


40V PNP SILICON PLANAR MEDIUM POWER TRANSISTOR IN SOT89

Features

- $BV_{CEO} > -40V$
- Maximum Continuous Current $I_C = -1A$
- Low saturation voltage $V_{CE(sat)} < -500mV @ -1A$
- Complementary NPN type: FCX491A
- **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

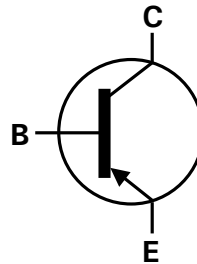
- Case: SOT89
- Case material: molded plastic. "Green" molding compound.
- UL Flammability Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish - Matte Tin Plated Leads, Solderable per MIL-STD-202, Method 208 
- Weight: 0.05 grams (Approximate)

Application

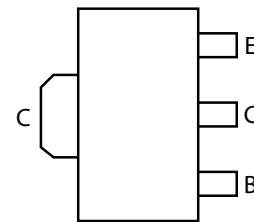
- Power MOSFET & IGBT gate driving
- Low loss power switching



Top View



Device Symbol



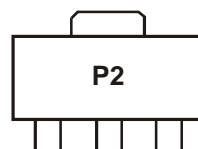
Top View
Pin Out

Ordering Information (Note 4)

| Product | Marking | Reel size (inches) | Tape width (mm) | Quantity per reel |
|-------------|---------|--------------------|-----------------|-------------------|
| FCX591ATA | P2 | 7 | 12 | 1,000 |
| FCX591A-13R | P2 | 13 | 12 | 4,000 |

- 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> 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>.

Marking Information



P2 = Product Type Marking Code

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

| Characteristic | Symbol | Limit | Unit |
|------------------------------|------------------|-------|------|
| Collector-Base Voltage | V _{CBO} | -40 | V |
| Collector-Emitter Voltage | V _{CEO} | -40 | V |
| Emitter-Base Voltage | V _{EBO} | -7 | V |
| Continuous Collector Current | I _C | -1 | A |
| Peak Pulse Current | I _{CM} | -2 | A |
| Peak Base Current | I _B | -200 | mA |

Thermal Characteristics

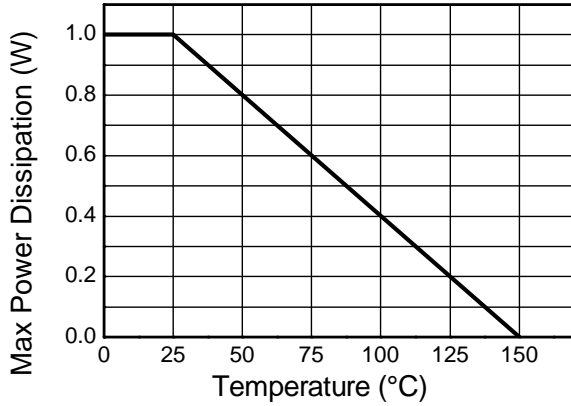
| Characteristic | Symbol | Value | Unit |
|--|-----------------------------------|-------------|------|
| Power Dissipation (Note 5) | P _D | 1 | W |
| Thermal Resistance, Junction to Ambient Air (Note 5) | R _{θJA} | 125 | °C/W |
| Thermal Resistance, Junction to Leads (Note 6) | R _{θJL} | 10.01 | °C/W |
| Operating and Storage Temperature Range | T _J , T _{STG} | -65 to +150 | °C |

ESD Ratings (Note 7)

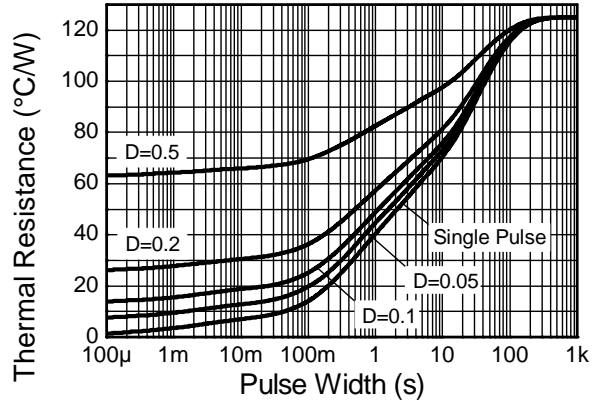
| Characteristic | Symbol | Value | Unit | JEDEC Class |
|--|---------|---------|------|-------------|
| Electrostatic Discharge - Human Body Model | ESD HBM | ≥ 8,000 | V | 3B |
| Electrostatic Discharge - Machine Model | ESD MM | ≥ 400 | V | C |

- Notes:
5. For a device surface mounted on 15mm X 15mm FR4 PCB with high coverage of single sided 1 oz copper, in still air conditions; device measured when operating in steady state condition.
 6. Thermal resistance from junction to solder-point (on the exposed collector pad).
 7. Refer to JEDEC specification JESD22-A114 and JESD22-A115.

