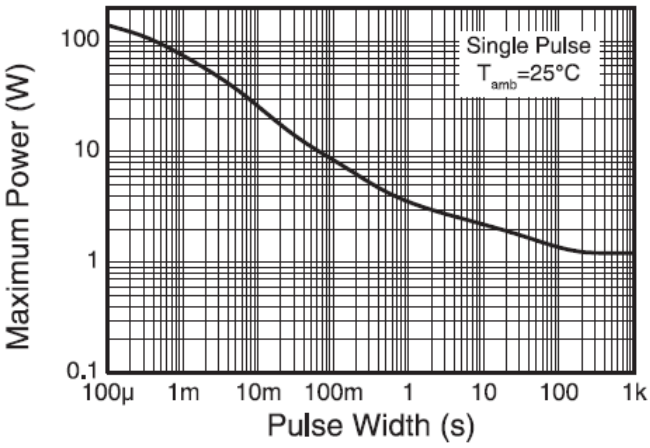
Safe Operating Area



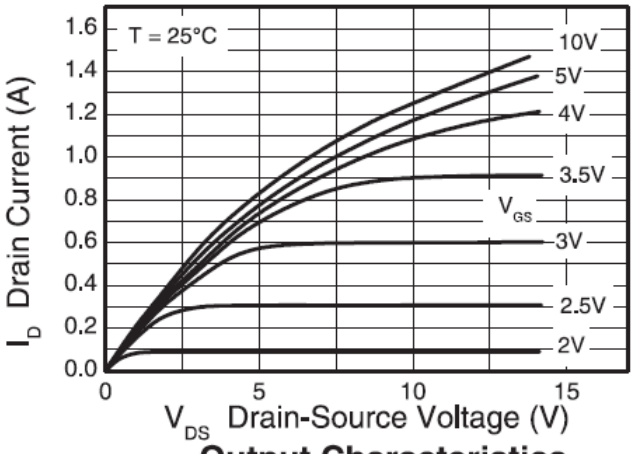
Derating Curve



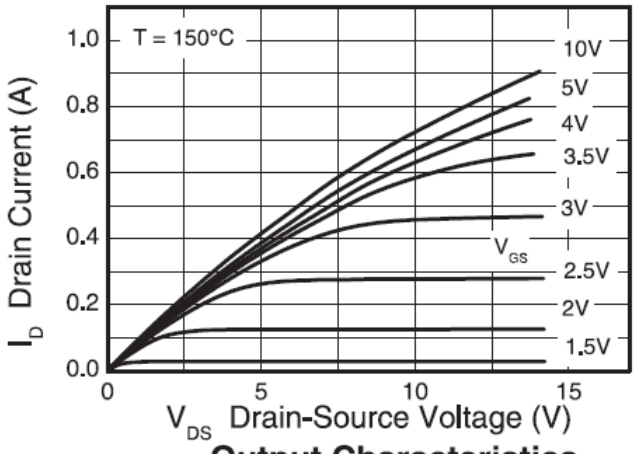
Transient Thermal Impedance



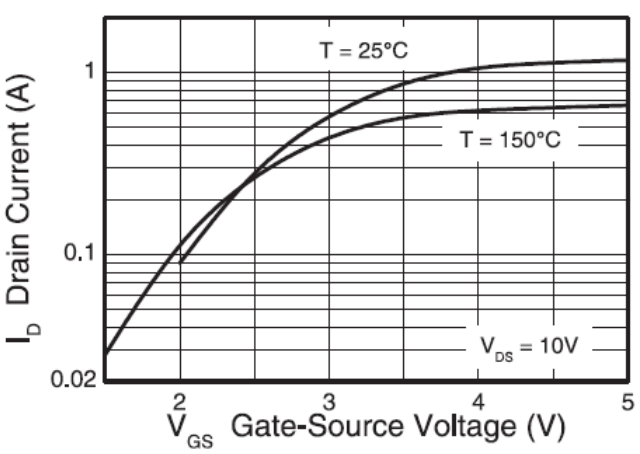
Pulse Power Dissipation



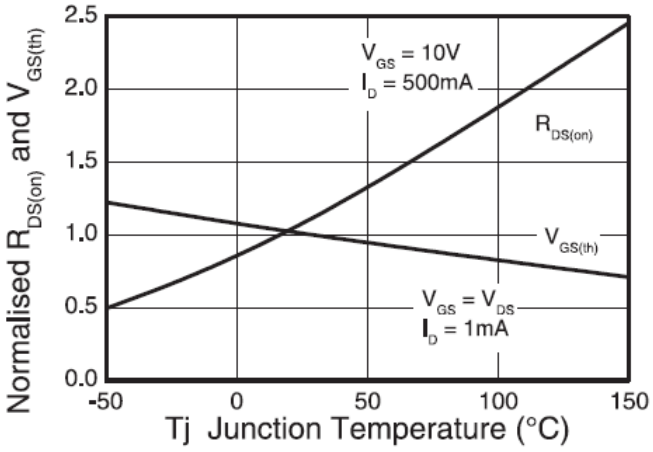
Output Characteristics



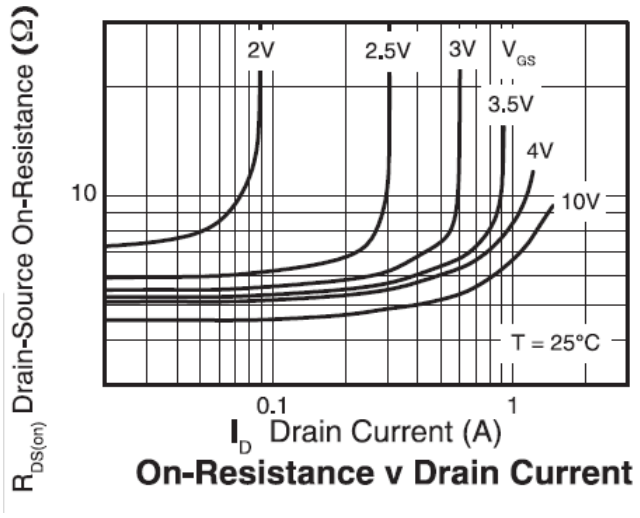
Output Characteristics



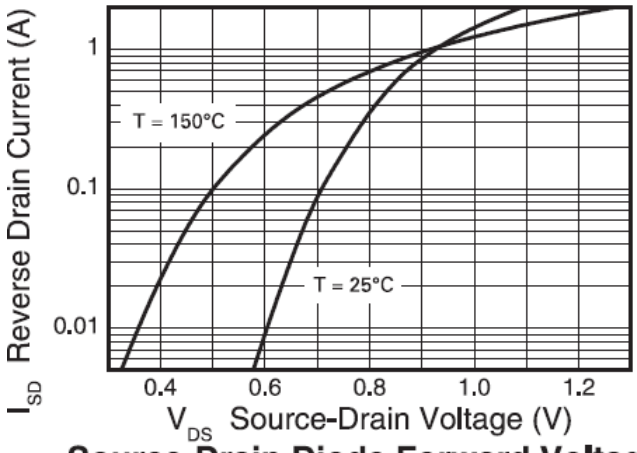
