

## Description

This Bipolar Junction Transistor (BJT) is designed to meet the stringent requirements of automotive applications.

## Features

- $BV_{CEX} > 150V$
- $BV_{CEO} > 60V$
- $BV_{ECO} > 6V$
- $I_C = 5A$  Continuous Collector Current
- $V_{CE(sat)} < 70mV @ 1A$
- $R_{CE(sat)} = 48m\Omega$  for a Low Equivalent On-Resistance
- Very Low Saturation Voltages
- Excellent hFE Characteristics
- 6V Reverse Blocking Capability
- **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**
- **PPAP Capable (Note 4)**

## Mechanical Data

- Case: SOT89
- Case Material: Molded Plastic. "Green" Molding Compound. UL Flammability Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish - Matte Tin Plated Leads, Solderable per MIL-STD-202, Method 208 e3
- Weight: 0.055 grams (Approximate)

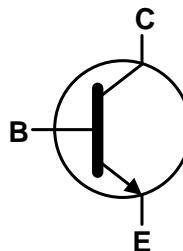
## Applications

- Motor Driving (including DC fans)
- Solenoid, Relay and Actuator Drivers
- DC-DC Modules
- Power Switches
- MOSFET Gate Drivers

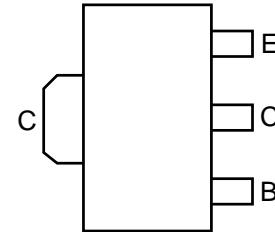
SOT89



Top View



Equivalent Circuit



Top View  
Pin-Out

## Ordering Information (Notes 4 & 5)

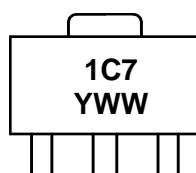
Product	Compliance	Marking	Reel size (inches)	Tape width (mm)	Quantity per reel
ZXTN25060BZQTA	Automotive	1C7	7	12mm	1,000

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](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. Automotive products are AEC-Q101 qualified and are PPAP capable. Refer to [http://www.diodes.com/quality/product\\_compliance\\_definitions/](http://www.diodes.com/quality/product_compliance_definitions/).
5. For packaging details, go to our website at <http://www.diodes.com/products/packages.html>.

## Marking Information

SOT89



1C7 = Product Type Marking Code

YWW = Date Code Marking

Y = Last Digit of Year (ex: 5 = 2015)

WW = Week Code (01 ~ 53)

**Absolute Maximum Ratings** (@ $T_A = +25^\circ\text{C}$ , unless otherwise specified.)

Characteristic	Symbol	Value	Unit
Collector-Base Voltage	$V_{CBO}$	150	V
Collector-Emitter Voltage (Forward Blocking)	$V_{CEX}$	150	V
Collector-Emitter Voltage	$V_{CEO}$	60	V
Emitter-Collector Voltage (Reverse Blocking)	$V_{ECO}$	6	V
Emitter-Base Voltage	$V_{EBO}$	7	V
Continuous Collector Current	$I_C$	5	A
Base Current	$I_B$	1	A
Peak Pulse Current	$I_{CM}$	10	A

**Thermal Characteristics** (@ $T_A = +25^\circ\text{C}$ , unless otherwise specified.)

Characteristic	Symbol	Value	Unit
Power Dissipation	$P_D$	1.1	W
		1.8	
		2.4	
		4.46	
Thermal Resistance, Junction to Ambient Air	$R_{\theta JA}$	117	°C/W
		68	
		51	
		28	
Thermal Resistance, Junction to Lead	$R_{\theta JL}$	8	
Operating and Storage Temperature Range	$T_J, T_{STG}$	-55 to +150	°C