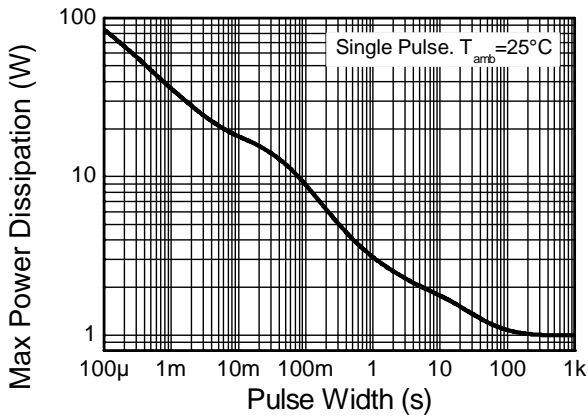
Thermal Characteristics and Derating Information



Derating Curve



Transient Thermal Impedance



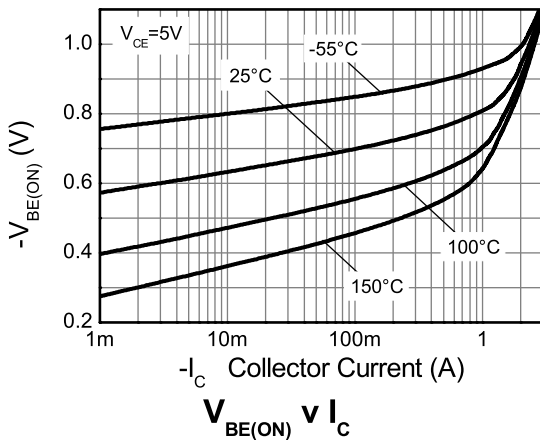
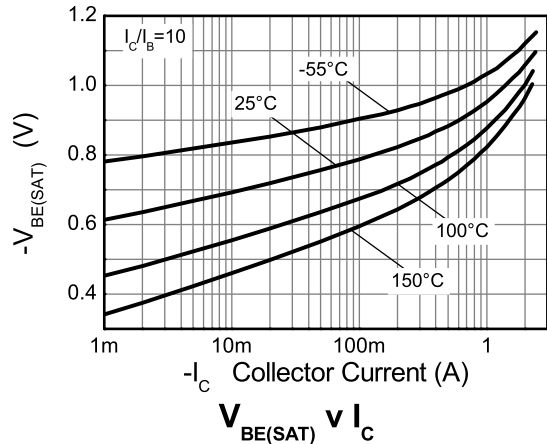
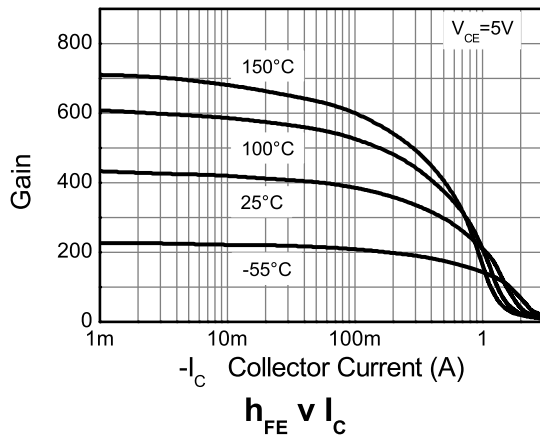
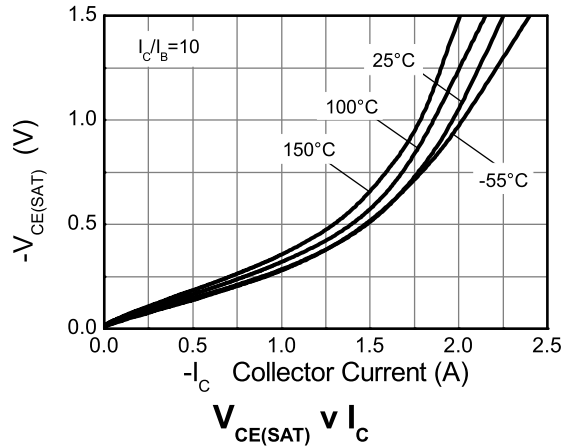
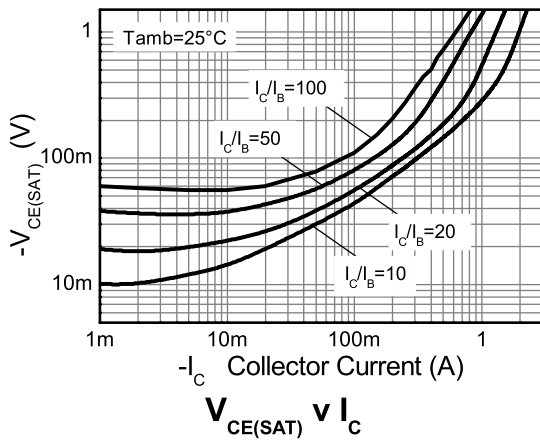
Pulse Power Dissipation