Typical Transfer Characteristics



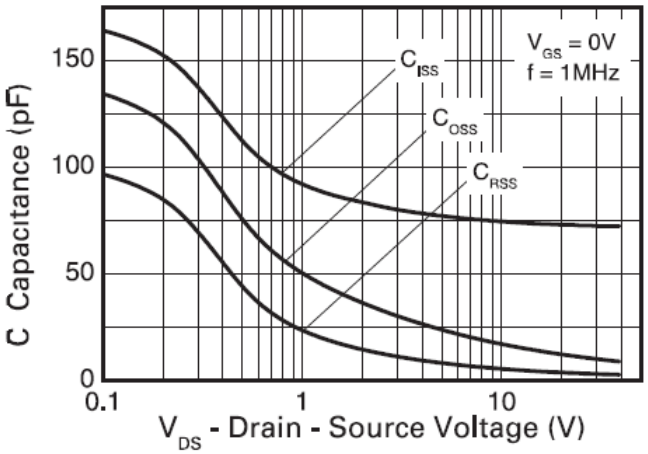
Normalised Curves v Temperature



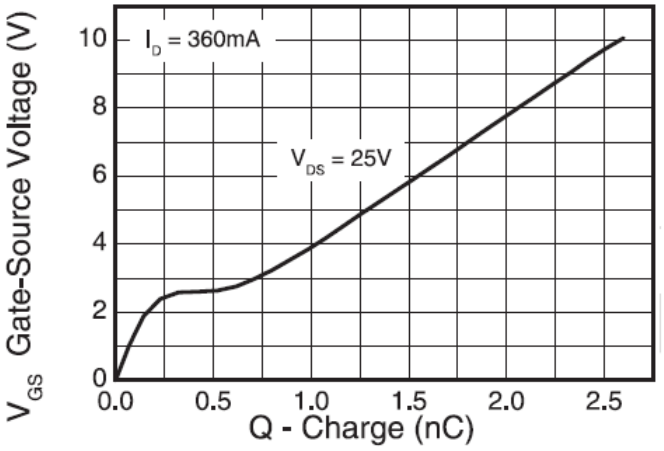
On-Resistance v Drain Current



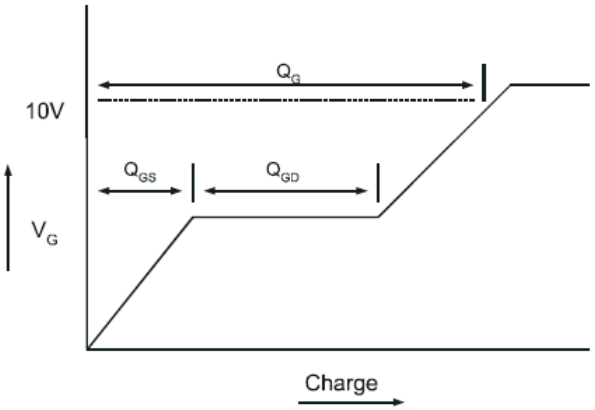
Source-Drain Diode Forward Voltage



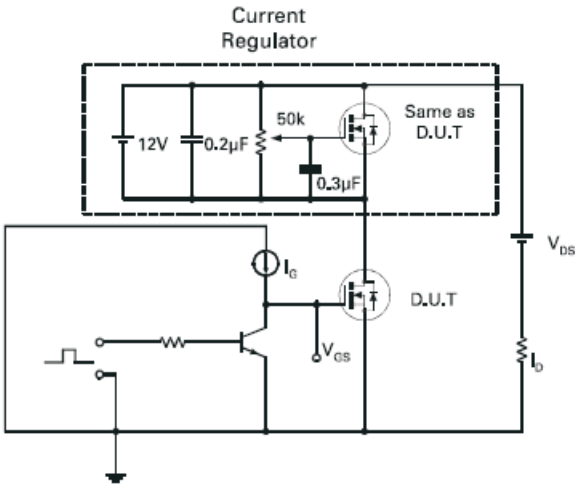
Capacitance v Drain-Source Voltage



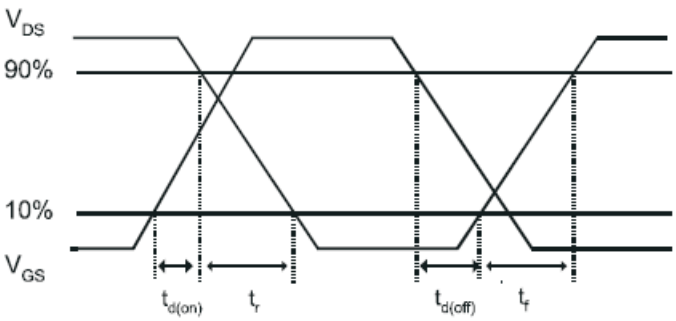
Gate-Source Voltage v Gate Charge