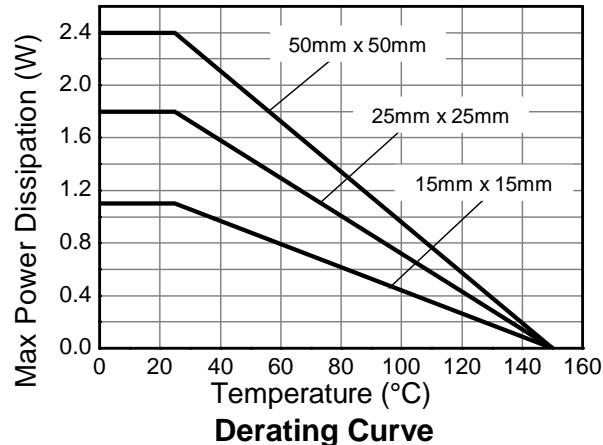
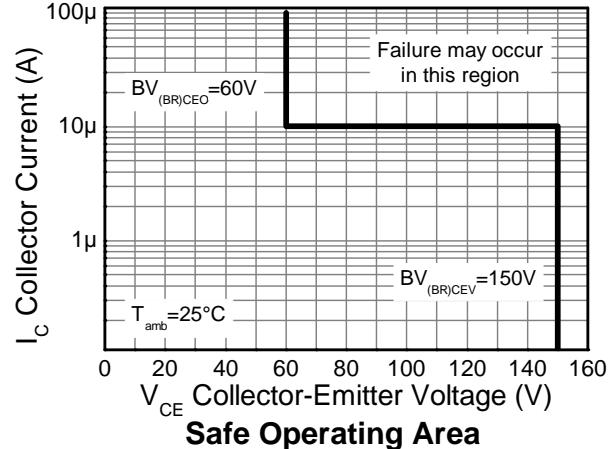
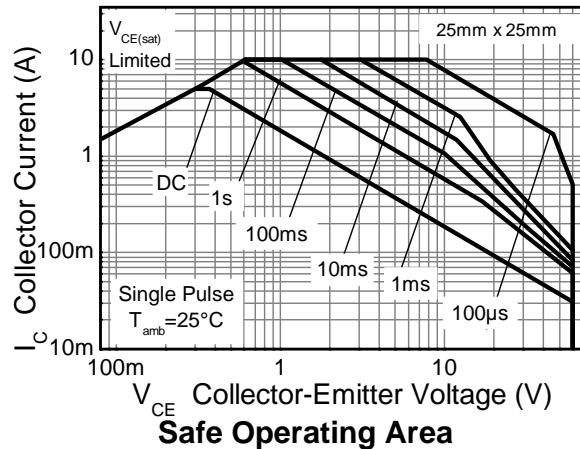
**ESD Ratings** (Note 11)

Characteristic	Symbol	Value	Unit	JEDEC Class
Electrostatic Discharge - Human Body Model	ESD HBM	4,000	V	3A
Electrostatic Discharge - Machine Model	ESD MM	400	V	C

