

**10V NPN MEDIUM POWER TRANSISTOR IN SOT89**

**Features**

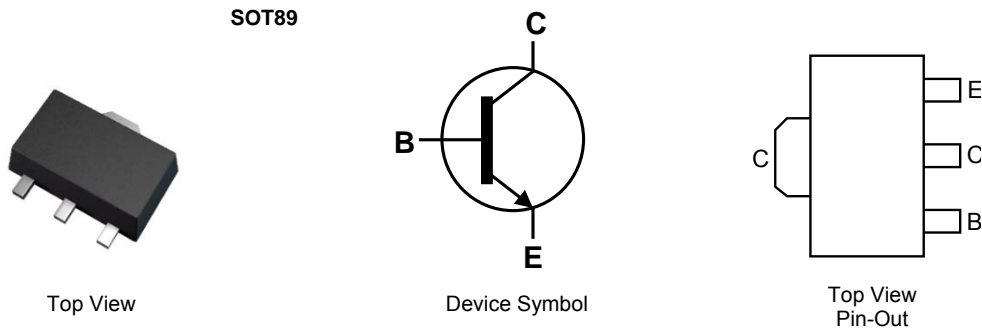
- $BV_{CEO} > 10V$
- $I_C = 4A$  High Continuous Current
- $I_{CM} = 20A$  Peak Pulse Current
- High Gain Holds up  $h_{FE} > 300 @ I_C=1A$
- Low Equivalent On-Resistance;  $R_{CE(sat)} = 40m\Omega$  at 4A
- Excellent  $h_{FE}$  Characteristics up to 20A
- **Lead-Free Finish; RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**

**Mechanical Data**

- Case: 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 Lead. Solderable per MIL-STD-202, Method 208 **(B3)**
- Weight: 0.052 grams (Approximate)

**Applications**

- Emergency Lighting Circuits
- Motor Driving (including DC fans)
- Solenoid, Relay and Actuator Drivers
- DC-DC Modules
- Backlight Inverters
- Power Switches
- MOSFET Gate Drivers

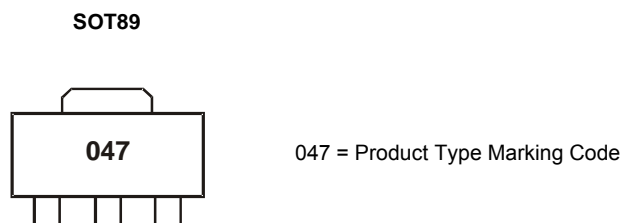


**Ordering Information** (Note 4)

Part Number	Marking	Reel size (inches)	Tape width (mm)	Quantity per reel
FCX1047ATA	047	7	12	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](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**



**Absolute Maximum Ratings** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic	Symbol	Value	Unit
Collector-Base Voltage	V <sub>CBO</sub>	35	V
Collector-Emitter Voltage	V <sub>CEO</sub>	10	V
Emitter-Base Voltage	V <sub>EBO</sub>	7	V
Continuous Collector Current	I <sub>C</sub>	4	A
Peak Pulse Current	I <sub>CM</sub>	20	A

