

**60V PNP MEDIUM POWER TRANSISTOR IN SOT89**

**Features**

- $BV_{CEO} > -60V$
- $I_C = -1A$  high Continuous Collector Current
- $I_{CM} = -2A$  Peak Collector Current
- $R_{CE(SAT)} = 295m\Omega$  for a Low Equivalent On-Resistance
- $h_{FE}$  characterized up to 2A for high current gain hold up
- Complementary NPN type: FCX491
- **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**

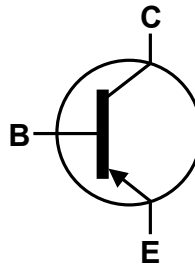
**Mechanical Data**

- 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 **Ⓔ3**
- Weight: 0.05 grams (Approximate)

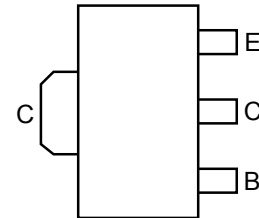
SOT89



Top View



Device Symbol



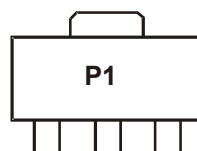
Top View  
Pin Out

**Ordering Information** (Note 4)

Product	Marking	Reel size (inches)	Tape width (mm)	Quantity per reel
FCX591TA	P1	7	12	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. For packaging details, go to our website at <http://www.diodes.com/products/packages.html>.

**Marking Information**



P1 = Product Type Marking Code

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

Characteristic	Symbol	Limit	Unit
Collector-Base Voltage	V <sub>CB0</sub>	-80	V
Collector-Emitter Voltage	V <sub>CEO</sub>	-60	V
Emitter-Base Voltage	V <sub>EBO</sub>	-7	V
Continuous Collector Current	I <sub>C</sub>	-1	A
Peak Pulse Current	I <sub>CM</sub>	-2	A
Base Current	I <sub>B</sub>	-200	mA

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

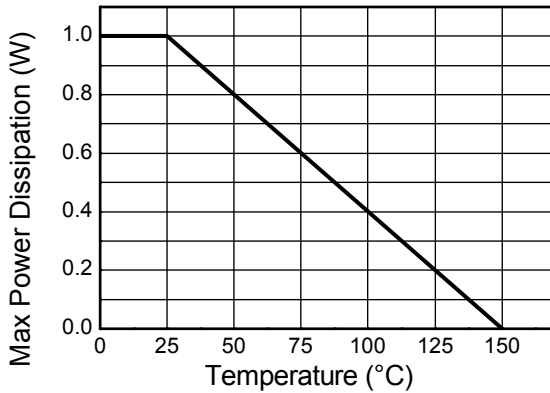
Characteristic	Symbol	Value	Unit
Power Dissipation	P <sub>D</sub>	(Note 5)	1
		(Note 6)	1.5
		(Note 7)	2.0
Thermal Resistance, Junction to Ambient Air	R <sub>θJA</sub>	(Note 5)	125
		(Note 6)	83
		(Note 7)	60
Thermal Resistance, Junction to Lead	R <sub>θJL</sub>	22	°C/W
Thermal Resistance, Junction to Case	R <sub>θJC</sub>	16	
Operating and Storage Temperature Range	T <sub>J</sub> , T <sub>STG</sub>	-65 to +150	°C

**ESD Ratings** (Note 10)

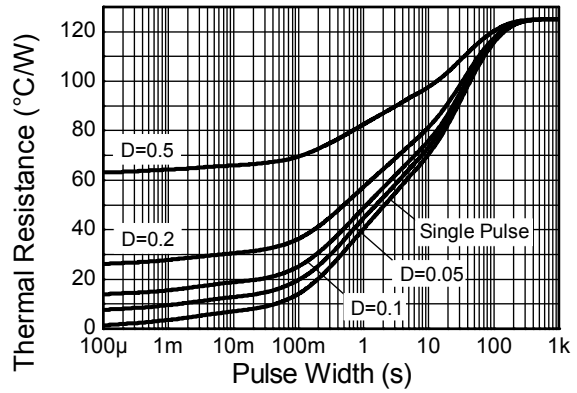
Characteristic	Symbol	Value	Unit	JEDEC Class
Electrostatic Discharge - Human Body Model	ESD HBM	4,000	V	3A
Electrostatic Discharge - Machine Model	ESD MM	400	V	C

- 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).
  - Thermal resistance from junction to the top of the case.
  - Refer to JEDEC specification JESD22-A114 and JESD22-A115.