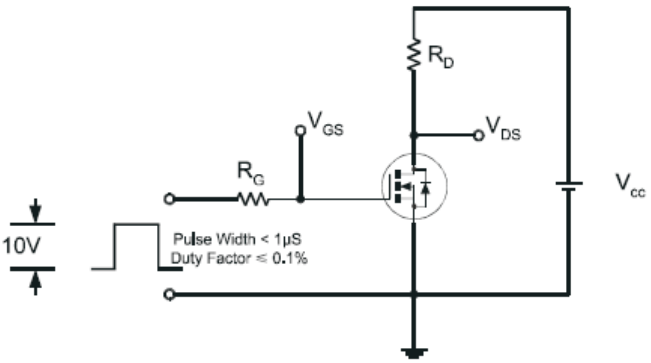
Basic Gate Charge Waveform



Gate Charge Test Circuit



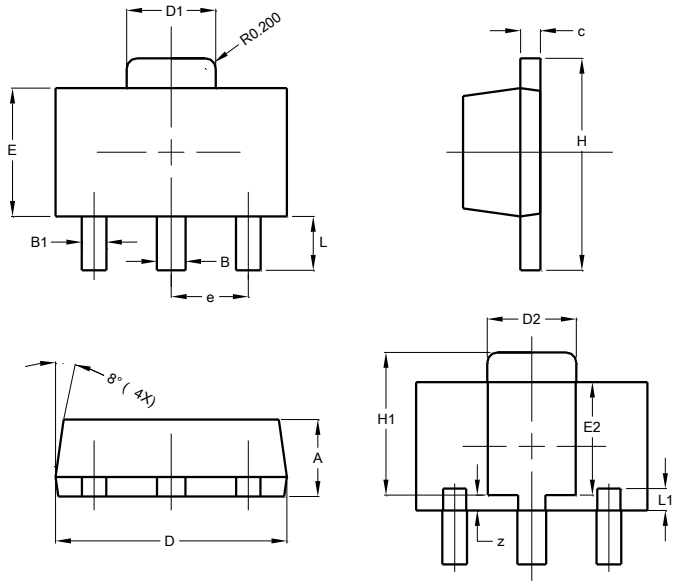
Switching Time Waveforms



Switching Time Test Circuit

Package Outline Dimensions

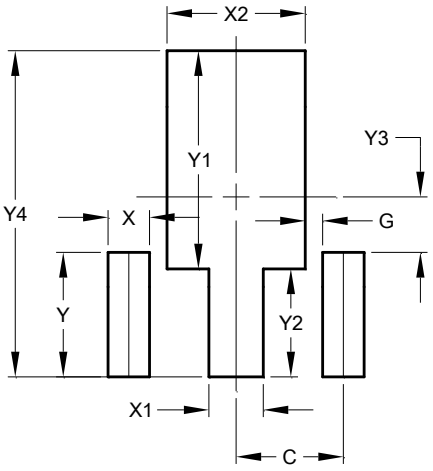
Please see AP02002 at http://www.diodes.com/datasheets/ap02002.pdf for the latest version.



SOT89			
Dim	**Min**	**Max**	**Typ**
A	1.40	1.60	1.50
B	0.50	0.62	0.56
B1	0.42	0.54	0.48
c	0.35	0.43	0.38
D	4.40	4.60	4.50
D1	1.62	1.83	1.733
D2	1.61	1.81	1.71
E	2.40	2.60	2.50
E2	2.05	2.35	2.20
e	-	-	1.50
H	3.95	4.25	4.10
H1	2.63	2.93	2.78
L	0.90	1.20	1.05
L1	0.427 REF		
Z	0.30 REF		
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	1.500
G	0.244
X	0.580
X1	0.760
X2	1.933
Y	1.730
Y1	3.030
Y2	1.500
Y3	0.770
Y4	4.530

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