**Thermal Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

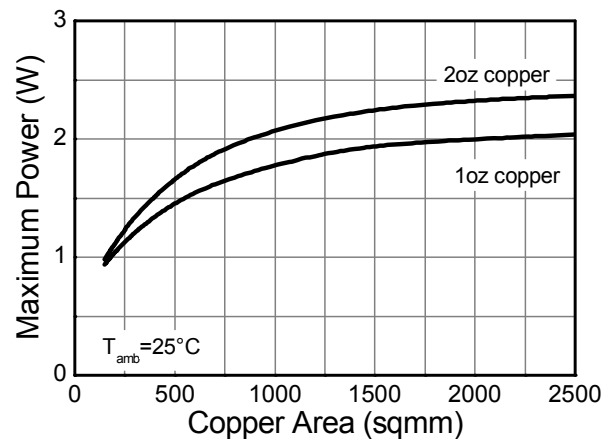
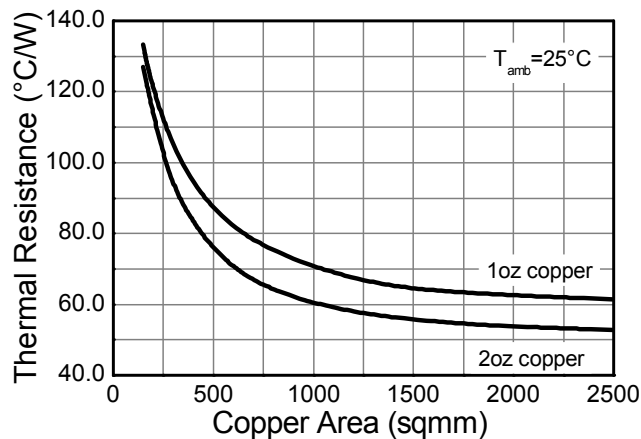
Characteristic	Symbol	Value	Unit
Power Dissipation	P <sub>D</sub>	(Note 5)	1
		(Note 6)	1.6
		(Note 7)	2.0
Thermal Resistance, Junction to Ambient Air	R <sub>θJA</sub>	(Note 5)	125
		(Note 6)	78
		(Note 7)	62.5
Thermal Resistance, Junction to Lead	R <sub>θJL</sub>	3.6	°C/W
Operating and Storage Temperature Range	T <sub>J</sub> , T <sub>STG</sub>	-55 to +150	°C