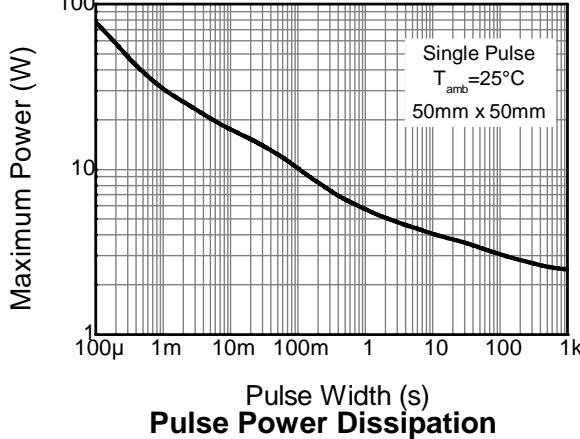
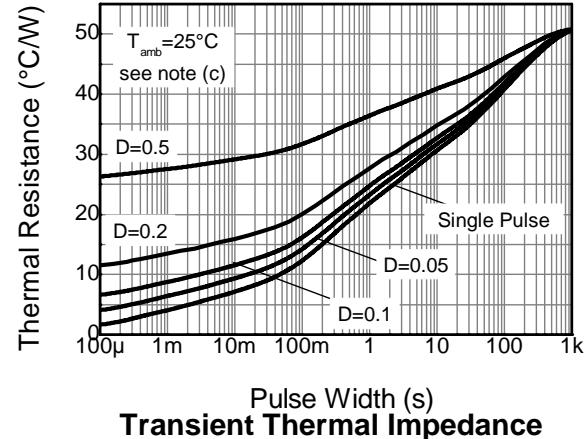
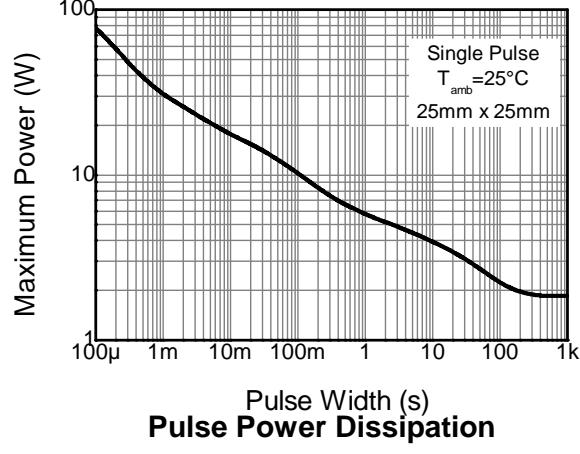
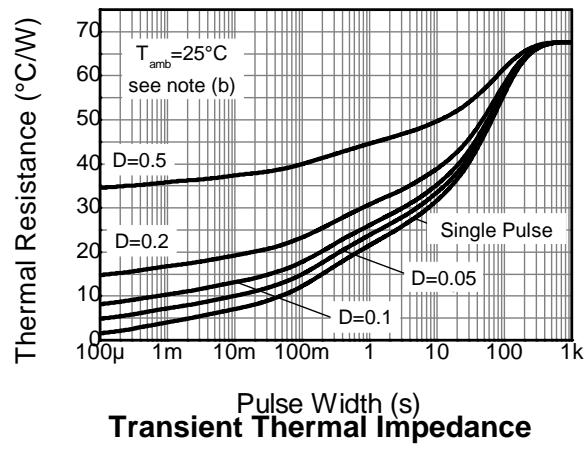
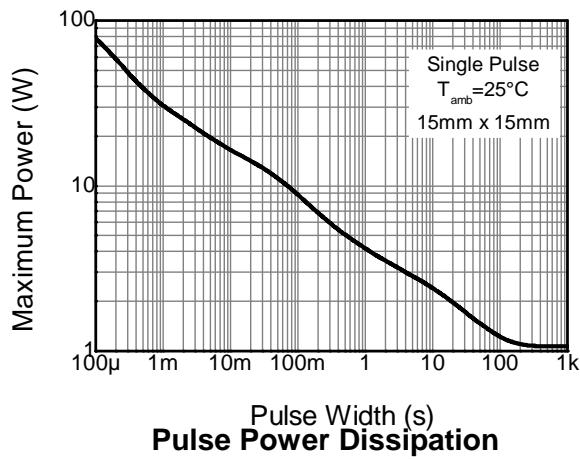
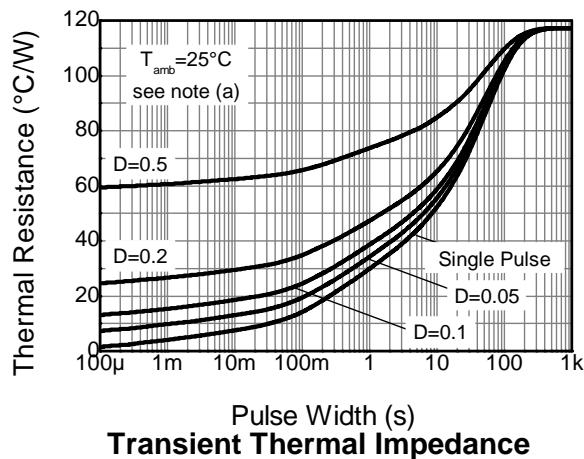
Notes:

- 6. For a device mounted with the exposed collector pad on 15mm x 15mm 1oz copper that is on a single-sided 1.6mm FR4 PCB; device is measured under still air conditions whilst operating in a steady-state.
- 7. Same as Note 5, except the device is mounted on 25mm x 25mm 2oz copper.
- 8. Same as Note 5, except the device is mounted on 50mm x 50mm 2oz copper.
- 9. Same as Note 7 measured at  $t < 5$  seconds.
- 10. Thermal resistance from junction to solder-point (on the exposed collector pad).
- 11. Refer to JEDEC specification JESD22-A114 and JESD22-A115.