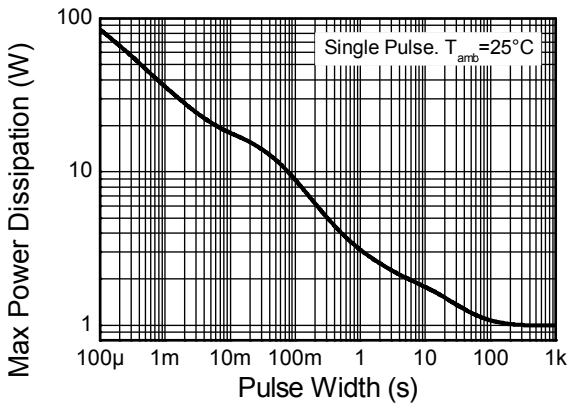
**Thermal Characteristics and Derating Information**



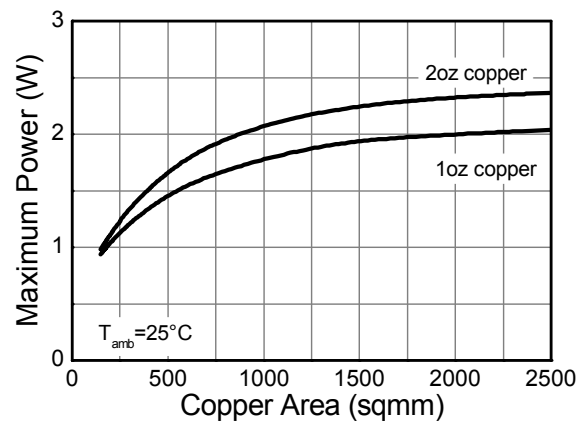
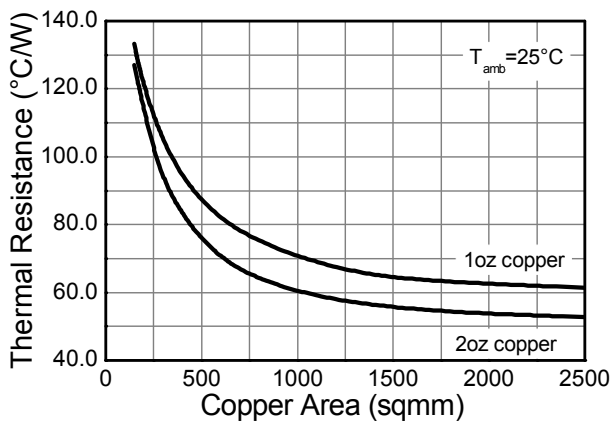
**Derating Curve**