**ESD Ratings** (Note 9)

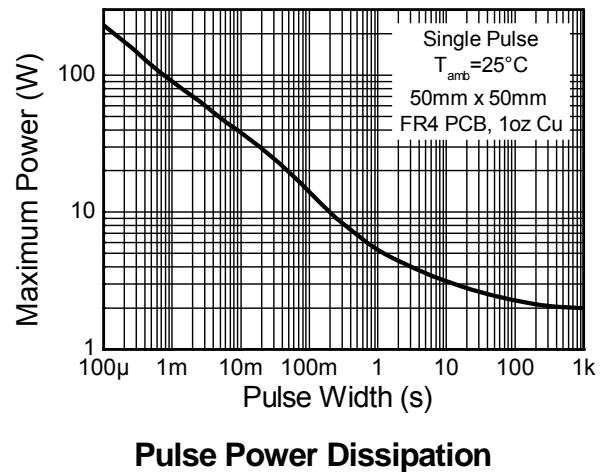
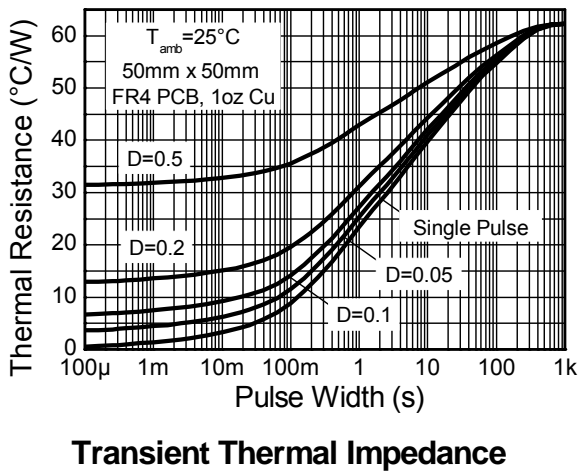
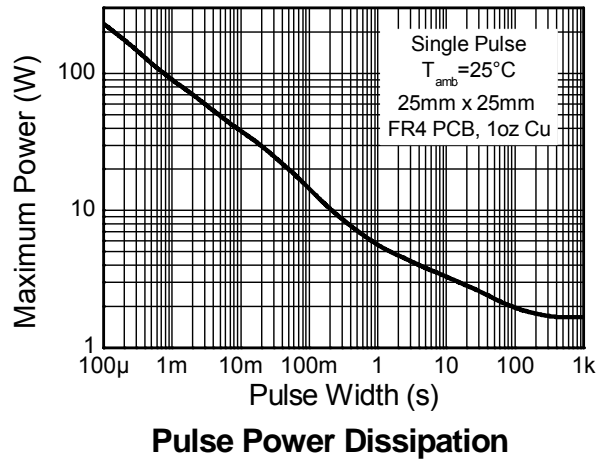
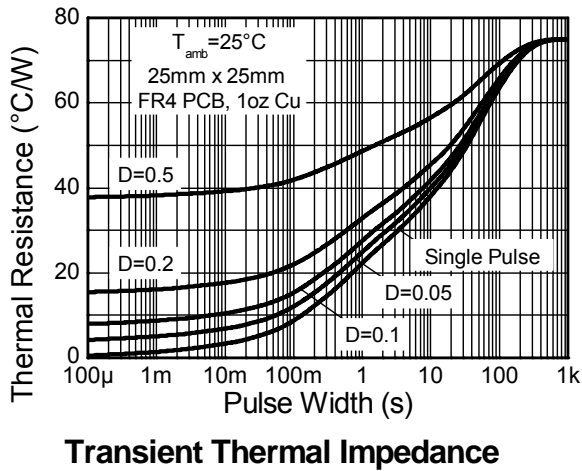
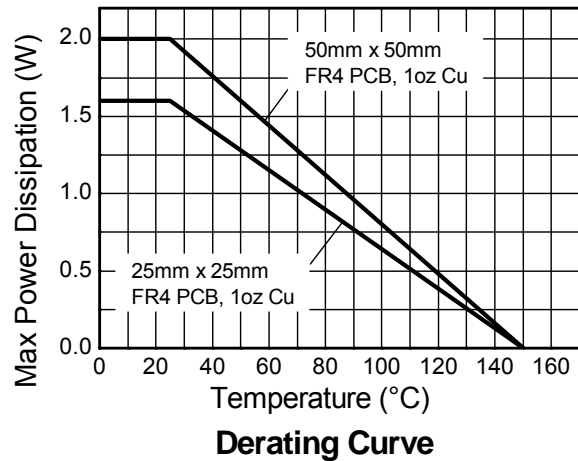
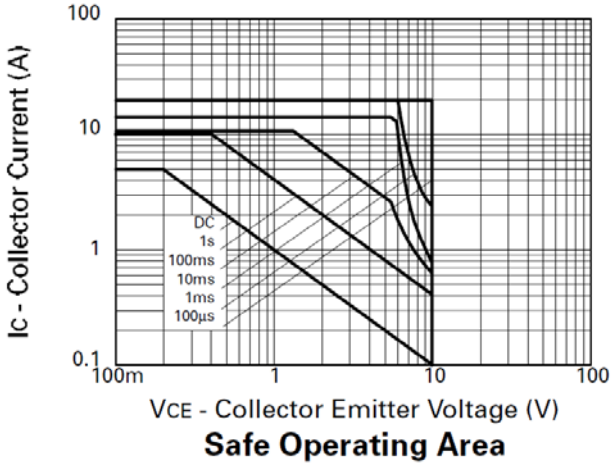
Characteristic	Symbol	Value	Unit	JEDEC Class
Electrostatic Discharge - Human Body Model	ESD HBM	4,000	V	3A
Electrostatic Discharge - Machine Model	ESD MM	400	V	C

- Notes:
- 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.
  - Same as Note 5, except the device is mounted on 25mm x 25mm 1oz copper.
  - Same as Note 5, except the device is mounted on 50mm x 50mm 1oz copper.
  - Thermal resistance from junction to solder-point (on the exposed collector pad).
  - Refer to JEDEC specification JESD22-A114 and JESD22-A115.