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

| Characteristic | Symbol | Min | Typ. | Max | Unit | Test Condition |
|---|----------------------|-----|------|-----------------------|------|--|
| Collector-Base Breakdown Voltage | BV _{CB0} | -40 | - | - | V | I _C = -100μA |
| Collector-Emitter Breakdown Voltage (Note 8) | BV _{CEO} | -40 | - | - | V | I _C = -10mA |
| Emitter-Base Breakdown Voltage | BV _{EBO} | -7 | - | - | V | I _E = -100μA |
| Collector Cutoff Current | I _{CB0} | - | - | -100 | nA | V _{CB} = -30V |
| Emitter Cutoff Current | I _{EBO} | - | - | -100 | nA | V _{EB} = -4V |
| Emitter Cutoff Current | I _{CES} | - | - | -100 | nA | V _{CES} = -30V |
| DC current transfer Static ratio (Note 8) | h _{FE} | 300 | - | - | - | I _C = -1mA, V _{CE} = -5V |
| | | 300 | - | 800 | | I _C = -100mA, V _{CE} = -5V |
| | | 250 | - | - | | I _C = -500mA, V _{CE} = -5V |
| | | 160 | - | - | | I _C = -1A, V _{CE} = -5V |
| | | 30 | - | - | | I _C = -2A, V _{CE} = -5V |
| Collector-Emitter Saturation Voltage (Note 8) | V _{CE(sat)} | - | - | -0.2 -0.35 -0.5 | V | I _C = -100mA, I _B = -1mA I _C = -500mA, I _B = -20mA I _C = -1A, I _B = -100mA |
| Base-Emitter Saturation Voltage (Note 8) | V _{BE(sat)} | - | - | -1.1 | V | I _C = -1A, I _B = -50mA |
| Base-Emitter Turn-on Voltage (Note 8) | V _{BE(on)} | - | - | -1.0 | V | I _C = -1A, V _{CE} = -5V |
| Transitional Frequency | f _T | 150 | - | - | MHz | I _E = -50mA, V _{CE} = -10V f = 100MHz |
| Output capacitance | C _{obo} | - | - | 10 | pF | V _{CB} = -10V, f = 1MHz, |

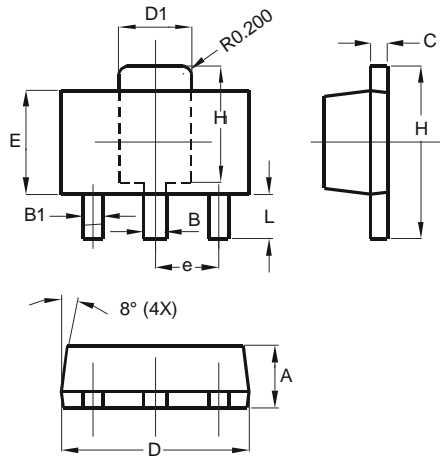
Notes: 8. Measured under pulsed conditions. Pulse width ≤ 300μs. Duty cycle ≤ 2%.

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



Package Outline Dimensions

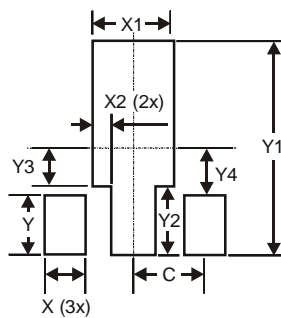
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for latest version.



| 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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