**Transient Thermal Impedance**



**Pulse Power Dissipation**

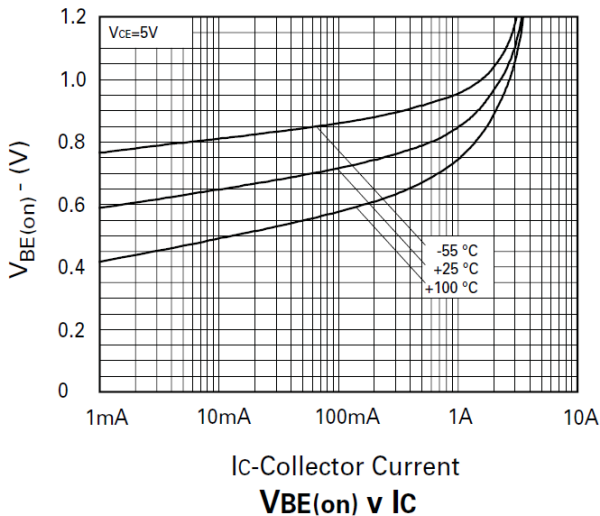
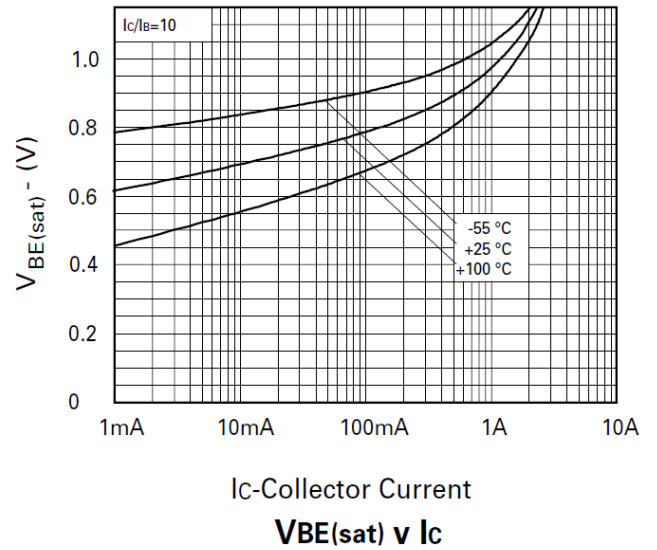
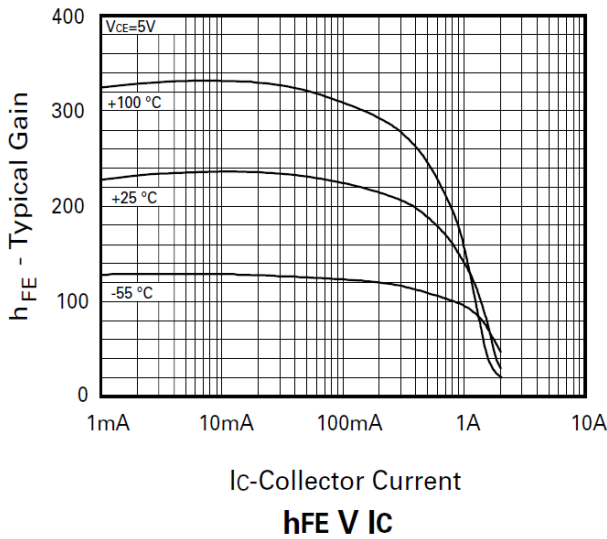
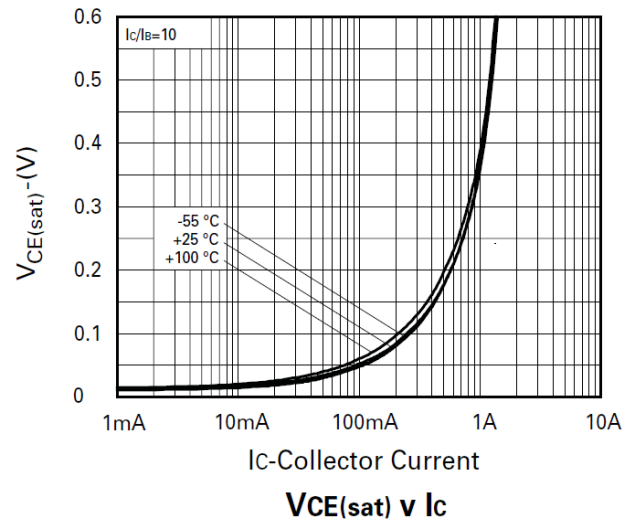
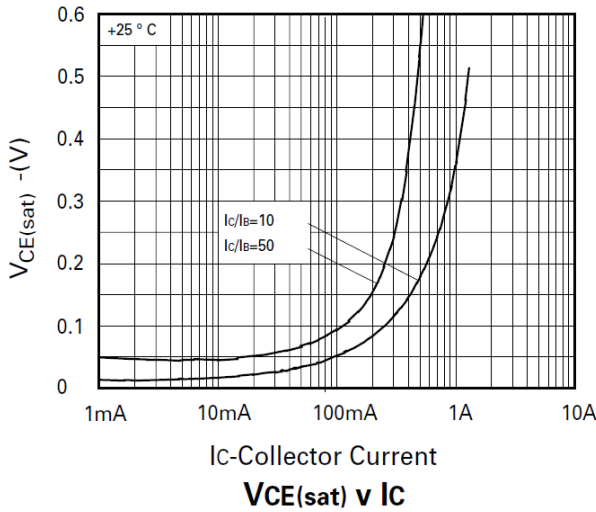