**Thermal Characteristics and Derating Information**



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

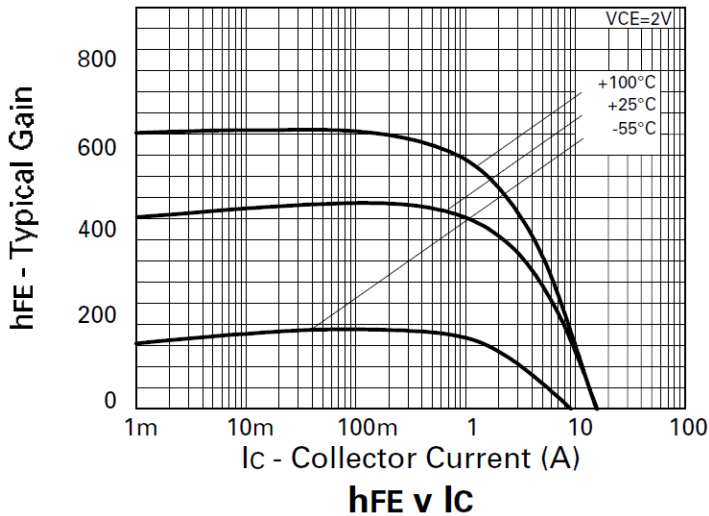
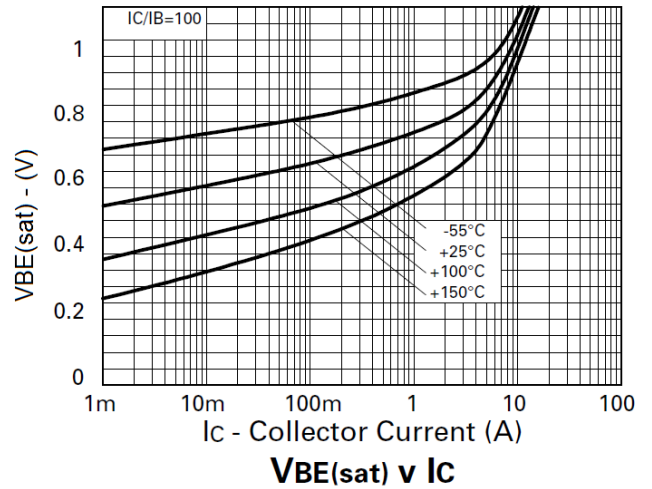
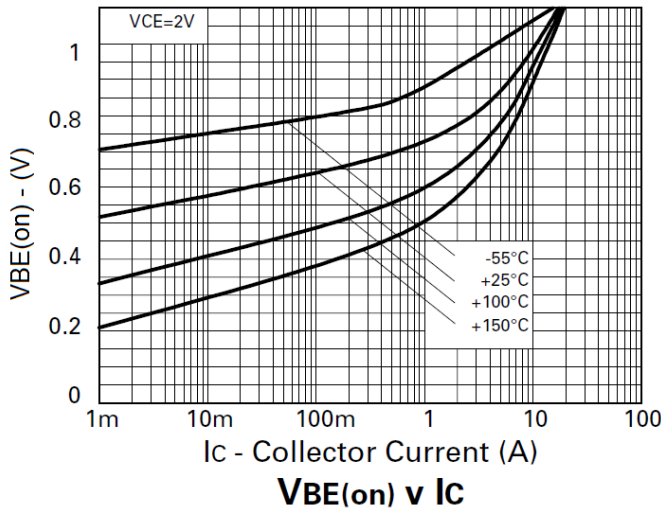
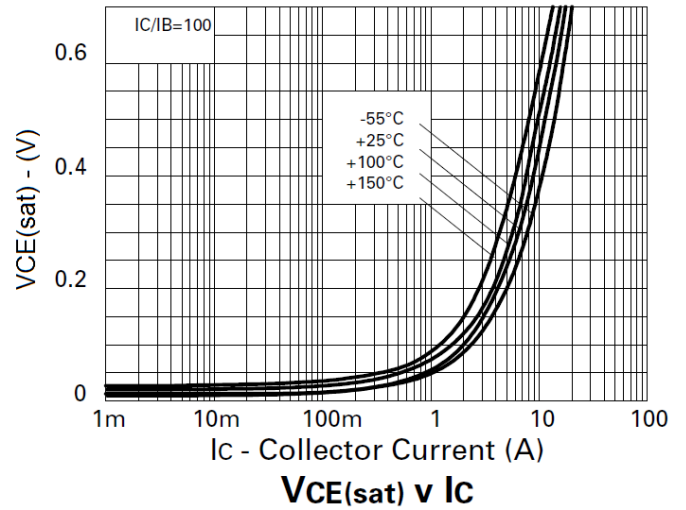
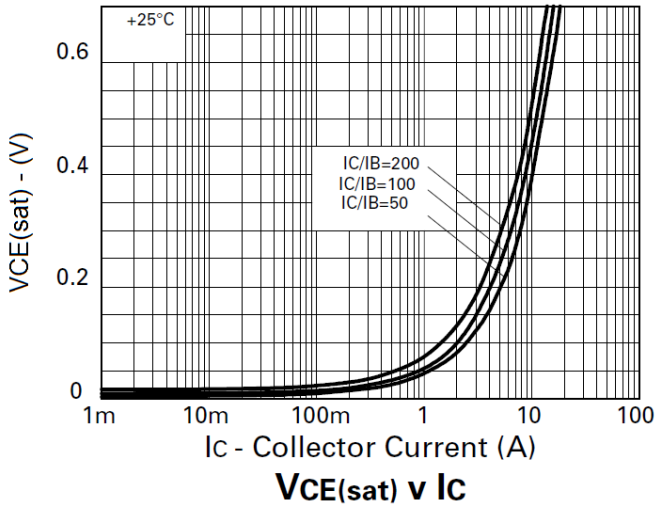