## Thermal Characteristics and Derating Information



**Thermal Characteristics and Derating Information** (continued)

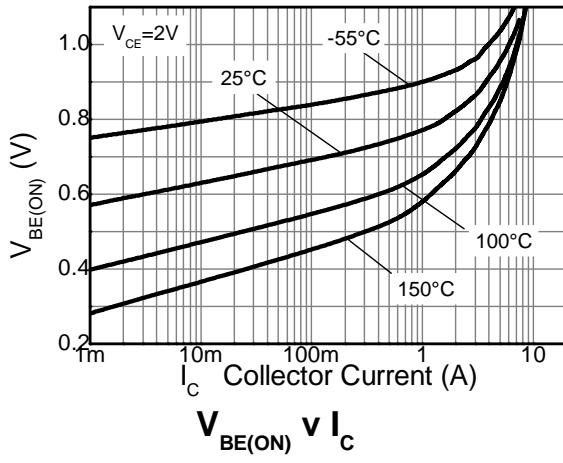
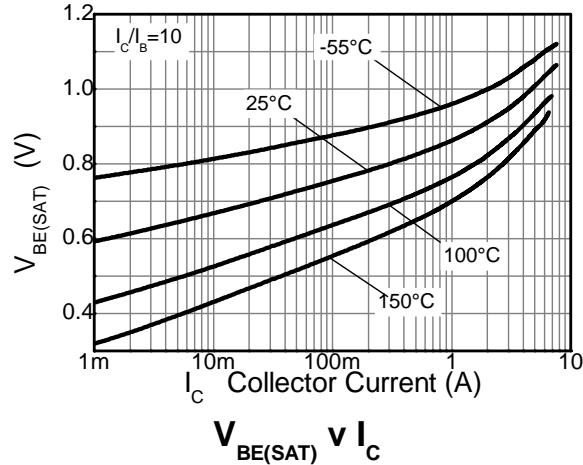
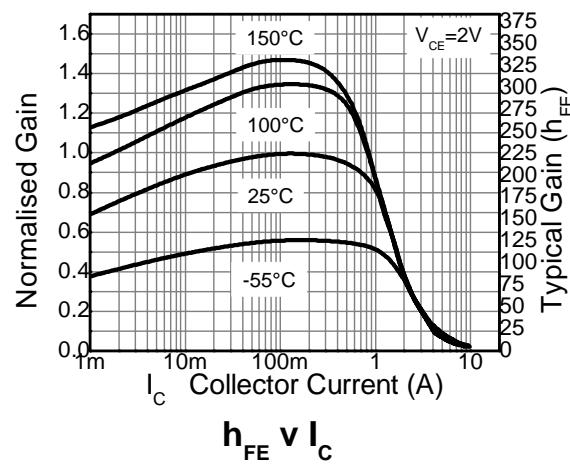
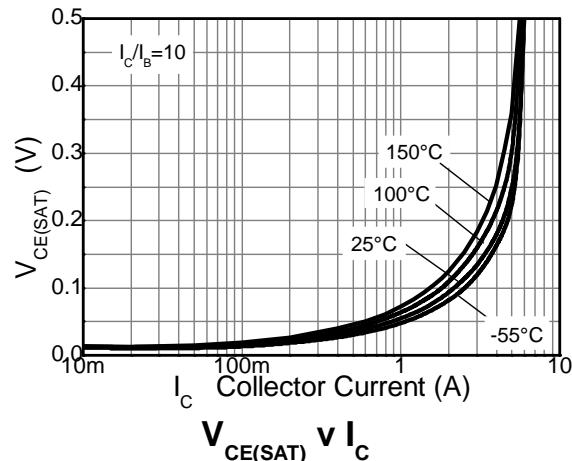
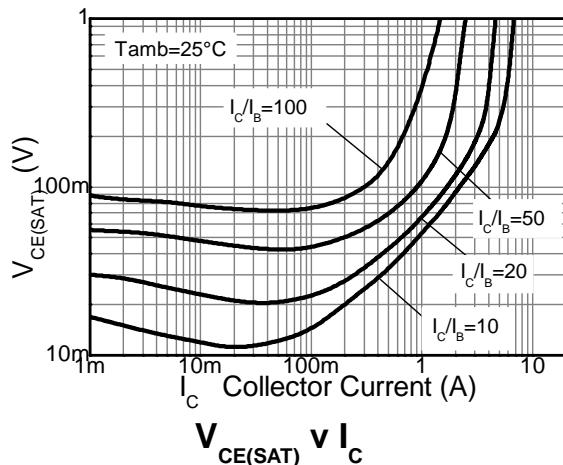