**Electrical Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
Collector-Base Breakdown Voltage	BV <sub>CBO</sub>	-80	—	—	V	I <sub>C</sub> = -100μA, I <sub>E</sub> = 0
Collector-Emitter Breakdown Voltage (Note 11)	BV <sub>CEO</sub>	-60	—	—	V	I <sub>C</sub> = -10mA, I <sub>B</sub> = 0
Emitter-Base Breakdown Voltage	BV <sub>EBO</sub>	-7	-8.1	—	V	I <sub>E</sub> = -100μA, I <sub>C</sub> = 0
Collector Cutoff Current	I <sub>CBO</sub>	—	<1	-100	nA	V <sub>CB</sub> = -60V
Emitter Cutoff Current	I <sub>EBO</sub>	—	<1	-100	nA	V <sub>EB</sub> = -5.6V, I <sub>C</sub> = 0
Emitter Cutoff Current	I <sub>CES</sub>	—	<1	-100	nA	V <sub>CES</sub> = -60V
DC current transfer Static ratio (Note 11)	h <sub>FE</sub>	100	220	—	—	I <sub>C</sub> = -1mA, V <sub>CE</sub> = -5V
		100	175	—		I <sub>C</sub> = -500mA, V <sub>CE</sub> = -5V
		80	155	300		I <sub>C</sub> = -1A, V <sub>CE</sub> = -5V
		15	40	—		I <sub>C</sub> = -2A, V <sub>CE</sub> = -5V
Collector-Emitter Saturation Voltage (Note 11)	V <sub>CE(sat)</sub>	—	-155 -295	-300 -600	mV	I <sub>C</sub> = -500mA, I <sub>B</sub> = -50mA I <sub>C</sub> = -1A, I <sub>B</sub> = -100mA
Base-Emitter Saturation Voltage (Note 11)	V <sub>BE(sat)</sub>	—	-965	-1200	mV	I <sub>C</sub> = -1A, I <sub>B</sub> = -100mA
Base-Emitter Turn-on Voltage (Note 11)	V <sub>BE(on)</sub>	—	-830	-1000	mV	I <sub>C</sub> = -1A, V <sub>CE</sub> = -5V
Transitional Frequency	f <sub>T</sub>	150	—	—	MHz	I <sub>E</sub> = -50mA, V <sub>CE</sub> = -10V f = 100MHz
Output capacitance	C <sub>obo</sub>	—	—	10	pF	V <sub>CB</sub> = -10V, f = 1MHz,

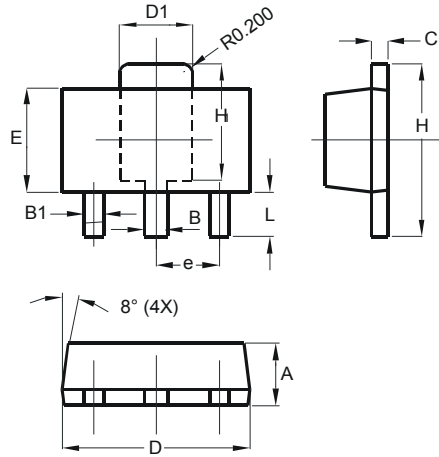
Note: 11. Measured under pulsed conditions. Pulse width ≤ 300μs. Duty cycle ≤ 2%.

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



## Package Outline Dimensions

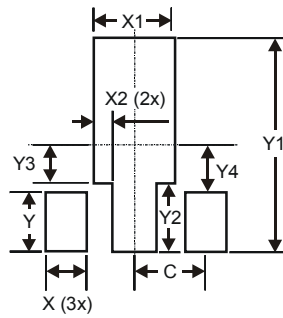
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for latest version.



SOT89		
Dim	Min	Max
A	1.40	1.60
B	0.44	0.62
B1	0.35	0.54
C	0.35	0.44
D	4.40	4.60
D1	1.62	1.83
E	2.29	2.60
e	1.50 Typ	
H	3.94	4.25
H1	2.63	2.93
L	0.89	1.20
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)
X	0.900
X1	1.733
X2	0.416
Y	1.300
Y1	4.600
Y2	1.475
Y3	0.950
Y4	1.125
C	1.500

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