**Electrical Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
Collector-Base Breakdown Voltage	BV <sub>CBO</sub>	35	—	—	V	I <sub>C</sub> = 100μA
Collector-Emitter Breakdown Voltage	BV <sub>CES</sub>	35	—	—	V	I <sub>C</sub> = 100μA
Collector-Emitter Breakdown Voltage (Note 10)	BV <sub>CEO</sub>	10	—	—	V	I <sub>C</sub> = 10mA
Collector-Emitter Breakdown Voltage	BV <sub>CEV</sub>	35	—	—	V	I <sub>C</sub> = 100μA, V <sub>EB</sub> = 1V
Emitter-Base Breakdown Voltage	BV <sub>EBO</sub>	7	—	—	V	I <sub>E</sub> = 100μA
Collector Cutoff Current	I <sub>CBO</sub>	—	0.3	10	nA	V <sub>CB</sub> = 20V
Collector Cutoff Current	I <sub>CES</sub>	—	0.3	10	nA	V <sub>CES</sub> = 20V
Emitter Cutoff Current	I <sub>EBO</sub>	—	0.3	10	nA	V <sub>EB</sub> = 5.6V
DC Current Transfer Static Ratio (Note 10)	h <sub>FE</sub>	280 290 300 200 200 60	430 440 450 350 330 110	1,200	—	I <sub>C</sub> = 10mA, V <sub>CE</sub> = 2V I <sub>C</sub> = 0.5A, V <sub>CE</sub> = 2V I <sub>C</sub> = 1A, V <sub>CE</sub> = 2V I <sub>C</sub> = 4A, V <sub>CE</sub> = 2V I <sub>C</sub> = 5A, V <sub>CE</sub> = 2V I <sub>C</sub> = 20A, V <sub>CE</sub> = 2V
Collector-Emitter Saturation Voltage (Note 10)	V <sub>CE(sat)</sub>	—	25 50 140 160 220	40 70 200 240 350	mV	I <sub>C</sub> = 0.5A, I <sub>B</sub> = 10mA I <sub>C</sub> = 1A, I <sub>B</sub> = 10mA I <sub>C</sub> = 3A, I <sub>B</sub> = 15mA I <sub>C</sub> = 4A, I <sub>B</sub> = 50mA I <sub>C</sub> = 5A, I <sub>B</sub> = 25mA
Base-Emitter Saturation Voltage (Note 10)	V <sub>BE(sat)</sub>	—	920	1,000	mV	I <sub>C</sub> = 4A, I <sub>B</sub> = 50mA
Base-Emitter Turn-on Voltage (Note 10)	V <sub>BE(on)</sub>	—	860	950	mV	I <sub>C</sub> = 4A, V <sub>CE</sub> = 2V
Transitional Frequency	f <sub>T</sub>	—	150	—	MHz	I <sub>C</sub> = 50mA, V <sub>CE</sub> = 10V, f = 50MHz
Output Capacitance	C <sub>obo</sub>	—	85	—	pF	V <sub>CB</sub> = 10V, f = 1MHz,
Switching Time	t <sub>on</sub>	—	130	—	ns	V <sub>CC</sub> = 10V, I <sub>C</sub> = 4A,
	t <sub>off</sub>	—	230	—	ns	I <sub>B1</sub> = I <sub>B2</sub> = ±40mA