**Electrical Characteristics** (@ $T_A = +25^\circ\text{C}$ , unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
Collector-Base Breakdown Voltage	$\text{BV}_{\text{CBO}}$	150	190	—	V	$I_C = 100\mu\text{A}$
Collector-Emitter Breakdown Voltage (Forward Blocking)	$\text{BV}_{\text{CEX}}$	150	190	—	V	$I_C = 100\mu\text{A}, R_{BE} \leq 1\text{k}\Omega$ or $-1\text{V} < V_{BE} < 0.25\text{V}$
Collector-Emitter Breakdown Voltage (Note 12)	$\text{BV}_{\text{CEO}}$	60	80	—	V	$I_C = 10\text{mA}$
Emitter-Base Breakdown Voltage	$\text{BV}_{\text{EBO}}$	7	8.0	—	V	$I_E = 100\mu\text{A}$
Emitter-Collector Breakdown Voltage (Reverse Blocking)	$\text{BV}_{\text{ECX}}$	6	8	—	V	$I_E = 100\mu\text{A}, R_{BC} \leq 1\text{k}\Omega$ or $<0.25\text{V} > V_{BC} > 0.25\text{V}$
Emitter-Collector Breakdown Voltage (Base Open)	$\text{BV}_{\text{ECO}}$	6	7	—	V	$I_E = 100\mu\text{A}$
Collector-Base Cutoff Current	$I_{\text{CBO}}$	—	<1	50 20	nA $\mu\text{A}$	$V_{CB} = 120\text{V}$ $V_{CB} = 120\text{V}, T_A = +100^\circ\text{C}$
Collector-Emitter Cutoff Current	$I_{\text{CEX}}$	—	—	100	nA	$V_{CE} = 120\text{V}, R_{BE} \leq 1\text{k}\Omega$ or $-1\text{V} < V_{BE} < 0.25\text{V}$
Emitter-Base Cutoff Current	$I_{\text{EBO}}$	—	<1	50	nA	$V_{EB} = 5.6\text{V}$
Collector-Emitter Saturation Voltage (Note 12)	$V_{\text{CE}(\text{sat})}$	—	55 70 185 240	70 90 230 305	mV	$I_C = 1\text{A}, I_B = 100\text{mA}$ $I_C = 1\text{A}, I_B = 50\text{mA}$ $I_C = 4\text{A}, I_B = 400\text{mA}$ $I_C = 5\text{A}, I_B = 500\text{mA}$
Base-Emitter Saturation Voltage (Note 12)	$V_{\text{BE}(\text{sat})}$	—	1,020	1,100	mV	$I_C = 5\text{A}, I_B = 500\text{mA}$
Base-Emitter Turn-On Voltage (Note 12)	$V_{\text{BE}(\text{on})}$	—	960	1,050	mV	$I_C = 5\text{A}, V_{CE} = 2\text{V}$
DC Current Gain (Note 12)	$\text{h}_{\text{FE}}$	100 90 45 —	200 180 90 20	300 — — —	—	$I_C = 10\text{mA}, V_{CE} = 2\text{V}$ $I_C = 1\text{A}, V_{CE} = 2\text{V}$ $I_C = 2\text{A}, V_{CE} = 50\text{V}$ $I_C = 5\text{A}, V_{CE} = 5\text{V}$
Transistor Frequency	$f_T$	—	185	—	MHz	$I_C = 100\text{mA}, V_{CE} = 5\text{V}$ $f=100\text{MHz}$
Output Capacitance	$C_{\text{obo}}$	—	11.5	20	pF	$V_{CB} = 10\text{V}, f=1\text{MHz}$
Delay Time	$t_d$	—	16	—	ns	$V_{CC} = 10\text{V}$ , $I_{CC} = 500\text{mA}$ $I_{B1} = -I_{B2} = 50\text{mA}$
Rise Time	$t_r$	—	15	—	ns	
Storage Time	$t_s$	—	509	—	ns	
Fall Time	$t_f$	—	57	—	ns	