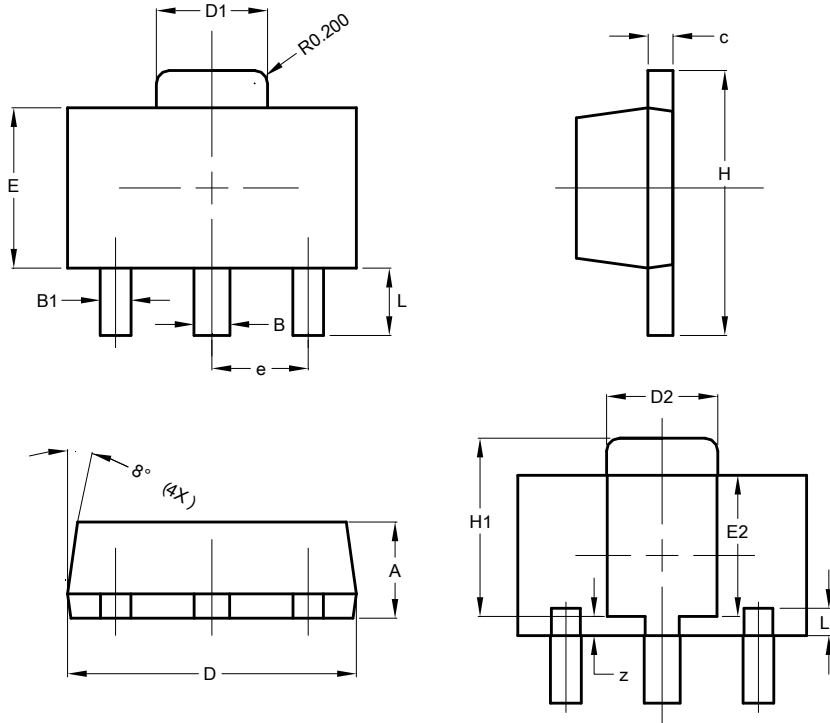
Note: 10. Measured under pulsed conditions. Pulse width = 300μs. Duty cycle ≤ 2%.

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



## Package Outline Dimensions

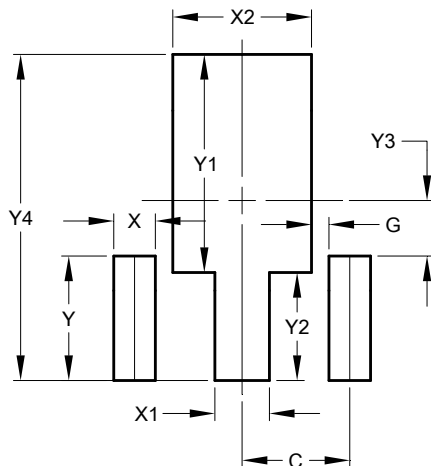
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for the latest version.



SOT89			
Dim	Min	Max	Typ
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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