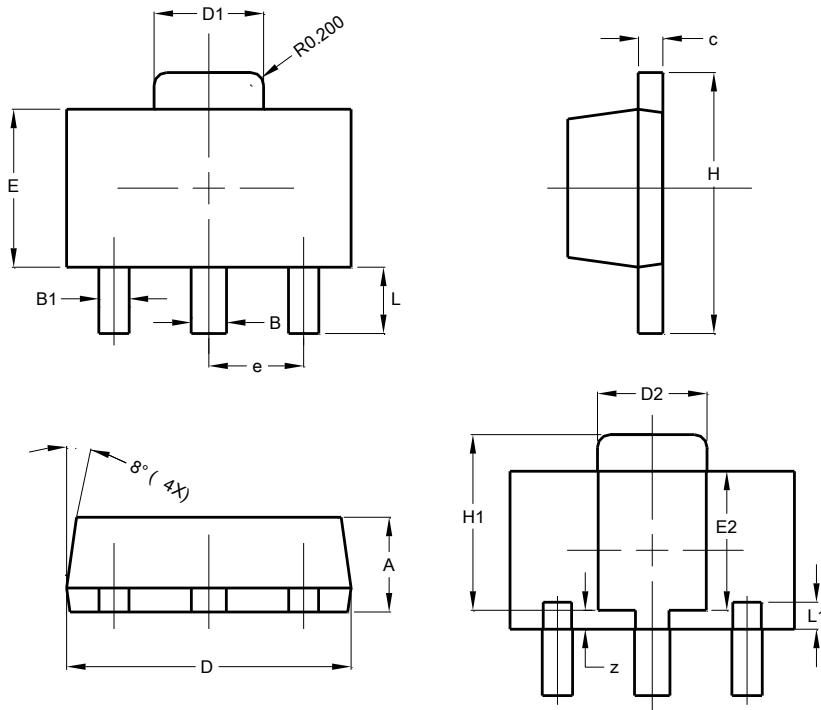
Note: 12. Measured under pulsed conditions. Pulse width  $\leq 300\mu\text{s}$ . Duty cycle  $\leq 2\%$ .

**Typical Electrical Characteristics** (@ $T_A = +25^\circ\text{C}$ , unless otherwise specified.)



## Package Outline Dimensions

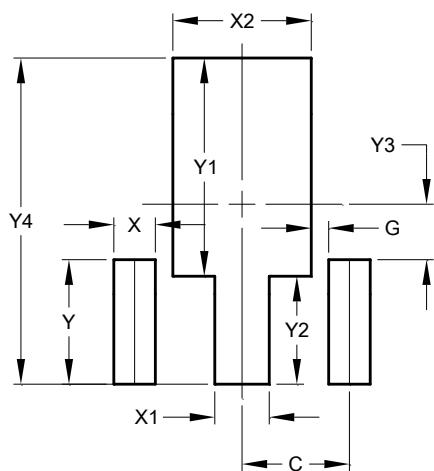
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for the latest version.



SOT89			
Dim	Min	Max	Typ
<b>A</b>	1.40	1.60	1.50
<b>B</b>	0.50	0.62	0.56
<b>B1</b>	0.42	0.54	0.48
<b>c</b>	0.35	0.43	0.38
<b>D</b>	4.40	4.60	4.50
<b>D1</b>	1.62	1.83	1.733
<b>D2</b>	1.61	1.81	1.71
<b>E</b>	2.40	2.60	2.50
<b>E2</b>	2.05	2.35	2.20
<b>e</b>	-	-	1.50
<b>H</b>	3.95	4.25	4.10
<b>H1</b>	2.63	2.93	2.78
<b>L</b>	0.90	1.20	1.05
<b>L1</b>	0.327	0.527	0.427
<b>z</b>	0.20	0.40	0.30
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)
<b>C</b>	1.500
<b>G</b>	0.244
<b>X</b>	0.580
<b>X1</b>	0.760
<b>X2</b>	1.933
<b>Y</b>	1.730
<b>Y1</b>	3.030
<b>Y2</b>	1.500
<b>Y3</b>	0.770
<b>Y4</b>	4.530

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